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## Research in Autism Spectrum Disorders

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## General health of adults with autism spectrum disorders – A whole country population cross-sectional study



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## ABSTRACT

**Background:** General health status in adult populations with autism spectrum disorders has been little studied. We aimed to investigate general health status and predictors of poor health in adults with autism spectrum disorders compared with other adults.

**Method:** Whole country data were drawn from Scotland's Census, 2011. We calculated and compared the frequencies of health status in adults with and without autism spectrum disorders. We then used logistic regressions to calculate odds ratios (OR) with 95% confidence intervals (95% CI) of autism predicting poor general health in the whole population, adjusted for age and gender, and OR (95% CI) of age and gender predicting poor general health within the autism spectrum disorders population.

**Results:** Autism spectrum disorders were reported for 6649/3,746,584 (0.2%) adults aged 25+ years, of whom 46.8% (N = 3111) had poor general health, compared with 23.7% (N = 887,878) of other people. Poor health was common across the entire lifecourse for adults with autism spectrum disorders. Autism had OR = 5.1 (4.9–5.4, 95% CI) for predicting poor general health, or OR = 7.5 (6.9–8.2, 95% CI) when the interaction with age was included. Poorer health was more common at older age, and for women.

**Conclusions:** Poor general health merits attention across the full lifecourse for adults with autism. Health practitioners need to be alert to the burden of potential health problems to seek them out to be addressed, and so the health agenda can turn towards potential mechanisms for prevention and better support for adults who may call upon services for people with autism.

### 1. Introduction

Autism spectrum disorders are common, yet most health evidence relates to children and young people rather than adults. This is a serious gap in the evidence-base, as autism spectrum disorders are lifelong, and health status is an integral component of quality of life. Additionally, there is some evidence to suggest that the health needs of people with autism spectrum disorders are sometimes

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overlooked, therefore, resulting in low level of satisfaction with healthcare services (Nicolaidis et al., 2012) further exacerbated by barriers in accessing medical care (Saqr, Braun, Porter, Barnette, & Hanks, 2017). This potentially puts adults with autism spectrum disorders at risk of not receiving effective treatments, or receiving potentially harmful treatments that are not required. People with autism spectrum disorders and health practitioners, therefore, need to be aware of the extent of health needs/health status, to ensure quality of life through availability and accessibility of health preventions, management, and support that is appropriately tailored to meet the needs of this population.

Adults with autism spectrum disorders appear to experience a wide range of additional health conditions, although their mental health has been more commonly studied than physical health. In view of this, it might be expected that they have poorer general health than other people. For example, systematic reviews suggest that depression (Stewart, Barnard, Pearson, Hasan, & O'Brien, 2006; Wigham, Barton, Parr, & Rodgers, 2017), bipolar disorder (Skokauskas & Frodl, 2015; Vannucchi et al., 2014), schizophrenia (Kincaid, Doris, Shannon, & Mulholland, 2017; Lugo Marín et al., 2018), suicidal thoughts/behaviour (Segers & Rawana, 2014; Zahid & Upthegrove, 2017), and non-affective psychosis (Padgett, Miltiou, & Tiffin, 2010) may be more common in adults with autism spectrum disorders than other people. There are fewer systematic reviews on physical health, but sleep problems (Van de Wouw, Evenhuis, & Ehteld, 2012), and atopy (Billeci et al., 2015; Su et al., 2016) may be more common in people with autism, and epilepsy is more common, especially in the presence of additional intellectual disabilities (Amiet et al., 2008). In a study of 378 adults with autism spectrum disorders, 88% who self-reported, and 74% who had carer reporting, described two or more physical health conditions, with the most common being sleep problems, allergies, and gastrointestinal conditions, and 57% and 45% respectively reported two or more mental health conditions (Gotham et al., 2015). In another study of 92 adults with autism spectrum disorders most commonly reported medical conditions were seizures, obesity, insomnia, and constipation, and the median number of medical conditions per person was 11 (Jones et al., 2016). A further study of 1507 adults with a record of autism spectrum disorders in their medical records found that 54% had a record of mental health conditions, and 14% had autoimmune conditions, 36% allergy, 35% gastrointestinal disorders, 18% sleep disorders, 12% epilepsy, 26% hypertension, 8% diabetes, 34% obesity, and 7% thyroid disease (Croen et al., 2015). In addition, in a study of 6649 adults with autism spectrum disorders, 14% had deafness or partial hearing loss, 12% had blindness or partial sight loss, 33% had mental health conditions, and 24% had physical disability (Rydzewska et al., 2018).

However, despite these reports on specific conditions, we have identified only two published studies investigating general health status in adults with autism spectrum disorders. A small Taiwanese study of 30 men and 11 women with autism without intellectual disabilities aged 20–37 years, compared their health ratings with a non-autism age, gender matched control group, using a 5-point Likert scale. Five (12.2%) adults with autism rated their health as extremely bad, 6 (14.6%) as bad, 16 (39.0%) as not bad/not good, 7 (17.1%) as good and 7 (17.1%) as extremely good. This compared with ratings amongst the control group of none scoring extremely bad (0%), 3 (7.3%) bad, 13 (31.7%) not bad/not good, 19 (46.3%) good and 6 (14.6%) extremely good (Lin, 2014). The group with autism, therefore, rated their general health as poorer, but the study was small scale, and its recruitment methods (via a hospital clinic and autism groups) may have resulted in a non-representative sample, and explains its inclusion of only young adults. A longitudinal study in USA of 180/406 adults with autism aged 23–60 years, 52% of whom also had intellectual disabilities, analysed data collected from mothers in 2011 to 2012. Physical health was recorded as poor or good/very good; 144 (80.0%) reported good/very good physical health, but there was no general population comparison data, limiting the conclusions that can be drawn (Bishop-Fitzpatrick et al., 2016). We are not aware of any other studies which have investigated the general health status of adults with autism spectrum disorders, nor compared this with the general population.

This study aimed to investigate the general health status of adults with autism spectrum disorders compared with other adults, the odds ratio (OR) with 95% confidence interval (95% CI) of autism predicting poor general health within the whole population, and the OR of age and gender predicting poor general health within the population with autism spectrum disorders.

## 2. Methods

### 2.1. Participants

Participants were drawn from Scotland's Census, 2011. People with autism spectrum disorders were identified from the question on the Census which asked: 'Do you have any of the following conditions which have lasted, or are expected to last, at least 12 months? Tick all that apply'. There was a choice of 10 response options, which included the following three: developmental disorder (for example, autistic spectrum disorder or Asperger's syndrome); learning disability (for example, Down's syndrome); learning difficulty (for example, dyslexia). Importantly, the question on developmental disorder only prompted respondents to reply with regards to autistic spectrum disorder or Asperger's syndrome. We, therefore, interpret responses to this question as relating to people who know they have autism spectrum disorders. Additionally, the question distinguished autism spectrum disorders from learning disability, which in the UK is synonymous with the international term 'intellectual disabilities', and learning difficulties such as dyslexia.

As part of the methodological preparations for Scotland's Census, 2011, cognitive question testing was undertaken on the question on these conditions, to investigate whether it was answered accurately and willingly, and what changes might be required to improve data quality. Retrospective probing was undertaken with 102 participants with a mix of gender and age, both with and without the conditions or with more than one of the conditions, and including people with autism spectrum disorders, intellectual disabilities, dyslexia, dyspraxia, speech impairment, mental health conditions (both milder and more serious), and other long-term conditions. This resulted in a redesign of the question on autism spectrum disorders to the version used. The other questions did not require any modification.

## 2.2. Measures & design

Scotland's Census, 2011 provides information on the number and characteristics of Scotland's population and households on the census date, 27 March 2011. The census is undertaken every 10 years. It includes the whole Scottish population: people living in communal establishments (such as care homes and student halls of residence) as well as people living in private households. The 2011 Census required the questions to be completed by the head of household or joint head of household on behalf of all occupants in private households, and the manager on behalf of all occupants in communal dwellings. It is a legal requirement to complete the Census, and failure to complete, or supplying false information can attract a fine of £1000. The 2011 Census team followed up non-responders, and also provided help to respond when that was needed, hence the high completion rate, estimated at 94% (National Records of Scotland (NRS, 2013)). Scotland's Census, 2011 is probably one of the few country censuses which identifies people with autism spectrum disorders, indeed it may be unique in this regard.

Approval was gained from the Scottish Government for secondary analysis of the Census data. Full details of the methodology and other background information on Scotland's Census 2011 are available at:

<http://www.scotlandscensus.gov.uk/supporting-information>.

Information on general health status of adults with and without autism spectrum disorders was collected through the question: 'How is your health in general?', which invited responses on a 5-point Likert scale: (1) very good, (2) good, (3) fair, (4) bad, (5) very bad.

## 2.3. Procedures and analysis

We calculated the number and percentage of adults aged 25+ years reported to have autism spectrum disorders, by age and gender. We also calculated the number and percentage of adults with and without autism spectrum disorders reporting very good, good, fair, bad, and very bad health, and compared differences using chi-square tests. Within the whole population of adults in Scotland, we then used a binary logistic regression to calculate odds ratios (OR) with 95% confidence intervals (95% CI) of autism predicting a derived, dichotomised variable of poor health (fair, bad, or very bad health) versus good health (very good or good health), adjusted for age and gender. Age was categorised into groups of 25–34, 35–44, 45–54, 55–64 and 65+, with the 25–34-year-old age group being the reference group. Gender was bivariate, with men being the reference group. Within the population with autism spectrum disorders, we then calculated the OR (95% CI) for age and gender predicting poor health. All analyses were conducted with SPSS software version 22.

## 3. Results

### 3.1. Number of adults with autism by age and gender

Scotland's Census, 2011 includes records on 3,746,584 people aged 25 years and over, of whom 6649 (0.2%) were reported to have autism spectrum disorders. 4610 (69.3%) of the 6649 adults with autism spectrum disorders were men, and 2039 (30.7%) were women. 1953 (29.4%) of adults with autism spectrum disorders were also recorded to have intellectual disabilities. Table 1 provides the age and gender characteristics of adults with and without autism spectrum disorders. The proportion of the population with autism spectrum disorders was lower at older age groups over 55 years.

### 3.2. General health

3111 (46.8%) of adults with autism spectrum disorders had poor (fair, bad, or very bad) general health, compared with 887,878 (23.7%) of other adults ( $\chi^2 = 1945.2$ ,  $df = 1$ ,  $p < 0.001$ ). Table 2 and Figs. 1–3 show general health status of adults with and without autism spectrum disorders in Scotland, by age group and gender. This shows adults at all ages with autism spectrum disorders being more likely to report poor general health compared to other adults; at age 25–34 years,  $\chi^2 = 3084.1$ ,  $df = 1$ ,  $p < 0.001$ ; at age 35–44 years,  $\chi^2 = 1554.4$ ,  $df = 1$ ,  $p < 0.001$ ; at age 45–54 years,  $\chi^2 = 723.1$ ,  $df = 1$ ,  $p < 0.001$ ; at age 55–64 years,  $\chi^2 = 273.3$ ,  $df = 1$ ,  $p < 0.001$ ; at age 65+ years,  $\chi^2 = 118.8$ ,  $df = 1$ ,  $p < 0.001$ . The proportion of people with autism spectrum disorders

**Table 1**  
Prevalence of autism spectrum disorders in adults aged 25+ years.

Age group	All adults			Adults with autism		
	Total N = 3,746,584	F N = 1,965,129	M N = 1,781,455	Total N = 6649	F N = 2039	M N = 4610
25-34y	667,327	338,720	328,607	2389 (0.36%)	636 (0.19%)	1753 (0.53%)
35-44y	734,754	377,084	357,670	1588 (0.22%)	471 (0.12%)	1117 (0.31%)
45-54y	786,756	402,239	384,517	1267 (0.16%)	377 (0.09%)	890 (0.23%)
55-64y	667,413	340,491	326,922	707 (0.11%)	233 (0.07%)	474 (0.14%)
65+y	890,334	506,595	383,739	698 (0.08%)	322 (0.06%)	376 (0.10%)

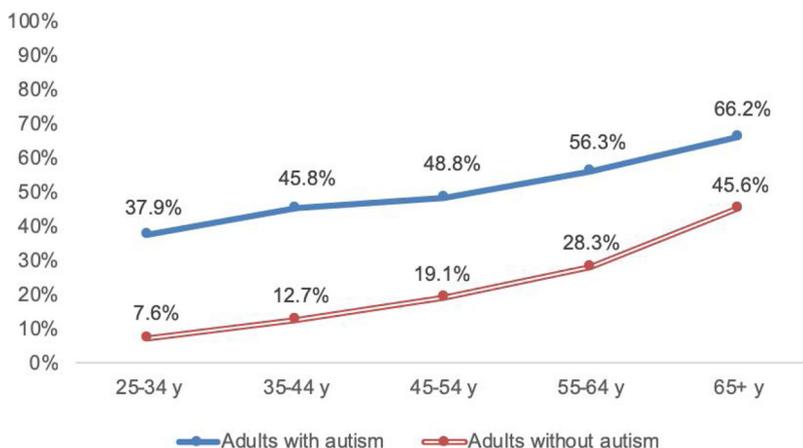
**Table 2**  
General health status of people with and without autism spectrum disorders.

All adults aged 25+						
N = 3,746,584						
General health	Autism			Without autism		
	Total	F	M	Total	F	M
	6649 (100%)	2039 (100%)	4610 (100%)	3,739,935 (100%)	1,963,090 (100%)	1,776,845 (100%)
Very good	1,327 (20.0%)	349 (17.1%)	978 (21.2%)	1,548,794 (41.4%)	799,671 (40.7%)	749,123 (42.2%)
Good	2,211 (33.3%)	634 (31.1%)	1577 (34.2%)	1,303,263 (34.8%)	678,544 (34.6%)	624,719 (35.2%)
Fair	1,909 (28.7%)	625 (30.7%)	1284 (27.9%)	601,767 (16.1%)	330,755 (16.8%)	271,012 (15.3%)
Bad	783 (11.8%)	276 (13.5%)	507 (11.0%)	217,741 (5.8%)	117,531 (6.0%)	100,210 (5.6%)
Very bad	419 (6.3%)	155 (7.6%)	264 (5.7%)	68,370 (1.8%)	36,589 (1.9%)	31,781 (1.8%)
25-34 y						
N = 667,327						
General health	Autism			Without autism		
	Total	F	M	Total	F	M
	2389 (100%)	636 (100%)	1753 (100%)	664,938 (100%)	338,084 (100%)	326,854 (100%)
Very good	593 (24.8%)	133 (20.9%)	460 (26.2%)	421,660 (63.4%)	210,543 (62.3%)	211,117 (64.6%)
Good	891 (37.3%)	224 (35.2%)	667 (38.0%)	192,928 (29.0%)	100,786 (29.8%)	92,142 (28.2%)
Fair	602 (25.2%)	176 (27.7%)	426 (24.3%)	37,707 (5.7%)	20,113 (5.9%)	17,594 (5.4%)
Bad	192 (8.0%)	64 (10.1%)	128 (7.3%)	10,071 (1.5%)	5296 (1.6%)	4775 (1.5%)
Very bad	111 (4.6%)	39 (6.1%)	72 (4.1%)	2572 (0.4%)	1346 (0.4%)	1226 (0.4%)
35-44 y						
N = 734,754						
General health	Autism			Without autism		
	Total	F	M	Total	F	M
	1588 (100%)	471 (100%)	1117 (100%)	733,166 (100%)	376,613 (100%)	356,553 (100%)
Very good	334 (21.0%)	85 (18.0%)	249 (22.3%)	400,806 (54.7%)	206,222 (54.8%)	194,584 (54.6%)
Good	526 (33.1%)	158 (33.5%)	368 (32.9%)	238,948 (32.6%)	121,246 (32.2%)	117,702 (33.0%)
Fair	451 (28.4%)	133 (28.2%)	318 (28.5%)	63,017 (8.6%)	33,142 (8.8%)	29,875 (8.4%)
Bad	192 (12.1%)	69 (14.6%)	123 (11.0%)	23,654 (3.2%)	12,406 (3.3%)	11,248 (3.2%)
Very bad	85 (5.4%)	26 (5.5%)	59 (5.3%)	6741 (0.9%)	3597 (1.0%)	3144 (0.9%)
45-54 y						
N = 786,756						
General health	Autism			Without autism		
	Total	F	M	Total	F	M
	1267 (100%)	377 (100%)	890 (100%)	785,489 (100%)	401,862 (100%)	383,627 (100%)
Very good	230 (18.2%)	67 (17.8%)	163 (18.3%)	351,549 (44.8%)	181,055 (45.1%)	170,494 (44.4%)
Good	419 (33.1%)	119 (31.6%)	300 (33.7%)	284,266 (36.2%)	141,915 (35.3%)	142,351 (37.1%)
Fair	376 (29.7%)	118 (31.3%)	258 (29.0%)	96,095 (12.2%)	49,986 (12.4%)	46,109 (12.0%)
Bad	164 (12.9%)	45 (11.9%)	119 (13.4%)	40,591 (5.2%)	22,004 (5.5%)	18,587 (4.8%)
Very bad	78 (6.2%)	28 (7.4%)	50 (5.6%)	12,988 (1.7%)	6902 (1.7%)	6086 (1.6%)
55-64 y						
N = 667,413						
General health	Autism			Without autism		
	Total	F	M	Total	F	M
	707 (100%)	233 (100%)	474 (100%)	666,706 (100%)	340,258 (100%)	326,448 (100%)
Very good	102 (14.4%)	24 (10.3%)	78 (16.5%)	221,444 (33.2%)	116,828 (34.3%)	104,616 (32.0%)
Good	207 (29.3%)	66 (28.3%)	141 (29.7%)	256,769 (38.5%)	129,784 (38.1%)	126,985 (38.9%)

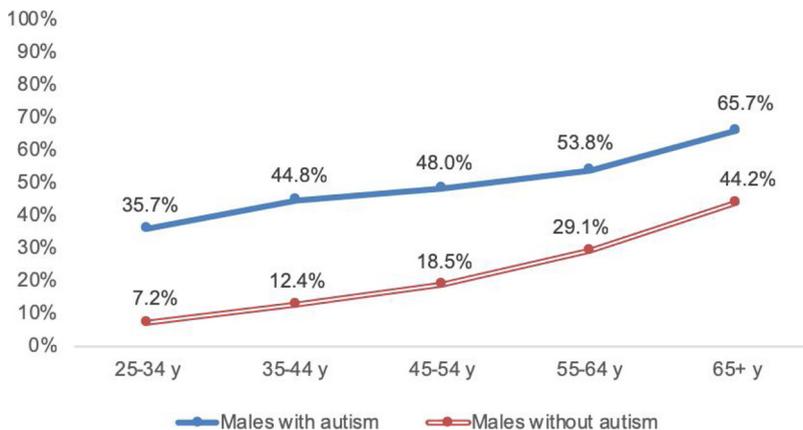
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**Table 2 (continued)**

55-64 y						
N = 667,413						
General health	Autism			Without autism		
	Total	F	M	Total	F	M
	707 (100%)	233 (100%)	474 (100%)	666,706 (100%)	340,258 (100%)	326,448 (100%)
Fair	224 (31.7%)	82 (35.2%)	142 (30.0%)	120,750 (18.1%)	60,958 (17.9%)	59,792 (18.3%)
Bad	112 (15.8%)	33 (14.2%)	79 (16.7%)	51,151 (7.7%)	24,781 (7.3%)	26,370 (8.1%)
Very bad	62 (8.8%)	28 (12.0%)	34 (7.2%)	16,592 (2.5%)	7907 (2.3%)	8685 (2.7%)
65+ y						
N = 890,334						
General health	Autism			Without autism		
	Total	F	M	Total	F	M
	698 (100%)	322 (100%)	376 (100%)	889,636 (100%)	506,273 (100%)	383,363 (100%)
Very good	68 (9.7%)	40 (12.4%)	28 (7.4%)	153,335 (17.2%)	85,023 (16.8%)	68,312 (17.8%)
Good	168 (24.1%)	67 (20.8%)	101 (26.9%)	330,352 (37.1%)	184,813 (36.5%)	145,539 (38.0%)
Fair	256 (36.7%)	116 (36.0%)	140 (37.2%)	284,198 (31.9%)	166,556 (32.9%)	117,642 (30.7%)
Bad	123 (17.6%)	65 (20.2%)	58 (15.4%)	92,274 (10.4%)	53,044 (10.5%)	39,230 (10.2%)
Very bad	83 (11.9%)	34 (10.6%)	49 (13.0%)	29,477 (3.3%)	16,837 (3.3%)	12,640 (3.3%)



**Fig. 1.** Proportion of adults aged 25+ with and without autism spectrum disorders reporting poor health by age.



**Fig. 2.** Proportion of males aged 25+ with and without autism spectrum disorders reporting poor health by age.

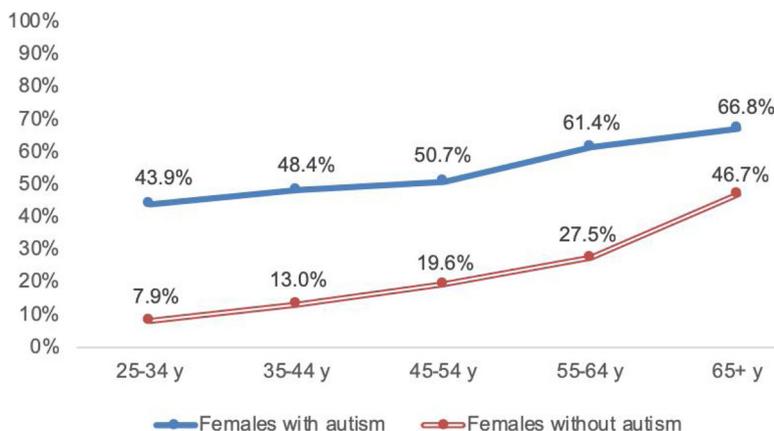


Fig. 3. Proportion of females aged 25+ with and without autism spectrum disorders reporting poor health by age.

rating their general health as poor increased with age, from 37.9% at 25–34 years, to 66.2% at 65+ years, compared respectively with 7.6% to 45.6% in the population without autism. Younger females with autism spectrum disorders aged 25–34 were more likely to have poor general health than males with autism, but at other age groups the difference was not statistically significant: at age 25–34 years,  $\chi^2 = 13.2$ ,  $df = 1$ ,  $p < 0.001$ ; at age 35–44 years,  $\chi^2 = 1.8$ ,  $df = 1$ ,  $p > 0.1$  ( $p = 0.183$ ); at age 45–54 years,  $\chi^2 = 0.8$ ,  $df = 1$ ,  $p > 0.1$  ( $p = 0.382$ ); at age 55–64 years,  $\chi^2 = 3.6$ ,  $df = 1$ ,  $p > 0.05$  ( $p = 0.056$ ); at age 65+ years,  $\chi^2 = 0.1$ ,  $df = 1$ ,  $p > 0.1$  ( $p = 0.764$ ).

Given the different age and gender distributions in the populations with and without autism spectrum disorders, we adjusted for both these variables, and found that autism had an odds ratio of 5.1 (4.9–5.4, 95% CI) in predicting poor health (Table 3). Within the whole population, a gradient is seen across age categories, with older adults being more likely to have poor health, as were women. When the interaction term is added (age  $\times$  autism), it can be seen that autism is shown to have more marked association with the outcome of poor health (OR = 7.5; 6.9–8.2, 95% CI) and more so at older age groups. Females had poorer health than males. Within the population with autism spectrum disorders, the influence of age was less marked for older age, whereas it was more marked for women (Table 4).

#### 4. Discussion and implications

Adults with autism spectrum disorders have substantially poorer general health than other adults, across the entire adult life-course. Indeed, we have quantified poor health to be more than five times more likely in adults with autism spectrum disorders compared with other people. The influence of autism spectrum disorders on poor health is even greater than that of older age in the whole population, as including the interaction term of age  $\times$  autism results in an ORs for autism spectrum disorders of 7.5. Women had poorer health status than men, particularly so women with autism spectrum disorders. These findings are important, as health practitioners need to be alert to the burden of potential health problems so that they are sought out to be addressed, and so that the health agenda can also start to turn towards potential mechanisms for prevention and better support.

Table 3  
Independent predictors of poor health in the whole population.

Variable	Regression 1		Regression 2 (including the interaction term: age $\times$ autism)		
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	
Autism	No autism (reference)		–		
	Autism spectrum disorders	5.149	4.891-5.420	7.537	6.935-8.190
Age group	25-34 (reference)		–		
	35-44	1.775	1.755-1.796	1.782	1.762-1.802
	45-54	2.859	2.829-2.890	2.873	2.843-2.904
	55-64	4.788	4.738-4.839	4.811	4.761-4.862
	65+	10.167	10.067-10.269	10.216	10.114-10.318
Gender	Male (reference)		–		
	Female	1.051	1.046-1.057	1.052	1.046-1.057
Age $\times$ autism	25-34 (reference)		–		
	35-44	–	.778	.684-.885	
	45-54	–	.543	.473-.623	
	55-64	–	.438	.369-.519	
	65+	–	.311	.261-.372	
Constant	.080		.080		

**Table 4**  
Independent predictors of poor health within the population with autism spectrum disorders.

Variable		Odds ratio	95% confidence interval
Age group	25-34 (reference)	–	
	35-44	1.380	1.213-1.570
	45-54	1.553	1.353-1.782
	55-64	2.088	1.761-2.475
	65+	3.089	2.585-3.693
Gender	Male (reference)	–	
	Female	1.235	1.110-1.374
Constant		.576	

There has been little previous focus on general health of adults with autism spectrum disorders despite adulthood comprising the majority of a person's lifespan. We identified only two published reports on this topic, only one of which drew comparisons with the general population but was conducted on a small scale, with a sample that may not have been representative (the authors acknowledge its bias), as it excluded those with additional intellectual disabilities, and included only a young adult age group (Lin, 2014). Results are not, therefore, directly comparable with our study findings. However, as outlined in the introduction, there is a broad range of health conditions that appear to be common in people with autism spectrum disorders and that are likely to contribute to their poor general health status. For example, a health insurance data study found that 1507 autistic adults compared with 15,070 non-autistic adults had higher rates of almost all physical and mental health conditions investigated in the study (Croen et al., 2015). Health conditions comorbid with autism are, therefore, clearly a topic that requires further study, and raised awareness amongst health practitioners and carers.

Existing research shows that adults with autism spectrum disorders are more likely to report unmet medical needs and dissatisfaction with their care than the general population (Nicolaidis et al., 2012) as well as barriers in accessing medical care (Sagr et al., 2017) though other studies showed levels of satisfaction with healthcare comparable to the general population (Gerber et al., 2017). Adults with autism spectrum disorders are also likely to be hospitalised for life-threatening conditions and undergo major surgeries (Jones et al., 2016), indicating a significant medical comorbidity burden. They also experience access barriers to healthcare and primary care treatment (Lunsky, Klein-Geltink, & Yates, 2013). Additionally, medical providers report lack of confidence in caring for their adult patients with autism spectrum disorders (Erickson-Warfield, Crossman, Delahaye, Der Weerd, & Kuhlthau, 2015; Unigwe et al., 2017; Zerbo, Massolo, Qian, & Croen, 2015), but little has been published on how to improve healthcare access and delivery for adults with autism. As the adolescent and adult populations with autism spectrum disorders continue to grow, it becomes increasingly important that we seek better understanding of their medical needs.

#### 4.1. Strengths and limitations

This study is both novel, and has considerable methodological strengths. It included the whole adult population of Scotland, and had a high completion rate (94%) as well as being large in scale. General health status was systematically enquired about for everyone, as was the presence or absence of autism spectrum disorders. Whilst the term 'developmental disorders' was used, the Census prompted responses only for autistic spectrum disorder or Asperger's syndrome, and carefully worded the question to capture autism spectrum disorders following cognitive testing of the question. Those adults, for whom a diagnosis of autism spectrum disorder was recorded, will reflect the contemporary diagnostic practices in place during their childhood; the concept of the autism spectrum has broadened in recent years. We do not know if this accounts for the lower prevalence of autism spectrum disorders recorded in the adults over the age of 55 years, or if this has been impacted upon by suicides or other causes of premature deaths, as the study is cross-sectional in design. The broadening of the autism spectrum concept in diagnostic practice reflects that seen in other high-income countries; hence we believe the results of this study are generalisable to other high-income countries. Census responses were completed by heads of households; hence some will have been self-reports and some proxy-reports. These reflect subjective reports of general health, rather than objective measurements of health.

#### 4.2. Implications

This study fills a significant gap in existing research on general health, an important component of quality of life, of adults with autism spectrum disorders, and has important implications. It is essential to have accurate information on health status in order to raise awareness, and accurately plan appropriate prevention and intervention measures, and provision of resources for people who may put demand upon services designed for people with autism spectrum disorders. The poor general health ratings observed in the population of adults with autism spectrum disorders demonstrate a clear need to focus on improvements in healthcare and supports, and on the wider determinants of health in this population which may well differ from the general population.

#### Conflicts of interest

None declared.

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