Supplementary materials
Supplementary Materials 1: Details of participant cohorts

We obtained datasets from several (but not all) of the sources we contacted. Due to an abundance of typically-developed females and some queried datasets, not all participants were included in the analysis reported in the main text. Here we provide details of the cohorts we collected.

- **Bournemouth University**

The ASC sample obtained by the authors at Bournemouth University consisted of 42 autistic women (mean age = 34.4 [SD: 10.85]) and 42 age-matched autistic men (mean age = 34.25 [SD: 10.76]). These participants were individuals who had presented for and received a diagnosis of Asperger Syndrome at the Dorset NHS Community Adult Asperger Service (CAAS) between 2012-2015. Although IQ testing was not conducted, participants were individuals who had gone undiagnosed until adulthood, so should be assumed to be of average or above-average IQ (> 70). Comorbid conditions, such as anxiety or depression, were not recorded.

Prior to the study being conducted, the CAAS clinic had obtained ethical approval from the NHS in order to conduct the RAADS-R on individuals who presented for diagnosis, who had been referred to the clinic from their general practitioner. Participants volunteered to complete this additional assessment. Collaboration between the clinic and the authors at Bournemouth University allowed us to access the mean scores of each participant in the four domains of the RAADS-R, although we did not have access to scores on individual items. Nor did we have access to any personal or identifying information. A confidentiality agreement was signed between CAAS and the authors, which specified that data would not be shared.

We also obtained a sample of typically-developing, non-autistic participants who were recruited on a voluntary basis from the local Bournemouth area. We excluded those who had reported that they had a current or historic psychiatric illness. The respondents were mainly students, and we noticed the
presence of several individuals with scores considerably higher than the suggested RAADS-R cut-off point for ASC (65). We had screened participants for diagnosed autism spectrum conditions, but to avoid the possibility of undiagnosed individuals with autism in the control group, we implemented an exclusion criteria for participants who scored 10% over the RAADS-R cut off point (i.e. participants who scored over 71.5 in the RAADS-R total). We therefore excluded 28 of 58 control males and 23 of 131 control females. This is 56% and 17.6% of the overall collected numbers for these groups respectively. It was surprising to see such a high distribution of males scoring above 71.5 in the RAADS-R total, a percentage that does not appear to align with the suggested prevalence of ASC in the population [1]. It may be worth mentioning that the sample were predominantly Psychology students, which is why females outnumbered males so strongly. We query whether males are perhaps less interested in this topic unless they have specific reason to be. This is however conjecture and we would not claim that a higher than average proportion of autistic individuals enter Psychology, although they are indeed known to be drawn to the STEM topics [2] and STEM careers are generally associated with a higher than average number of autistic traits [3].

- *The Libero/Kana group, MIND Institute of Sacramento, California / University of Alabama at Birmingham*

We received a sample of 19 individuals with ASC from this group: five women (mean age: 34 [SD: 7]) and 14 men (mean age: 30.6 [SD: 8]). This group provided IQ scores for their sample: the ASC group had a mean full-scale IQ of 115.5 (SD: 12.6) as measured by the Wechsler Abbreviated Scale of Intelligence [4], and no individuals fell below a cut-off of 80. All participants had been formally diagnosed through use of the Autism Diagnostic Interview-Revised (ADI-R [5]) and the Autism Diagnostic Observation Schedule (ADOS [6]): the authors did not perform the diagnostic assessment but verified the diagnosis in the participants’ clinical records. ASC participants were recruited from clinics and service providers in Alabama, USA.
We also received 17 control participants, four women (mean age: 33.4 [SD: 10]) and 13 men (mean age: 38.8 [SD: 12.8]), who together had an average full-scale IQ of 118 (SD: 10.4). These participants were screened through a self-report history questionnaire to exclude individuals with neuropsychiatric disorders (ASC, ADHD, Tourettes) and were medication-free. They were volunteers recruited from the Birmingham, Alabama area.

Data from both participant groups was reported in:


- The Kirkovski/Fitzgerald group, Monash University, Australia / Deakin University, Australia

From this group we received a sample of 13 autistic women (mean age: 26.7 [SD: 7.6]) and 12 autistic men (mean age: 33.9 [SD: 9.2]). These individuals had been formally diagnosed by an experience clinician (psychiatric, psychologist or paediatrician) prior to the study they took part in, with the authors verifying the diagnosis through access to each participant’s diagnostic report. All but four of the participants had a diagnosis of Asperger Syndrome (three women and a man were diagnosed with
high-functioning autism). We were able to access intelligence scores as measured by the Kaufman Brief Intelligence Test second edition (KBIT-2 [7]): autistic participants as a group showed an average composite (verbal + non-verbal) IQ score of 109.8 (SD: 14.9).

We also received 12 female controls (mean age: 27.4 [SD: 10.3]) and 12 male controls (mean age: 33.1 [SD: 9.4]), who showed an average IQ composite score of 113.3 (SD: 13.6). Both autistic and non-autistic participants were screened for a history of intellectual disability, psychiatric or neurological disorder, but autistic participants with anxiety and mood disorders were not excluded due to the extremely high incidence of these conditions in this population.

Participants from each group were recruited from via flyers placed around university campus, social media (facebook/gumtree), presentations at support groups for ASD, and the Monash Alfred Psychiatry Research Centre (MAPrc) participant database.

Data from these participants was reported in:


We received a sample of 152 individuals with a formally diagnosed ASC from this group. 11 individuals whose sex was reported as ‘other’ were discarded, such that 141 participants with ASC were suitable for use in the meta-analysis: 84 women (mean age: 36.8 [SD: 13.5]), and 57 men (mean age: 36.3 [13.6]). This was a volunteer sample who responded to advertisements in the local area (Los Angeles), online (autism-related websites, forums and blogs) and on social media sites, and to emails sent to autism support groups and centres world-wide (this was an online study). These authors also included participants with self-diagnosed ASC and with elevated autistic traits in their study, but we include only those who reported having a formal diagnosis, though no more details are had regarding this. All but 11 (7%) scored above the RAADS-R suggested cut-off of 65, but Ritvo and colleagues themselves recognised the possibility of autistic individuals falling below cut-off.

This group also supplied us with data from 479 control participants without a formal diagnosis of ASC, who did not consider themselves to be on the spectrum. As there were two participants here who marked their sex as ‘other’, this left 477 participants: 381 female controls (mean age: 36.2 [SD: 13.2]) and 96 male controls (mean age: 35.8 [SD: 14]).

No details are had regarding IQ of either group, but in the original Schwartzman study, these autistic and non-autistic individuals were part of a larger group (n = 828, which also included, for example, self-diagnosed individuals with ASC and those uncertain if they felt they were on the autism spectrum) of whom 92% (761) had been to college, so we may assume that participants were of average to above-average IQ and did not have an intellectual disability. Schwartzman et al report that of these 828 participants, 80% were Caucasian, 5% Asian, 4.5% Hispanic, 2% of African descent, 2% Middle Eastern, 5% multi-ethnic, and 1.5% declining to answer. Respondents came from 31 different countries but 84% of participants were from the United States.

Unlike the Libero/Kana and the Kirkovski/Fitzgerald group, and like our own data, Schwartzman et al. did not screen their control participants for the presence of an undiagnosed ASC. As such, as with our own dataset, we removed control participants who scored over 10% higher than the 65 RAADS-R
suggested cut-off for autism (i.e. participants who scored over 71.5 [72 and above] in the RAADS-R total). Removing 41 control women and 14 control men left us with 340 control women (mean age: 36.3 [SD: 13.2]) and 82 control men (mean age: 35.9 [SD: 14]). This is 10.8% and 14.6% removed of the total number of control men and women originally.

Data from these participants was originally reported in:

**Supplementary Material 2: Database search (Step 1 of Meta-Analysis)**

Relevant studies are displayed in italics.

*Web of Science* search results (6):


PubMed search results (4):


Google Scholar search results (85):

** indicates that study did not use our specific version of the RAADS-R but rather the revised 14-item version or the original scale.


60. Close, M. PUBLISH OR PUBLISH.


65. Mateescu, L., Mihailescu, I., Frunza, A. A., Coman, M., Rad, F., Anghel, C. G., ... & Manea, M. ASSESSMENT TOOLS FOR AUTISM SPECTRUM DISORDERS IN ADULTS PATIENTS.


82. Быховский, О. Б. Психологические особенности успешных и неуспешных коммуникативных паттернов.


**indicates that study did not use our specific version of the RAADS-R but rather the revised 14-item version or the original scale.


85. Subject Index. Comprehensive Psychiatry, 35(6), 480-489.

Supplementary Materials 3: Targeted papers (Step 2 of Meta-Analysis)

We identified the following 16 studies as relevant to our meta-analysis. Individual publications are grouped here by the research-group they belong to.

1) The Ritvo/Bejerot group, Yale University / Karolinska Institutet, Stockholm

We contacted R. Ritvo, E. Ritvo, and S. Bejerot of the below publications:


2) The Libero/Kana group, MIND Institute of Sacramento, California / University of Alabama at Birmingham

We contacted L. Libero and R. Kana of the below publications:

3) **The Kirkovski/Fitzgerald group, Monash University, Australia / Deacon University, Australia**

We contacted M. Kirkovski of the below publications:


4) **The Schwartzman / Kapp group, University of California, Los Angeles, USA**

We contacted B. Schwartzman of the below publication:

5) The Schneider/Dux group, University of Queensland, Australia

We contacted D. Schneider and P. Dux of the below publication:


6) The Sizoo/Horwitz group, Dimence, The Netherlands / University Medical Centre Groningen, The Netherlands

We contacted B. Sizoo and Dr Horwitz of the below publications:


7) The Zimmerman/Gullo group, Griffith University, Australia / University of Queensland, Australia

We contacted D. Zimmerman and Dr Gullo of the below publication:

8) *The Dunlop/Rajan group, Monash University, Australia*

We contacted R. Rajan of the below publication:


**Supplementary Materials 4: Invitation to participate in meta-analysis**
Dear Dr

Please forgive me contacting you out of the blue. I am a researcher based at Bournemouth University, UK, studying sex differences in autism. Specifically, I hope to complete a meta-analysis of sex differences as they emerge in the Ritvo Adult Asperger Diagnostic Scale Revised (Ritvo et al, 2011), and thus am contacting authors whom have used this instrument in the hope that they might share part of their data.

Your below publication came to my attention during my literature search:

...

I wondered if you might be willing to share part of the data from that paper, or any other relevant publication since, for the purpose of my meta-analysis. The data I am specifically looking for is:

- Age, total RAADS-R and RAADS-R domain scores from people with confirmed ASD
- Age, total RAADS-R and RAADS-R domain scores from controls, people without ASD

If possible, IQ scores of participants would be wonderful to have, too.

I would be terribly grateful if you might respond to my enquiry and let me know if this is data you might be willing to share with me, if the terms of your ethics approval allows. I note that I previously contacted Drs Riva and Edward Ritvo who were unable to give me any data
themselves, but encouraged and expressed their interest in my work. If you have any questions about my proposed work, I would be delighted to tell you more.

Thank you very much for your time in reading this email.

Yours sincerely,

Rachel Moseley