

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository:<https://orca.cardiff.ac.uk/id/eprint/128515/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Uljarevic, Mirko, Cooper, Matthew N., Bebbington, Keely, Glasson, Emma J., Maybery, Murray T., Varcin, Kandice, Alvares, Gail A., Wray, John, Leekam, Susan and Whitehouse, Andrew J. O. 2020. Deconstructing the repetitive behaviour phenotype in Autism Spectrum Disorder 1 through a large population-based analysis. *Journal of Child Psychology and Psychiatry* 61 (9) , pp. 1030-1042. 10.1111/jcpp.13203

Publishers page: <http://doi.org/10.1111/jcpp.13203>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



Table S1. Modeling of each RRB individually; ordinal logistic regression

Variable	CI*	IS*	RMB*
Model 1**			
Age of diagnosis (years)	0.96 (0.94,0.97)	1.06 (1.05,1.08)	1.07 (1.06,1.09)
Comorbid ADHD	0.91 (0.75,1.12)	1.38 (1.13,1.69)	1.27 (1.03,1.58)
Sex (Male)	0.93 (0.79,1.09)	1.01 (0.86,1.18)	1.81 (1.54,2.12)
Model 2***			
CI		1.00 (0.93,1.08)	1.02 (0.95,1.10)
IS	0.99 (0.93,1.07)		1.53 (1.43,1.65)
RMB	1.03 (0.95,1.11)	1.59 (1.47,1.72)	

Note: ADHD: Attention deficit hyperactivity disorder; CI, Circumscribed Interests; IS, Insistence on Sameness; RMB, Repetitive Motor Behaviors; *data presented as OR (95% CI) from ordinal logistic regression.

** Model 1 – basic model, additionally adjusted for calendar year.

*** Model 2 – same adjustments as model 1 but 1 with each RRB added in turn (not simultaneously)

Table S2. Modeling of Full-Scale IQ as both a continuous and dichotomous (low IQ; <70) outcome; linear and logistic regression respectively, by sex

Variable	Male (n=1282)		Female (n=272)	
	Continuous IQ*	Low IQ*	Continuous IQ*	Low IQ*
Model 1**				
Age of diagnosis (years)	0.95 (0.67,1.23)	0.90 (0.87,0.93)	0.99 (0.4,1.58)	0.92 (0.86,0.98)
Comorbid ADHD	2.97 (-0.51,6.46)	0.65 (0.42,0.98)	6.33 (-1.9,14.55)	0.52 (0.18,1.31)
Model 2***				
CI	-3.74 (-5.11,-2.38)	1.52 (1.31,1.77)	-2.20 (-5.14,0.74)	1.15 (0.86,1.56)
IS	3.61 (2.23,4.99)	0.72 (0.62,0.83)	5.95 (3.20,8.69)	0.56 (0.41,0.75)
RMB	3.44 (1.99,4.89)	0.80 (0.69,0.93)	3.88 (0.88,6.89)	0.83 (0.62,1.12)

* Data presented as unstandardized coefficient (95% CI) for Continuous IQ from linear regression and OR (95% CI) for Low IQ from logistic regression

** Model 1 – basic model, additionally adjusted for calendar year

*** Model 2 – model 1 with each RRB added in turn (not simultaneously)

Table S3. Modeling of Full-Scale IQ as both a continuous and dichotomous (low IQ; <70) outcome; linear and logistic regression respectively, by sex and age of diagnosis.

Variable	Male (n=1282)		Female (n=272)	
	Continuous IQ*	Low IQ*	Continuous IQ*	Low IQ*
Cohort 1a				
– Diagnosed age 0-12 years				
CI	-3.30 (-4.74,-1.87)	1.53 (1.30,1.81)	-1.78 (-4.85,1.29)	1.12 (0.82,1.53)
RMB	3.30 (1.79,4.81)	0.81 (0.69,0.96)	3.27 (0.15,6.40)	0.84 (0.61,1.15)
Cohort 2a				
– Diagnosed age 13+ years				
CI	-6.54 (-10.14,-2.93)	1.6 (1.04,2.56)	-0.81 (-10.53,8.92)	1.88 (0.55,8.04)
RMB	-0.73 (-5.17,3.70)	1.05 (0.65,1.75)	2.78 (-7.69,13.25)	2.17 (0.49,15.18)
Cohort 1b				
– Diagnosed age 0-3 years				
IS	5.27 (2.45,8.09)	0.67 (0.50,0.88)	4.78 (-0.36,9.91)	0.59 (0.34,0.97)
Cohort 2b				
– Diagnosed age 4-6 years				
IS	2.95 (0.64,5.27)	0.83 (0.66,1.06)	8.63 (4.43,12.84)	0.27 (0.13,0.50)

Table S4. Modeling of the association between DSM-IV social and communication scores and each RRB individually; ordinal regression

Variable	CI*	IS*	RMB*
Model 1**			
Social Interaction Impairments	1.65 (1.46,1.88)	1.11 (0.99,1.25)	1.07 (0.96,1.21)
Communication Impairments	1.25 (1.18,1.31)	0.78 (0.74,0.82)	0.86 (0.82,0.90)
Model 2***			
Social Interaction Impairments	1.44 (1.27,1.65)	1.43 (1.26,1.62)	1.24 (1.10,1.41)
Communication Impairments	1.19 (1.13,1.25)	0.74 (0.70,0.78)	0.83 (0.79,0.88)

* CI, Circumscribed Interests; IS, Insistence on Sameness; RMB, Repetitive Motor Mannerisms; data presented as OR (95% CI) from ordinal logistic regression

** Model 1 – each mean DSM-IV score added in turn (not simultaneously), adjusted for age of diagnosis, calendar year, and sex

*** Model 2 – same adjustments as model 1 but with both DSM-IV scores simultaneously in the model

Figure S1: Individual social and communication criteria rating concordance, by sex; percentage of criteria Met (score 2-3)

Note: 1a: Nonverbal behaviors; 1b: Peer relationships; 1c: Sharing enjoyment with others; 1d: Social/emotional reciprocity; 2a: Spoken language delays; 2b: Conversation initiation and sustaining; 2c: Repetitive language use; 2d: Spontaneous make-believe play; 3a: CI; 3b: IS; 3c: RMB; 3d: preoccupation with parts of objects. Each plotted value represents the percentage of the full sample that met both criteria, where the columns and rows match for example 1a-1a, this is the percentage of the full sample that met criteria 1a and therefore that would be the maximum possible percentage that any of the other 1a pairings could reach.