

(Twin studies of) ADHD in adults

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Developmental Twin Study of Attention Problems

High Heritabilities Throughout Development

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JAMA PSYCHIATRY/VOL 70 (NO. 3), MAR 2013

The heritability of clinically diagnosed attention deficit hyperactivity disorder across the lifespan

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Psychological Medicine (2014), 44, 2223–2229.

Acknowledgements

- Zheng Chang
 - Qi Cheng
 - Therese Ljung
 - Charlotte Skoglund
 - Amir Sariaslan
 - Johan Zetterqvist
 - Paul Lichtenstein
 - Arvid Sjölander
 - Niklas Långström
 - Ylva Ginsberg
 - **IMPACT**
 - Linda Halldner
 - Eva Serlachius
 - Brian D'Onofrio
 - Seena Fazel
 - Philip Asherson
 - Andrew Merwood
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Do we need a heritability study of clinically diagnosed ADHD?



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→ ADHD as a categorical disorder vs an extreme of a continuous trait

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1. Is needed to explore how genetic factors influence ADHD across different levels of severity
 - ADHD as a categorical disorder vs an extreme of a continuous trait
2. Is needed to resolve inconsistencies regarding the heritability of ADHD in adults

1. Genetic factors across levels of severity



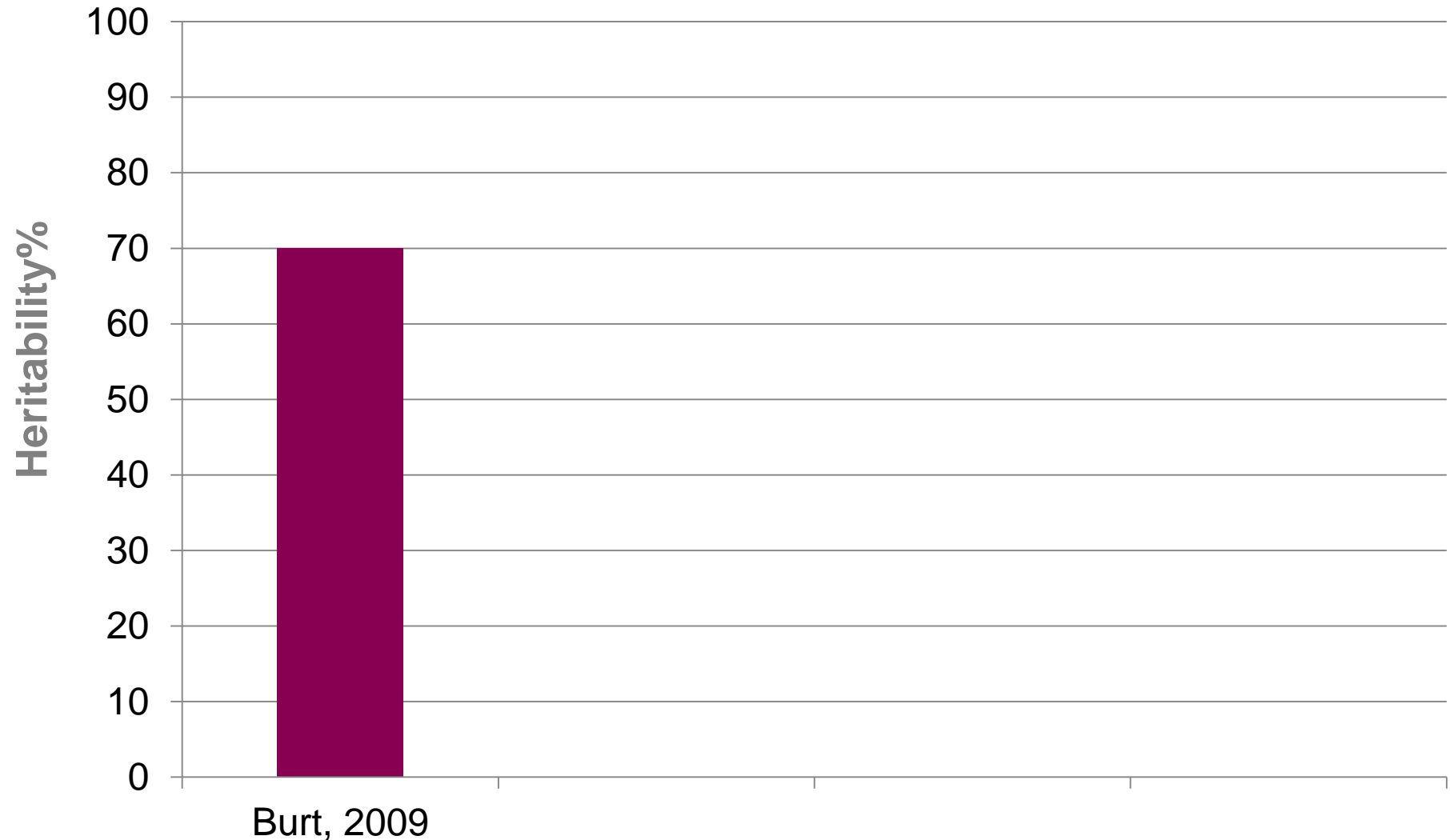
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1. Genetic factors across levels of severity

Continuous trait measures of ADHD



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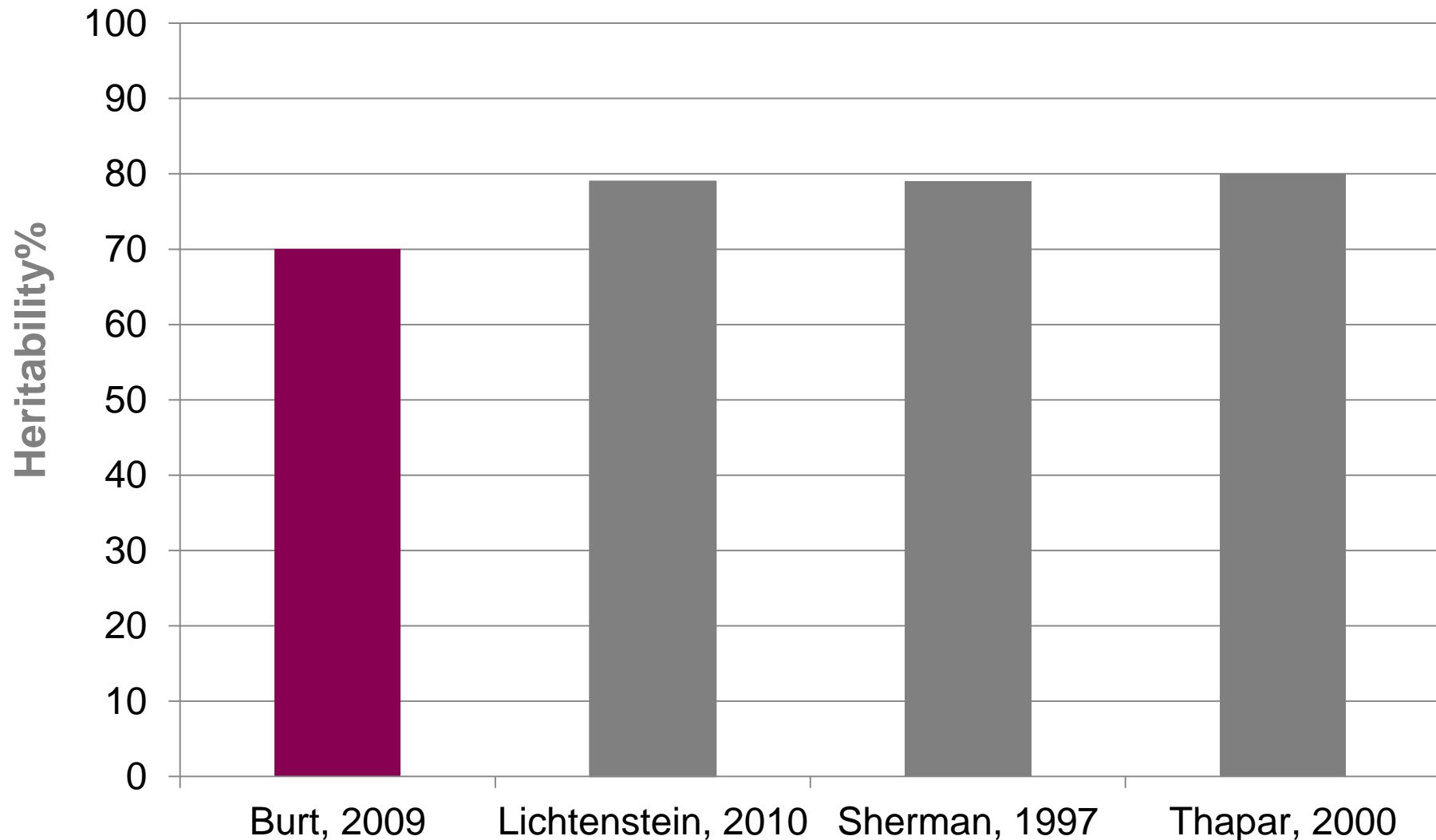


1. Genetic factors across levels of severity



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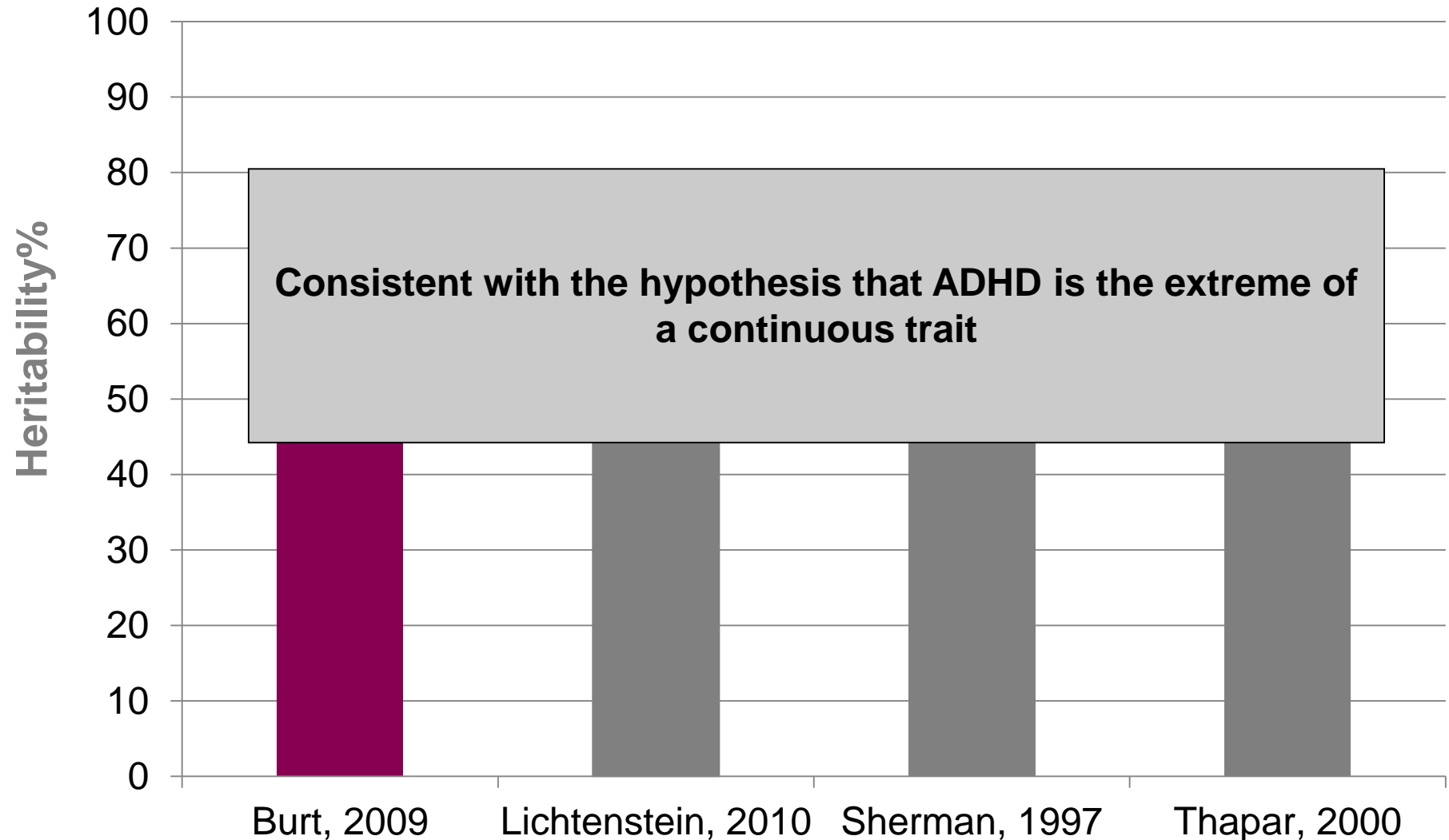
Categorical measures of ADHD



1. Genetic factors across levels of severity



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- However... limitations...
 - Broad categories that contains milder and sub-threshold cases
 - Lacked information on age of onset and impairment criteria

1. Genetic factors across levels of severity



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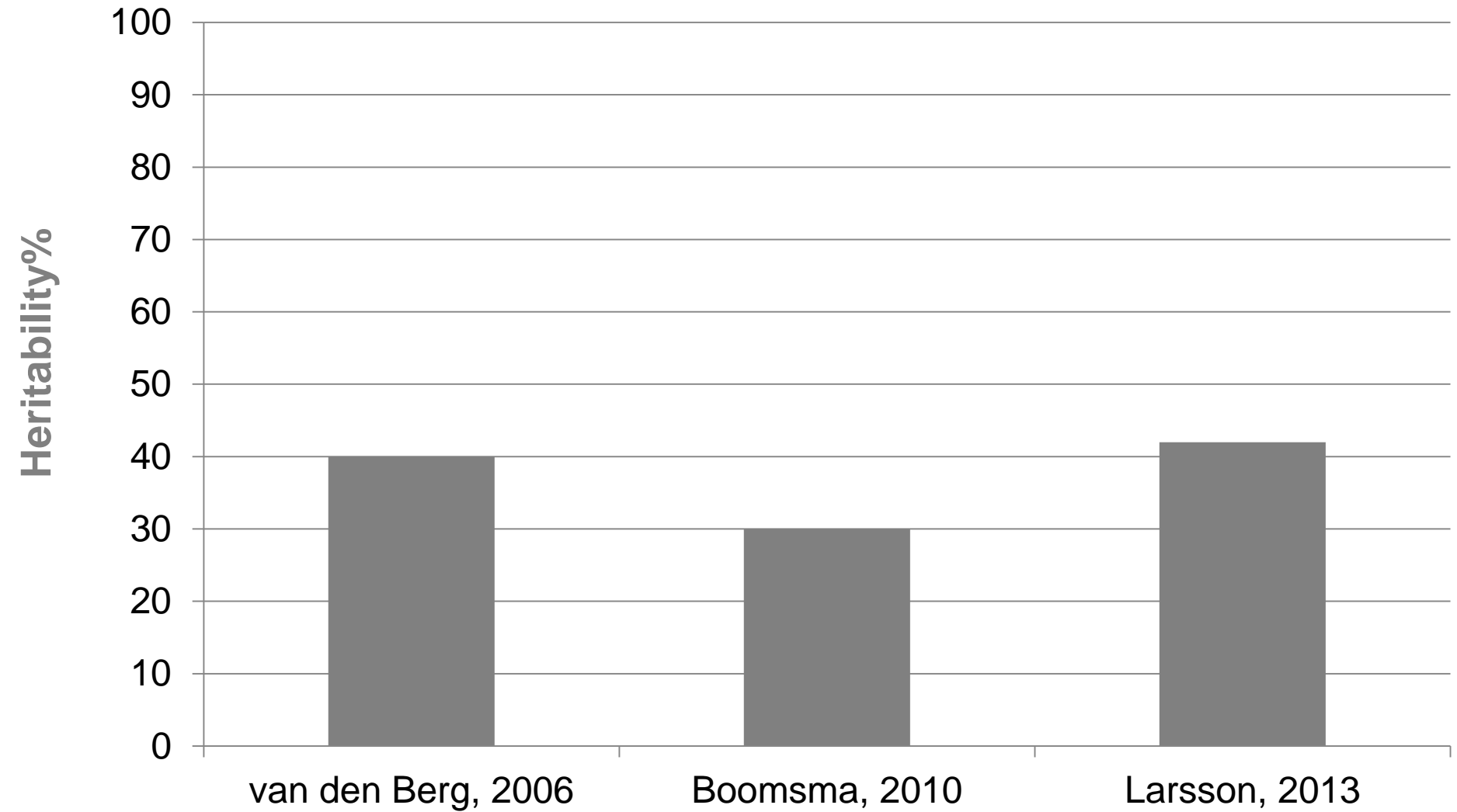
- However... limitations...
 - Broad categories that contains milder and sub-threshold cases
 - Lacked information on age of onset and impairment criteria
 - Thus..
 - More stringent diagnostic methods and narrow definitions of ADHD may generate different heritability estimates
-

2. The heritability of ADHD in adults

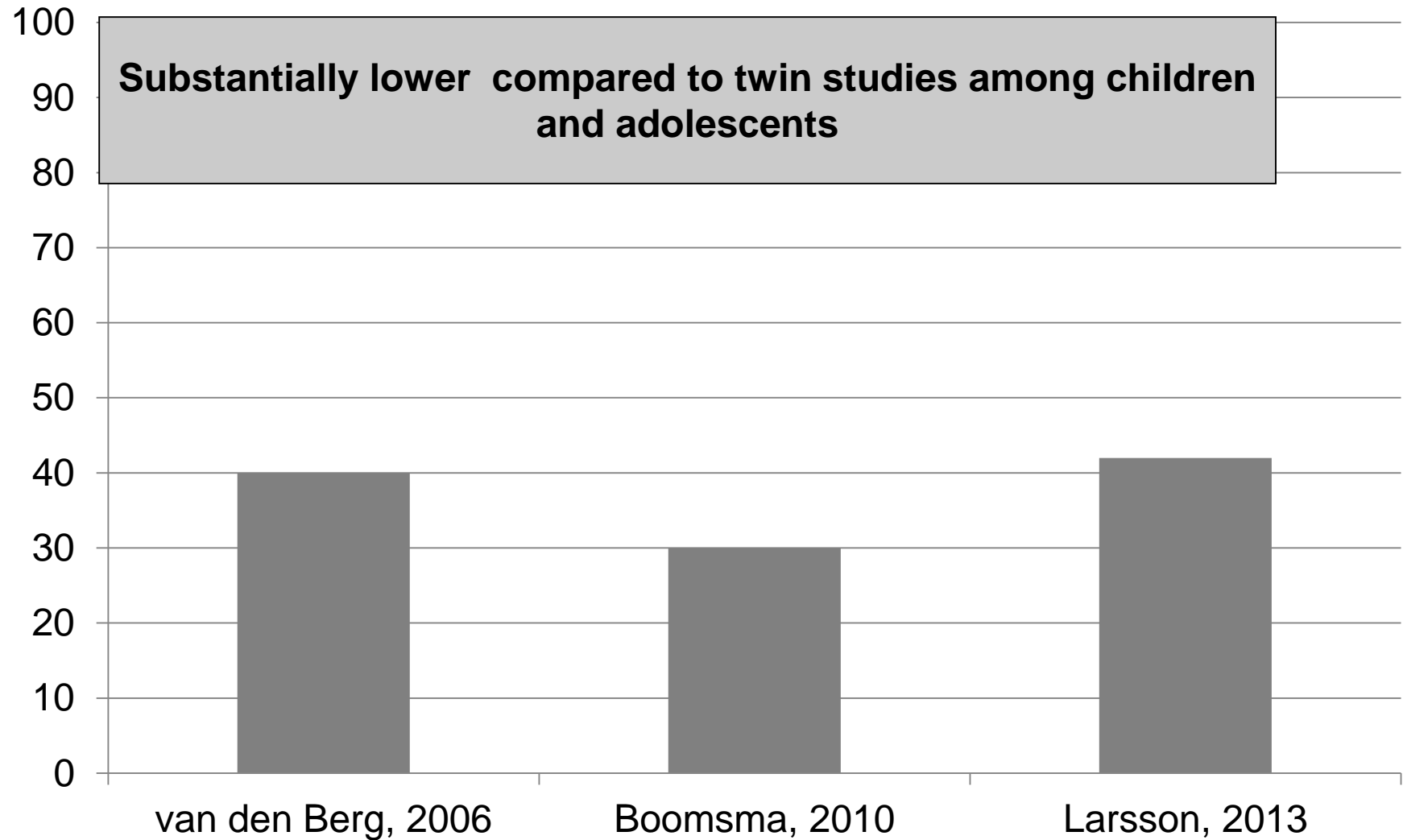


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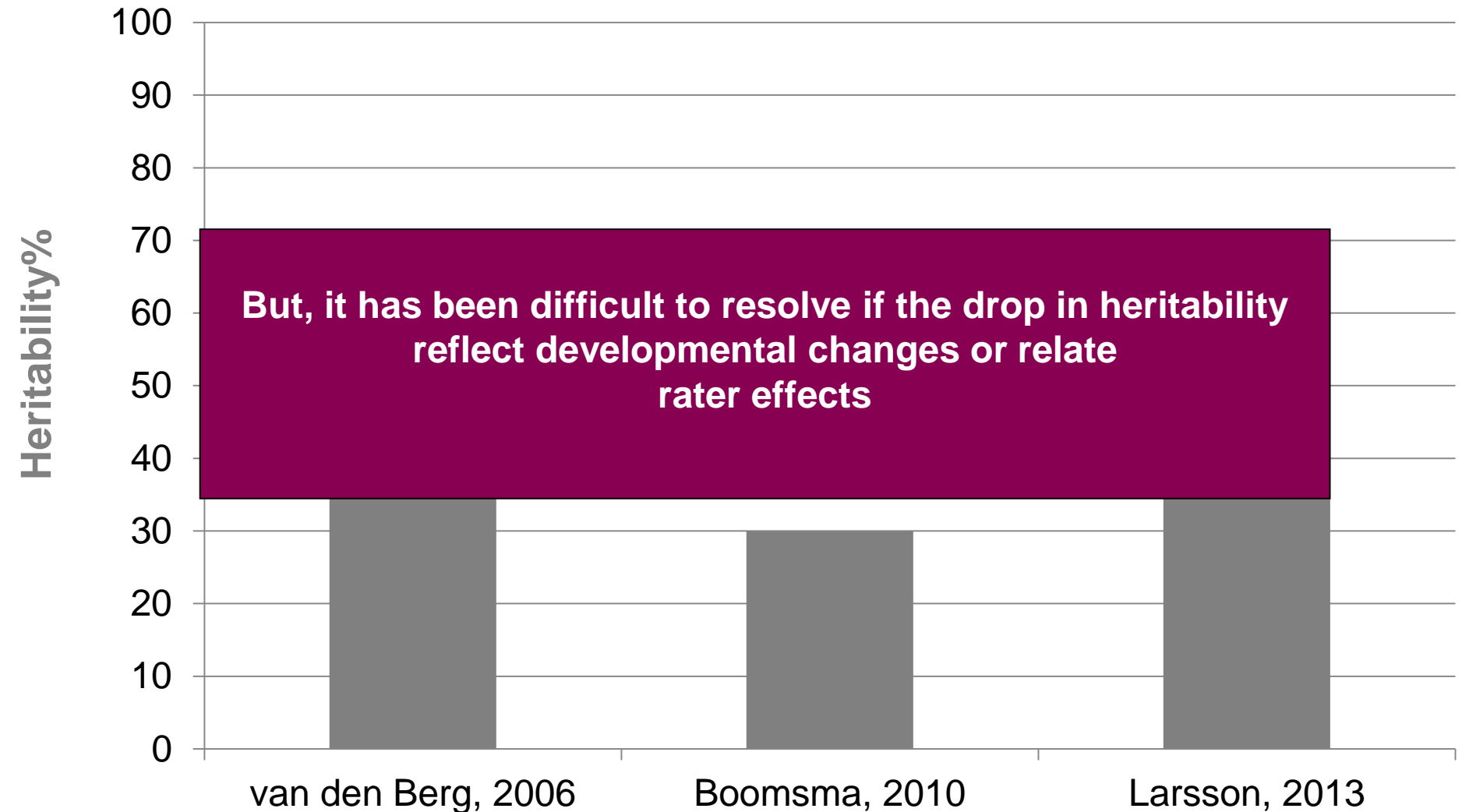
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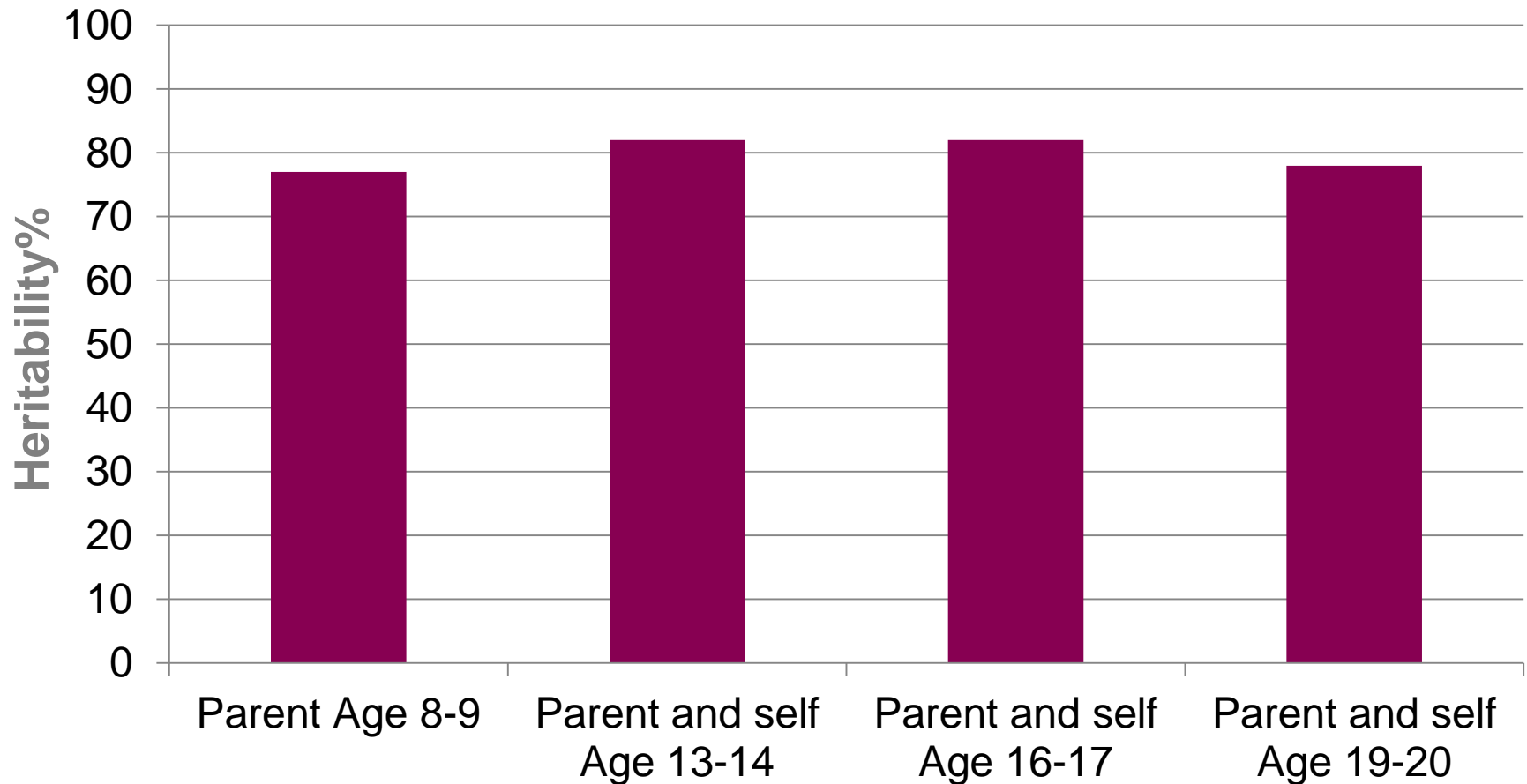
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- Swedish longitudinal twin study; Chang et al (2013)
 - Heritability of ADHD in adults was substantial (78%) when both self and parent ratings were combined into a composite index of ADHD

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Shared view of parent and self ratings



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 - Heritability of ADHD in adults was substantial (78%) when both self and parent ratings were combined into a composite index of ADHD
 - Together this indicate that the low heritability for ADHD in adults is best explained by rater effects
- But, a twin study of clinically diagnosed ADHD in adults is needed to close this question
-

- Estimate the heritability of clinically diagnosed ADHD across the life span with a specific focus on ADHD in adults

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 1. Based on similarities in the heritability estimates between continuous trait measures and broad categorical definitions, we expect high estimates also for clinically diagnosed ADHD
 2. Based on recent cross-informant twin studies, we predict high heritability also for ADHD in adults
 - Cross-informant measures and clinical diagnosis both focus on pervasive symptoms
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- Twins born between 1959 and 2001 from the Swedish Twin Registry with known zygosity
 - Clinical data of ADHD diagnosis was available from 1997-2010
 - Diagnosis of ADHD according to ICD-10 (Patient Register; 1997-)
 - ADHD medication (Prescribed Drug Register; 2005-)
-


Sample and measures

	N	ADHD%
Total sample (1959-2001)	59,514	1.45%
Adults (1959-1991)	37,714	0.72%
Children and adolescents (1992-2001)	21,800	2.71%

Results: Tetrachoric within-twin pair correlations

	MZM	DZM	MZF	DZF	Opposite-sex twins
Tetrachoric correlations (95% CI)	0.90 (0.84-0.94)	0.48 (0.33-0.61)	0.81 (0.68-0.90)	0.50 (0.28-0.67)	0.49 (0.40-0.58)

Results: Model fitting results of univariate analysis of the full sample



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	Fit of model compared to saturated model				
Model	-2LL	df	χ^2	Δ df	AIC
Saturated model	8092.5	59489	-	-	-
1. ACE Univariate					
Full sex-limitation model ^a	8112.0	59505	19.5	16	-12.5
Common effects sex-limitation model	8112.0	59506	19.5	17	-14.5
Null model	8113.5	59509	21.0	20	-19.0
2. AE Univariate					
Full sex-limitation model	8112.5	59507	20.0	18	-16.0
Common effects sex-limitation model	8112.5	59508	20.0	19	-18.0
Null model	8113.7	59510	21.3	21	-20.7

Results: Best fitting model

Clinical diagnosis of ADHD	Genetic effects (95% CI)		Non-Shared environment (95% CI)
1. Full sample	0.88 (0.83-0.92)		0.12 (0.08-0.17)

Results: Best fitting model

Clinical diagnosis of ADHD	Genetic effects (95% CI)	Shared environment (95% CI)	Non-Shared environment (95% CI)
1. Full sample	0.88 (0.83-0.92)	0.08 (0.03-0.13)	0.12 (0.08-0.17)
2. ADHD in Adults (1959-1991)	0.74 (0.59-0.85)	0.10 (0.02-0.18)	0.26 (0.15-0.41)

- Heritability of clinically diagnosed ADHD is high across the life span
 1. Similar heritability estimates for continuous trait measures, broad categorical definitions and narrow diagnostic definitions provide further support for ADHD as the extreme of a continuous trait
 2. High heritability for ADHD in adults indicate that the previous reports of low heritability is best explained by rater effects
 - Molecular genetic studies of ADHD in adults
 - Use cross-informant data that are developmentally informative (age-of-onset or longitudinal data)
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Did I convince you?
