



QIMR Berghofer
Medical Research Institute

THE FUTURE OF HEALTH

Genetic prejudice as a cognitive bias: Evidence from a multivariate twin study

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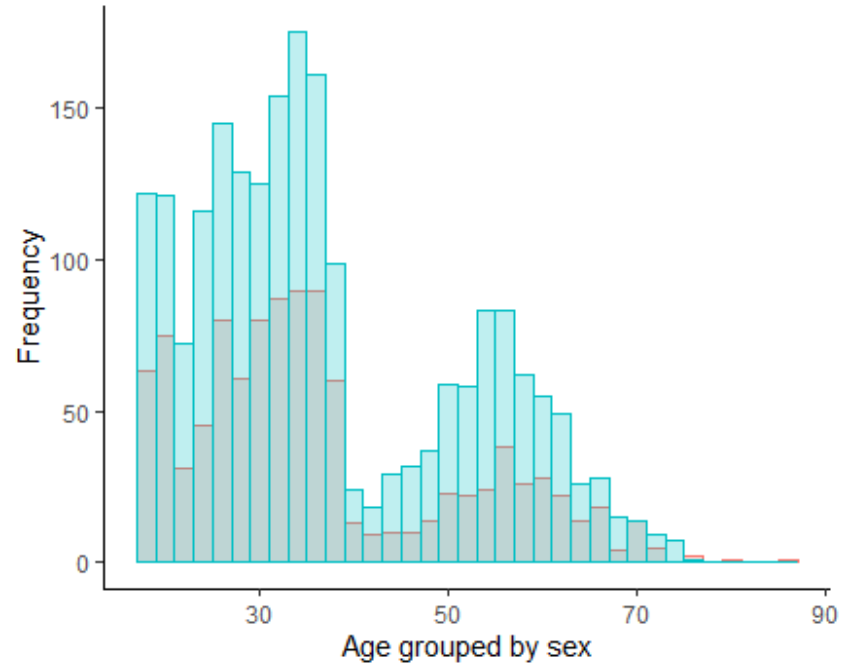
Context of the study

- Part of PhD project on public understanding of genetics:
 - Portrayal of genetics in online news.
 - Surveys on literacy, beliefs about heritability, **genetic deterministic thinking.**
 - Also attitudes towards psychiatric genetic testing.
 - Perceived usefulness, **worries and fears about its applications**, and more.

The present study

Survey in Australia (N=3,974)

- Families participating in genetic studies at QIMR Berghofer.
- 773 MZ twins and 1,054 DZ twins.
- 17 to 86 y.o. (M=37.5, SD=14.1).
- 66.5% women, and 57.5% with university degree.
- Genetic literacy: 6.8% very poor, 30.3% poor, 48.3% fair, 4.5% good.



Beliefs about genetics and behaviour

Genetic deterministic thinking

Definition:

Belief that a behaviour or trait is determined by the someone's genome.

- Related to **genetic or biological essentialism**: belief that people have an innate, internal '**essence**' that emerges from their genetic make-up and makes us who we are.

A measure of biological essentialism

Items from the Bastian & Haslam scale (2006):

6-point Likert scale that range from Strongly disagree to Strongly agree

- a. The kind of person someone is can be largely attributed to their genetic inheritance **(41.3% agree or strongly agree)**.
- b. Whether someone is one kind of person or another is determined by their biological make-up **(32.0%)**.
- c. There are different types of people and with enough scientific knowledge these different "types" can be traced back to genetic causes **(33.6%)**.
- d. With enough scientific knowledge, the basic qualities a person has could be traced back to, and explained by, their biological make-up **(38.8%)**.

Beliefs about genetics and behaviour (II)

Biological essentialism



Genetic prejudice

- **Prejudice:** feeling or preconceived evaluation (often negative) of a person prior to actual experience based on their perceived group membership.
- **Genetic prejudice:** perceived group membership is genetic risk status or genetic predisposition.

“I wouldn’t choose a partner who has a strong genetic predisposition for depression.” (25.7% agreement)

Genetics and behaviour

Biological essentialism



Genetic prejudice

$r = 0.18 [0.12, 0.25]$

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“I wouldn’t choose a partner who has a strong genetic predisposition for depression.” (20.2–25.7% agreement)

Previous research

Biological essentialism

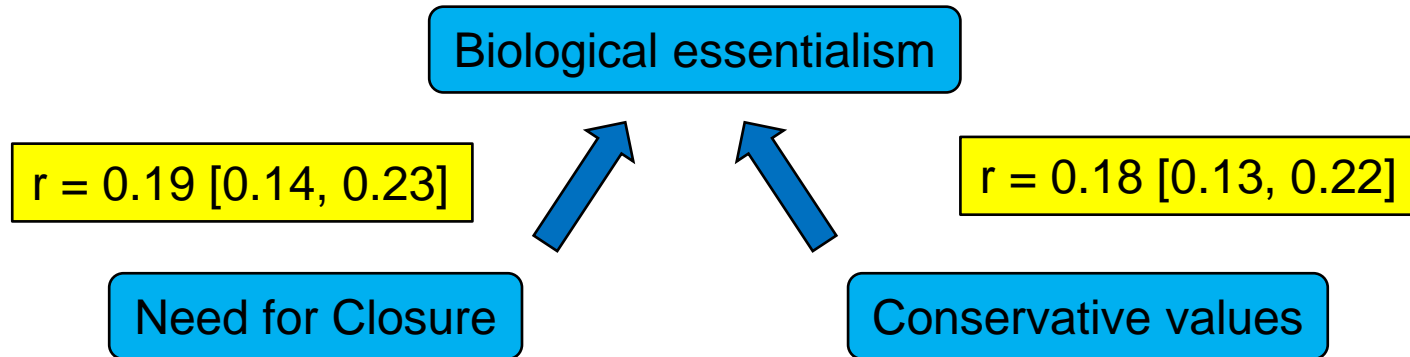
Need for Closure

- Desire for a clear answer on a given topic (Webster & Kruglanski, 1994)
“I dislike questions which could be answered in many different ways”

Conservative values

- Patriotism
- Nationalism
- Respect for authority
- Religiousness
- Group norms over individuality

Previous research



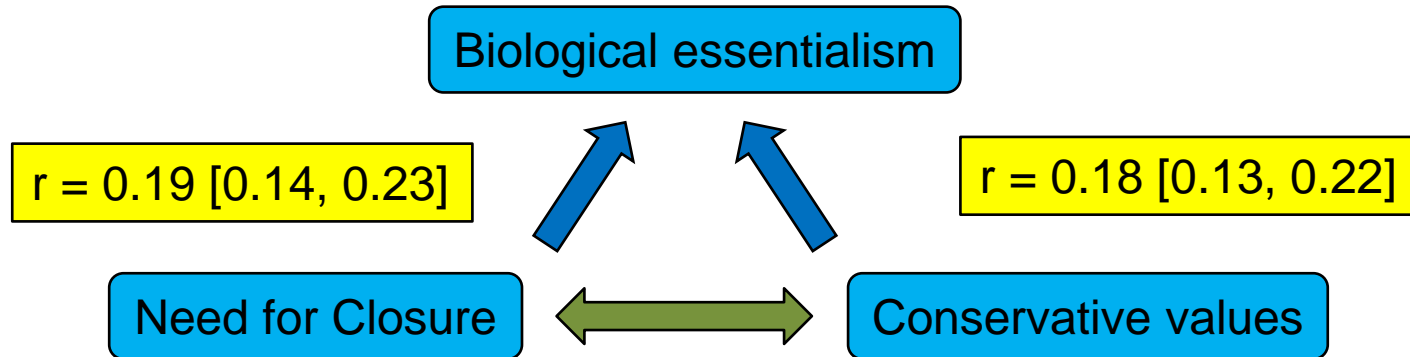
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Previous research



- Desire for a clear answer on a given topic (Webster & 1994)

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$r = 0.22 [0.18, 0.27]$

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Allport's *prejudiced personality*

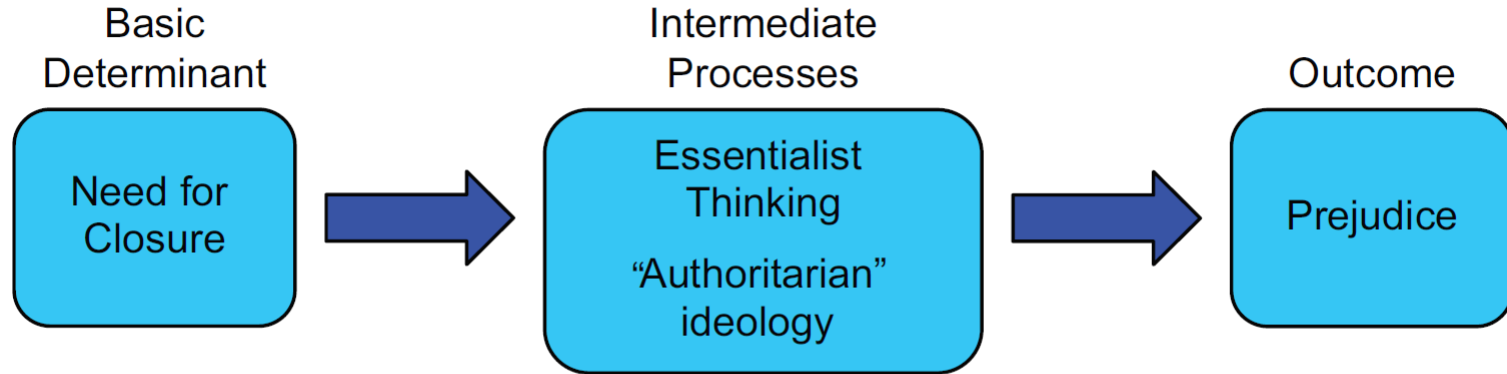


Fig. 1. Allport's *prejudiced personality* in contemporary terms: General model of the effects of need for closure as a general motivated cognitive style on various forms of prejudice through intermediate processes of essentialist thinking and authoritarian ideology.

Roets, A., & Van Hiel, A. (2011)

Inherence heuristic

Essentialist thinking



Heuristic
bias

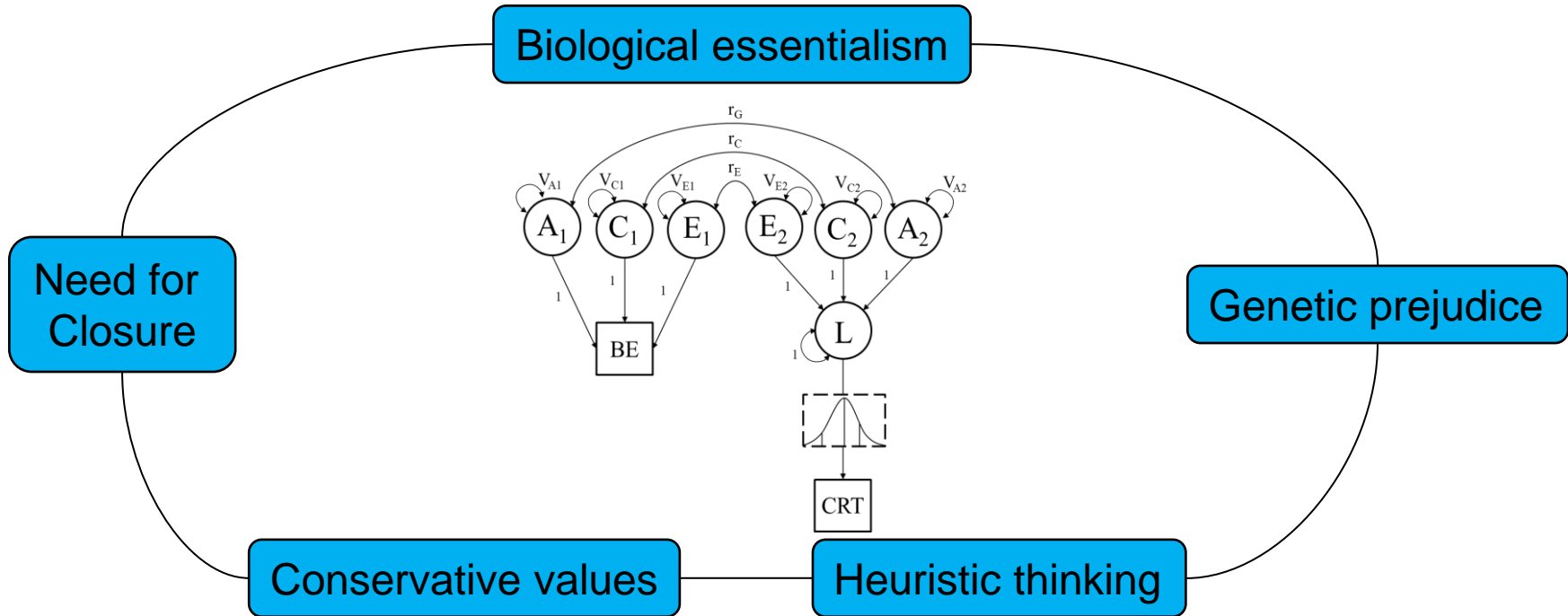
Cimpian and Salomon (2014):

- “Likely innate.”
- If correct, essentialist thinking would be associated with cognitive ability, creativity, and need for closure*.

Research questions

1. No previous genetic studies on any measure of essentialist thinking: innate cognitive modules?
2. No genetic studies on relationship between essentialism, prejudice, need for closure, and sociopolitical values: support for *prejudiced personality*?

Bivariate twin analyses



Bivariate twin analyses

Biological essentialism

Need for Closure

Sum score *Biological basis of behaviour* scale (Bastian & Haslam, 2006):

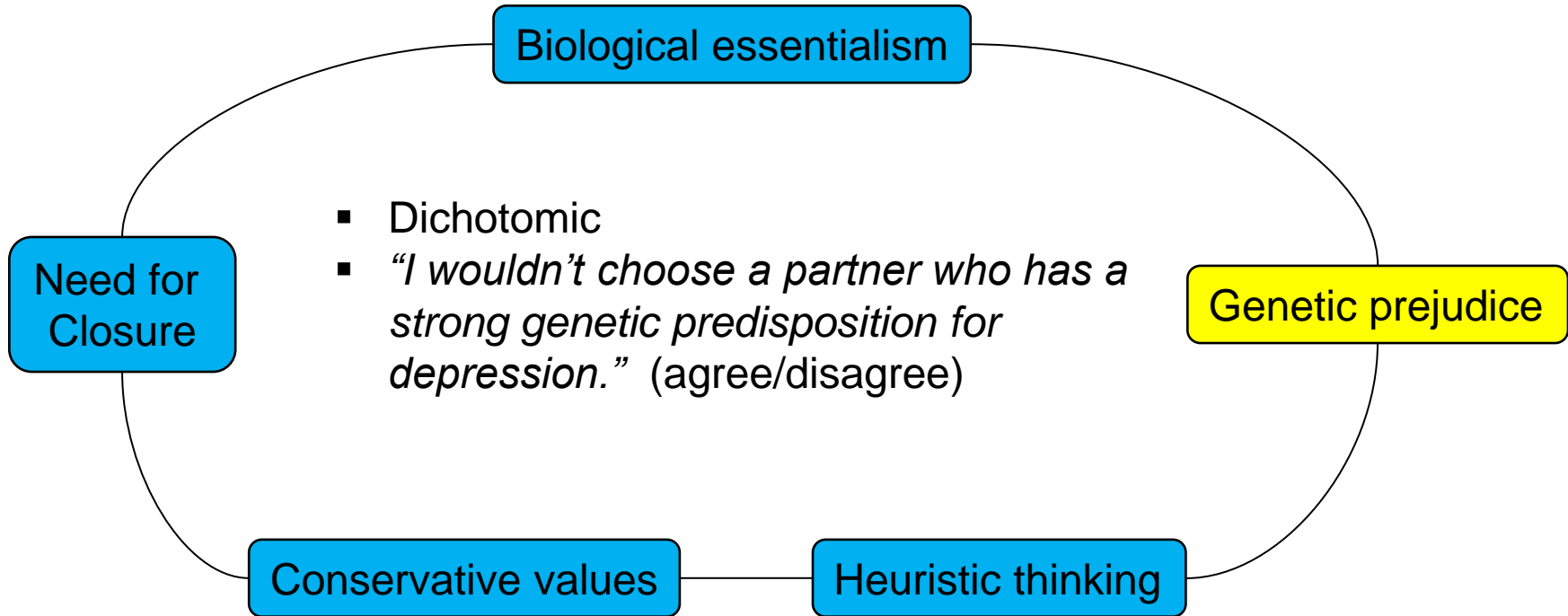
- 8 items
- “*The kind of person someone is can be largely attributed to their genetic inheritance*”
- 6-point Likert scale: *Strongly disagree* to *Strongly agree*

Genetic prejudice

Conservative values

Heuristic thinking

Bivariate twin analyses



Bivariate twin analyses

Biological essentialism

Need for Closure

Cognitive Reflection Test (Frederick, 2005)

- Tendency to commit heuristic errors
- 3 Items
- Ordinal
- “A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?”

Genetic prejudice

Conservative values

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Bivariate twin analyses

Biological essentialism

Moral Foundations Questionnaire
(Graham et al., 2011)

- 16 items (out of 30)
- 6-point Likert scale
- Patriotism, sacrifice for the group, obedience to authority and religiousness...

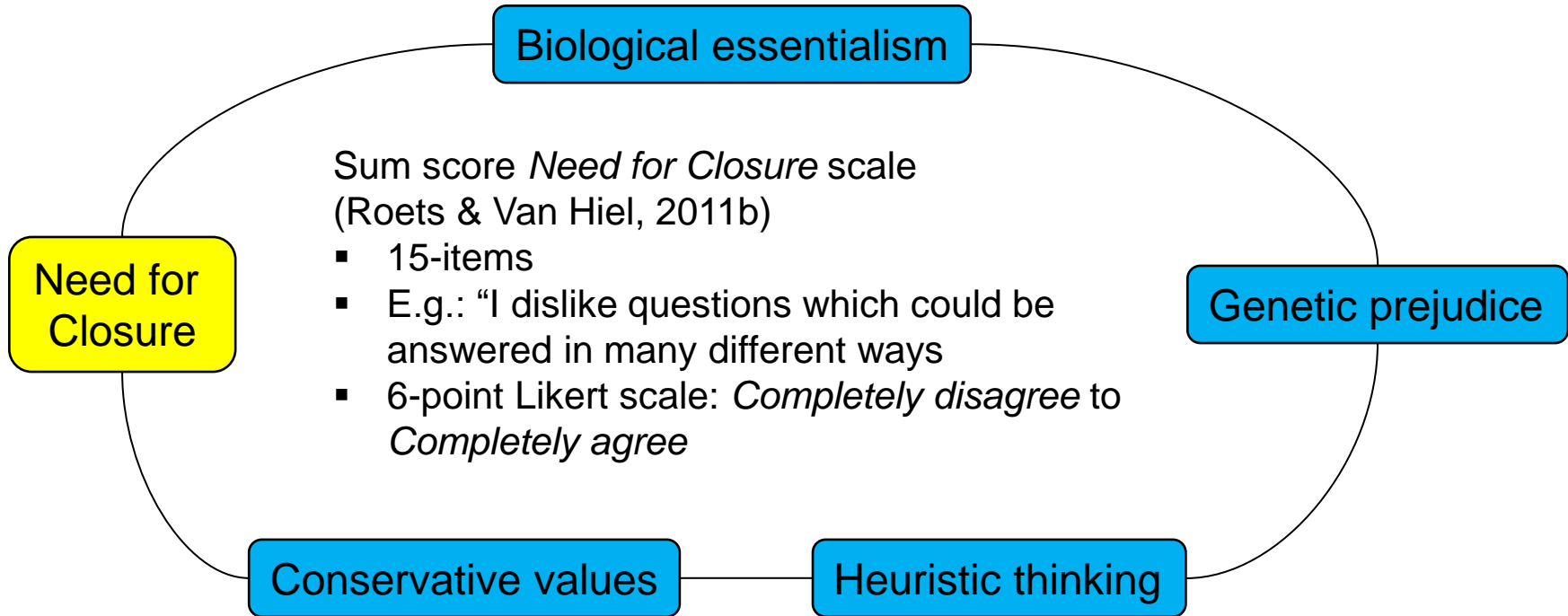
Need for Closure

Genetic prejudice

Conservative values

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Bivariate twin analyses



Phenotypic correlations

Table 1. Phenotypic correlations for each combination of measures and within-trait correlations.

	1	2	3	4	5
(1) BE					
(2) NFC	0.19* [0.14, 0.23]				
(3) CON	0.18* [0.13, 0.22]	0.22* [0.18, 0.27]			
(4) HEU	-0.07* [-0.12, -0.02]	-0.10* [-0.15, -0.05]	-0.20* [-0.25, -0.15]		
(5) PC-Dep	0.18* [0.12, 0.25]	0.13* [0.07, 0.20]	0.09* [0.00, 0.18]	-0.09* [-0.10, -0.02]	

Note: Correlations calculated after equating means, variances, and thresholds across twin order and zygosity.

BE = biological essentialism; NFC = need for closure; CON = conservative values sum score; HEU = cognitive reflection test;

PC-Dep = partner choice based on genetic risk for major depression.

Bivariate genetic estimates

Table 2. Standardized genetic variance components and correlations from best fitting bivariate twin model between phenotypes.

A	1	2	3	4	5
(1) BE	0.16 [0.05, 0.26]		77.8% [39.9, 100]		82.6% [65.9, 100]
(2) NFC		0.37 [0.26, 0.47]	53.5% [20.2, 83.0]		
(3) CON ^a	0.51 [0.26, 0.92]	0.32 [0.12, 0.76]	0.30 [0.02, 0.58]	88.4% [54.2, 100]	
(4) HEU			-0.43 [-0.84, -0.23]	0.54 [0.42, 0.64]	
(5) PC-Dep	0.98 [0.54, 1.77]				0.36 [0.14, 0.55]

^a $V_C = 0.16$ [-0.07, 0.38]

Note: Missing combinations are the result from failure to meet design assumptions.

Bivariate unique environment estimates

Table 3. Standardized unique environment variance components and correlations from best fitting bivariate twin model between phenotypes.

E	1	2	3	4	5
(1) BE	0.84 [0.73, 0.94]		22.2% [0, 60.1]		17.4% [0, 34.0]
(2) NFC		0.63 [0.53, 0.74]	46.5% [17.0, 79.8]		
(3) CON ^a	0.06 [-0.05, 0.16]	0.17 [0.06, 0.28]	0.54 [0.45, 0.64]	11.6% [0, 45.7]	
(4) HEU			-0.20 [-0.25, -0.15]	0.46 [0.36, 0.58]	
(5) PC-Dep	-0.07 [-0.22, 0.08]				0.64 [0.45, 0.86]

Note: Missing combinations are the result from failure to meet design assumptions.

Discussion

- H^2 results match previous univariate findings.
- Weak support for “innate” mechanisms underlying biological essentialism, or its relationship with need for closure or heuristic thinking.
- Support for conservatism, heuristic thinking, and need for closure sharing biological mechanisms (innate cognitive modules?).
- No evidence of VA in correlates with prejudice.

Limitations

- Very indirect indicators of each construct.
- Essentialism likely more influenced by genetic factors in early childhood.
- Small sample size.

However:

- Phenotypic correlations replicated in 2 independent samples.
- First genetically informative study on essentialism and prejudice.
- Focus on the area of genetics.

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