

Callous-unemotional traits: Genetic overlap with externalizing and internalizing problems

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A shared etiology?

CU traits and externalizing problems

- Youth with high levels of callous-unemotional (CU) traits (lack of empathy and guilt, shallow affect) and high levels of conduct problems are at risk of developing severe and persistent antisocial behaviour and psychopathy in adulthood.
- Studies have found significant genetic contributions to the etiology of CU traits and conduct problems. These behaviours have also been found to share a large part of their genetic etiology, with correlations ranging from $r_a = .36$ to $r_a = .76$.
- Hyperactivity is another risk factor for antisocial behaviour and potentially, for psychopathy. Evidence shows a correlation with CU traits and conduct problems.
- Hyperactivity has been found to be highly genetic. However, no study has examined the etiological overlap between hyperactivity and CU traits.

CU traits and internalizing problems

- Research shows that CU traits and anxiety are negatively correlated.
- A few studies have found moderate genetic contributions to anxiety and one study has found a genetic overlap between CU traits and anxiety ($r_a = -.40$).

Aim

- To investigate the etiological (genetic and environmental) contributions to CU traits, externalizing and internalizing problems;
- To estimate the the degree of etiological overlap between CU traits and 1) conduct problems, 2) hyperactivity and 3) anxiety.

Method

Sample

- 428 participants from the Developmental Outcomes in a Genetic Twin Study in Sweden (223 pairs; 18 of which are incomplete).
- All twins are same-sex and 15 years old (43% MZ; 42% female).

Measures

CU Traits: *Youth Psychopathy Index, Callous-Unemotional Dimension*, self-report. 15 items, $\alpha = .80$ (ex. *I usually feel calm when other people are scared*)

Externalizing and internalizing problems: *Strengths and Difficulties Questionnaire*, self-report:

- Conduct problems. 5 items, $\alpha = .49$ (ex. *I get very angry and often lose my temper*)
- Hyperactivity. 5 items, $\alpha = .75$ (ex. *I am constantly fidgeting or squirming*)
- Anxiety. 5 items, $\alpha = .72$ (ex. *I worry a lot*)

Data Analysis

First step: ACE modeling

- Estimation of the etiological contribution of genetic (A), shared environment (C) and unique environment (E) influences.
- Univariate models were performed for CU traits, conduct problems, hyperactivity and anxiety.

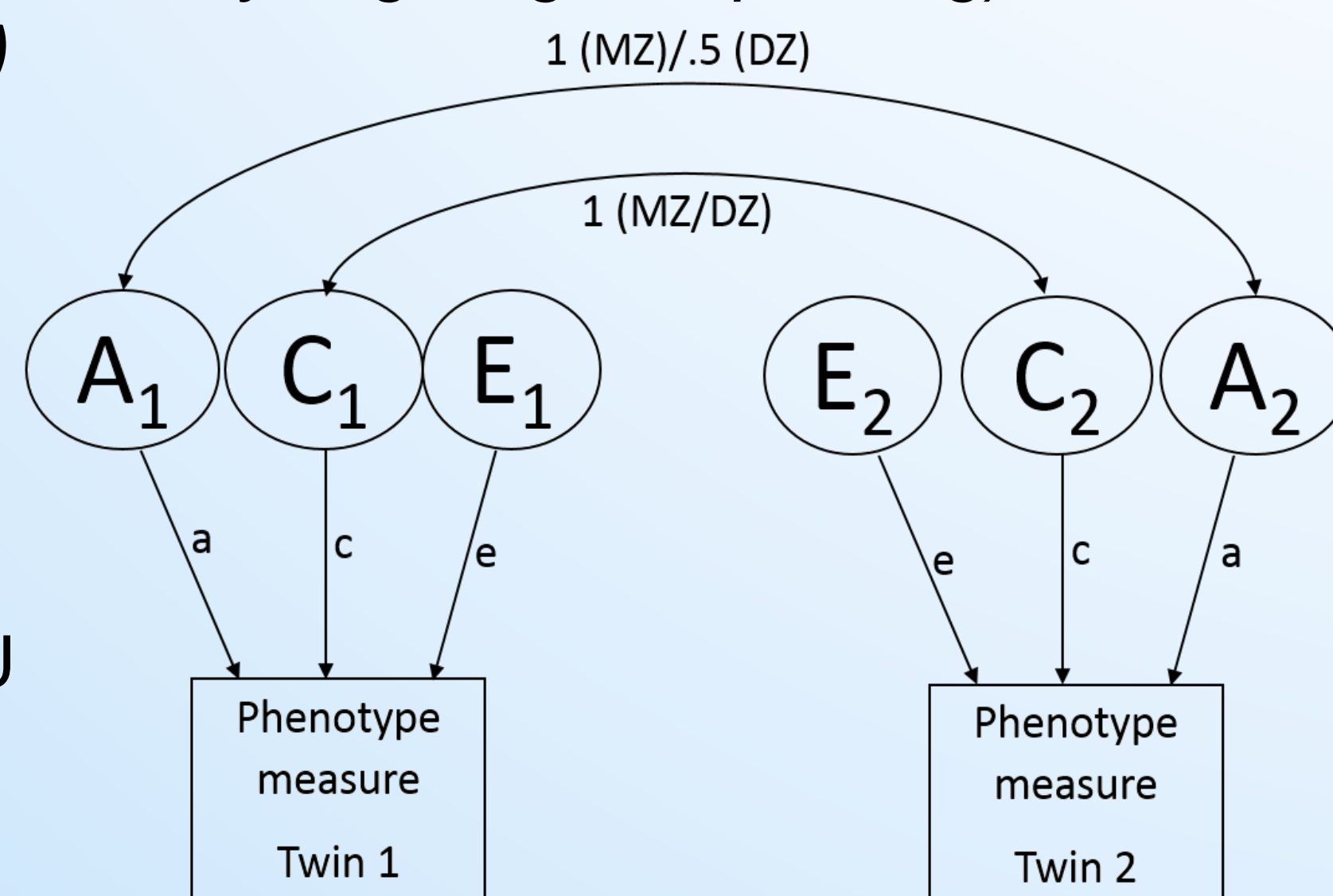


Figure 1. ACE model

Second step: Cholesky decompositions

- Estimation of the degree to which each ACE factor overlaps between two disorders, indicating level of shared variance.
- Bivariate models were performed for CU traits and conduct problems, CU traits and hyperactivity and CU traits and anxiety.

Results

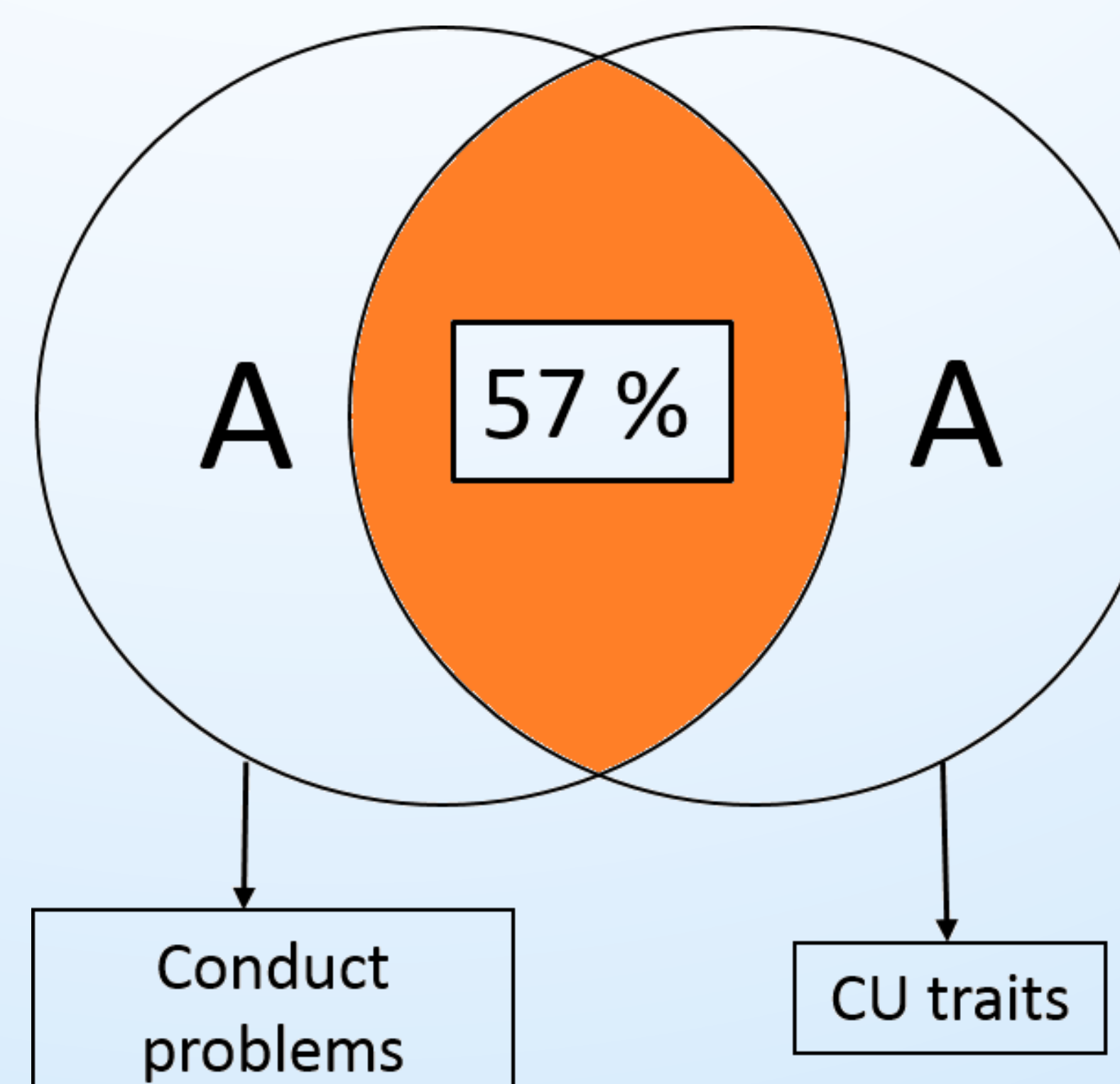
Table 1. Best fit models for CU traits, conduct problems, hyperactivity and anxiety

Behaviours	Best fit model	A	C	E
CU traits	AE	.63	--	.37
Conduct problems	ACE	.27	.16	.58
Hyperactivity	AE	.36	--	.64
Anxiety	ACE	.38	.14	.48

Table 2. Genetic correlations between CU traits and conduct problems, hyperactivity and anxiety

	CU traits
	r_A (95% CI)
Conduct problems	0.75 (0.39 – 1.00)
Hyperactivity	0.34 (0.12 – 0.59)
Anxiety	-0.29 (-1.00 – -0.07)

Figure 1. Genetic variance overlap between CU traits and conduct problems



Results

Figure 2. Genetic variance overlap between CU traits and hyperactivity

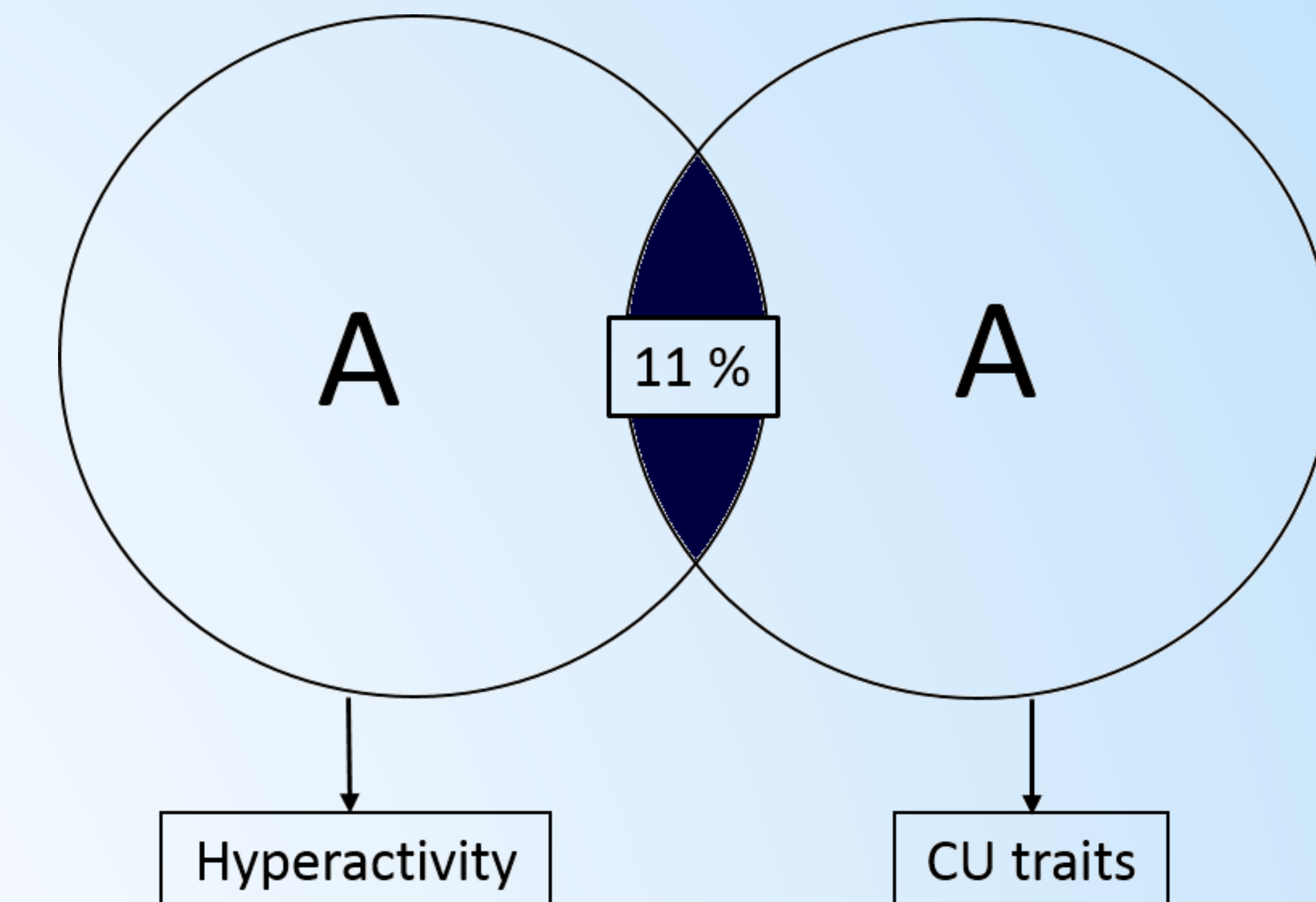
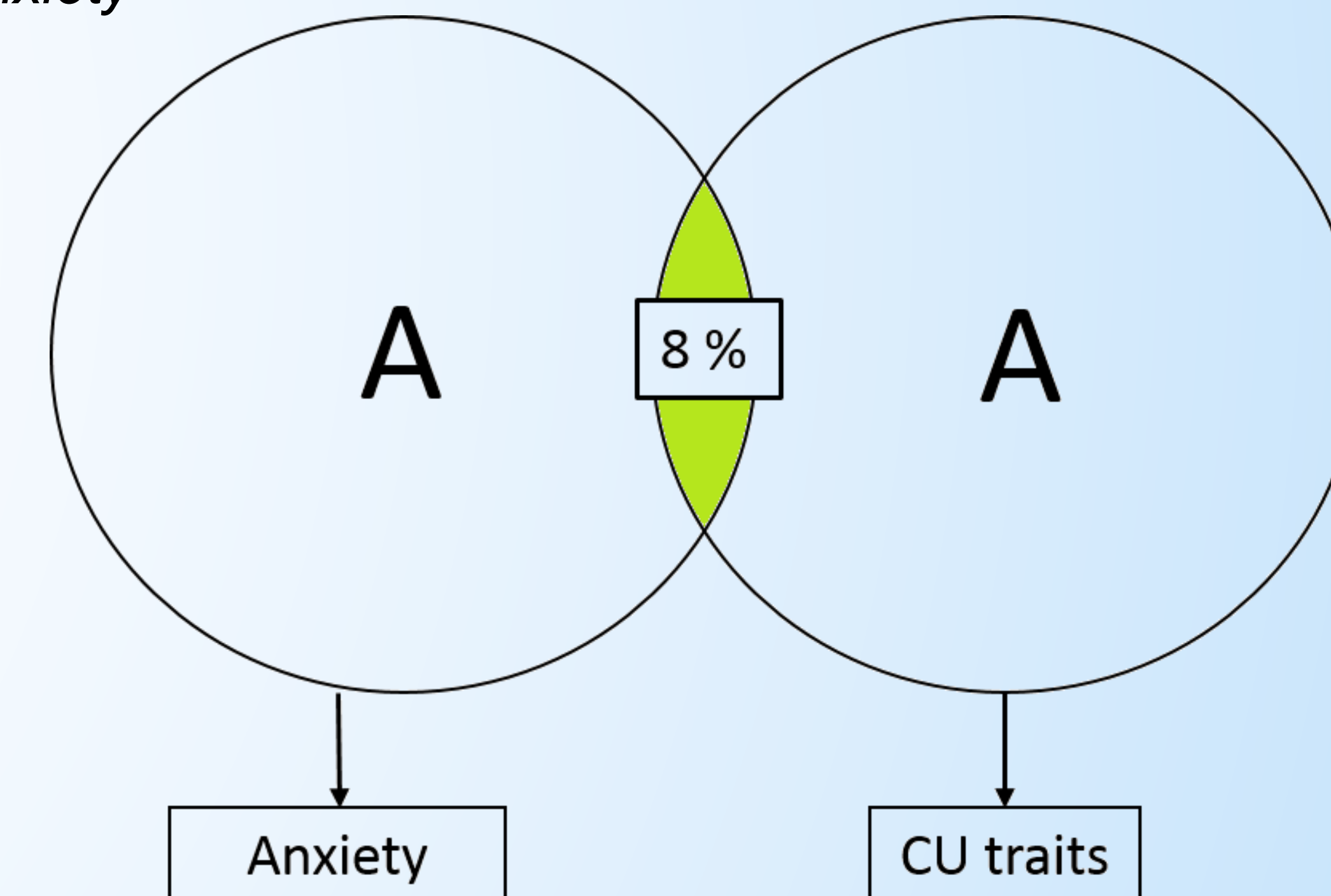


Figure 3. Genetic variance overlap between CU traits and anxiety



Discussion

Shared etiology between CU traits and conduct problems

- A strong genetic correlation was found between CU traits and conduct problems, confirming previous studies.

CU traits and hyperactivity: comorbid but etiologically different

- While hyperactivity and CU traits are correlated, the small genetic overlap suggests that they are etiologically distinct disorders.

Do CU traits and anxiety protect against each other?

- Negative correlation indicates that the manifestation of one behaviour *decreases* the risk of the other
- In line with previous findings showing low levels of anxiety in people with high levels of psychopathic traits.

Genetic does not imply destiny

- A genetically-influenced disorder can nonetheless be treated. (ex. Social skills training)