Personality and health: A problem of convergent-discriminant validity

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Personality and health
A problem of convergent-discriminant validity

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Bad traits kill you ... or, then, maby not

Bad personality makes you sick
And then kills

• If you score low on **Emotional stability** and **Conscientiousness**
  • Smoking, drinking, physical inactivity, poor diet
  • High BMI, elevated inflammation, metabolic syndrome, diabetes, cardiovascular disease, sexually transmitted disease etc.
  • Death

• Low **intelligence** is no better

Terracciano and Costa, 2004; Malouff et al., 2007; Rhodes and Smith, 2006; Mõttus et al., 2 x in press; Mõttus et al., in revision; Sutin et al. (2011), Sutin et al., 2010, 2010 and 2011, Goodwin and Friedman, 2006; Mõttus et al., in press; Kern and Friedman, 2008
But the effects are often really tiny
I mean, really tiny. Or they aren’t there at all

Inflammatory markers:

• **Neuroticism** and **Conscientiousness** correlated to **IL-6**:
  • $r = 0.04$ and $-0.07$ ($p < 0.01$; $N = 5,000$; Sutin et al., 2010)
  • Small studies have stronger effects (up to $r = .40$) but for different traits (Openness)

• Age-11 **intelligence** and age-45 inflammatory markers:
  • $r = -0.01$ to $-0.06$ ($p < 0.01$; $N = 9,400$; Calvin et al., 2011)

• Traits account for **less than 0.5% of variance** in inflammation
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Maybe that’s OK
Did we really expect to do better?

- There is probably about $e^6$ reasons why a particular bad health condition comes about
- Often probably idiosyncratic
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An example

Another example

Conclusion

**But maybe stronger effects are sometimes just masked**

Maybe bad is not bad for everyone

- Let’s assume that traits influence health via health-related life-style choices and health-care
- Then maybe:
  - If your body is not inherently liable to a particular health issue, the personality-related behavioural choices may be less relevant (e.g., genes x trait interactions)
  - In an environment that facilitates health-care, you may have to invest less personal effort in keeping healthy compared to an adverse environment (e.g., SES x trait interactions)
  - If your body is young, the bad choices may have had less time to have an effect compared to when it is old (age x trait interactions)
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Could be built into our hypotheses

- Why not specify **when** these associations are **more** and when **less** likely to happen?
- Akin to the convergent-discriminant validity concept
Inherent vulnerability for diabetes

Is it especially bad if you have bad genes AND low IQ?

- Diabetes and related traits may be linked to low intelligence
- Can genetic risk for type 2 diabetes moderate the associations?
  - When the risk is higher, low IQ and the behaviours it entails are more consequential?
  - When the risk is lower, IQ may matter less
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Genetic risk X IQ interaction
Lothian Birth Cohort 1936; 1,004 people at age 70 (86 with diabetes)

- Childhood intelligence predicting diabetes and related traits
  - Glycated hemoglobin (HbA1C), body mass index (BMI)

- Polygenic risk scores for Type 2 diabetes
  - Based on Type 2 Diabetes GWAS consortium findings (Voight et al., 2010) ¹
  - Using all available SNPs, regardless of the ‘significance’ of the associations with Type 2 Diabetes
  - Using SNPs that had associations with T2D at various levels of significance (p < 0.5, 0.4, 0.3, 0.2, 0.1, 0.05, 0.01)

¹ Calculated by Michelle Luciano
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Predictors of self-reported diabetes

• The eight risk scores, main effects: $OR = 1.61$ to $1.90$ ($p < 0.001$)
• Age 11 IQ main effects: $OR = 0.72$ to $0.81$ (mostly significant)

• Interactions: $p = 0.07$ to $0.26$
  • Basically non-significant, that is
• Genetic risk groups (median-split on the all-SNP risk score)
  • Low genetic risk: the effect of age 11 IQ: $OR = 0.81$ ($p = 0.27$)
  • High genetic risk: the effect of age 11 IQ: $OR = 0.67$ ($p = 0.002$)
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An example

Another example

Conclusion

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Support for genetic risk moderating intelligence-diabetes risk associations?
   Possibly

• Results inconsistent in terms of significance but consistent in terms of pattern
• That is, such studies need large samples
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Number of natural teeth in older age

A marker of health and life-long health care

• Low Emotional stability and Conscientiousness might predict poorer oral health
  • Only Conscientiousness did

• The associations might be moderated by SES
  • In ‘good’ environments (regular brushing, flossing and dental checks normative) people may just get carried along
  • In ‘worse’ environments stronger personal effort is needed to carry on regular day-to-day oral care
  • Personality traits (high conscientiousness) may give a relatively bigger advantage in worse environments

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Thank you

Michelle Luciano, Ian J. Deary, Mark McCarthy, John M. Starr

MAGIC and DIAGRAM consortia