Personality and health: A problem of convergent-discriminant validity

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Bad traits kill you ...

... or, then, maby not

An example

Another example

Conclusion

Personality and health
A problem of convergent-discriminant validity

René Mõttus

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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
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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
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
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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)

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- 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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• Genetic risk groups
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Support for genetic risk moderating intelligence-diabetes risk associations?

Possibly

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• That is, such studies need large samples
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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