Personality and health: A problem of convergent-discriminant validity

Citation for published version:

Link:
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Document Version:
Peer reviewed version

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Personality and health
A problem of convergent-discriminant validity

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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
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 $r = 0.40$) 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
Bad traits kill you ...

... or, then, maby not

An example

Another example

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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
Bad traits kill you ...
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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)

¹ Calculated by Michelle Luciano
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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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• Interactions: $p = 0.02$ to $0.43$
  • all $p$s $< 0.05$ except for the two least-SPN-inclusive risk scores
• Genetic risk groups
  • Low genetic risk: the effect of age 11 IQ: $\beta = -0.11$ ($p < 0.05$)
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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

Mõttus, Starr, & Deary (in press; Health Psychol)
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Thank you

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

MAGIC and DIAGRAM consortia