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TITLE: Two genetic analyses to elucidate causality in the associations between body mass index and psychological traits

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KEYWORDS: direction of causation, allele score, personality, Mendelian randomization, nuances

ABSTRACT:

Background/Objectives: Many personality traits correlate with BMI, but the existence and direction of causal links between them have are unclear. If personality influences BMI, knowing causal direction could inform weight management strategies. If BMI instead influences personality, knowing this would contribute to a better understanding of the effects of weight change and the mechanisms of personality development.

Subjects/Methods: We employed two genetically informed methods. In Mendelian randomization (N=3,541 from Estonian Biobank) , allele scores for personality traits Neuroticism, Worry, and Depressive Affect were set to predict BMI. Similarly, allele score for BMI was used to predict eating-specific and domain-general phenotypic personality traits. PPS-s are aggregate scores of NEO PI-R personality traits weighted by BMI. In Direction of Causation, twin data from five countries (N=5,424) were used to assess the fit of alternative causal models: PPSs influencing BMI, BMI influencing PPSs, reciprocal causation, and no causation.

Results: In Mendelian randomization, the allele score for BMI predicted domain-general (β=0.04, *P*=.022) and eating-specific PPS-s (β=0.04, *P*=.012). In reverse, only the allele score for Worry predicted BMI (β=-0.07, *P*<.001). In Direction of Causation, BMI similarly predicted domain-general (β=0.21, *P*<.001) and eating-specific PPS-s (β=0.19,

P<.001). In exploratory analyses, causal links between BMI and domain-general personality traits appeared reciprocal for higher-weight individuals (BMI>~25).

Conclusions: Results suggest an influence of BMI on personality; influences of personality on BMI appear limited. Centering weight management interventions around personality may therefore not provide additional benefits, but maintaining or achieving normal-range weight may contribute to a more favorable personality profile.

https://osf.io/preprints/nutrixiv/q8ehr/

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