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Bidirectional Mendelian randomization study reveals causal effects of psychosocial factors on chronic back pain and vice versa

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Motivation and Aim: Risk factors for chronic back pain (CBP) are difficult to study utilizing traditional approaches due to shared genetic background [1]. We performed a bidirectional Mendelian randomization (MR) study to examine causal relationships between risk factors (education, smoking, alcohol intake, exercises, sleep and depression) and CBP.

Methods and Algorithms: We identified instrumental variables for risk factors and CBP from the largest published genome-wide association studies of these traits conducted in Europeans. We carried out inverse weighted variance meta-analysis (IVW) [2], Causal Analysis Using Summary Effect (CAUSE) [3] and sensitivity analyses to investigate the evidence for causality. We interpreted the exposure-outcome associations as being consistent with a hypothesis of causality if results of IVW or CAUSE were statistically significant after correction for multiple testing ($p < 0.003$), and the direction and magnitude of effect were concordant between IVW, CAUSE, and sensitivity analyses.

Results: We observed statistically significant causal associations between years of schooling (OR = 0.54 per increase of ~4 years of schooling), ever smoking (OR = 1.27), alcohol consumption (OR = 1.29) and major depressive disorder (OR = 1.41) and the CBP risk. We also detected a significant causal effect of CBP on greater alcohol consumption (OR = 1.19) and smoking (OR = 1.21).

Conclusion: Thus, fewer years of education, smoking, greater alcohol intake, and depression increase CBP risk. CBP increases the risk of greater alcohol intake and smoking.

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