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Shared genetics of asthma and mental health disorders: a large-scale genome-wide cross-trait analysis

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ABSTRACT Epidemiological studies demonstrate an association between asthma and mental health disorders, although little is known about the shared genetics and causality of this association. Thus, we aimed to investigate shared genetics and the causal link between asthma and mental health disorders.

We conducted a large-scale genome-wide cross-trait association study to investigate genetic overlap between asthma from the UK Biobank and eight mental health disorders from the Psychiatric Genomics Consortium: attention deficit hyperactivity disorder (ADHD), anxiety disorder (ANX), autism spectrum disorder, bipolar disorder, eating disorder, major depressive disorder (MDD), post-traumatic stress disorder and schizophrenia (sample size 9537–394 283).

In the single-trait genome-wide association analysis, we replicated 130 previously reported loci and discovered 31 novel independent loci that are associated with asthma. We identified that ADHD, ANX and MDD have a strong genetic correlation with asthma at the genome-wide level. Cross-trait meta-analysis identified seven loci jointly associated with asthma and ADHD, one locus with asthma and ANX, and 10 loci with asthma and MDD. Functional analysis revealed that the identified variants regulated gene expression in major tissues belonging to the exocrine/endocrine, digestive, respiratory and haemic/immune systems. Mendelian randomisation analyses suggested that ADHD and MDD (including 6.7% sample overlap with asthma) might increase the risk of asthma.

This large-scale genome-wide cross-trait analysis identified shared genetics and potential causal links between asthma and three mental health disorders (ADHD, ANX and MDD). Such shared genetics implicate potential new biological functions that are in common among them.