

# Childhood Asthma and Type 1 Diabetes Mellitus: A Meta-analysis and Bidirectional Mendelian Randomization Study

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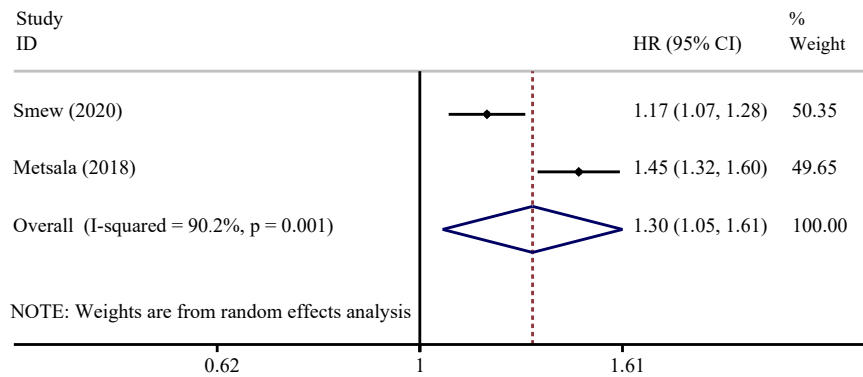
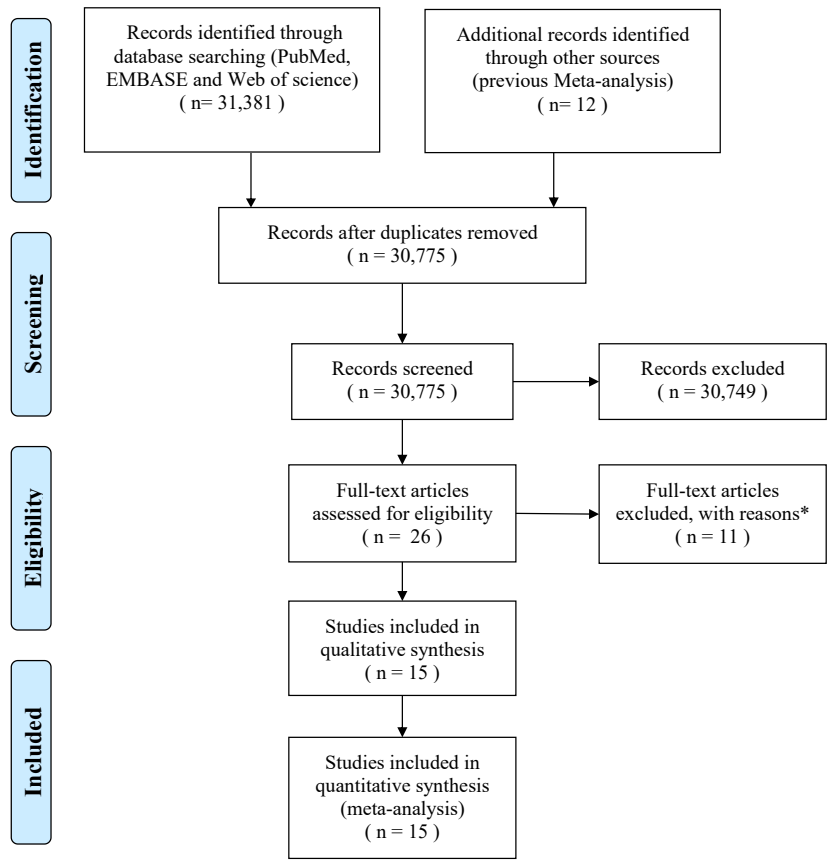
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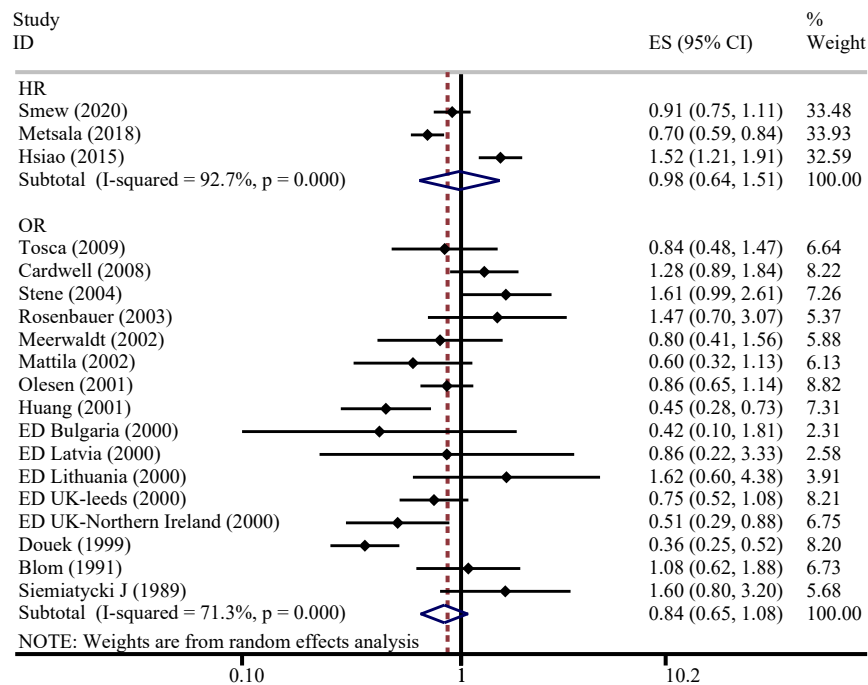
## Abstract

**Background:** World-wide incidence and prevalence of both asthma and type 1 diabetes mellitus (T1DM) in children has been increasing in past decades. Association between the two diseases has been found in some but not other studies. **Objective:** We conducted a meta-analysis to verify such an association, and bidirectional Mendelian randomization analysis to examine the potential cause-effect relationships. **Methods:** Three databases (PubMed, Embase and Web of Science) were searched from their inception to February 1, 2021. Pooled hazard ratios (HR) or odds ratios (OR), and 95% confidence intervals, were calculated. Associations between single-nucleotide polymorphisms with childhood asthma and T1DM were selected based on genome-wide association studies. The outcome datasets were obtained from FinnGen study. We used the inverse variance-weighted, weighted median and MR-Egger methods to estimate causal effects. To assess robustness and horizontal pleiotropy, MR-Egger regression and MR pleiotropy residual sum and outlier test was conducted. **Results:** In meta-analysis, childhood asthma was associated with an increased risk of T1DM (HR=1.30, 95% CI 1.05-1.61, P=0.014), whereas T1DM was not associated with the risk of asthma (HR=0.98, 95% CI 0.64-1.51, P=0.941; OR=0.84, 95% CI 0.65-1.08, P=0.168). MR analysis indicated increased genetic risk of T1DM in children with asthma (OR=1.308; 95% CI 1.030-1.661; P =0.028). Analysis using the IVW method indicated not associated between T1DM and genetic risk of asthma (OR=1.027, 95%CI 0.970-1.089, P=0.358). **Conclusion:** Both meta-analysis and MR study suggested that childhood asthma was a risk factor for T1DM. No epidemiological or genetic evidence for an association of T1DM with asthma incidence. Further studies could be carried out to leverage this newfound insight into better clinical and experimental research in asthma and T1DM. Further studies could be carried out to leverage this newfound insight into better clinical and experimental research in asthma and T1DM.

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