Compared MR methods Summary-level data-based MR methods 1. IVW-class 2. Outlier detection and removal IVW (fixed) MR-PRESSO IVW (random) cML-MA MR-Lasso 3. Model-based Egger RAPS 4. Outlier robust CAUSE MR-Robust. MR-APSS Weighted-median MRMix Weighted-mode MR-ConMix MRCUE

Confounding scenario (a)

Population stratification

Dataset

1130 exposure-outcome trait pairs

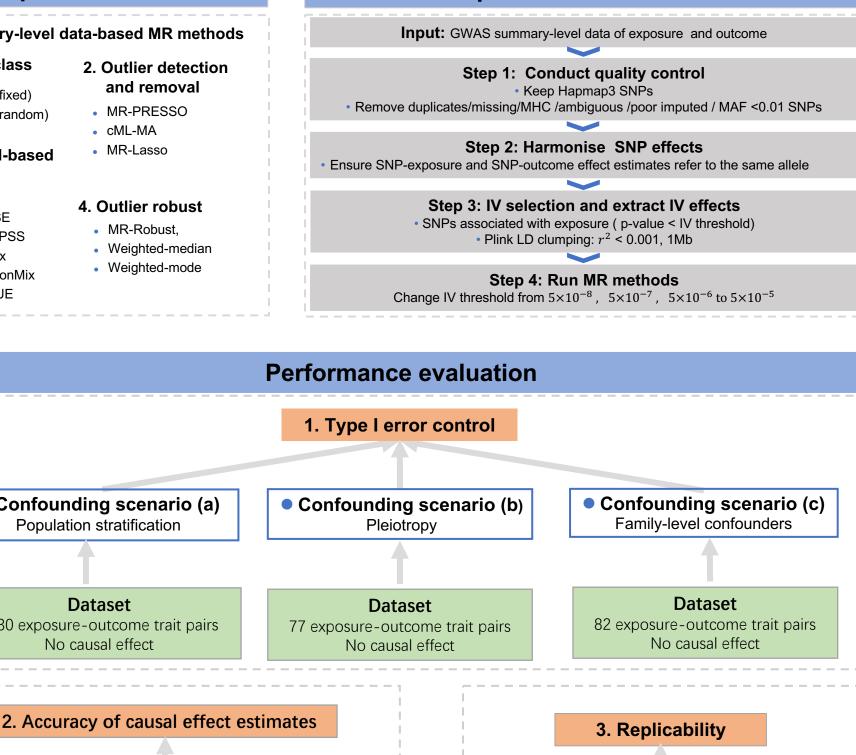
No causal effect

Dataset

Six exposure-outcome pairs

True casual effect = 1

B



Case study

LDL-C (six GWASs) and CAD

Steps of run MR methods