

Supplementary Table S3. Quality control and inclusion criteria

Study	Genotyping platform(s)	Genotype calling algorithm	Genotyping center	Call rate (%)	MAF (%)
Discovery					
RS-I	Illumina HumanHap 550K V.3 Duo	BeadStudio	Genetic Lab, Department Internal Medicine, Erasmus MC, NL	≥ 98%	≥ 1%
RS-II	Illumina HumanHap 550K V.3 Duo	BeadStudio	Genetic Lab, Department Internal Medicine, Erasmus MC, NL	≥ 98%	≥ 1%
RS-III	Illumina HumanHap 610-Quad V1	BeadStudio	Genetic Lab, Department Internal Medicine, Erasmus MC, NL	≥ 98%	≥ 1%
Replication					
TwinsUK	HumanHap610Q, 1M-Duo, and 1.2M-Duo	Illuminus (1)	Wellcome Trust Sanger Institute, Hinxton, UK Genetic Lab,	≥ 98%	≥ 1%
Leiden Hand OA Studies	Illumina Infinium 660W-Quad	Beadstudio	Department Internal Medicine, Erasmus MC, NL	≥ 99%	≥ 5%
Framingham Heart Study	Affymetrix 500K Dual GeneChip+50K gene-centered MIP set	BRLMM	Affymetrix	≥ 97%	≥ 1%

HWE P-value	SNPs meeting inclusion criteria	Other criteria
$\geq 10^{-6}$	512,349	
$\geq 10^{-6}$	466,389	1) sex mismatch with typed X-linked markers, 2) excess autosomal heterozygosity $> 0.336 \sim \text{FDR} > 0.1\%$, 3) duplicates and/or first or second degree relatives using IBS probabilities $> 97\%$ from PLINK, 4) ethnic outliers using IBS distances $> 3\text{SD}$ from PLINK
$\geq 10^{-6}$	517,658	
$\geq 10^{-6}$	303,940	1) Autosomal heterozygosity $\geq 2 \text{SD}$ from mean, 2) non-European ancestry from PCA with HapMap3 populations, 3) sample mismatch based on IBD probabilities
$\geq 10^{-4}$	-	1) QT_assoc was applied to correct for familial dependence; H. W. Uh et al., Genotype-Based Score Test for Association Testing in Families. Stat Biosci. 2015;7(2):394-416. PMID26473021
$\geq 10^{-6}$	412,053	1) SNPs missing physical locations or not mapping to Build 37 locations; 2) SNPs with Mendelian errors greater than 1000; 3) SNPs not mapping to chromosomes 1-22 or X; 4) Duplicate SNPs

Imputation	Imputation backbone
MACH/Minimac	1000G V3. reference panel
MACH/Minimac	1000G V3. reference panel
MACH/Minimac	1000G V3. reference panel
IMPUTE	1000G V3. reference panel
IMPUTE	1000G V3. reference panel
MACH/Minimac	1000G V3. reference panel