Genetic and environmental influences on the correlations between traits of metabolic syndrome and chronic kidney disease

Supplemental Table 1. Equation to calculate the estimated glomerular filtration rate (eGFR, mL/min/1.73m^2)

Supplemental Table 2. Bivariate decomposition analyses in twin study

Supplemental Figure 1. Spearman correlation matrix

Supplemental Table 1. Equation to calculate estimated glomerular filtration rate (eGFR, mL/min/1.73m2)

Year. Equation	Male		Female	
2012. CKD-EPI$_{CysC}$	$S_{CysC} \leq 0.8$:	$133 \times (S_{CysC}/0.8)^{-0.499} \times 0.996^{Age}$	$S_{CysC} \leq 0.8$:	$133 \times (S_{CysC}/0.8)^{-0.499} \times 0.996^{Age} \times 0.932$
	$S_{CysC} > 0.8$:	$133 \times (S_{CysC}/0.8)^{-1.328} \times 0.996^{Age}$	$S_{CysC} > 0.8$:	$133 \times (S_{Cys}C/0.8)^{-1.328} \times 0.996^{Age} \times 0.932$

S_{CysC}: serum cystatin C (mg/L); CKD-EPI: equations from Chronic Kidney Disease Epidemiology Collaboration.

Supplemental Table 2. Bivariate decomposition analyses in twin study

Correlated pairs (Best-fitted model)	rP (se)	Biv a² (se)	Biv d² (se)	Biv c² (se)	Biv e² (se)	rA (se)	rE (se)
CKD — Metabolic syndrome (ACE)	**0.16** (0.02)	**51%** (20%)	-	15% (14%)	**34%** (9%)	**0.29** (0.11)	**0.27** (0.07)
Pairs between eGFR and continuous traits of metabolic syndrome							
eGFR — Waist circumference (ADE)	**-0.19** (0.01)	**56%** (25%)	16% (26%)	-	**28%** (6%)	**-0.34** (0.15)	**-0.14** (0.03)
eGFR — Triglycerides (ADE)	**-0.20** (0.01)	**44%** (23%)	2% (25%)	-	**54%** (6%)	**-0.22** (0.11)	**-0.25** (0.03)
eGFR — HDL (ADE)	**0.22** (0.01)	**53%** (21%)	7% (22%)	-	**40%** (5%)	**0.24** (0.09)	**0.24** (0.03)
eGFR — Abdominal obesity (ADE)	**-0.16** (0.01)	**69%** (30%)	8% (32%)	-	**23%** (9%)	**-0.30** (0.12)	**-0.14** (0.04)
eGFR — High triglycerides (ACE)	**-0.15** (0.01)	**44%** (15%)	-	23% (11%)	**33%** (7%)	**-0.21** (0.07)	**-0.25** (0.04)
eGFR — Low HDL (ACE)	**-0.18** (0.01)	**45%** (14%)	-	15% (21%)	**40%** (6%)	**-0.22** (0.07)	**-0.31** (0.04)
eGFR — Dyslipidemia (ADE)	**-0.19** (0.01)	**46%** (20%)	12% (22%)	-	**42%** (6%)	**-0.22** (0.10)	**-0.28** (0.04)
eGFR — Metabolic syndrome (ADE)	**-0.18** (0.01)	**51%** (21%)	13% (23%)	-	**36%** (6%)	**-0.23** (0.10)	**-0.24** (0.04)

Twin-based structural equation model is performed in 4721 complete twin pairs (1327 monozygotic, 1780 same-sex dizygotic and 1614 opposite-sex dizygotic pairs). The estimated glomerular filtration rate (eGFR) in this table is calculated from cystatin C-based equation from the Chronic Kidney Disease Epidemiology (CKD-EPI) Collaboration group; and chronic kidney disease (CKD) is defined as eGFR <60 mL/min/1.73m^2. The best-fitted model is defined according to the Akaike information criterion, ADE model (including additive and dominant genetic components, as well as unique environmental component), ACE model (including additive genetic component, shared and unique environmental components). rP: phenotypic correlation coefficient; se: standard error; Biv a^2: bivariate additive genetic variance (bivariate narrow-sense heritability); Biv d^2: bivariate dominant genetic variance; Biv c^2: bivariate common environmental variance; rA: additive genetic correlation coefficient; rE: non-shared/unique environmental correlation coefficient. HDL: high-density lipoprotein; Metabolic syndrome is defined by the National Cholesterol Education Program-Adult Treatment Panel III guideline; significant estimates are in bold (P-value<0.05).

Supplemental Figure 1. Spearman correlation matrix. The strength of the correlation is presented in color gradient, estimates of the spearman correlation coefficients are presented in the box, with bold numbers indicate the statistically significance (P-value<0.05).

	eGFR Creatinine	eGFR Creatinine+Cystatin C	eGFR Cystatin C	CKD Creatinine	CKD Creatinine+Cystatin C	CKD Cystatin C	CKD All
Waist circumference	0.03	-0.11	-0.19	0.03	0.07	0.10	0.03
Fasting glucose	0.07	0.02	-0.02	-0.02	0.00	0.00	-0.02
Triglyceride	-0.01	-0.14	-0.20	0.07	0.11	0.13	0.07
High-density lipoprotein	0.04	0.17	0.22	-0.05	-0.10	-0.14	-0.06
Systolic blood pressure	0.05	0.03	0.00	-0.02	-0.02	0.00	-0.01
Diastolic blood pressure	0.03	0.02	0.01	-0.03	-0.02	-0.01	-0.02
Abdominal Obesity	0.03	-0.09	-0.16	0.03	0.07	0.10	0.02
Hyperglycemia	0.06	0.01	-0.03	0.02	0.05	0.07	0.03
High triglyceride	-0.01	-0.11	-0.15	0.07	0.11	0.12	0.08
Low HDL	-0.03	-0.14	-0.18	0.06	0.11	0.14	0.07
Dyslipidemia	-0.02	-0.14	-0.19	0.07	0.12	0.14	0.09
Hypertension	0.02	-0.03	-0.06	0.10	0.12	0.15	0.10
Metabolic syndrome	0.02	-0.11	-0.18	0.06	0.12	0.16	0.07

Spearman Rho

-0.25
-0.20
-0.15
-0.10
-0.05
0.00
0.05
0.10
0.15
0.20
0.25