

Supplemental Materials

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Table S1 Spearman correlations among different predicted body composition parameters

| | WC | HC | WHR | BMI | FM | LM | PF |
|-------|------|------|------|------|------|------|------|
| Men | | | | | | | |
| WC | 1.00 | 0.77 | 0.80 | 0.79 | 0.98 | 0.52 | 0.97 |
| HC | | 1.00 | 0.28 | 0.76 | 0.82 | 0.71 | 0.69 |
| WHR | | | 1.00 | 0.51 | 0.72 | 0.15 | 0.84 |
| BMI | | | | 1.00 | 0.88 | 0.69 | 0.75 |
| FM | | | | | 1.00 | 0.66 | 0.92 |
| LM | | | | | | 1.00 | 0.35 |
| PF | | | | | | | 1.00 |
| Women | | | | | | | |
| WC | 1.00 | 0.83 | 0.74 | 0.76 | 0.83 | 0.62 | 0.84 |
| HC | | 1.00 | 0.28 | 0.79 | 0.87 | 0.74 | 0.78 |
| WHR | | | 1.00 | 0.39 | 0.42 | 0.29 | 0.53 |
| BMI | | | | 1.00 | 0.94 | 0.63 | 0.95 |
| FM | | | | | 1.00 | 0.83 | 0.89 |
| LM | | | | | | 1.00 | 0.51 |
| PF | | | | | | | 1.00 |

BMI, body mass index; FM, fat mass; HC, hip circumference; LM, lean mass; PF: percent fat; WC, waist circumference; WHR, waist-hip ratio

All correlations were significant with $p < 0.05$.

Table S2 Category boundaries of all the body composition parameters

| | Men (n = 399) | | | Women (n = 288) | | |
|--------------------------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
| | Tertile 1 (n = 132) | Tertile 2 (n = 131) | Tertile 3 (n = 136) | Tertile 1 (n = 95) | Tertile 2 (n = 95) | Tertile 3 (n = 98) |
| FM (kg) | < 11.088 | 11.088 - 15.650 | > 15.650 | < 17.478 | 17.478 - 21.573 | > 21.573 |
| LM (kg) | < 46.377 | 46.377 - 50.377 | > 50.377 | < 32.867 | 32.867 - 35.735 | > 35.735 |
| PF (%) | < 20.622 | 20.622 - 23.304 | > 23.304 | < 35.402 | 35.402 - 37.630 | > 37.630 |
| BMI (kg/m ²) | < 21.800 | 21.800 - 24.500 | > 24.500 | <22.200 | 22.200 - 24.700 | > 24.700 |
| WC (cm) | < 75.000 | 75.000 - 82.000 | > 82.000 | < 71.000 | 71.000 -76.000 | > 76.000 |
| HC (cm) | < 90.000 | 90.000 - 94.000 | > 94.000 | < 90.000 | 90.000 - 95.000 | > 95.000 |
| WHR | < 0.841 | 0.841 - 0.879 | > 0.879 | < 0.773 | 0.773 - 0.814 | > 0.814 |

BMI, body mass index; FM, fat mass; HC, hip circumference; LM, lean mass; PF: percent fat; WC, waist circumference; WHR, waist-hip ratio

Table S3 Univariable Cox regression analysis for DM

| Variable | Change | HR | 95% CI | p |
|--------------------------|-------------------|--------|-------------|---------|
| Men | | | | |
| Age (years) | 1-SD increment | 1.05 | 0.996-1.10 | 0.072 |
| Smoking (%) | Yes vs no | 0.79 | 0.44-1.45 | 0.448 |
| Hypertension (%) | Yes vs no | 1.36 | 0.66-2.81 | 0.406 |
| DM family history (%) | Yes vs no | 0.44 | 0.14-1.40 | 0.163 |
| SBP (mm Hg) | 1-SD increment | 1.02 | 0.998-1.036 | 0.076 |
| DBP (mm Hg) | 1-SD increment | 1.02 | 0.998-1.052 | 0.234 |
| FPG (mmol/L) | 1-SD increment | 1.78 | 1.26-2.52 | 0.001 |
| TC (mmol/l) | 1-SD increment | 1.15 | 0.79-1.66 | 0.476 |
| TG (mmol/L) | 1-SD increment | 1.16 | 0.91-1.47 | 0.248 |
| HDL-C (mmol/L) | 1-SD increment | 0.57 | 1.16-2.00 | 0.376 |
| LDL-C (mmol/L) | 1-SD increment | 1.04 | 0.73-1.48 | 0.818 |
| Height (cm) | 1-SD increment | 1.01 | 0.96-1.06 | 0.834 |
| Weight (cm) | 1-SD increment | 1.07 | 1.04-1.11 | < 0.001 |
| BMI (kg/m ²) | 1-SD increment | 1.23 | 1.13-1.33 | < 0.001 |
| WC (cm) | 1-SD increment | 1.09 | 1.05-1.13 | < 0.001 |
| HC (cm) | 1-SD increment | 1.09 | 1.05-1.14 | < 0.001 |
| WHR | 0.01-SD increment | 1.09 | 1.04-1.15 | < 0.001 |
| FM (kg) | 1-SD increment | 1.16 | 1.09-1.22 | < 0.001 |
| LM (kg) | 1-SD increment | 1.10 | 1.04-1.17 | 0.002 |
| PF (%) | 1-SD increment | 1.23 | 1.13-1.34 | < 0.001 |
| Women | | | | |
| Age (years) | 1-SD increment | 1.04 | 0.98-1.11 | 0.161 |
| Smoking (%) | Yes vs no | 20.306 | -- | 0.771 |

| | | | | |
|--------------------------|-------------------|-------|------------|---------|
| Hypertension (%) | Yes vs no | 2.00 | 0.84-4.76 | 0.116 |
| DM family history (%) | Yes vs no | 0.57 | 0.17-1.88 | 0.353 |
| SBP (mm Hg) | 1-SD increment | 1.02 | 0.999-1.04 | 0.062 |
| DBP (mm Hg) | 1-SD increment | 1.03 | 0.99-1.07 | 0.111 |
| FPG (mmol/L) | 1-SD increment | 1.86 | 1.14-3.03 | 0.013 |
| TC (mmol/l) | 1-SD increment | 1.67 | 1.12-2.50 | 0.012 |
| TG (mmol/L) | 1-SD increment | 1.46 | 1.26-1.69 | < 0.001 |
| HDL-C (mmol/L) | 1-SD increment | 0.081 | 0.01-0.54 | 0.009 |
| LDL-C (mmol/L) | 1-SD increment | 1.05 | 0.67-1.65 | 0.824 |
| Height (cm) | 1-SD increment | 0.91 | 0.84-0.98 | 0.009 |
| Weight (cm) | 1-SD increment | 1.04 | 0.986-1.09 | 0.156 |
| BMI (kg/m ²) | 1-SD increment | 1.27 | 1.10-1.46 | 0.001 |
| WC (cm) | 1-SD increment | 1.11 | 1.06-1.17 | < 0.001 |
| HC (cm) | 1-SD increment | 1.08 | 1.01-1.16 | 0.019 |
| WHR | 0.01-SD increment | 1.17 | 1.09-1.25 | < 0.001 |
| FM (kg) | 1-SD increment | 1.11 | 1.02-1.21 | 0.013 |
| LM (kg) | 1-SD increment | 0.99 | 0.89-1.12 | 0.912 |
| PF (%) | 1-SD increment | 1.38 | 1.19-1.60 | < 0.001 |

BMI, body mass index; DBP, diastolic blood pressure; DM, diabetes mellitus; FPG, fasting plasma glucose; FM, fat mass; HC, hip circumference; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; LM, lean mass; SBP, systolic blood pressure; PF, percent fat; TC, total cholesterol; TG, triglyceride; WC, waist circumference; WHR, waist-hip ratio.

Table S4 Multivariable Cox regression models of commonly used obesity indicators for DM

| | Case (%) | Multivariable hazards regression * | |
|----------------------|-------------|------------------------------------|---------|
| | | HR (95% CI) | p |
| For men | | | |
| BMI | | | |
| per 1-SD increase | | 1.27 (1.16-1.380) | < 0.001 |
| T1 (reference) | 9 (6.87%) | 1 | - |
| T2 | 10 (7.75%) | 1.09 (0.44-2.69) | 0.856 |
| T3 | 29 (20.86%) | 3.90 (1.81-8.37) | < 0.001 |
| p for trend | | | < 0.001 |
| WC | | | |
| per 1-SD increase | | 1.10 (1.07-1.14) | < 0.001 |
| T1 (reference) | 5 (4.03%) | 1 | - |
| T2 | 17 (12.78%) | 3.24 (1.19-8.78) | 0.021 |
| T3 | 26 (18.31%) | 5.97 (2.27-15.71) | < 0.001 |
| p for trend | | | < 0.001 |
| HC | | | |
| per 1-SD increase | | 1.11 (1.06-1.16) | < 0.001 |
| T1 (reference) | 9 (7.03%) | 1 | - |
| T2 | 11 (9.40%) | 1.19 (0.49-2.88) | 0.701 |
| T3 | 28 (18.18%) | 2.87 (1.35-6.08) | 0.006 |
| p for trend | | | 0.004 |
| WHR | | | |
| per 0.01-SD increase | | 1.09 (1.04-1.15) | < 0.001 |
| T1 (reference) | 5 (3.82%) | 1 | - |

| | | | |
|----------------------|-------------|-------------------|---------|
| T2 | 18 (13.85%) | 3.65 (1.35-9.83) | 0.011 |
| T3 | 25 (18.12%) | 5.42 (2.07-14.18) | 0.001 |
| p for trend | | | < 0.001 |
| Women | | | |
| BMI | | | |
| per 1-SD increase | | 1.23 (1.07-1.42) | 0.005 |
| T1 (reference) | 4 (4.40%) | 1 | - |
| T2 | 8 (8.33%) | 1.50 (0.44-5.07) | 0.515 |
| T3 | 14 (13.86%) | 1.64 (0.50-5.36) | 0.413 |
| p for trend | | | 0.712 |
| WC | | | |
| per 1-SD increase | | 1.10 (1.04-1.16) | 0.001 |
| T1 (reference) | 4 (4.26%) | 1 | - |
| T2 | 4 (4.60%) | 0.77 (0.18-3.18) | 0.712 |
| T3 | 18 (16.82%) | 2.54 (0.83-7.78) | 0.104 |
| p for trend | | | 0.051 |
| HC | | | |
| per 1-SD increase | | 1.06 (0.99-1.14) | 0.114 |
| T1 (reference) | 4 (5.06%) | 1 | - |
| T2 | 8 (8.33%) | 1.26 (0.37-4.33) | 0.718 |
| T3 | 14 (12.39%) | 1.52 (0.47-4.92) | 0.481 |
| p for trend | | | 0.768 |
| WHR | | | |
| per 0.01-SD increase | | 1.16 (1.07-1.25) | < 0.001 |
| T1 (reference) | 1 (1.06%) | 1 | - |
| T2 | 5 (5.21%) | 4.54 (0.53-38.91) | 0.168 |

| | | | |
|-------------|-------------|---------------------|---------|
| T3 | 20 (20.41%) | 15.91 (2.10-120.52) | 0.007 |
| p for trend | | | < 0.001 |

*, adjusted for hypertension (yes/no), DM family history (yes/no), smoking (yes/no), alcohol (yes/no), activity (yes/no), TG, TC, HDL-C, LDL-C, and FPG in men; DM family history (yes/no), smoking (yes/no), alcohol (yes/no), activity (yes/no), SBP, TG, TC, HDL-C, and FPG in women

BMI, body mass index; DM, diabetes mellitus; FPG, fasting plasma glucose; HC, hip circumference; HDL-C, high-density lipoprotein cholesterol; HR, hazard ratio; LDL-C, low-density lipoprotein cholesterol; SBP, systolic blood pressure; SD, standard deviation; T, tertile; TC, total cholesterol; TG, triglyceride; WC, waist circumference; WHR, waist-hip ratio

Figure S1 Associations of three novel predicted body composition with risk of DM for men

Restricted cubic splines were used to flexibly models and visualize the relations of different parameters with risk of DM. Hazard ratios are indicated by solid lines and 95% CIs by shaded areas. Reference points were the medians for FM (A; 13.61 kg), LM (B; 48.27 kg), and PF (C; 22.04%), respectively. The dotted line represents HR = 1. Confounders in Table 2 were adjusted.

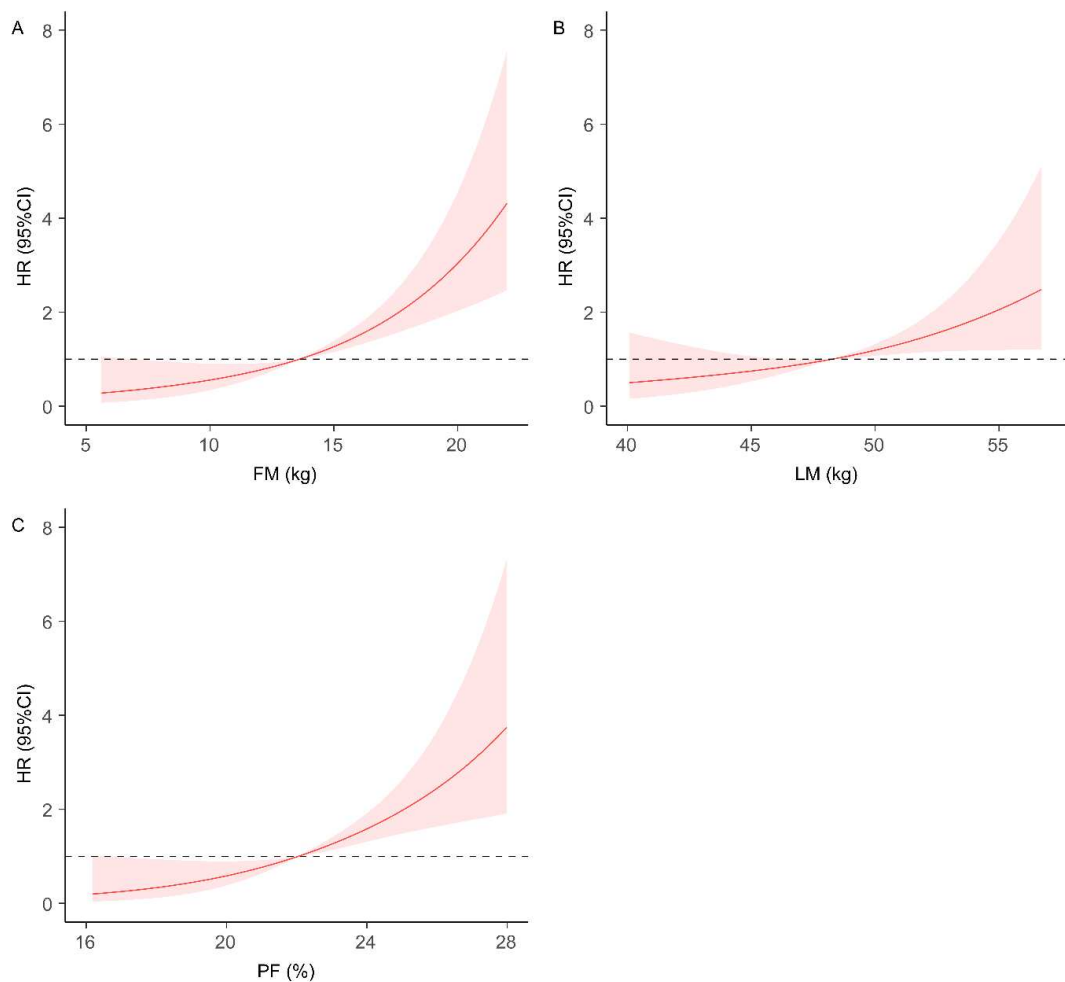


Figure S2 Associations of three novel predicted body composition with risk of DM for women

Restricted cubic splines were used to flexibly model and visualize the relations of different parameters with risk of DM. Hazard ratios are indicated by solid lines and 95% CIs by shaded areas. Reference points were the medians for FM (A; 19.45 kg), LM (B; 34.38 kg), and PF (C; 36.39%), respectively. The dotted line represents HR = 1. Confounders in Table 2 were adjusted.

