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| Supplementary Table 1. Definition of cardiometabolic risk factors |
| Component | Definition |
| Central obesity | Waist circumference ≥ 90th percentile (age and sex specific)\* |
| Dyslipidemia | Triglycerides | ≥ 1.2419 mmol/L (110 mg/dL) |
|  | HDL-C | ≤ 1.03 mmol/L |
| Glucose intolerance | Fasting plasma glucose ≥ 6.1mmol/L |
| High blood pressure | Blood pressure ≥ 90th percentile (age, sex, and height specific) |
| Metabolic syndrome | ≥ 3 of above 5 indicators |
| Waist circumference percentiles were determined from “High waist circumference screening threshold among children and adolescents aged 7～18 years” for Chinese children, and from Anthropometric reference data for children and adults: United States, 2011-2014 for American children. |
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| Supplementary Table 2. Parameters of the receiver operating characteristic (ROC) curves analysis for the diagnostic performance of Tri-ponderal Mass (TMI) in identifying cardiometabolic risks in Chinese and American children. |
| Parameter | Obesity | Dyslipidemia (TG) | Dyslipidemia (HDL-C) | Glucose intolerance | High blood pressure | Metabolic syndrome |
| Boys | Girls | Boys | Girls | Boys | Girls | Boys | Girls | Boys | Girls | Boys | Girls |
| **Chinese population** |  |  |  |  |  |  |  |  |  |  |  |  |
| Area under curve | 0.9470 | 0.8897 | 0.5707 | 0.5460 | 0.5597 | 0.5941 | 0.4915 | 0.6888 | 0.6445 | 0.6001 | 0.8445 | 0.7658 |
| 95% CI | 0.9440,0.9500 | 0.8854,0.8940 | 0.5579,0.5834 | 0.5328,0.5592 | 0.5469,0.5724 | 0.5810,0.6071 | 0.4786,0.5044 | 0.6763,0.7010 | 0.6382,0.6508 | 0.5934,0.6068 | 0.8349,0.8537 | 0.7544,0.7770 |
| Cut-off (value)  | 13.67  | 13.09  | 12.93  | 12.16  | 12.35  | 12.56  | 11.93  | 12.90  | 12.70  | 12.58  | 13.84  | 13.26  |
| Cut-off (percentile)  | 72.1 | 68.0 | 62.1 | 48.1 | 51.1 | 57.4 | 42.5 | 64.3 | 58.4 | 57.9 | 74.1 | 72.9 |
| Sensitivity, % | 87.7  | 79.6  | 45.8  | 56.0  | 54.7  | 53.3  | 62.5  | 62.5  | 57.6  | 53.0  | 79.1  | 69.7  |
| Specificity, % | 88.2  | 81.8  | 67.1  | 50.4  | 54.4  | 59.5  | 44.1  | 65.0  | 63.9  | 60.7  | 79.9  | 73.7  |
| PV (+), % | 66.6  | 55.9  | 30.6  | 32.2  | 16.2  | 14.4  | 0.5  | 0.3  | 35.7  | 26.8  | 23.0  | 14.9  |
| PV (-), % | 96.4  | 93.3  | 79.6  | 73.1  | 88.1  | 90.0  | 99.7  | 99.9  | 81.2  | 82.6  | 98.0  | 97.4  |
| **American population** |  |  |  |  |  |  |  |  |  |  |  |  |
| Area under curve | 0.9780 | 0.9567 | 0.6933 | 0.6196 | 0.7105 | 0.6835 | 0.6204 | 0.5760 | 0.6309 | 0.6266 | 0.9329 | 0.8871 |
| 95% CI | 0.9730,0.9824 | 0.9497,0.963 | 0.6698,0.7162 | 0.5937,0.6450 | 0.6954,0.7252 | 0.6676,0.6990 | 0.5974,0.6430 | 0.5515,0.6002 | 0.6131,0.6485 | 0.6085,0.6445 | 0.9166,0.9469 | 0.8663,0.9056 |
| Cut-off (value)  | 16.74  | 18.50  | 13.78  | 13.79  | 14.21  | 14.95  | 13.51  | 15.90  | 13.93  | 14.72  | 16.21  | 16.45  |
| Cut-off (centile)  | 83.0 | 83.7 | 59.4 | 47.4 | 64.5 | 60.4 | 56.6 | 69.2 | 61.4 | 57.9 | 79.9 | 73.0 |
| Sensitivity, % | 93.3  | 90.4  | 63.7  | 64.3  | 61.7  | 65.7  | 61.7  | 50.0  | 56.8  | 60.0  | 89.7  | 90.5  |
| Specificity, % | 92.4  | 90.0  | 70.7  | 53.2  | 72.0  | 64.5  | 59.8  | 71.5  | 62.6  | 60.4  | 85.6  | 76.1  |
| PV (+), % | 60.2  | 42.5  | 38.0  | 23.4  | 37.9  | 20.9  | 5.1  | 1.9  | 11.7  | 11.1  | 25.5  | 7.2  |
| PV (-), % | 99.1  | 99.1  | 87.4  | 87.0  | 87.2  | 93.0  | 97.8  | 99.2  | 94.3  | 94.8  | 99.3  | 99.7  |
| Abbreviations: TG, triglycerides; HDL-C, high density lipoprotein cholesterol; CI, confidential interval; PV (+), positive predictive value; PV (-), negative predictive value.  |

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| Supplementary Table 3. Tri-ponderal mass index threshold for the optimal cut-off percentiles. |
| Percentiles | Chinese |  | American |
| Boys | Girls | 　 | Boys | Girls |
| P1 | 9.19 | 9.30 |  | 9.39 | 9.72 |
| P50 | 12.27 | 12.24 |  | 12.99 | 13.97 |
| P70 | 13.48 | 13.2 |  | 14.82 | 16.05 |
| P75 | 13.93 | 13.52 |  | 15.35 | 16.73 |
| P80 | 14.46 | 13.91 | 　 | 16.22 | 17.62 |
| P85 | 15.12 | 14.43 | 　 | 17.08 | 18.89 |
| P90 | 15.98 | 15.15 |  | 18.39 | 20.12 |
| P99 | 19.68 | 18.98 | 　 | 25.17 | 27.49 |

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| Supplementary Table 4. Sensitivity analysis of different subgroups in Chinese validate population. |
| Subgroups | Cut-off threshold | Area under curve | FPR | FNR | TFR |
| Sex |  |  |  |  |  |
| Boy | P75 | 0.7629 (0.7263, 0.7996) | 22.6 (20.6, 24.6) | 24.8 (18.0, 32.7) | 22.8 (20.9, 24.7) |
| P80 | 0.7371 (0.6971, 0.7771)\* | 17.4 (15.7, 19.3) | 35.2 (27.4, 43.5) | 18.8 (17.0, 20.6) |
| P85 | 0.7290 (0.6880, 0.7700)\* | 12.8 (11.3, 14.5) | 41.4 (33.3, 49.8) | 15.0 (13.4, 16.7) |
| Girl | P75 | 0.7624 (0.7226, 0.8022) | 23.8 (21.8, 25.9) | 23.7 (16.4, 32.4) | 23.8 (21.9, 25.8) |
| P80 | 0.7666 (0.7246, 0.8086) | 17.9 (16.1, 19.8) | 28.8 (20.8, 37.9) | 18.6 (16.8, 20.4) |
| P85 | 0.7357 (0.6905, 0.7809)\* | 12.2 (10.7, 13.8) | 40.7 (31.7, 50.1) | 14.0 (12.4, 15.7) |
| Region |  |  |  |  |  |
| Urban | P75 | 0.7479 (0.7134, 0.7824) | 22.4 (20.7, 24.2) | 28.0 (21.5, 35.3) | 22.8 (21.2, 24.6) |
| P80 | 0.7385 (0.7021, 0.7749) | 16.9 (15.3, 18.5) | 35.4 (28.4, 43.0) | 18.3 (16.7, 19.9) |
| P85 | 0.7120 (0.6744, 0.7497)\* | 11.9 (10.5, 13.3) | 45.7 (38.2, 53.4) | 14.4 (13.0, 15.9) |
| Rural | P75 | 0.7925 (0.7514, 0.8337) | 24.4 (22.1, 26.9) | 17.0 (9.9, 26.6) | 24.0 (21.8, 26.3) |
| P80 | 0.7748 (0.7274, 0.8221) | 18.9 (16.8, 21.1) | 26.1 (17.3, 36.6) | 19.4 (17.3, 21.5) |
| P85 | 0.7733 (0.7235, 0.8231) | 13.5 (11.7, 15.5) | 31.8 (22.3, 42.6) | 14.7 (12.9, 16.6) |
| FPR, false positive rate; FNR, false negative rate; TR, total misclassification rate.\* Area under curve decreased significantly compared to the former cut off percentile.Sex specific 75th, 80th and 85th percentiles were used as threshold values for each population. |
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| Supplementary Table 5. Sensitivity analysis of different subgroups in American validate population. |
| Subgroups | Cut-off threshold | Area under curve | FPR, % | FNR | TFR |
| Sex |  |  |  |  |  |
| Boy | P80 | 0.9066 (0.8870, 0.9262) | 18.7 (14.9, 23.0) | - | 18.0 (14.3, 22.1) |
| P85 | 0.8807 (0.7903, 0.9711) | 10.5 (7.6, 14.1) | 13.3 (1.7, 40.5) | 10.6 (7.8, 14.1) |
| P90 | 0.8338 (0.7173, 0.9503) | 6.6 (4.3, 9.6) | 26.7 (7.8, 55.1) | 7.3 (5.0, 10.4) |
| Girl | P80 | 0.8497 (0.7682, 0.9313) | 18.3 (14.3, 22.8) | 11.8 (1.5, 36.4) | 18.0 (14.1, 22.4) |
| P85 | 0.8513 (0.7563, 0.9463) | 12.1 (8.8, 16.0) | 17.6 (3.8, 43.4) | 12.4 (9.1, 16.2) |
| P90 | 0.7778 (0.6597, 0.8959) | 9.1 (6.3, 12.7) | 35.3 (14.2, 61.7) | 10.4 (7.4, 14.0) |
| Race |  |  |  |  |  |
| White | P80 | 0.8378 (0.7249, 0.9508) | 15.8 (11, 21.5) | 16.7 (2.1, 48.4) | 15.8 (11.2, 21.4) |
| P85 | 0.8773 (0.7656, 0.9889) | 7.9 (4.6, 12.5) | 16.7 (2.1, 48.4) | 8.4 (5.0, 12.9) |
| P90 | 0.7229 (0.5744, 0.8715)\* | 5.4 (2.7, 9.5) | 50.0 (21.1, 78.9) | 7.9 (4.7, 12.4) |
| Black | P80 | 0.9059 (0.8789, 0.9330) | 18.8 (13.7, 24.9) | - | 18.4 (13.4, 24.4) |
| P85 | 0.8106 (0.5646, 1.0000) | 12.9 (8.6, 18.3) | 25.0 (0.6, 80.6) | 13.1 (8.8, 18.5) |
| P90 | 0.6980 (0.4143, 0.9817) | 10.4 (6.6, 15.5) | 50.0 (6.8, 93.2) | 11.2 (7.2, 16.3) |
| Mexican | P80 | 0.8859 (0.8572, 0.9146) | 22.8 (17.3, 29.2) | - | 21.6 (16.3, 27.6) |
| P85 | 0.8511 (0.7386, 0.9637) | 13.1 (8.8, 18.5) | 16.7 (2.1, 48.4) | 13.3 (9.1, 18.5) |
| P90 | 0.8803 (0.7687, 0.9918)\* | 7.3 (4.1, 11.7) | 16.7 (2.1, 48.4) | 7.8 (4.6, 12.2) |
| Other | P80 | 0.9259 (0.8923, 0.9596) | 14.8 (8.7, 22.9) | - | 14.3 (8.4, 22.2) |
| P85 | 0.9444 (0.9147, 0.9742) | 11.1 (5.9, 18.6) | - | 10.7 (5.7, 18.0) |
| P90 | 0.9583 (0.9322, 0.9845) | 8.3 (3.9, 15.2) | - | 8.0 (3.7, 14.7) |
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