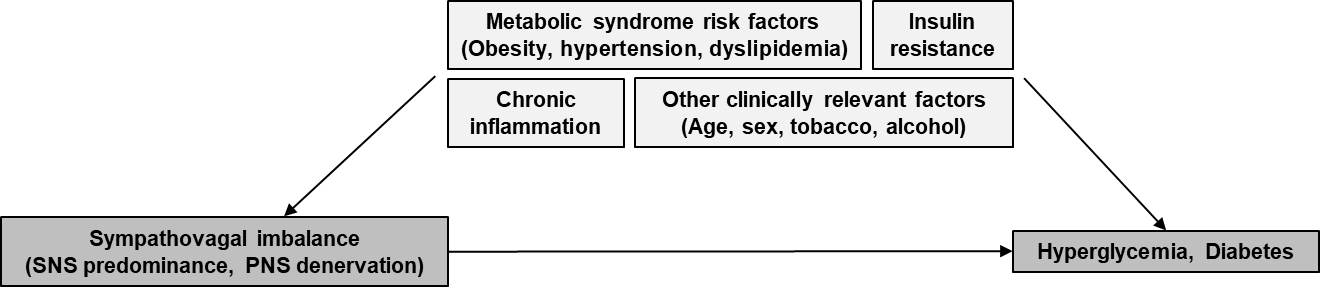
**SYPPLEMENTAL MATERIALS**

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**Supplemental Figure 1. Causal diagram describing the hypothesis of this study.**

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**Supplemental Figure 2.** Kaplan-Meier curves for the risk of incident diabetes according to HRV measurement.

**Supplemental Table 1.** Risk of incident diabetes according to HRV measurement as continuous variables

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Age and sex-adjusted HR (95% CI)\* | Multivariate-adjusted HRs (95% CIs)\* | |
| Model 1 | Model 2 |
| Heart rate† | 1.04 (1.03-1.04) | 1.03 (1.02-1.03) | 1.02 (1.01-1.02) |
| Ln SDNN‡ | 0.52 (0.45-0.59) | 0.72 (0.62-0.84) | 0.81 (0.70-0.95) |
| Ln RMSSD‡ | 0.44 (0.39-0.48) | 0.63 (0.56-0.71) | 0.73 (0.65-0.83) |
| Ln TP‡ | 0.90 (0.87-0.94) | 0.96 (0.91-1.01) | 0.98 (0.93-1.03) |
| Ln LF norm§ | 1.39 (1.25-1.54) | 1.20 (1.08-1.33) | 1.15 (1.04-1.27) |
| Ln HF norm‡ | 0.89 (0.84-0.95) | 0.94 (0.88-1.01) | 0.96 (0.89-1.03) |
| Ln LF/HF ratio§ | 1.24 (1.17-1.32) | 1.13 (1.06-1.20) | 1.10 (1.03-1.17) |

\*Cox proportional hazards regression models were used to estimate HRs and 95% CIs. Right-skewed variables (i.e., SDNN, RMSSD, TP, VLF, LF, HF, LF norm, HF norm, and LF/HF ratio) were log-transformed for the analysis. Model 1 was adjusted for age, sex, body mass index, low-density lipoprotein cholesterol, high-sensitivity C-reactive protein, current smoking, and alcohol intake ≥ 20 g/day. Model 2 is the same as model 1 adjusted for systolic blood pressure and homeostasis model assessment for insulin resistance score.

†Data for heart rate was available in 54,069 subjects. ‡Lower = worse. §Higher = worse.

HR, hazard ratio; CI, confidence interval; Ln, natural logarithmic value; SDNN, standard deviation of the normal-to-normal interval; RMSSD, root mean square difference; TP, total power; LF norm, normalized low-frequency; HF norm, normalized high-frequency.

**Supplemental Table 2.** Risk of incident diabetes according to tertile of HRV measurement stratified by sex

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Person-years | Number of events | Incidence rate (1,000 person-years) (95% CI) | Age-adjusted HR (95% CI)a | Multivariate-adjusted HR (95% CI)\* | |
| Model 1 | Model 2 |
| Heart rate |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| Men (*n* = 32,952) |  |  |  |  |  |  |
| T1 (32-60) | 50,616.457 | 252 | 4.98 (4.40-5.63) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (61-67) | 49,658.768 | 352 | 7.09 (6.39-7.87) | 1.47 (1.25-1.73) | 1.35 (1.14-1.60) | 1.23 (1.04-1.46) |
| T3 (≥68) | 50,794.968 | 510 | 10.04 (9.21-10.95) | 2.14 (1.84-2.49) | 1.76 (1.50-2.07) | 1.43 (1.21-1.68) |
| *P* for trend |  |  |  | <0.001 | <0.001 | <0.001 |
| Women (*n* = 21,117) |  |  |  |  |  |  |
| T1 (32-61) | 29,010.516 | 50 | 1.72 (1.31-2.27) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (62-67) | 28,300.35 | 54 | 1.91 (1.46-2.49) | 1.12 (0.76-1.65) | 1.05 (0.65-1.70) | 0.93 (0.57-1.52) |
| T3 (≥68) | 35,350.968 | 151 | 4.27 (3.64-5.01) | 2.51 (1.82-3.45) | 1.43 (0.93-2.18) | 1.18 (0.76-1.82) |
| *P* for trend |  |  |  | <0.001 | 0.063 | 0.337 |
| SDNN (ms)‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | 0.002 | 0.061 |
| Men (*n* = 32,953) |  |  |  |  |  |  |
| T1 (0–35.2) | 50,130.103 | 504 | 10.05 (9.21-10.97) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.3–48.2) | 50,692.632 | 363 | 7.16 (6.46-7.94) | 0.78 (0.68-0.89) | 0.94 (0.81-1.08) | 0.99 (0.86-1.14) |
| T3 (≥ 48.3) | 50,253.287 | 247 | 4.92 (4.34-5.57) | 0.59 (0.50-0.68) | 0.72 (0.61-0.85) | 0.80 (0.68-0.94) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.012 |
| Women (*n* = 21,122) |  |  |  |  |  |  |
| T1 (0–35.8) | 30,921.164 | 128 | 4.14 (3.48-4.92) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.9–48.3) | 31,196.126 | 59 | 1.89 (1.47-2.44) | 0.50 (0.37-0.68) | 0.69 (0.46-1.02) | 0.75 (0.50-1.12) |
| T3 (≥48.4) | 30,564.917 | 68 | 2.22 (1.75-2.82) | 0.65 (0.48-0.88) | 0.90 (0.62-1.32) | 1.00 (0.68-1.48) |
| *P* for trend |  |  |  | 0.001 | 0.472 | 0.887 |
| RMSSD (ms)‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | 0.001 |
| Men (*n* = 32,953) |  |  |  |  |  |  |
| T1 (0–27.9) | 50,044.293 | 577 | 11.53 (10.63-12.51) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (28.0–41.5) | 50,966.571 | 316 | 6.20 (5.55-6.92) | 0.58 (0.50-0.66) | 0.72 (0.62-0.83) | 0.78 (0.68-0.90) |
| T3 (≥41.6) | 50,065.158 | 221 | 4.41 (3.87-5.04) | 0.46 (0.39-0.53) | 0.62 (0.52-0.73) | 0.72 (0.61-0.85) |
| *P* for trend |  |  |  | <0.001 | <0.001 | <0.001 |
| Women (*n* = 21,122) |  |  |  |  |  |  |
| T1 (0–32.1) | 31,098.984 | 140 | 4.50 (3.81-5.31) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (32.2–46.8) | 31,141.788 | 59 | 1.89 (1.47-2.45) | 0.46 (0.34-0.63) | 0.72 (0.49-1.05) | 0.82 (0.56-1.20) |
| T3 (≥46.9) | 30,441.435 | 56 | 1.84 (1.42-2.39) | 0.49 (0.36-0.68) | 0.80 (0.53-1.20) | 0.98 (0.65-1.49) |
| *P* for trend |  |  |  | <0.001 | 0.185 | 0.778 |
| TP (ms2)‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | 0.335 | 0.710 |
| Men (*n* = 32,953) |  |  |  |  |  |  |
| T1 (0–802.8) | 50,135.217 | 472 | 9.41 (8.60-10.30) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (802.9–1,618.9) | 50,658.825 | 368 | 7.26 (6.56-8.05) | 0.84 (0.73-0.96) | 0.96 (0.83-1.10) | 1.00 (0.87-1.16) |
| T3 (≥ 1,619.0) | 50,281.979 | 274 | 5.45 (4.84-6.13) | 0.68 (0.59-0.79) | 0.83 (0.70-0.97) | 0.89 (0.76-1.04) |
| *P* for trend |  |  |  | <0.001 | 0.022 | 0.188 |
| Women (*n* = 21,122) |  |  |  |  |  |  |
| T1 (0–833.1) | 31,078.637 | 118 | 3.80 (3.17-4.55) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (833.2–1,603.3) | 30,957.095 | 71 | 2.29 (1.82-2.89) | 0.66 (0.49-0.89) | 0.99 (0.69-1.42) | 0.95 (0.66-1.38) |
| T3 (≥1,603.4) | 30,646.475 | 66 | 2.15 (1.69-2.74) | 0.68 (0.50-0.92) | 0.95 (0.65-1.41) | 1.06 (0.71-1.58) |
| *P* for trend |  |  |  | 0.007 | 0.820 | 0.818 |
| LF norm (n.u.)§ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | 0.005 | 0.030 |
| Men (*n* = 32,953) |  |  |  |  |  |  |
| T1 (0–40.8) | 50,441.21 | 277 | 5.49 (4.88-6.18) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (40.9-60.9) | 50,162.823 | 384 | 7.66 (6.93-8.46) | 1.41 (1.21-1.64) | 1.29 (1.09-1.51) | 1.24 (1.05-1.46) |
| T3 (≥61.0) | 50,471.989 | 453 | 8.98 (8.19-9.84) | 1.63 (1.40-1.89) | 1.39 (1.18-1.62) | 1.32 (1.13-1.54) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.001 |
| Women (*n* = 21,122) |  |  |  |  |  |  |
| T1 (0–27.8) | 30,782.609 | 69 | 2.24 (1.77-2.84) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (27.9-46.7) | 30,982.768 | 76 | 2.45 (1.96-3.07) | 1.09 (0.79-1.51) | 0.95 (0.63-1.43) | 0.91 (0.61-1.37) |
| T3 (≥46.8) | 30,916.83 | 110 | 3.56 (2.95-4.29) | 1.56 (1.15-2.11) | 1.04 (0.71-1.53) | 0.92 (0.62-1.36) |
| *P* for trend |  |  |  | 0.003 | 0.803 | 0.702 |
| HF norm (n.u.)‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | 0.003 | 0.023 |
| Men (*n* = 32,953) |  |  |  |  |  |  |
| T1 (0–38.4) | 49,975.45 | 443 | 8.86 (8.08-9.73) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (38.5-58.5) | 50,373.544 | 394 | 7.82 (7.09-8.63) | 0.90 (0.78-1.03) | 0.96 (0.84-1.11) | 0.97 (0.85-1.12) |
| T3 (≥58.6) | 50,727.028 | 277 | 5.46 (4.85-6.14) | 0.62 (0.53-0.72) | 0.73 (0.62-0.85) | 0.76 (0.65-0.89) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.001 |
| Women (*n* = 21,122) |  |  |  |  |  |  |
| T1 (0–52.6) | 30,782.229 | 109 | 3.54 (2.93-4.27) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (52.7-71.6) | 30,878.77 | 75 | 2.43 (1.94-3.05) | 0.70 (0.52-0.94) | 0.89 (0.61-1.30) | 0.96 (0.66-1.42) |
| T3 (≥71.7) | 31,021.199 | 71 | 2.29 (1.81-2.89) | 0.66 (0.49-0.88) | 0.97 (0.66-1.42) | 1.10 (0.74-1.62) |
| *P* for trend |  |  |  | 0.004 | 0.828 | 0.667 |
| LF/HF ratio§ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | 0.003 | 0.014 |
| Men (*n* = 32,953) |  |  |  |  |  |  |
| T1 (0–0.6) | 46,451.376 | 253 | 5.45 (4.82-6.16) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (0.7-1.5) | 53,663.704 | 404 | 7.53 (6.83-8.30) | 1.40 (1.20-1.64) | 1.30 (1.10-1.53) | 1.26 (1.07-1.48) |
| T3 (≥1.6) | 50,960.942 | 457 | 8.97 (8.18-9.83) | 1.64 (1.41-1.91) | 1.41 (1.20-1.65) | 1.35 (1.15-1.58) |
| *P* for trend |  |  |  | <0.001 | <0.001 | <0.001 |
| Women (*n* = 21,122) |  |  |  |  |  |  |
| T1 (0–0.3) | 27,021.963 | 60 | 2.22 (1.72-2.86) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (0.4-0.8) | 33,526.201 | 84 | 2.51 (2.02-3.10) | 1.13 (0.81-1.57) | 0.82 (0.55-1.24) | 0.79 (0.52-1.19) |
| T3 (≥0.9) | 32,134.042 | 111 | 3.45 (2.87-4.16) | 1.53 (1.12-2.10) | 0.94 (0.64-1.39) | 0.84 (0.56-1.24) |
| *P* for trend |  |  |  | 0.005 | 0.855 | 0.429 |

\*Cox proportional hazard models were used to estimate HRs and 95% CIs. Right-skewed variables (i.e., SDNN, RMSSD, TP, LF norm, HF norm, and LF/HF ratio) were log-transformed for the analysis. Model 1 was adjusted for age, sex, body mass index, low-density lipoprotein cholesterol, high-sensitivity C-reactive protein, current smoking, and alcohol intake ≥20 g/day. Model 2: Model 1 plus an adjustment for systolic blood pressure and homeostasis model assessment for insulin resistance score.

CI, confidence interval; HF norm, normalized high-frequency; HR, hazard ratio; LF norm, normalized low-frequency; RMSSD, root mean square difference; SDNN, standard deviation of the normal-to-normal interval; TP, total power.

**Supplemental Table 3.** Risk of incident diabetes according to HRV measurement stratified by fasting glucose level of 100mg/dL

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Person-years | Number of events | Incidence rate (1,000 person-years) (95% CI) | Age- and sex-adjusted HR (95% CI)a | Multivariate-adjusted HR (95% CI)\* | |
| Model 1 | Model 2 |
| Heart rate |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| FPG <100 mg/dL (*n* = 41,029) |  |  |  |  |  |  |
| Tertile 1 (32-60) | 59,533.859 | 90 | 1.51 (1.23-1.86) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (61-66) | 54,809.799 | 81 | 1.48 (1.19-1.84) | 1.08 (0.80-1.45) | 0.95 (0.68-1.34) | 0.95 (0.68-1.33) |
| Tertile 3 (≥67) | 68,774.387 | 147 | 2.14 (1.82-2.51) | 1.62 (1.25-2.11) | 1.36 (1.01-1.84) | 1.32 (0.98-1.78) |
| *P* for trend |  |  |  | <0.001 | 0.025 | 0.047 |
| FPG ≥100 mg/dL (*n* = 13,039) |  |  |  |  |  |  |
| Tertile 1 (32-61) | 18,127.723 | 240 | 13.24 (11.67-15.02) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (62-39) | 22,246.716 | 364 | 16.36 (14.76-18.13) | 1.29 (1.09-1.51) | 1.24 (1.05-1.48) | 1.24 (1.04-1.48) |
| Tertile 3 (≥70) | 20,235.841 | 447 | 22.09 (20.13-24.24) | 1.81 (1.54-2.12) | 1.47 (1.24-1.75) | 1.46 (1.23-1.74) |
| *P* for trend |  |  |  | <0.001 | <0.001 | <0.001 |
| SDNN (ms) ‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| FPG <100 mg/dL (*n* = 41,033) |  |  |  |  |  |  |
| Tertile 1 (0–36.2) | 61,396.142 | 149 | 2.43 (2.07-2.85) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (36.3–49.1) | 61,180.301 | 85 | 1.39 (1.12-1.72) | 0.61 (0.47-0.80) | 0.80 (0.60-1.07) | 0.84 (0.63-1.12) |
| Tertile 3 (≥49.2) | 60,558.075 | 84 | 1.39 (1.12-1.72) | 0.64 (0.49-0.84) | 0.82 (0.61-1.11) | 0.88 (0.65-1.19) |
| *P* for trend |  |  |  | <0.001 | 0.167 | 0.359 |
| FPG ≥100 mg/dL (*n* = 13,041) |  |  |  |  |  |  |
| Tertile 1 (-1.0–33.3) | 20,022.023 | 431 | 21.53 (19.59-23.66) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (33.4–45.6) | 20,224.2 | 346 | 17.11 (15.40-19.01) | 0.84 (0.73-0.97) | 1.00 (0.86-1.16) | 1.00 (0.86-1.16) |
| Tertile 3 (≥45.7) | 20,373.785 | 274 | 13.45 (11.95-15.14) | 0.69 (0.59-0.81) | 0.83 (0.70-0.98) | 0.84 (0.71-0.99) |
| *P* for trend |  |  |  | <0.001 | 0.037 | 0.045 |
| RMSSD (ms) ‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| FPG <100 mg/dL (*n* = 41,033) |  |  |  |  |  |  |
| Tertile 1 (0–30.8) | 61,351.039 | 158 | 2.58 (2.20-3.01) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (30.9–45.1) | 61,408.077 | 93 | 1.51 (1.24-1.86) | 0.65 (0.50-0.84) | 0.90 (0.68-1.20) | 0.92 (0.70-1.23) |
| Tertile 3 (≥45.2) | 60,375.403 | 67 | 1.11 (0.87-1.41) | 0.53 (0.40-0.71) | 0.70 (0.50-0.98) | 0.72 (0.52-1.00) |
| *P* for trend |  |  |  | <0.001 | 0.039 | 0.060 |
| FPG ≥100 mg/dL (*n* = 13,041) |  |  |  |  |  |  |
| Tertile 1 (0–25.6) | 19,939.762 | 482 | 24.17 (22.11-26.43) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (25.7–38.6) | 20,424.739 | 322 | 15.77 (14.13-17.58) | 0.68 (0.59-0.78) | 0.86 (0.73-1.00) | 0.86 (0.74-1.00) |
| Tertile 3 (≥38.7) | 20,255.507 | 247 | 12.19 (10.76-13.81) | 0.56 (0.48-0.66) | 0.74 (0.62-0.87) | 0.74 (0.63-0.88) |
| *P* for trend |  |  |  | <0.001 | <0.001 | <0.001 |
| TP (ms2) ‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| FPG <100 mg/dL (*n* = 41,033) |  |  |  |  |  |  |
| Tertile 1 (0–843.8) | 61,219.1 | 128 | 2.09 (1.76-2.49) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (843.9-1,663.6) | 61,084.241 | 104 | 1.70 (1.40-2.06) | 0.86 (0.66-1.12) | 1.10 (0.83-1.45) | 1.11 (0.84-1.47) |
| Tertile 3 (≥1,663.7) | 60,831.228 | 86 | 1.41 (1.14-1.75) | 0.74 (0.56-0.97) | 0.87 (0.64-1.19) | 0.89 (0.65-1.21) |
| *P* for trend |  |  |  | 0.029 | 0.452 | 0.518 |
| FPG ≥100mg/dL (*n* = 13,041) |  |  |  |  |  |  |
| Tertile 1 (0–729.3) | 19,982.823 | 414 | 20.72 (18.82-22.81) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (729.4-1,460.1) | 20,436.424 | 338 | 16.54 (14.87-18.40) | 0.85 (0.73-0.98) | 1.00 (0.86-1.17) | 1.01 (0.86-1.17) |
| Tertile 3 (≥1,460.2) | 20,200.761 | 299 | 14.80 (13.22-16.58) | 0.79 (0.68-0.92) | 0.96 (0.82-1.14) | 0.97 (0.82-1.14) |
| *P* for trend |  |  |  | 0.002 | 0.680 | 0.728 |
| LF norm (n.u.) § |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| FPG <100 mg/dL (*n* = 41,033) |  |  |  |  |  |  |
| Tertile 1 (0–33.9) | 60,702.218 | 76 | 1.25 (1.00-1.57) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (34.0-54.7) | 61,091.751 | 93 | 1.52 (1.24-1.87) | 1.06 (0.78-1.44) | 1.00 (0.71-1.41) | 0.98 (0.69-1.38) |
| Tertile 3 (≥54.8) | 61,340.55 | 149 | 2.43 (2.07-2.85) | 1.55 (1.17-2.06) | 1.36 (0.99-1.88) | 1.34 (0.98-1.85) |
| *P* for trend |  |  |  | 0.001 | 0.030 | 0.036 |
| FPG ≥100 mg/dL (*n* = 13,041) |  |  |  |  |  |  |
| Tertile 1 (0–39.5) | 20,320.846 | 268 | 13.19 (11.70-14.87) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (39.6-60.1) | 20,072.252 | 368 | 18.33 (16.55-20.31) | 1.37 (1.17-1.60) | 1.27 (1.07-1.51) | 1.27 (1.07-1.51) |
| Tertile 3 (≥60.2) | 20,226.91 | 415 | 20.52 (18.64-22.59) | 1.50 (1.28-1.75) | 1.32 (1.12-1.56) | 1.31 (1.11-1.55) |
| *P* for trend |  |  |  | <0.001 | 0.002 | 0.002 |
| HF norm (n.u.) ‡ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| FPG <100 mg/dL (*n* = 41,033) |  |  |  |  |  |  |
| Tertile 1 (0–44.6) | 61,132.457 | 146 | 2.39 (2.03-2.81) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (44.7-65.4) | 60,920.578 | 95 | 1.56 (1.28-1.91) | 0.71 (0.55-0.93) | 0.74 (0.56-0.98) | 0.73 (0.55-0.97) |
| Tertile 3 (≥65.5) | 61,081.484 | 77 | 1.26 (1.01-1.58) | 0.66 (0.50-0.88) | 0.73 (0.53-1.00) | 0.74 (0.54-1.01) |
| *P* for trend |  |  |  | 0.002 | 0.027 | 0.032 |
| FPG ≥100mg/dL (*n* = 13,041) |  |  |  |  |  |  |
| Tertile 1 (0–39.3) | 20,064.225 | 408 | 20.33 (18.45-22.41) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (39.4-60.0) | 20,207.661 | 376 | 18.61 (16.82-50.59) | 0.93 (0.81-1.07) | 0.96 (0.83-1.12) | 0.97 (0.83-1.12) |
| Tertile 3 (≥60.1) | 20,348.12 | 267 | 13.12 (11.64-14.79) | 0.67 (0.57-0.78) | 0.75 (0.64-0.89) | 0.76 (0.64-0.90) |
| *P* for trend |  |  |  | <0.001 | 0.001 | 0.002 |
| LF/HF ratio§ |  |  |  |  |  |  |
| *P* for interaction |  |  |  | <0.001 | <0.001 | <0.001 |
| FPG <100 mg/dL (*n* = 41,033) |  |  |  |  |  |  |
| Tertile 1 (0–0.4) | 51,153.457 | 55 | 1.08 (0.83-1.40) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (0.5-1.1) | 66,715.225 | 107 | 1.60 (1.33-1.94) | 1.31 (0.94-1.81) | 1.13 (0.78-1.64) | 1.11 (0.77-1.61) |
| Tertile 3 (≥1.2) | 65,265.837 | 156 | 2.39 (2.04-2.80) | 1.77 (1.29-2.42) | 1.50 (1.06-2.14) | 1.48 (1.04-2.11) |
| *P* for trend |  |  |  | <0.001 | 0.010 | 0.012 |
| FPG ≥100 mg/dL (*n* = 13,041) |  |  |  |  |  |  |
| Tertile 1 (0–0.6) | 19,950.522 | 264 | 13.23 (11.73-14.93) | 1 (reference) | 1 (reference) | 1 (reference) |
| Tertile 2 (0.7-1.4) | 19,431.63 | 350 | 18.01 (16.22-20.00) | 1.34 (1.14-1.57) | 1.24 (1.04-1.47) | 1.24 (1.04-1.47) |
| Tertile 3 (≥1.5) | 21,237.856 | 437 | 20.58 (18.73-22.60) | 1.50 (1.29-1.75) | 1.32 (1.12-1.56) | 1.31 (1.11-1.55) |
| *P* for trend |  |  |  | <0.001 | 0.001 | 0.002 |

\*Cox proportional hazard models were used to estimate HRs and 95% CIs. Right-skewed variables (i.e., SDNN, RMSSD, TP, LF norm, HF norm, and LF/HF ratio) were log-transformed for the analysis. Model 1 was adjusted for age, sex, body mass index, low-density lipoprotein cholesterol, high-sensitivity C-reactive protein, current smoking, and alcohol intake ≥ 20 g/day. Model 2: Model 1 plus an adjustment for systolic blood pressure.

CI, confidence interval; HF norm, normalized high-frequency; HR, hazard ratio; LF norm, normalized low-frequency; RMSSD, root mean square difference; SDNN, standard deviation of the normal-to-normal interval; TP, total power.

**Supplemental Table 4.** Results of sensitivity analysis conducted in the subjects whose glycated hemoglobin level was less than 6.0%

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Number of subjects | Person-years | Number of events | Incidence rate (100,000 person-years) (95% CI) | Age- and sex-adjusted HR (95% CI)\* | Multivariate-adjusted HR (95% CI)\* | |
| Model 1 | Model 2 |
| Heart rate |  |  |  |  |  |  |  |
| T1 (32-60) | 15,684 | 70,836.2 | 166 | 2.34 (2.01-2.73) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (61-67) | 17,086 | 76,930.4 | 201 | 2.61 (2.28-3.00) | 1.22 (0.99-1.50) | 1.19 (0.95-1.48) | 1.07 (0.86-1.34) |
| T3 (≥68) | 17,830 | 80,094.3 | 340 | 4.24 (3.82-4.72) | 2.05 (1.70-2.47) | 1.70 (1.38-2.09) | 1.39 (1.12-1.71) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | 0.001 |
| SDNN (ms) ‡ |  |  |  |  |  |  |  |
| T1 (0-35.6) | 16,764 | 75,831.5 | 324 | 4.27 (3.83-4.76) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.7-48.5) | 16,923 | 76,647.2 | 211 | 2.75 (2.41-3.15) | 0.71 (0.59-0.84) | 0.87 (0.72-1.05) | 0.92 (0.76-1.11) |
| T3 (≥48.6) | 16,919 | 75,408.4 | 172 | 2.28 (1.96-2.65) | 0.63 (0.52-0.75) | 0.75 (0.61-0.92) | 0.81 (0.66-1.00) |
| *P* for trend |  |  |  |  | <0.001 | 0.006 | 0.047 |
| RMSSD (ms) ‡ |  |  |  |  |  |  |  |
| T1 (0-29.8) | 16,825 | 76,398.3 | 379 | 4.96 (4.49-5.49) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (29.9-43.9) | 16,873 | 76,415.9 | 190 | 2.49 (2.16-2.87) | 0.57 (0.48-0.68) | 0.72 (0.60-0.87) | 0.79 (0.66-0.96) |
| T3 (≥44.0) | 16,908 | 75,073.0 | 138 | 1.84 (1.56-2.17) | 0.48 (0.40-0.59) | 0.62 (0.50-0.78) | 0.74 (0.59-0.93) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | 0.004 |
| TP (ms2) ‡ |  |  |  |  |  |  |  |
| T1 (0-822.2) | 16,868 | 76,040.0 | 320 | 4.21 (3.77-4.70) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (822.3-1,627.8) | 16,868 | 76,217.4 | 202 | 2.65 (2.31-3.04) | 0.69 (0.58-0.82) | 0.82 (0.68-0.99) | 0.84 (0.69-1.01) |
| T3 (≥1,627.9) | 16,870 | 75,629.7 | 185 | 2.45 (2.12-2.83) | 0.67 (0.55-0.80) | 0.79 (0.65-0.97) | 0.85 (0.69-1.04) |
| *P* for trend |  |  |  |  | <0.001 | 0.017 | 0.082 |
| LF norm (n.u.)§ |  |  |  |  |  |  |  |
| T1 (0-35.0) | 16,828 | 75,426.3 | 156 | 2.07 (1.77-2.42) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.1-55.8) | 16,844 | 75,906.8 | 228 | 3.00 (2.64-3.42) | 1.26 (1.02-1.54) | 1.16 (0.92-1.45) | 1.11 (0.88-1.39) |
| T3 (≥55.9) | 16,934 | 76,554.1 | 323 | 4.22 (3.78-4.71) | 1.58 (1.30-1.92) | 1.34 (1.08-1.66) | 1.23 (0.99-1.52) |
| *P* for trend |  |  |  |  | <0.001 | 0.006 | 0.056 |
| HF norm (n.u.) ‡ |  |  |  |  |  |  |  |
| T1 (0-43.5) | 16,836 | 76,066.8 | 322 | 4.23 (3.80-4.72) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (43.6-64.3) | 16,820 | 75,808.0 | 226 | 2.98 (2.62-3.40) | 0.78 (0.66-0.93) | 0.85 (0.70-1.02) | 0.88 (0.73-1.06) |
| T3 (≥64.4) | 16,950 | 76,012.3 | 159 | 2.09 (1.79-2.44) | 0.64 (0.52-0.77) | 0.76 (0.61-0.94) | 0.82 (0.67-1.02) |
| *P* for trend |  |  |  |  | <0.001 | 0.007 | 0.058 |
| LF/HF ratio§ |  |  |  |  |  |  |  |
| T1 (0-0.4) | 13,412 | 60,030.3 | 267 | 1.83 (1.52-2.21) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (0.5-1.2) | 19,947 | 89,873.2 | 330 | 2.97 (2.64-3.35) | 1.38 (1.11-1.73) | 1.22 (0.95-1.55) | 1.17 (0.92-1.49) |
| T3 (≥1.3) | 17,247 | 77,983.6 | 707 | 4.23 (3.80-4.71) | 1.75 (1.41-2.18) | 1.43 (1.12-1.82) | 1.30 (1.03-1.66) |
| *P* for trend |  |  |  |  | <0.001 | 0.002 | 0.027 |

\*Cox proportional hazard models were used to estimate HRs and 95% CIs. Right-skewed variables (i.e., SDNN, RMSSD, TP, LF norm, HF norm, LF/HF ratio) were log-transformed for the analysis. Model 1 was adjusted for age, sex, body mass index, low-density lipoprotein cholesterol, high-sensitivity C-reactive protein, current smoking, and alcohol intake ≥ 20 g/day. Model 2: Model 1 plus an adjustment for systolic blood pressure and homeostasis model assessment for insulin resistance score.

CI, confidence interval; HF norm, normalized high-frequency; HR, hazard ratio; LF norm, normalized low-frequency; RMSSD, root mean square difference; SDNN, standard deviation of the normal-to-normal interval; TP, total power.

Supplemental Table 5. Comparisons of predicting value of heart rate variability, various parameters, and the self-assessment score for diabetes risk

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | N | AUC | (95% CI) | *P* value |
| Heart rate | 54,063 | 0.590 | 0.575–0.606 |  |
| SDNN (ms) | 54,069 | 0.405 | 0.360–0.421 |  |
| RMSSD (ms) | 54,069 | 0.353 | 0.338–0.369 |  |
| TP (ms2) | 54,069 | 0.427 | 0.411–0.442 |  |
| LF (ms2) | 54,069 | 0.460 | 0.444–0.475 |  |
| HF (ms2) | 54,069 | 0.373 | 0.358–0.389 |  |
| LF norm (n.u.) | 54,069 | 0.595 | 0.581–0.610 |  |
| HF norm (n.u.) | 54,069 | 0.408 | 0.393–0.423 |  |
| LF/HF ratio | 54,069 | 0.584 | 0.570–0.598 |  |
| FPG | 54,074 | 0.846 | 0.835–0.857 |  |
| FPG + Heart rate | 54,068 | 0.847 | 0.836–0.859 | 0.001 |
| FPG + SDNN | 54,074 | 0.849 | 0.837–0.860 | < 0.001 |
| FPG + RMSSD | 54,074 | 0.851 | 0.840–0.862 | < 0.001 |
| FPG + TP | 54,074 | 0.847 | 0.835–0.858 | 0.002 |
| FPG + LF | 54,074 | 0.847 | 0.835–0.858 | 0.004 |
| FPG + HF | 54,074 | 0.849 | 0.838–0.860 | < 0.001 |
| FPG + LF norm | 54,074 | 0.847 | 0.836–0.859 | 0.059 |
| FPG + HF norm | 54,074 | 0.847 | 0.835–0.858 | < 0.001 |
| FPG + LF/HF ratio | 54,074 | 0.848 | 0.836–0.859 | 0.004 |
| HbA1c | 54,070 | 0.847 | 0.836–0.858 |  |
| HbA1c + Heart rate | 54,064 | 0.853 | 0.842–0.864 | < 0.001 |
| HbA1c + SDNN | 54,070 | 0.852 | 0.841–0.863 | < 0.001 |
| HbA1c + RMSSD | 54,070 | 0.858 | 0.847–0.869 | < 0.001 |
| HbA1c + TP | 54,070 | 0.850 | 0.839–0.861 | < 0.001 |
| HbA1c + LF | 54,070 | 0.849 | 0.838–0.860 | 0.006 |
| HbA1c + HF | 54,070 | 0.854 | 0.843–0.864 | < 0.001 |
| HbA1c + LF norm | 54,070 | 0.852 | 0.841–0.863 | < 0.001 |
| HbA1c + HF norm | 54,070 | 0.851 | 0.841–0.862 | < 0.001 |
| HbA1c + LF/HF ratio | 54,070 | 0.853 | 0.842–0.864 | < 0.001 |
| HOMA-IR | 54,026 | 0.743 | 0.730–0.756 |  |
| HOMA-IR + Heart rate | 54,020 | 0.742 | 0.728–0.756 | 0.522 |
| HOMA-IR + SDNN | 54,026 | 0.749 | 0.735–0.762 | 0.091 |
| HOMA-IR + RMSSD | 54,026 | 0.754 | 0.741–0.767 | 0.010 |
| HOMA-IR + TP | 54,026 | 0.746 | 0.732–0.759 | 0.084 |
| HOMA-IR + LF | 54,026 | 0.744 | 0.730–0.757 | 0.592 |
| HOMA-IR + HF | 54,026 | 0.753 | 0.740–0.766 | < 0.001 |
| HOMA-IR + LF norm | 54,026 | 0.747 | 0.734–0.761 | 0.183 |
| HOMA-IR + HF norm | 54,026 | 0.745 | 0.731–0.758 | 0.155 |
| HOMA-IR + LF/HF ratio | 54,026 | 0.746 | 0.733–0.760 | 0.007 |
| The self-assessment score for diabetes risk | 36250 | 0.773 | 0.758–0.789 |  |
| Score + Heart rate | 36247 | 0.782 | 0.767–0.797 | < 0.001 |
| Score + SDNN | 36250 | 0.778 | 0.763–0.793 | 0.010 |
| Score + RMSSD | 36250 | 0.786 | 0.771–0.802 | < 0.001 |
| Score + TP | 36250 | 0.775 | 0.759–0.790 | 0.127 |
| Score + LF | 36250 | 0.773 | 0.758–0.789 | 0.971 |
| Score + HF | 36250 | 0.780 | 0.765–0.796 | < 0.001 |
| Score + LF norm | 36250 | 0.777 | 0.762–0.793 | 0.062 |
| Score + HF norm | 36250 | 0.776 | 0.760–0.791 | 0.011 |
| Score + LF/HF ratio | 36250 | 0.779 | 0.764–0.794 | 0.003 |

AUC, areas under the receiver operating characteristics curves; CI, confidence interval; FPG, fasting plasma glucose; HbA1c, glycated hemoglobin; HOMA-IR, homeostasis model assessment for insulin resistance score; HF norm, normalized high-frequency; LF norm, normalized low-frequency; RMSSD, root mean square difference; SDNN, standard deviation of the normal-to-normal interval; TP, total power.

**Supplemental Table 6.** Risk of incident diabetes according to tertiles of HRV measurement with adjustment for fasting glucose level

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | Person-years | Number of events | Incidence rate (100,000 person-years) | Age- and sex-adjusted HR (95% CI)\* | Multivariate-adjusted HR (95% CI)\* | |
| Model 1 | Model 2 |
| Total subjects | 243,758.2 | 1,369 | 5.62 (5.33-5.92) |  |  |  |
| Heart rate |  |  |  |  |  |  |
| T1 (32-60) | 75,280.3 | 295 | 3.92 (3.50-4.39) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (61-67) | 82,305.8 | 413 | 5.02 (4.56-5.53) | 1.39 (1.20-1.62) | 1.31 (1.11-1.53) | 1.16 (0.99-1.37) |
| T3 (≥68) | 86,145.9 | 661 | 7.67 (7.11-8.28) | 2.21 (1.92-2.53) | 1.72 (1.48-2.00) | 1.24 (1.06-1.45) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.007 |
| SDNN (ms)‡ |  |  |  |  |  |  |
| T1 (-1.0–35.4) | 80,945.5 | 635 | 7.84 (7.26-8.48) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.5–48.3) | 82,336.4 | 422 | 5.13 (4.66-5.64) | 0.73 (0.64-0.82) | 0.91 (0.80-1.04) | 1.03 (0.90-1.18) |
| T3 (≥ 48.4) | 80,476.4 | 312 | 3.88 (3.47-4.33) | 0.60 (0.52-0.69) | 0.75 (0.64-0.87) | 0.91 (0.78-1.05) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.278 |
| RMSSD (ms)‡ |  |  |  |  |  |  |
| T1 (-1.0–29.5) | 81,508.3 | 754 | 9.25 (8.61-9.94) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (29.6–43.6) | 81,786.7 | 355 | 4.34 (3.91-4.82) | 0.54 (0.47-0.61) | 0.70 (0.61-0.80) | 0.82 (0.72-0.94) |
| T3 (≥ 43.7) | 80,463.3 | 260 | 3.23 (2.86-3.65) | 0.47 (0.40-0.54) | 0.65 (0.55-0.76) | 0.84 (0.72-0.99) |
| *P* for trend |  |  |  | < 0.001 | < 0.001 | 0.009 |
| TP (ms2)‡ |  |  |  |  |  |  |
| T1 (0–815.5) | 81,219.3 | 594 | 7.31 (6.75-7.93) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (815.6–1,612.9) | 81,573.1 | 431 | 5.28 (4.81-5.81) | 0.80 (0.71-0.91) | 0.95 (0.83-1.09) | 1.07 (0.93-1.22) |
| T3 (≥ 1613.0) | 80,965.9 | 344 | 4.25 (3.82-4.72) | 0.69 (0.60-0.79) | 0.85 (0.73-0.98) | 1.02 (0.88-1.18) |
| *P* for trend |  |  |  | <0.001 | 0.034 | 0.729 |
| LF norm (n.u.)§ |  |  |  |  |  |  |
| T1 (0–35.2) | 80,754.5 | 296 | 3.67 (3.27-4.11) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.3–56.1) | 81,333.4 | 441 | 5.42 (4.94-5.95) | 1.30 (1.12-1.51) | 1.20 (1.02-1.41) | 1.18 (1.00-1.38) |
| T3 (≥ 56.2) | 81,670.4 | 632 | 7.74 (7.16-8.37) | 1.67 (1.45-1.93) | 1.40 (1.20-1.63) | 1.25 (1.07-1.46) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.005 |
| HF norm (n.u.)‡ |  |  |  |  |  |  |
| T1 (0–43.2) | 81,400.2 | 629 | 7.73 (7.15-8.36) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (43.3–64.2) | 81,393.3 | 437 | 5.37 (4.89-5.90) | 0.77 (0.68-0.87) | 0.84 (0.74-0.96) | 0.92 (0.81-1.05) |
| T3 (≥ 64.3) | 80,964.7 | 303 | 3.74 (3.34-4.19) | 0.61 (0.53-0.70) | 0.73 (0.63-0.85) | 0.84 (0.72-0.98) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.021 |
| LF/HF ratio§ |  |  |  |  |  |  |
| T1 (0–0.5) | 80,852.8 | 297 | 3.67 (3.28-4.12) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (0.6–1.2) | 78,456.8 | 419 | 5.34 (4.85-5.88) | 1.28 (1.10-1.49) | 1.18 (1.00-1.39) | 1.16 (0.99-1.67) |
| T3 (≥ 1.3) | 84,448.7 | 653 | 7.73 (7.16-8.35) | 1.67 (1.45-1.92) | 1.40 (1.20-1.63) | 1.25 (1.08-1.46) |
| *P* for trend |  |  |  | <0.001 | <0.001 | 0.004 |

\*Cox proportional hazards regression models were used to estimate HRs and 95% CIs. Right-skewed variables (i.e., SDNN, RMSSD, TP, LF norm, HF norm, LF/HF ratio) were log-transformed for the analysis.

Model 1 was adjusted for age, sex, body mass index, low-density lipoprotein cholesterol, high-sensitivity C-reactive protein, current smoking, and alcohol intake ≥ 20 g/day. Model 2 is the same as model 1 with an adjustment for systolic blood pressure and fasting glucose level.

CI, confidence interval; HF norm, normalized high-frequency; HR, hazard ratio; LF norm, normalized low-frequency; Ln, natural logarithmic value; RMSSD, root mean square difference; SDNN, standard deviation of the normal-to-normal interval; TP, total power.

**Supplemental Table 7.** Results of sensitivity analysis excluding the subjects taking antihypertensive medication

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Number of subjects | Person-years | Number of events | Incidence rate (100,000 person-years) (95% CI) | Age- and sex-adjusted HR (95% CI)\* | Multivariate-adjusted HR (95% CI)\* | |
| Model 1 | Model 2 |
| Heart rate |  |  |  |  |  |  |  |
| T1 (32-60) | 16,304 | 73,832.613 | 267 | 3.62 (3.21-4.08) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (61-67) | 17,796 | 80,298.831 | 372 | 4.63 (4.19-5.13) | 1.40 (1.20-1.64) | 1.32 (1.11-1.56) | 1.20 (1.01-1.42) |
| T3 (≥68) | 18,583 | 83,536.958 | 601 | 7.19 (6.64-7.79) | 2.25 (1.95-2.60) | 1.75 (1.49-2.06) | 1.44 (1.23-1.70) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | <0.001 |
| SDNN (ms)‡ |  |  |  |  |  |  |  |
| T1 (0-35.6) | 17,445 | 78,993.878 | 572 | 7.24 (6.67-7.86) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.7-48.5) | 17,670 | 80,224.786 | 382 | 4.76 (4.31-5.26) | 0.72 (0.64-0.82) | 0.90 (0.78-1.03) | 0.96 (0.83-1.10) |
| T3 (≥48.6) | 17,574 | 78,475.94 | 286 | 3.64 (3.25-4.09) | 0.60 (0.52-0.69) | 0.74 (0.63-0.86) | 0.80 (0.68-0.94) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | 0.008 |
| RMSSD (ms)‡ |  |  |  |  |  |  |  |
| T1 (0-29.7) | 17,418 | 79, 159.535 | 683 | 8.63 (8.00-9.30) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (29.8-43.8) | 17,626 | 79,970.976 | 324 | 4.05 (3.63-4.52) | 0.53 (0.46-0.60) | 0.69 (0.60-0.79) | 0.74 (0.64-0.86) |
| T3 (≥43.9) | 17,645 | 78,564.093 | 233 | 2.97 (2.61-3.37) | 0.45 (0.38-0.52) | 0.61 (0.52-0.73) | 0.72 (0.61-0.85) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | <0.001 |
| TP (ms2)‡ |  |  |  |  |  |  |  |
| T1 (0-824.2 | 17,563 | 79,320.241 | 538 | 6.78 (6.22-7.38) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (824.3-1,625.4) | 17,562 | 79,481.843 | 394 | 4.96 (4.49-5.47) | 0.80 (0.70-0.91) | 0.96 (0.84-1.11) | 0.99 (0.86-1.14) |
| T3 (≥1625.5) | 17,564 | 78,892.52 | 308 | 3.90 (3.49-4.37) | 0.67 (0.58-0.77) | 0.81 (0.70-0.95) | 0.88 (0.75-1.03) |
| *P* for trend |  |  |  |  | <0.001 | 0.011 | 0.129 |
| LF norm (n.u.)§ |  |  |  |  |  |  |  |
| T1 (0-35.1) | 17,538 | 78,765.886 | 258 | 3.28 (2.90-3.70) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (35.2-56.0) | 17,532 | 79,199.671 | 398 | 5.03 (4.56-5.54) | 1.36 (1.16-1.59) | 1.26 (1.06-1.50) | 1.22 (1.03-1.45) |
| T3 (≥56.1) | 17,619 | 79,729.046 | 584 | 7.32 (6.75-7.94) | 1.78 (1.54-2.07) | 1.50 (1.28-1.77) | 1.41 (1.20-1.65) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | <0.001 |
| HF norm (n.u.)‡ |  |  |  |  |  |  |  |
| T1 (0-43.3) | 17,535 | 79,308.706 | 579 | 7.30 (6.73-7.92) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (43.4-64.3) | 17,576 | 79,427.765 | 395 | 4.97 (4.51-5.49) | 0.75 (0.66-0.86) | 0.83 (0.72-0.95) | 0.86 (0.74-0.98) |
| T3 (≥64.4) | 17,578 | 78,958.133 | 266 | 3.37 (2.99-3.80) | 0.58 (0.50-0.67) | 0.69 (0.59-0.81) | 0.73 (0.63-0.86) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | <0.001 |
| LF/HF ratio§ |  |  |  |  |  |  |  |
| T1 (0-0.4) | 13,899 | 62,310.921 | 189 | 3.03 (2.63-3.50) | 1 (reference) | 1 (reference) | 1 (reference) |
| T2 (0.5-1.2) | 20,669 | 93,352.526 | 451 | 4.83 (4.41-5.30) | 1.39 (1.17-1.65) | 1.22 (1.01-1.46) | 1.19 (0.99-1.43) |
| T3 (≥1.3) | 18,121 | 82,031.157 | 600 | 7.31 (6.75-7.92) | 1.89 (1.60-2.23) | 1.51 (1.26-1.81) | 1.41 (1.18-1.69) |
| *P* for trend |  |  |  |  | <0.001 | <0.001 | <0.001 |

\*Cox proportional hazard models were used to estimate HRs and 95% CIs. Right-skewed variables (i.e., SDNN, RMSSD, TP, LF norm, HF norm, LF/HF ratio) were log-transformed for the analysis. Model 1 was adjusted for age, sex, body mass index, low-density lipoprotein cholesterol, high-sensitivity C-reactive protein, current smoking, and alcohol intake ≥ 20 g/day. Model 2: Model 1 plus an adjustment for systolic blood pressure and homeostasis model assessment for insulin resistance score.

CI, confidence interval; HF norm, normalized high-frequency; HR, hazard ratio; LF norm, normalized low-frequency; RMSSD, root mean square difference; SDNN, standard deviation of the normal-to-normal interval; TP, total power.