

Healthy Lifestyle and Heart Rate Variability in the General Population

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Purpose

The combined influence of lifestyle and cardiovascular risk factors, such as smoking, physical activity, obesity, or elevated blood pressure (BP) on autonomic function, is not well studied. We therefore assessed the relationship of a lifestyle-score with 24-hour (h) heart rate variability (HRV) in the general population.

Methods

We performed a population-based cohort study of healthy adults aged 25-41 years without prevalent cardiovascular disease, diabetes or body mass index >35kg/m² (GAPP-Study). 24-h electrocardiograms were performed with a validated device. Systematic post-processing was done. The standard deviation of all normal RR intervals (SDNN) was used as a HRV marker in this analysis.

Healthy lifestyle habits were summed to a score with a scale from 0 = most unhealthy to 7 = most healthy.

One point was given for:

- never smoked
- BMI <25kg/m²
- healthy diet
- physical activity ≥150min/week
- Systolic BP ≤120, diastolic BP ≤80mmHg and not using antihypertensive treatment
- cholesterol ≤200mg/dl
- glycated hemoglobin A1c ≤5.6%

Due to a positive interaction between sex and lifestyle-score (p<0.0001), sex-stratified multivariable linear regression analysis were constructed. SDNN as the outcome-variable was log-transformed.

Results

2080 participants (median age 37 years) were included in this analysis, of which 46.6% were men (**Table 1**). Median SDNN (interquartile range (IQR)) for men and women was 67.2ms (56.2; 80.7) and 58.3ms (49.7; 69.7), respectively. Compared to men, women had a higher lifestyle-score (**Figure 1**). 21 participants had a score of 0, 9 individuals had a score of 7. Results of the multivariable linear regression analyses across lifestyle score categories are shown in **Figure 2**.

Table 1 Baseline characteristics stratified by sex

Total n = 2080	Males n = 970	Females n = 1110	p-Value
Age (y)	36.9 (31.4; 40.5)	36.7 (31.0; 40.1)	0.28
SDNN (ms)	67.2 (56.2; 80.7)	58.3 (49.7; 69.7)	<0.0001
BMI (kg/m ²)	25.6 (23.6; 27.9)	22.6 (20.6; 25.3)	<0.0001
Curr. smoking (%)	239 (24.6)	211 (19.0)	0.002
Systolic BP (mmHg)	126 (120; 135)	113 (107; 120)	<0.0001

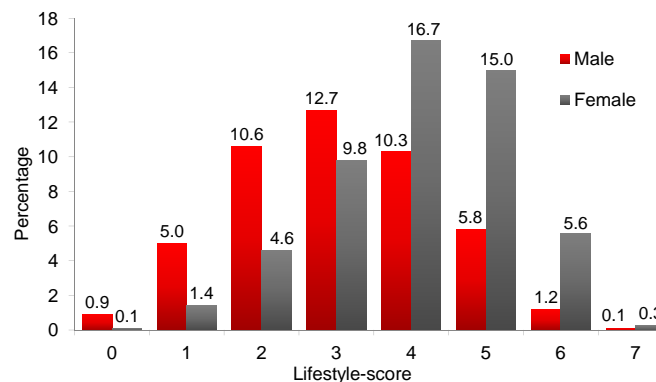


Figure 1 Distribution of the lifestyle-score

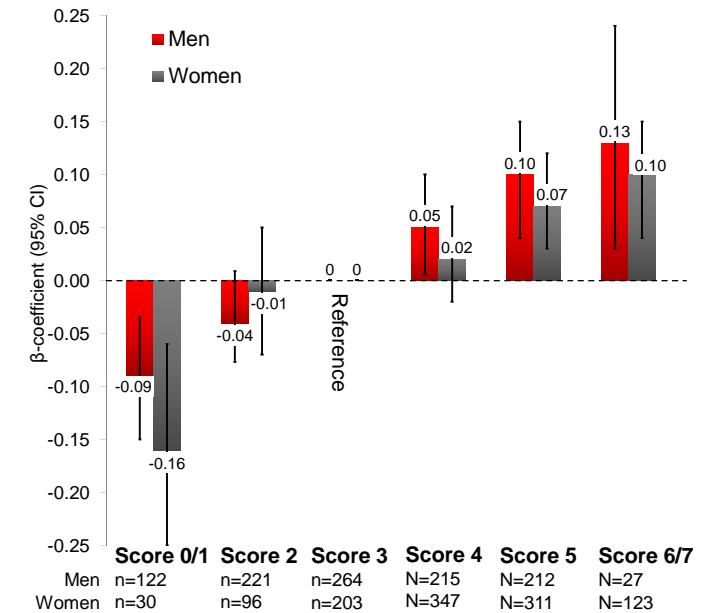


Figure 2 Relationship between the lifestyle-score and SDNN

SDNN was log-transformed. Data are β-coefficients and 95% confidence intervals adjusted for age, education level, alcohol consumption, and history of cardiovascular disease.

Conclusion

A healthy lifestyle is very rare among young adults from the general population. We observed that a healthy lifestyle was strongly associated with a greater HRV in this population.