

Fitness, physical activity and low sedentary time all associated with lower risk of type 2 diabetes

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New research published in *Diabetologia* (the journal of the European Association for the Study of Diabetes [EASD]) shows that cardiorespiratory fitness (CRF), high-intensity physical activity (HPA) and low sedentary time (ST) are all associated with a lower risk of type 2 diabetes. The study is by Jeroen van der Velde and Annemarie Koster, Maastricht University, Netherlands, and colleagues.

While previous research has individually connected CRF, HPA and ST with cardiometabolic health, the majority of studies on HPA and ST did not account for CRF, and this study is the first to examine combinations of ST and CRF.

It is known that differences in CRF between individuals are partly explained by differences in frequency and intensity of physical activity. Further, recent studies have shown that high levels of ST were associated with a lower CRF.

Nonetheless, an estimated 10 to 50% of CRF is explained by factors other than physical activity, including genetic differences and behavioural or environmental elements.

This means that someone could engage regularly in HPA and not have high CRF, or have high CRF without frequently engaging in HPA. The authors say: "Thus, although to some extent they are interrelated, HPA,

ST and CRF should be considered different traits and may be independently associated with cardiometabolic health."

This study used data from 1993 people aged 40-75 years from the Maastricht Study, all living in the southern part of the Netherlands. ST and HPA were measured using an accelerometer device. CRF was assessed using cycle-ergometer testing, with various calculations used to determine power output and oxygen consumption.

The researchers found that higher ST, lower HPA and lower CRF were independently associated with greater odds for type 2 diabetes and also metabolic syndrome (a cluster of factors indicating poor metabolic health, such as high blood pressure and large waist circumference).

The authors then looked at high, medium and low levels and ST, HPA and CRF in combination with each other. Compared with those who had both high CRF and high HPA, the group with low CRF and low HPA had a 5.7 times higher risk of metabolic syndrome and a 6.4 times higher risk of type 2 diabetes.

Similarly, all subgroups with medium or low CRF had higher odds for the metabolic syndrome, prediabetes and type 2 diabetes, irrespective of ST. Even in those with high CRF, high ST was associated with a trebling of risk of metabolic syndrome and a doubling of risk of type 2 diabetes, suggesting that high CRF may not be enough to 'counteract' the poor health outcomes associated with high ST. This adds to the accumulating evidence that reducing a person's daily amount of ST could be an important part in improving their cardiometabolic health.

The highest risk of metabolic syndrome and type 2 diabetes was observed in the group with low CRF and high ST; this group had a nine-times higher risk of metabolic syndrome, a trebling of risk of prediabetes and an eight times higher risk of type 2 diabetes when

compared with the group with high CRF and low ST.

The authors say: "High ST, low HPA, and low CRF were each associated with several markers of cardiometabolic health and higher risk for the metabolic syndrome and type 2 diabetes independent of each other. A combination of low CRF and low HPA, and a combination of low CRF and high ST, were associated with a particularly high risk of having the metabolic syndrome and type 2 diabetes."

Furthermore, they discovered that a change from low to medium CRF appeared to be more beneficial than from medium to high CRF, since the difference in risk of type 2 diabetes and metabolic [syndrome](#) was higher between low and medium CRF than between medium and high CRF.

The authors add: "In order to improve cardiovascular risk and to prevent type 2 diabetes these data support the development of new strategies that target all three components: ST, HPA, and CRF. However, at this stage our study is limited by its cross-sectional design, which makes it difficult to determine causality. Future work that incorporates health changes over time is needed to determine if the observed associations hold true."

They conclude: "We also need to find out what amount of ST is associated with a clinically relevant increase in risk and which levels of HPA and CRF are associated with clinically relevant lower risk for the [metabolic syndrome](#) and type 2 [diabetes](#)."

More information: Jeroen H. P. M. van der Velde et al. Which is more important for cardiometabolic health: sedentary time, higher intensity physical activity or cardiorespiratory fitness? The Maastricht Study, *Diabetologia* (2018). [DOI: 10.1007/s00125-018-4719-7](https://doi.org/10.1007/s00125-018-4719-7)

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