

# Muscle-strengthening and conditioning in women associated with reduced risk of diabetes

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Aerobic exercise is known to prevent type 2 diabetes, and muscle-strengthening alone or in combination with aerobic exercise improves diabetic control among those with diabetes. Although men who weight train have been found to have an associated reduced risk of developing diabetes, whether such an association exists for women has not been established.

In this week's *PLOS Medicine*, Anders Grøntved (Harvard School of Public Health, Boston, MA, USA, and University of Southern Denmark, Denmark) and colleagues prospectively followed up 99,316 middle-aged and older women for 8 years from the Nurses' Health Study ([NHS] 2000–2008) and Nurses' Health Study II ([NHSII] 2001–2009) who did not have diabetes at baseline, and determined whether their weekly time spent performing [resistance exercise](#), lower intensity muscular conditioning exercises (yoga, stretching, toning), and aerobic moderate and [vigorous physical activity](#) (MVPA) reported at baseline and in 2004/2005 was associated with a reduced risk of new onset of diabetes.

During the 705,869 person years of follow-up, 3,491 women developed type 2 diabetes. They found that resistance exercise and lower intensity muscular conditioning exercises were both independently associated with a reduced risk for diabetes, even after adjusting for [aerobic activity](#) and many other potential confounding factors. Women who engaged in at least 150 min/week of aerobic activity and at least 60 min/week of

muscle-strengthening activities had the most substantial risk reduction compared with inactive women (pooled RR = 0.33 [95% CI 0.29–0.38]). Limitations to the study were that physical activity was self-reported by questionnaire, and the study population consisted of nurses with mostly European ancestry.

The authors state, "The findings from our study...suggest that incorporating muscle-strengthening and conditioning activities with aerobic activity according to the current recommendation for physical activity provides substantial benefit for [diabetes] prevention in women." While women who followed current recommendations for both muscle-strengthening and aerobic activity had a substantially reduced risk of diabetes, even those who engaged in muscle-strengthening and aerobic activity at levels lower than currently recommended had a reduced risk of developing [diabetes](#).

**More information:** Grøntved A, Pan A, Mekary RA, Stampfer M, Willett WC, et al. (2014) Muscle Strengthening and Conditioning Activities and Risk of Type 2 Diabetes: A Prospective Study in Two Cohorts of US Women. *PLoS Med* 11(1): e1001587. [DOI: 10.1371/journal.pmed.1001587](#)

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