# **Supplement 1. Grade adjusted pace calculations**

The current study relied on a dataset consisting of >25,000 recreational, which contains information of their time, distance, and elevation data, sampled every 100 m. We implemented a grade adjusted pace which takes into account the gradient of terrain during the recorded activities, and estimates an equivalent pace relative to an even terrain. For example, the energy cost of running uphill is greater than that of running flat (1), so the grade adjusted pacing on ascents will be calculated as faster than the actual pace, and vice versa for descents. The calculation of grade adjusted pacing used in this work is based on the formulation described by Minetti et al. (1), which describes an adjustment for grade (Adjusted (g)) as follows:

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Then, the grade-adjusted pace for a pace *p* and grade *g* is given by:

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Thus, for example, a 4 min∙km-1 pace (15.0 km∙h-1) over a 1% downhill gradient is equivalent to of 4 min 22 seconds per km (14.2 km∙h-1).

**References**

1. Minetti AE, Moia C, Roi GS, Susta D, Ferretti G. Energy cost of walking and running at extreme uphill and downhill slopes. *J Appl Physiol*. 2002;93(3):1039–46.