

Reply to Wang: chronic disease and handgrip strength.

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1 To The Editor:

2 We thank Wang and Chen¹ for their comments on our work. In our recent study² of
3 6,864 community dwelling men and women, handgrip strength and body mass index
4 were measured at baseline and at four years follow-up. Compared to participants
5 with stable weight and grip strength, risk of all-cause mortality was significantly
6 greater in those experiencing weight loss over 4 years and reduced handgrip
7 strength, with the highest risk in those with both weight loss and reduced strength.
8 The models were adjusted for age, sex, physical activity, smoking, self-reported
9 wealth, depressive symptoms, and long standing illnesses.

10 Wang and Chen suggest that “The observed joint association of changes in handgrip
11 strength and weight with mortality is very likely explained by the progress of chronic
12 diseases or prognostic factors of health condition.” We agree that this is an important
13 issue to consider. In a population-wide study such as the English Longitudinal Study
14 of Ageing, it is common to conduct home-based clinical assessments that involve a
15 nurse visiting participants in their own homes.³ This model can sometimes limit the
16 ability to collect information on hard clinical diagnosis or disease stage. The self-
17 reported information that is collected on disease status is, nevertheless, often found
18 to be highly valid when compared with more objective assessments.^{4,5} In the present
19 study our main indicator of disease status was a self-reported item enquiring about
20 the presence of long standing illnesses. Around 54% of the sample reported
21 presence of long standing illnesses. Although relatively crude, self-reported long
22 standing illness was associated with higher risk of all-cause mortality (age- and sex-
23 adjusted hazard ratio=1.37, 95% CI, 1.20, 1.57) in the present study. One should
24 also consider that successful ageing is a multidimensional phenotype and is not
25 merely determined by the presence of clinical disease, but also incorporates freedom

26 from physical disability, plus preserved cognitive, affective and social functioning.⁶

27 We endeavored to capture some of these factors in our analyses by controlling for
28 physical activity, depressive symptoms, and wealth.

29 As suggested, we repeated our analyses in participants without chronic disease (see
30 Table). The results are very similar to those presented in our original paper, showing
31 that the highest mortality risk was observed in participants with weight loss and
32 reduced handgrip strength (hazard ratio = 4.18; 2.16, 8.08). However, in contrast to
33 our previous analyses, weight gain (with or without loss of strength) also appeared to
34 be associated with mortality in this sub-sample of apparently healthy individuals at
35 baseline.

36 In summary, we agree that it is important to control for underlying disease, although
37 our sensitivity analyses suggest the observed joint association of changes in
38 handgrip strength and weight with mortality is unlikely to be explained by existing
39 chronic conditions. We cannot rule out other sources of residual confounding.
40 Muscle tissue plays an important role in health and disease,⁷ and the association
41 between handgrip strength and mortality is biologically plausible.

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Table. Hazard ratios (95% CI) for the association of 4-year changes in handgrip strength and weight with mortality in participants without chronic disease at baseline (n=2,202; 93 deaths).

Weight change ¹	Grip strength change ²	
	<i>Stable</i>	<i>Lost</i>
<i>Stable</i>	1.00 (reference)	1.61 (0.91, 2.85)
<i>Gain</i>	3.32 (1.27, 8.66)	2.84 (1.02, 7.89)
<i>Lost</i>	1.70 (0.62, 4.69)	4.18 (2.16, 8.08)

Hazard ratios adjusted for age, sex, physical activity, smoking, wealth, depressive symptoms.

¹Weight change defined as increase or reduction in 5% of initial body mass between clinical assessment waves 2 to 4; ²Loss of grip strength defined as reduction in 5% of initial grip measure between clinical assessment waves 2 to 4.