EDITORIAL

Epidemiology and Population Health

Does physical activity cause weight loss?

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In recent correspondence Allison et al. [1] and Pontzer [2] debate the extent to which there is evidence for compensatory processes that minimize the influence physical activity has on energy balance and therefore how effective physical activity is as a strategy for weight loss.

The authors find common ground in their appraisal of whether the amount of energy expenditure caused by increased physical activity translates directly to weight loss in a linear fashion; it doesn't, as if it did people should lose more weight than they do in trials in which physical activity is increased under close supervision [3]. However, the authors find less common ground on the overall utility of physical activity as a tool for weight loss. Because of the above considerations Pontzer is not convinced that physical activity promotes weight loss, suggesting that due to uncertainty in research to date, the effect of physical activity on weight loss may be non-existent or at best physical activity is a poor tool for weight loss. Conversely, Allison et al. argue that there is convincing evidence that physical activity causes modest weight loss, providing you look at data from the most compelling study designs; randomized control trials.

How, in 2022, after decades of research on the topic, can consensus on the effect physical activity has on weight loss seemingly not have emerged? Exactly quantifying any effect of physical activity is notoriously difficult due to challenges in measuring physical activity accurately and ensuring there is adherence to the amount of physical activity prescribed. A different challenge to reaching consensus is the sheer number of studies conducted, which will undoubtedly sometimes produce contrasting findings. As Allison et al. allude to, systematic reviews of such studies are therefore essential. Yet, as pointed out by Pontzer et al., even here there may be a lack of consensus because one of the systematic reviews cited by Allison et al. [4] found no evidence from randomized control trials that physical activity causes weight loss.

Much like individual studies, systematic reviews differ in their methodological quality, appropriateness of statistical analyses and sample size. This is why systematic reviews of systematic reviews or "Umbrella" reviews will become increasingly important in determining in which way the overall evidence on questions about obesity point [5]. Assessing evidence from 12 systematic reviews on the impact physical activity has on weight loss in randomized trials, Bellicha et al. [6] conclude with confidence that physical activity does cause weight loss. In line with Allison et al. they note that the amount is modest (a mean difference of 1.5 to 3.5 kg in the review by Bellicha et al. [6]), but importantly this amount of weight loss would also be likely to convey cardiovascular health benefits (particularly if some of the weight loss is due to a loss of visceral fat).

There are of course other ways physical activity could impact on body weight; by preventing weight gain and promoting maintenance of weight loss. In the context of weight gain prevention in populations at risk of weight gain (e.g., women who are pregnant), several systematic reviews point in the same direction; physical activity is an effective tool in stemming excess weight gain [7–9]. Effects on weight loss maintenance are less well studied [10] and there is greater uncertainty. Yet, a recent large, randomized control trial by Lundgren et al. [11] found that combining liraglutide therapy and physical activity improved weight loss maintenance significantly more so than liraglutide therapy alone, but further inquiry will be needed.

Another area in need of further research in the context of physical activity is the contribution of Spontaneous Physical Activity (SPA: i.e., non-intentional fidgeting, standing, and ambulating) to energy balance [12]. Pioneering work by Levine et al. [13] suggests that individuals classified as lean may expend as much as 350 kcal more each day than those classified with obesity due to Non-Exercise Activity Thermogenesis (NEAT). This study also made the intriguing observation that NEAT patterns did not change with weight loss in the group classified with obesity or weight gain in the group classified as lean. Thus, there is a question mark over the extent to which SPA/NEAT is amenable to change and can contribute to weight control, but further investigation is certainly warranted.

Physical activity alone will not be a magic bullet for weight loss, as Pontzer elegantly argues. However, as Allison et al. argue, physical activity is one tool that we can use to address obesity on an individual patient level and ideally in conjunction with a more powerful tool for weight loss; dietary intervention.

Eric Robinson [1]✉ and David Stensel [2,3,4]

[1]*Institute of Population Health, University of Liverpool, Liverpool, UK.* [2]*School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, UK.* [3]*National Institute for Health and Care Research (NIHR) Leicester Biomedical Research Centre, University Hospitals of Leicester, National Health Service (NHS) Trust and the University of Leicester, Leicester, UK.* [4]*Faculty of Sport Sciences, Waseda University, Tokorozawa, Japan.*
✉*email: eric.robinson@liv.ac.uk*

REFERENCES

1. Allison D, Bier D, Locher J. Measurement rigor is not a substitute for design rigor in causal inference: increased physical activity does cause (modest) weight loss. Int J Obes. (in press). https://doi.org/10.1038/s41366-022-01234-9.
2. Pontzer H. Exercise is essential for health but a poor tool for weight loss: a reply to Allison and Colleagues. Int J Obes. (in press). https://doi.org/10.1038/s41366-022-01248-3.

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3. Dhurandhar EJ, Kaiser KA, Dawson JA, Alcorn AS, Keating KD, Allison DB. Predicting adult weight change in the real world: a systematic review and meta-analysis accounting for compensatory changes in energy intake or expenditure. Int J Obes. 2015;39:1181–87.
4. Jansen SCP, Hoorweg BBN, Hoeks SE, van den Houten MML, Scheltinga MRM, Tejink JAW, et al. A systematic review and meta-analysis of the effects of supervised exercise therapy on modifiable cardiovascular risk factors in intermittent claudication. J Vasc Surg. 2019;69:1293–308.
5. Robinson E, Roberts C, Vainik U, Jones A. The psychology of obesity: an umbrella review and evidence-based map of the psychological correlates of heavier body weight. Neurosci Biobehav Rev. 2020;119:468–80.
6. Bellicha A, van Baak MA, Battista F, Beaulieu K, Blundell JE, Busetto L, et al. Effect of exercise training on weight loss, body composition changes, and weight maintenance in adults with overweight or obesity: an overview of 12 systematic reviews and 149 studies. Obes Rev. 2021;22:e13256.
7. Sanabria-Martínez G, García-Hermoso A, Poyatos-León R, Álvarez-Bueno C, Sánchez-López M, Martínez-Vizcaíno V. Effectiveness of physical activity interventions on preventing gestational diabetes mellitus and excessive maternal weight gain: a meta-analysis. BJOG: Int J Obstet Gynaecol. 2015;122:1167–74.
8. Hamann V, Deruelle P, Enaux C, Deguen S, Kihal-Talantikite W. Physical activity and gestational weight gain: a systematic review of observational studies. BMC Public Health. 2022;22:1–5.
9. Muktabhant B, Lawrie TA, Lumbiganon P, Laopaiboon M. Diet or exercise, or both, for preventing excessive weight gain in pregnancy. Cochrane Database Syst Rev. 2015;2015:CD007145. https://doi.org/10.1002/14651858.CD007145.pub3.
10. Foright RM, Presby DM, Sherk VD, Kahn D, Checkley LA, Giles ED, et al. Is regular exercise an effective strategy for weight loss maintenance? Physiol Behav. 2018;188:86–93.
11. Lundgren JR, Janus C, Jensen SB, Juhl CR, Olsen LM, Christensen RM, et al. Healthy weight loss maintenance with exercise, liraglutide, or both combined. N Engl J Med. 2021;384:1719–30.
12. Mavanji V, Pomonis B, Kotz CM. Orexin, serotonin, and energy balance. WIREs Mech Dis. 2021;14:e1536. https://doi.org/10.1002/wsbm.1536.
13. Levine JA, Lanningham-Foster LM, McCrady SK, Krizan AC, Olson LR, Kane PH, et al. Interindividual variation in posture allocation: possible role in human obesity. Science. 2005;307:584–6.

AUTHOR CONTRIBUTIONS

ER drafted the manuscript. DS provided revisions. Both authors contributed to the final manuscript.

COMPETING INTERESTS

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ADDITIONAL INFORMATION

Correspondence and requests for materials should be addressed to Eric Robinson.