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2 **Title:** Response to “Physical Activity and Depression: Type of Exercise Matters”

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23 We thank Pareja-Galeano *et al*¹ for their comments on the findings reported in our
24 recent publication on the association between physical activity and symptoms of
25 depression in adolescents². Firstly, we would like to clarify that the measure of
26 physical activity that we used was individually calibrated combined heart rate and
27 movement sensing, not just heart rate. Secondly, the lack of statistically significant
28 associations in our study is strictly speaking not in disagreement with the meta-
29 analysis showing an effect of physical activity on depressive symptoms³, as the
30 confidence limits overlap. What is key to appreciate is that this is a prospective and
31 developmentally sensitive study regarding the putative causal associations between
32 routine activity and the emergence of depressive symptoms in a random sample of
33 community based adolescents. Our study addresses a quite distinct element in the
34 interplay between physical and mental health development compared to any
35 intervention study of activity on mood.

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37 That said, it is worth pointing out that part of the variance in self-reported activity
38 may reflect a person's perception of him or her being an active and dynamic person,
39 irrespective of true activity level, and that this self-image may in fact be protective
40 against depression. This presents a challenge to our understanding of the aetiology of
41 depressive symptoms, which likely includes a complex interplay of true behavioural
42 differences, social norms, and perception. It is also possible that there are true
43 population differences in the aetiology of depression; the meta-analysis³ was focussed
44 on clinical trials interventions in clinically depressed adults ranging in age from 18 to
45 71.6 years, whereas our work concentrates on a population-based sample of
46 adolescents.

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48 It is possible that variations in activity type may relate to depressive symptoms in
49 adolescents, irrespective of their overall volume of activity or time spent at higher
50 intensities. Whilst our objective data are not well-suited to infer these types of
51 activity, we do have additional data from self-report (at baseline), which relates to
52 different types of activity performed including participation in weight training
53 collected as number of days per week. We used this frequency measure as indicative
54 of strength-based exercise classifying participants into those performing weight
55 training at least once per week (n=166 and n=147 during term and holidays,
56 respectively) and those who did not.

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58 We added these strength-based exercise variables to linear and logistic regression
59 models originally presented in our manuscript (with sex and objective physical
60 activity as predictors). We found that strength-based exercise did not predict
61 depression or alter the effects of objective physical activity measures in any of the
62 models. The logistic regression models at baseline were not tested due empty cells.

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64 In summary, these analyses using self-reported frequency of weight training suggest
65 that in this population of adolescents, strength-based exercise did not have a
66 differential beneficial effect on depressive symptoms compared to overall physical
67 activity. Well-designed studies addressing the role of different types of activity in the
68 aetiology of depressive symptoms within this age group need to be conducted before
69 any firm conclusions can be drawn.

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71 **References**

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