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May 4, 2021

Dr. Farshid Guilak

Editor-in-Chief, Journal of Biomechanics

[em@editorialmanager.com](mailto:em@editorialmanager.com)

**RE: BM-D-21-00131**

Dear Dr., Guilak,

We thank you for the opportunity to revise the manuscript and the reviewer for their insightful comments. Attached you will find a revised manuscript titled: “The influence of bicycle lean on maximal power output during sprint cycling” that we hope you will find acceptable for publication in the *Journal of Biomechanics*.

In the following pages we have addressed all of the reviewer comments on a point-by-point basis and also indicated altered parts of the manuscript text as follows:

* italicized text refers to new text that has been included within the manuscript and,
* strikethrough text refers to old text that has now been omitted.

Thank you in advance for your time and effort in reviewing our response.

Sincerely,

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| Ross Wilkinson, Ph.D.  Post-doctoral Researcher  Integrative Physiology Dept.  University of Colorado Boulder  ross.wilkinson@colorado.edu | Rodger Kram, Ph.D. Associate Professor, Emeritus Integrative Physiology Dept. University of Colorado Boulder rodger.kram@colorado.edu |

Response to Reviewer

General

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| **Comment** | This manuscript submitted at Journal of Biomechanics focuses on the maximal output power during sprint cycling with or without lean. For this study, nineteen recreational cyclists performed 5-seconds sprints against variable resistance until they reach their maximal output power. The main result obtained in this study is that the maximum power is identical between the ad-lib condition and the locked condition.  The manuscript is clear and well written. |
| **Response** | We thank the reviewer for their concise summary and positive feedback. |
| **Comment** | This study is an incremental study (see Wilkinson et al. 2020. http://dx.doi.org/10.31236/osf.io/hj9gp). It is surprising to note that this manuscript quotes previous unpublished studies by the same author. The reviewer thinks that these data should first be peer-reviewed before being cited. Moreover, this first study on the same topic leads to very close results as the authors stated "[…] and peak instantaneous crank power in the Unconstrained condition were greater than Self-Restricted but similar to in the Trainer". Thus, what is different between these previous results and the new ones? Moreover, the authors have changed the names of the different conditions: ad-libitum (unconstrained), locked (trainer) and minimal lean (self-restricted). The reviewer believes that the authors should use the same name for the same condition. |
| **Response** | We thank the reviewer for taking the time to review and compare this study to the pre-print by Wilkinson et al. (2020). We apologize for not being more explicit that this study remains a pre-print, however we think citing pre-print material is an acceptable practice when necessary.  We have edited the in-text referencing to the pre-print as (Wilkinson et al., 2020 *PREPRINT*)  The main difference between these two studies is that Wilkinson et al. (2020 PREPRINT) was at a submaximal power output as stated on line 37:  “Further, the question of whether minimizing lean affects maximal power remains open. Wilkinson et al. (2020 *PREPRINT*) compared rider biomechanics on rollers, but only at a submaximal power output (5 W kg–1).” Thus, the difference in peak instantaneous crank power­­ (measured at 100 Hz) merely indicates a difference in the pattern of crank power production rather than an increase in maximal power output.  We have also renamed the conditions in Wilkinson et al. (2020 PREPRINT) to be consistent with the current submission. |
| **Comment** | On page 5, line 47-51, the assumptions were probably made after the results were obtained. Indeed, no results from the literature (except the ones published by the main author) can lead to such precise hypotheses. The hypotheses should be reformulated more broadly. |
| **Response** | We are disappointed that the reviewer would question our scientific integrity. These hypotheses were made *a priori* by the main author who–as you state–has published their own findings on this topic, which point toward these hypotheses. The main author completed a Ph.D. thesis on this precise topic. For reference, the Ph.D. thesis is available here: https://espace.library.uq.edu.au/view/UQ:d9a30f4. |
| **Comment** | The method is unclear. Indeed, the authors used a crank-mounted sensor (Garmin Ltd, Olathe, KA, USA) with 1 Hz resolution. This was followed by three to five short (5-s) maximal sprints in a non-seated posture under the ad-lib lean condition, each separated by 3-min of rest. Finally, the authors recorded the maximal instantaneous 1-second crank power. The reviewer doesn't understand how the authors can measured the instantaneous cadence with such low frequency. Indeed, the authors obtained a mean cadence around 110 rpm. Thus, they measured the cadence every two rotations. This seems too low to measure the maximal instantaneous power. |
| **Response** | We measured both crank power and cadence with 1 Hz resolution, we did not measure instantaneous crank power.  We have modified the text at Line 71 to avoid any confusion:  “A crank-mounted sensor (Garmin Ltd, Olathe, KA, USA) measured cadence with 1 Hz resolution. ~~The power meter creates a 1-second average from data measured at 65 Hz.~~ *The power meter measured crank power with 1 Hz resolution.*” |
| **Comment** | The authors mention the dynamic balance of the cyclists (page 12, line 186). How they define this concept? The balance is usually a static concept. How the authors can measure a good or a bad dynamic balance during a pedaling task? |
| **Response** | Dynamic balance is the ability of an object to balance while in motion. For example, during cycling the rider’s center of mass can fall outside of the bicycle’s base of support as long as the velocity of the rider’s center of mass is directed toward the bicycle’s base of support.  For the readers interests, we have included the following in-text citation at Line 186: “...dynamic balance *(Hof et al., 2005)*.”  Hof, A. L., M. G J Gazendam, and W. E. Sinke. 2005. “The Condition for Dynamic Stability.” Journal of Biomechanics 38 (1): 1–8. https://doi.org/10.1016/j.jbiomech.2004.03.025. |
| **Comment** | The authors provide no results regarding the joint torques and joint powers. Thus, it is unclear for the reader if the same output crank power observed with the ad-lib and the locked conditions necessitates the same power developed by the cyclists. The authors should briefly discuss this issue. |
| **Response** | We have added the following paragraph to discuss this topic:  “*We did not collect motion capture or three-dimensional pedal force data and thus cannot provide any insight into individual joint kinematics or kinetics. Although net total crank power is equal to net total joint power across a complete crank cycle, it is possible that the contribution of power by individual joints differed between the three conditions.*” |
| **Comment** | On page 13 at line 224, the authors use non-standard units. Please modify it. |
| **Response** | We have modified the units at Line 224: “~~65 km hr~~~~–1~~ *18.0 m s–1*” |

End of response to Reviewer.