Comparing Two Athletic Recovery Positions Between Maximum Effort Training Intervals

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INTRODUCTION

Throughout time spent as coaches of various types and levels of sport. We have observed a consistent clash between two recovery positions recommended by coaches to their athletes: hands behind head (HBH), and hands on knees (HOK). As a coach or trainer, comprehension of how the body works when it comes to exercise recovery is imperative, because it allows them to tap more deeply into the athletic potential of their pupils. According to Goll (2022), understanding recovery can help us "maximize efficiency of athletes competing in high intensity training" (p.7).

OBJECTIVES

Research by Michaelson et al., (2019), Goll (2022) and Skaggs et al., (2016) suggests that the hands on knee position is the superior recovery position when compared to the hands behind head position. All three of these studies compared different positions through various testing methodologies. However, each study has limitations that we hope to cover in our research within this subject. Of those who have explored this subject, most have done so utilizing high performance athletes and aerobic training intervals. Thus, the authors determined that exploring HBH and HOK recovery positions through the lens of anaerobic energy systems could be beneficial for the general populace. Is there a superior recovery position between intermittent bouts of maximal effort exercise?

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MATERIALS & METHODS

Research Site and Equipment: Research was conducted at Douglas College's New Westminster Campus. A *Velotron* stationary bicycle ergometer equipped with *Racermate One Technology,* was used to gather data for analysis.

Subjects: The study initially consisted of 14 participants (n=14) between the ages of 18-50 years old who were determined to be healthy.

Experimental Design: For the purpose of this study, a modified version of the WAnT (MWAnT) was used. The aforementioned metrics of peak anaerobic power, anaerobic capacity, and fatigue index, in Watts per kilogram (W/kg) and Watts per second (W/S), was focused for data collection.

Table 2
MWAnT Methodology

Stage	Procedures	Duration (sec)
Warm Up	• 180 second active duration • Cadence should maintain 60 rpm • 60 Watt resistance for female participants • 90 Watt resistance for male participants • Active component will be followed by 120 seconds of passive rest on the *Velotron* • Warm-up will total 400 seconds	400
Sprint 1	• 10 seconds of pedaling against no resistance • 30 seconds duration of maximal effort • Resistance set at 0.075 per kilogram body weight in Watts • No cadence requirements, just maximal effort	40
Data Collection 1	• Researchers will collect anaerobic power, anaerobic capacity, and fatigue index data.	N/A
Recovery	• Participants will dismount the *Velotron* • Participants will adopt a recovery protocol procedure: V, HBH or HOK • Participants will mount the *Velotron* upon completion of recovery	180
Sprint 2	• 10 seconds of pedaling against no resistance • 30 seconds duration of maximal effort • Resistance set at 0.075 per kilogram body weight in Watts • No cadence requirements, just maximal effort	40
Data Collection 2	• Researchers will collect peak anaerobic power, anaerobic capacity, and fatigue index data.	N/A
Cool Down	• Resistance will be set to zero • Cadence should maintain 60 rpm	120

Note. Methodology for carrying out the MWAnT

RESULTS

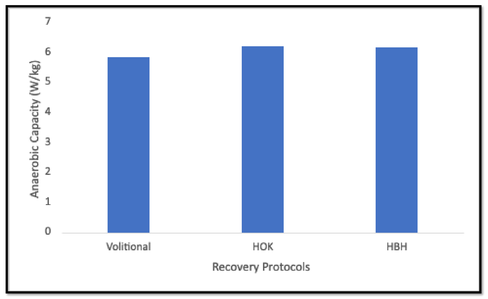
Table 3

Means, P Values, and One Way Analyses of Variance in Anaerobic Capacity, Anaerobic Power, and Fatigue Index Between Volitional, Hands on Knees, and Hands Behind Head Recovery Protocols

Recovery Protocol	Anaerobic Capacity				Anaerobic Power				Fatigue Index			
	Mean (W/kg)	*p* versus Volitional	*p* versus HOK	*p* versus HBH	Mean (W/kg)	*p* versus Volitional	*p* versus HOK	*p* versus HBH	Mean (W/S)	*p* versus Volitional	*p* versus HOK	*p* versus HBH
Volitional	5.86	—	0.498	0.567	7.67	—	0.670	0.977*	10.21	—	0.426*	0.434
HOK	6.21	0.498*	—	0.964*	7.87	0.670*	—	0.645*	12.96	0.426	—	0.271
HBH	6.18	0.567*	0.964	—	7.66	0.977	0.645	—	9.03	0.434*	0.271*	—

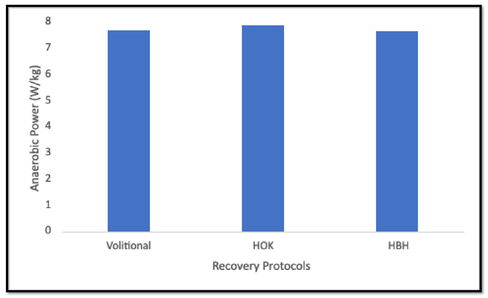
Note. Table demonstrating the results of nine separate one-way ANOVA where $p \leq 0.05$ implies statistical significance. An asterisk (*) indicates the more favorable protocol in terms of *p*-values, but not a statistically significant one.

FIGURE 1: Mean Anaerobic Capacity



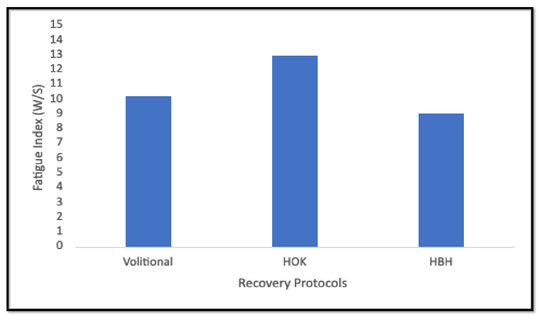
Note. A graph depicting mean anaerobic power data in watts per kilogram (W/kg) generated during the MWanT, and following one of three recovery protocols: Volitional, HOK or HBH.

FIGURE 2: Mean Anaerobic Power



Note. A graph depicting mean anaerobic capacity data in watts per kilogram (W/kg) generated during the MWanT, and following one of three recovery protocols: Volitional, HOK or HBH.

FIGURE 3: Fatigue Index



Note. A graph depicting mean fatigue index data in watts per second (W/S) generated during the MWanT, and following one of three recovery protocols: Volitional, HOK or HBH.

DISCUSSION

Through nine separate ANOVA tests and the comparison of mean results for each position, no statistically significant findings could be observed. Initially, there was concern that allowing participants free reign during the volitional control session would lead many to opt for active recovery; which has been shown to enhance recuperation and thus, could confound results (Draper et al., 2006). Fortunately, only four participants performed movement based recovery while the other three either lay down or chose to be seated (see Appendix D). Therefore, it is argued that the mean volitional results likely reflect a true value. This is because the benefits of active recovery modalities would likely be evened out by the shortcomings of the passive positions (Draper et al., 2006).

A review article by Minett and Duffield (2014) claims that recovery post exercise is best assessed through a measurement of muscular power. Furthermore, Bogdanis et al. (2003) characterize anaerobic power as the peak power output generated while engaged in short-duration maximal-effort exercise. Interestingly however, in the present study, anaerobic power demonstrated the least variance of all measured data, which can be viewed in table 3 and figure 2. Perhaps this uniformity can be explained by the brief countdown period prior to the MWanT being performed against minimal resistance—allowing participants to achieve similar peak anaerobic power numbers at the onset of the testing process. Therefore, it is believed that results have shown anaerobic power to be an inadequate metric for the purposes of the current study, and other methods of assessing post exercise recovery muscular power output should be explored.

The metric which demonstrated the greatest mean variance and subsequently, most considerable *p*-value, was fatigue index. When comparing HBH to HOK in the present research, a *p*-value of 0.271 can be observed in favor of HBH being a more optimal recovery position by a slim margin. While the same metrics were not used, this data would be contrary to findings by Michaelson et al. (2019) whose research indicated HOK was the significantly superior recovery position compared to HBH. In the present study, this *p*-value can likely be explained by a data anomaly resultant of what Oliver (2007) refers to as 'pacing'.

CONCLUSION

Maximal effort exercise stresses numerous bodily systems, and thus, optimizing recovery is crucial for athletic success between repeated bouts on the sports field or everyday life. Based on review and interpretation of data from the present study, there is little evidence to suggest either HBH or HOK over the other as beneficial recovery positions between repeated bouts of maximal effort exercise within the general population.

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