

### INTRODUCTION

Due to the COVID-19 pandemic, nationwide mask mandates led to gyms requiring patrons to wear face coverings while working out in order to prevent the spread of the disease. While the use of face coverings has been beneficial to helping keep people safe, it was met with mixed opinions and some frustration by gym users that argued that it was impacting their workout. Early criticisms included that wearing face masks affected respiratory function, heart rate and perceived effort. The purpose of this study was to measure the effects of wearing a surgical face mask during submaximal exercise on heart rate (HR), rate of perceived exertion (RPE) and oxygen saturation to determine whether a measurable difference exists.

## METHODS

(18-23), recreationally active female Five college aged participants performed two submaximal tests in a randomized, crossover fashion; one with a surgical face mask and one without. Both tests consisted of a 5-minute warm-up followed by 15 minutes at 70% of age predicted maximum heart (220-age). During the exercise bout, RPE, oxygen saturation, and HR were collected every three minutes.

## **RESULTS AND DISCUSSION**

Subject with a mask.				
Subject	O <sub>2</sub> Saturation	Heart Rate	RPE	
Subject 1	93.8% ± .44%	155 BPM ± 4BPM	12 ± .44	
Subject 2	92.8% ± .84%	146 BPM ± 4BPM	12 ± .8	
Subject 3	93.6% ± 1.34%	142 BPM ± 4BPM	13 ± .83	
Subject 4	95.4% ± 1.6%	158 BPM ± 6 BPM	8.4 ± .54	
Subject 5	95.2% ± .44%	135 BPM ± 2.4 BPM	$11.8 \pm 1.8$	

**Table 1:** Mean and standard deviation of all variables for each subject with a mask

**Table 2:** Mean and standard deviation of all variables for each cubiect without a mack

subject without a mask.				
Subject	O <sub>2</sub> Saturation	Heart Rate	RPE	
Subject 1	90.0% ± 3.24%	144 BPM ± 6 BPM	11 ± 0.55	
Subject 2	92.8% ± .84%	142 BPM ± 3.8 BPM	8 ± .5	
Subject 3	92.6% ± .89%	155 BPM ± 1.9 BPM	12.6 +/-1.1	
Subject 4	93.8% ± 1.5%	164 BPM ± 3 BPM	8 ± 0	
Subject 5	96% ± 0%	142 BPM ± .8 BPM	12.2 ± 1.3	

# The Effects on HR, RPE and Oxygen Saturation While Wearing a Surgical Face Mask During Submaximal Exercise

Martin Camunez, Annelise Kalmbach, Trey Satterfield, Madison Smith-Sanchez and Brent Alumbaugh Department of Kinesiology, Colorado Mesa University, Grand Junction, Colorado

> We found that wearing a surgical face mask during submaximal exercise had a significant difference (p<.05) on heart rate and RPE in some of our subjects. Amongst all of the individuals and as a group there was no difference in oxygen saturation. As a group, though, there was no significant difference in heart rate and RPE. These results suggest that there is more discomfort or other factors involved with wearing a mask that can impact someone's workout and make it feel more difficult, even if they are still getting as much oxygen to their blood. With no changes in oxygen saturation, our results suggest that even with a face covering, people are still getting just as much oxygen in as without and not having a detrimental impact on their health. While we do not know the exact mechanism for the increase In heart rate in some of our subjects with the mask, this does show a possible physiological basis for why exercising with a mask feels more difficult.













**Figure 1b:** Mean RPE of all subjects (t(4)=-1.3,

Figure2a: Represents an oxygen saturation response observed in one subject. Differences were not statistically different, p>.05.



statistically different, p<0.01.



**Figure 2c:** Represents a common response witnessed across all subjects over the course of the 15 minute exercise bout. RPE was significantly (p<0.01) lower in the "Without Mask" condition.

#### CONCLUSION

The differences in heart rate for some of our subjects may be a potential physiological basis for the increased RPE scores in our subjects albeit heart rate differences were not statistically different. Face masks are necessary in order to prevent the spread of the disease and keeping individuals safe. Results indicate that, although there are no statistically significant differences in oxygen saturation and HR, perceived effort was significantly higher in the masked condition. Individuals that feel as if a face covering is inhibiting performance should be encouraged to exercise Recognizing potential discomfort and training at lower outdoors. intensities may be beneficial in an indoor environment.