

## **Comparing Surgical and N95 Mask Use on Resting Oxygen Consumption in Healthy Young Adults**

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### **ABSTRACT**

Face masks reduce the spread of COVID-19, but their impact on respiratory physiology largely remains unknown. While some studies found that exercising while wearing cloth or surgical face masks has no effect on performance or muscle oxygenation, studies have shown wearing surgical masks during high-intensity interval training (HIIT) and aerobic exercise had negative impacts on cardiopulmonary function. However, few studies examined changes in cardiorespiratory metabolism while wearing different types of face masks at rest. **PURPOSE:** To examine oxygen consumption ( $\text{VO}_2$ ) and carbon dioxide ventilation ( $\text{VCO}_2$ ) while wearing surgical and N95 masks at rest. **METHODS:** This study was IRB approved. Twenty-two subjects (age  $24.6 \pm 2.94$ , 14 female), were recruited from a convenience sample and signed written consent. Subjects had no known history of respiratory/metabolic disease or claustrophobia.  $\text{VO}_2$  (mL/kg/min) and  $\text{VCO}_2$  (mL/min) were recorded using indirect calorimetry under a canopy. Subjects fasted overnight for a minimum of eight hours. Each subject's first trial recorded baseline measurements without a face mask, then the order of their surgical and N95 mask trials was randomized. Each of the three trials were 15 minutes, with a rest between conditions. Comfort levels were measured after each condition using a Likert scale, and open-ended responses were recorded after testing. **RESULTS:** Repeated measures ANOVA with post-hoc Bonferroni correction was used to analyze the mean values during the final 10 minutes of each trial. Both  $\text{VO}_2$  and  $\text{VCO}_2$  were significantly lower in the surgical mask condition when compared with no face mask ( $p=0.005$ ,  $p=0.008$ , respectively), but were not significantly different in the N95 mask condition compared with no face mask ( $p=0.12$ ,  $p=0.054$ , respectively). The majority (95.5%) of subjects reported being least comfortable wearing the N95 mask. **CONCLUSION:**  $\text{VO}_2$  and  $\text{VCO}_2$  at rest were significantly decreased when subjects wore surgical masks compared to no face masks, while N95 masks showed no significant difference. These findings suggest that in an acute setting, different types of face masks may have varied effects on oxygen consumption. Further research is needed to understand the impact of the prolonged use of face masks at rest.