

Facemask Type Impacts Dyspnea During Maximal Exercise Testing, but Mental Toughness Does Not Mediate

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ABSTRACT

With the increasing use of facemasks during maximal exercise testing, concerns have been raised about their impact on perceptual responses, such as dyspnea and discomfort. Mental toughness (MT) has been proposed as a potential mediator for the relationship between facemasks and perceptual responses. **PURPOSE:** Examine whether sensational perceptions related to facemasks and maximal exercise testing are mediated by MT. **METHODS:** The study utilized a randomized crossover design. Five participants completed a maximum Bruce protocol while wearing a surgical (SM), cloth (CM), N95 (N95), or no mask (NM). Perceptual responses were collected at pre-exercise (PRE), Respiratory Exchange Ratio of 1.0 (RER_{1.0}), and immediately post-exercise (IPE), using Feeling Scale (FS) and Dyspnea scale (CR10). We used the IPE time point for maximum FS and CR10 responses. Mental Toughness Index (MTI) was administered at PRE and IPE. Δ MTI change was calculated as PRE-MTI minus IPE-MTI. A mediation analysis using the medmode and jAMM packages on Jamovi vs. 2.3 at $p < .005$ was performed to assess the mediating role of Δ MTI on the linkage between facemasks and FS or CR10 respectively. We used simple contrasts comparing the NM with each of the remaining facemasks. The large sample z-test of the mediated effect and non-parametric resampling procedure of bootstrapping (percent) with 1000 samples for the calculation of the standard errors of the mediated effect was employed. **RESULTS:** The indirect effect of Δ MTI on FS was not significant for any of the contrasts. The direct effect of facemasks on FS was not significant. Therefore, there is no mediating effect of Δ MTI on FS. The indirect effect of Δ MTI on CR10 was not significant for any of the contrasts. The direct effect of NM to CM facemask contrasts on CR10 (1.77) was significant ($\beta = .42$, $z = 2.03$, $p = .042$), indicating only a direct effect and no mediation is present. **CONCLUSION:** MT does not mediate the relationship between facemasks and dyspnea/discomfort during maximal exercise testing. However, there was a significant direct effect of the type of facemask on the dyspnea score, with the NM to CM contrast being the most impactful. These findings suggest that the type of facemask worn during exercise can have a direct impact on perceived dyspnea, with CMs potentially causing more discomfort than SMs or N95s.