Table-1: Characteristics of The Included Systematic Reviews for Acute Physiological Impact of Respiratory Protection Mask Use:

Investigator	Included Studies	Participants	Intervention	Comparison	Exercise Protocol	Outcomes Reported
Chen, 2022(1)	6 studies (3 randomized crossover trials/RCT and 3 non-randomized controlled trials)	313 COPD patients	Surgical facemask, N95 respirator, Dual cartridge half-face facemasks and disposable non-filter medical facemasks	No mask	6-minutes' walk, Steady Exercise state, High-intensity exercise	Ends tidal carbon dioxide, RR, HR, Oxygen saturation, Pulmonary function, Blood pressure, Blood lactate, Minute ventilation and inspiratory time, Six-Minute walking test, expected relative exercise capacity, Work rate
Engerof, 2021 (2)	14 studies (14 randomized controlled crossover trials)	246 Healthy individuals	Surgical mask, FFP to/N95 respirator with and without exhalation valve	No facemask	Rest, Steady exercise state, Graded exercise	Oxygen Uptake and Saturation, Carbon Dioxide Exhalation and Partial Pressure, Pulmonary Function, Physical Performance
Glanzel,2022(3)	36 randomized cross-over studies	749 healthy adults	Clothing (CM), surgical (SM), FFP2/N95, and exhalation valved FFP2/N95	No facemask	NR	Discomfort, Subjective stress responses, Dyspnea, Time-to-exhaustion performance, Power output performance, Muscle force and exercise performance

Investigator	Included Studies	Participants	Intervention	Comparison	Exercise Protocol	Outcomes Reported
Lima, 2023(4)	10 studies (13 randomized crossover trials/randomized controlled trial)	306 (1 study with 106 participants were children aged 7-14)	N95/FFP2 respirators	No facemask	Aerobic exercise	HR, RR, Blood pressure, Oxygen saturation (SpO2), Perceived exertion
Litwinowicz, 2022 (5)	26 studies (25 Randomized crossover studies and one retrospective observational study)	751 Healthy individuals	Surgical facemask, (FFP1, FFP2, FFP3/ N95, N97, N99 respirators), Cloth masks	No face mask, Different type of facemask	Low intensity activities, Moderate to high-intensity activities	Heart rate, Respiratory rate, Pulse oximetry measures - oxygen saturation (spo2), Oxygen uptake, Tidal volume, Transcutaneous carbon dioxide pressure (tcpco2), Systolic blood pressure (SPB), Thermoregulation measures and subjective heat perceptions, Perception of exertion
Roeckner, 2020 (6)	4 studies (1 randomized crossover trials/3 prospective trial)	42 Pregnant women	N95 respirators	Non pregnant women, No facemask	Rest, Progressive exercise state	Heart rate, Respiratory rate, Blood pressure, Fetal heart rate, Oxygen saturation, Transcutaneous CO2, Perceived exertion
Shaw, 2021(7)	22 studies (13 randomized crossover trials, 7 non-randomized crossover trials, and 2 retrospective	1573 Participants (1 study with 106 participants were children aged 7-14)	Surgical face mask, FFP2/N95 respirators, Cloth masks	No facemask	Low to moderate exercise, Progressive exercise state	Exercise performance, Arterial oxygen saturation, Muscle oxygenation, End-tidal and

Investigator	Included Studies	Participants	Intervention	Comparison	Exercise Protocol	Outcomes Reported
	studies)					arterial CO2, RPE, Cardiac output and stroke volume, Blood pressure, Respiratory rate, Ventilation and tidal volume, Lactate
Wangsan, 2022 (8)	13 studies (8 randomized cross-over studies, three non-randomized studies, and two observational studies)	260 participants	N95/FFP2 respirators	No facemask	Low-Moderate Physical Workload, High Physical Workload	Oxygen Saturation, Partial Pressure of Carbon (PCO2) Dioxide
Zheng, 2023 (9)	45 studies (42 Randomized crossover studies, 2 RCT and one non-randomized repeated measure study)	1264 Healthy individuals (1 study with 106 participants were children aged 7-14)	Surgical face mask, FFP2/N95 respirators, Cloth masks	No mask	Steady exercise protocol, Progressive intensity protocol	Heart rate, VO2, SpO2, PetCO2, RPE, Thermal sensation, Blood lactate, Respiratory rate, Minute ventilation, Tidal volume VE/VCO2

CM, Cloth Mask; CO2, Carbon Dioxide; COPD, Chronic Obstructive Pulmonary Disease; FFP, Filtering Face Piece; HR, Heart Rate; NR, Not Reported; PCO2, Partial Pressure of Carbon Dioxide; PetCO2, End-expiratory carbon dioxide partial pressure; RPE, Rating of perceived exertion; RR, Respiratory Rate; SBP, Systolic Blood Pressure; SM, Surgical Mask; SpO2, Saturation of Peripheral Oxygen; tcpo2, Transcutaneous carbon dioxide pressure; VO2, rate of oxygen consumption; VE/VCO2, minute ventilation/carbon dioxide production.

Table-2: Characteristics of the included studies for Cognitive and Psychological impact of respiratory protection mask use:

Author, year	Study design	Population / Country	Total number of participants	Age Mean (SD)	Female (%)	Interventions	Control	Outcomes
Braun-Trocchio, 2022(10)	Non-randomized control study	Healthy university students and staff/ United States	54	21.2 (5.5)	70%	Face mask	No mask	Task Specific Motivations, Task Duration, Commitment Check, Attention

Author, year	Study design	Population / Country	Total number of participants	Age Mean (SD)	Female (%)	Interventions	Control	Outcomes
								Allocation, Ratings of Perceived Exertion (RPE)
Chong, 2022(11)	Cross sectional study	Healthcare workers/Singapore	93	38.1 (8.4)	58%	Surgical face mask, N95, PAPR, Clean Space HALO	No mask	Disruption of communication w/ patients, Claustrophobia
Deng, 2022(12)	RCT	Healthy university students and staff/US	20	20 to 30	45%	Surgical mask, Cloth mask	No mask	Effect of wearing a mask on work engagement, Effect of wearing a mask on mental workload, Skin conductance level
Grimm, 2022(13)	RCT	Healthy adults/ Germany	23	23.5 (2.1)	56.5%	Surgical mask, Filtering face piece type 2 (FFP2)	No mask	Hemodynamic parameters, Metabolic response to mask wearing, Self-reported data including cognitive performance
Ipek, 2021(14)	Cross sectional study	Health care workers /Turkey	34	31.3 (6.4)	56%	Surgical mask	N95 masks.	Attention deficit and difficulty in concentrating
Jahangiri, 2022(15)	Quasi-experimental study	Healthy university students /Iran	40	26.5 (3.9)	47.5%	Face mask	N95 mask	Continuous performance test (CPT), N-back test, Correct responses and response time
Khalid, 2021(16)	Cross sectional study	Gastroenterologists/USA	12	NR	NR	Surgical mask	SM and N95 FFR, Powered air-purifying respirator	Claustrophobia
Slimani, 2021(17)	Cross sectional study	Healthy students/ Tunsia	17	17.6	47%	Cloth mask	No mask	Concentration Performance, Total Number

Author, year	Study design	Population / Country	Total number of participants	Age Mean (SD)	Female (%)	Interventions	Control	Outcomes
								of Errors, Rate of Perceived Exertion
Su, 2021(18)	Cross sectional study	Health care workers/Taiwan	68	41	23.5%	Surgical mask	N95 respirator	Anxiety, Fatigue, Depression, Difficulty talking (determined via questionnaire)
Tornero-Aguilera, 2021(19)	Cross sectional study	Healthy university students/ Spain	50	20.2(2.9)	24%	Surgical face mask	No mask	Mental fatigue perception, Reaction time, Heart rate variability

Clean Space HALO, CleanSpace® HALO™ mask; CPT, Continuous performance test; FFP, Filtering Face Piece; NR, Not Reported; PAPR, Powered Air Purifying Respirator; RCT, Randomized Controlled Trial; RPE, Rating of perceived exertion; SM, Surgical Mask; US, United State; USA, United State of America

Table-3: Methodological Quality of Comparative Observational Studies (Newcastle Ottawa scale)

Study Label	Selection Bias	Baseline Imbalances Between Groups	Was Outcome Assessment Blinded?	Overall
Braun-Trocchio, 2022(10)	Moderate risk	Low risk	High risk	High risk
Chong, 2022(11)	High risk	High risk	High risk	High risk
Ipek, 2021(14)	Moderate risk	Low risk	High risk	High risk
Jahangiri, 2022(15)	High risk	Low risk	High risk	High risk
Khalid, 2021(16)	High risk	Low risk	High risk	High risk
Slimani, 2021(17)	High risk	Low risk	High risk	High risk
Su, 2021(18)	Moderate risk	Low risk	High risk	High risk
Tornero-Aguilera, 2021(19)	High risk	Low risk	High risk	High risk

Table-4: Methodological Quality of Randomized Clinical Trials

Author, Year	Bias Arising from the Randomization Process	Bias due to Deviations from Intended Interventions	Bias Due to Missing Outcome Data	Bias in The Measurement of the Outcome	Bias in Selection of The Reported Result	Other	Overall
Deng, 2022(12)	Low risk	Low risk	Low risk	Moderate risk	Low risk	Moderate risk	Moderate risk
Grimm, 2022(13)	Low risk	Low risk	Low risk	Low risk	Low risk	Moderate risk	Moderate risk

References:

1. Chen X, Zhang C, Ibrahim S, Tao S, Xia X, Li Y, et al. The impact of facemask on patients with COPD: A systematic review and meta-analysis. Front Public Health. 2022;10:1027521.
2. Engeroff T, Groneberg DA, Niederer D. The Impact of Ubiquitous Face Masks and Filtering Face Piece Application During Rest, Work and Exercise on Gas Exchange, Pulmonary Function and Physical Performance: A Systematic Review with Meta-analysis. Sports Med Open. 2021;7(1):92.
3. Glanzel MH, Barbosa IM, Machado E, Prusch SK, Barbosa AR, Lemos LFC, et al. Facial mask acute effects on affective/psychological and exercise performance responses during exercise: A meta-analytical review. Front Physiol. 2022;13:994454.
4. Lima G, Rocha TC, Silva Junior G, Martins MT. The influence of N95 and FFP2 masks on cardiorespiratory variables in healthy individuals during aerobic exercise: a systematic review and meta-analysis. J Bras Pneumol. 2023;49(3):e20220143.
5. Litwinowicz K, Choroszy M, Ornat M, Wrobel A, Waszczuk E. Bayesian network meta-analysis of face masks' impact on human physiology. Sci Rep. 2022;12(1):5823.
6. Roeckner JT, Krstic N, Sipe BH, Obican SG. N95 Filtering Facepiece Respirator Use during Pregnancy: A Systematic Review. Am J Perinatol. 2020;37(10):995-1001.
7. Shaw KA, Zello GA, Butcher SJ, Ko JB, Bertrand L, Chilibeck PD. The impact of face masks on performance and physiological outcomes during exercise: a systematic review and meta-analysis. Appl Physiol Nutr Metab. 2021;46(7):693-703.
8. Wangsan K, Sapbamrer R, Sirikul W, Panumasvivat J, Surawattanasakul V, Assavanopakun P. Effect of N95 Respirator on Oxygen and Carbon Dioxide Physiologic Response: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2022;19(14).
9. Zheng C, Poon ET, Wan K, Dai Z, Wong SH. Effects of Wearing a Mask During Exercise on Physiological and Psychological Outcomes in Healthy Individuals: A Systematic Review and Meta-Analysis. Sports Med. 2023;53(1):125-50.
10. Braun-Trocchio R, Renteria J, Warfield E, Harrison K, Williams A. The Effects of Face Coverings on Perceived Exertion and Attention Allocation during a Stepping Task. Int J Environ Res Public Health. 2022;19(11).
11. Chong LS, Bundele A, Sumner J, Mukhopadhyay A. Advances in respiratory protective equipment: practical experiences of CleanSpace(R) HALO by healthcare workers. J Hosp Infect. 2022;124:22-8.
12. Deng M, Wang X, Menassa CC. Investigating the effect of wearing masks on office work in indoor environments during a pandemic using physiological sensing. Build Environ. 2022;221.
13. Grimm K, Niederer D, Nienhaus A, Groneberg DA, Engeroff T. Blood gas levels, cardiovascular strain and cognitive performance during surgical mask and filtering face piece application. Sci Rep. 2022;12(1):9708.
14. Ipek S, Yurttutan S, Gullu UU, Dalkiran T, Acipayam C, Doganer A. Is N95 face mask linked to dizziness and headache? Int Arch Occup Environ Health. 2021;94(7):1627-36.
15. Jahangiri H, Zamanian Z, Daneshmandi H, Seif M, Jamshidi H. Investigating the short-term effects of using full-body hospital personal protective equipment and changes in physical workload intensity on human physiological and cognitive performance. Ergonomics. 2022:1-15.
16. Khalid A, Romutis S, Ibinson J, Thomas C, Myint A, Dueker J, et al. Acute physiologic effects of N95 respirator use on gastroenterologists performing simulated colonoscopy. Gastrointest Endosc. 2021;94(1):160-8 e3.
17. Slimani M, Miarka B, Znazen H, Moalla W, Hammami A, Paravlic A, et al. Effect of a Warm-Up Protocol with and without Facemask-Use against COVID-19 on Cognitive Function: A Pilot, Randomized Counterbalanced, Cross-Sectional Study. Int J Environ Res Public Health. 2021;18(11).

18. Su CY, Peng CY, Liu HL, Yeh IJ, Lee CW. Comparison of Effects of N95 Respirators and Surgical Masks to Physiological and Psychological Health among Healthcare Workers: A Randomized Controlled Trial. Int J Environ Res Public Health. 2021;18(24).
19. Tornero-Aguilera JF, Clemente-Suarez VJ. Cognitive and psychophysiological impact of surgical mask use during university lessons. Physiol Behav. 2021;234:113342.