

Supplementary Appendix

Modified Downs and Black Quality Appraisal Questions:

All questions (with exception of question 5) were scored on the following scale: Yes = 1, No = 0 or Unable to determine = 0.

Reporting:

1. Is the hypothesis/aim/objective of the study clearly described?
2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
3. Are the characteristics of the patients included in the study clearly described?
5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?
(Scoring: Yes =2; Partially = 1; No=0 or Unable Determine=0).
6. Are the main findings of the study clearly described?
7. Does the study provide estimates of the random variability in the data for the main outcomes?
10. Have actual probability values been reported for the main outcomes except where the probability value is less than 0.001 (i.e. indicating $P = 0.043$ rather than $P < 0.05$)?

External Validity:

11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited?
12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited?

Internal Validity (Bias)

15. Was an attempt made to blind those measuring the main outcomes of the intervention?
16. If any of the results of the study were based on 'data dredging', was this made clear?
18. Were the statistical tests used to assess the main outcomes appropriate?
20. Were the main outcome measures used accurate (valid and reliable)?

Internal Validity (Confounding)

22. Were study subjects in different intervention groups or were the cases and controls recruited over the same period of time?
25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?

Table 1: Modified Downs and Black Quality Appraisal

Study (year)	Reporting							External Validity		Internal Validity - Bias				Internal Validity-Confounding		Total Score /16	Total Score %
	1	2	3	5	6	7	10	11	12	15	16	18	20	22	25		
Antonelli-Incalzi <i>et al.</i> (2012)	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	12	75.0
Andrianopoulos <i>et al.</i> (2021)	1	1	1	2	1	1	0	0	0	0	1	1	1	0	1	11	68.75
Bonnevie <i>et al.</i> (2020)	1	1	1	0	1	1	1	0	0	0	1	1	1	1	0	10	62.5
Cleutjens <i>et al.</i> (2017)	1	1	0	1	1	1	1	1	0	0	1	1	1	0	0	10	62.5
Cleutjens <i>et al.</i> (2018)	1	1	0	1	1	1	1	1	0	0	1	1	1	0	0	10	62.5
Cruthirds <i>et al.</i> (2021)	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	11	68.75
Dag <i>et al.</i> (2016)	1	1	0	2	1	0	1	0	0	0	1	1	1	0	1	10	62.5
Emery <i>et al.</i> (1991)*	1	1	1	0	1	1	0	0	0	0	1	1	1	0	0	8	50.0
Emery. (1994)*	1	1	1	0	1	1	0	0	0	0	0	1	1	0	0	7	43.75
Ferrari <i>et al.</i> (2004)	1	1	1	0	1	1	0	1	0	0	1	1	1	1	0	10	62.5
France <i>et al.</i> (2021)	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	10	62.5
Gore <i>et al.</i> (2021)	1	1	1	2	1	1	1	0	0	0	1	1	1	1	1	13	81.25
Grant <i>et al.</i> (1982)	1	1	1	2	1	1	1	0	0	0	1	1	1	0	0	11	68.75
Hassan <i>et al.</i> (2020)	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	10	68.75
Heraud <i>et al.</i> (2018)	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	10	62.5
Karpman <i>et al.</i> (2014)	1	1	1	0	1	1	1	0	0	0	1	1	1	0	0	9	56.25
Kaygusuz (2021)	1	1	1	2	1	1	1	0	0	0	1	1	1	0	0	11	68.75
Morlino <i>et al.</i> (2017)	1	1	0	0	1	1	0	0	0	0	1	1	1	0	0	7	43.75
Ozsoy <i>et al.</i> (2020)	1	1	1	0	1	1	1	0	0	0	1	1	1	1	0	10	62.5
Ozyemisci-Taskiran <i>et al.</i> (2015)	1	1	0	1	1	1	1	0	0	0	1	1	1	1	0	10	62.5

Park & Larson <i>et al.</i> (2015)	1	1	0	2	1	1	1	1	1	0	1	1	1	1	1	14	87.5
Park <i>et al.</i> (2018)	1	1	0	2	1	1	0	1	1	0	1	1	1	0	1	12	75.0
Park <i>et al.</i> (2020)	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	10	62.5
Randeep <i>et al.</i> (2019)	1	1	1	0	1	1	1	0	0	0	1	1	1	1	0	10	62.5
Roncero <i>et al.</i> (2016)	1	1	1	2	1	1	1	0	0	0	1	1	1	0	1	12	75.0
Schure <i>et al.</i> (2016)	1	1	1	2	1	1	0	0	0	0	1	1	1	0	1	11	68.75
Soysal <i>et al.</i> (2015)	1	1	0	0	1	1	0	0	0	0	1	1	1	0	1	8	50.0
Tudorache <i>et al.</i> (2017)	1	1	1	2	1	1	1	0	0	0	1	1	1	0	1	12	75.0
Van Hove <i>et al.</i> (2021)	1	1	1	2	1	1	1	0	0	0	1	1	1	0	1	12	75.0
Yazar <i>et al.</i> (2018)	1	1	1	2	1	1	1	1	0	0	1	1	1	0	1	13	81.25
Yohannes <i>et al.</i> (2021)	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	10	62.5
Total for each item	31	31	23	34	31	30	23	7	2	0	30	31	31	8	12		Mean per study %
% per each item	100	100	74.2	54.8	100	96.8	74.2	22.6	6.5	0	96.8	100	100	25.8	38.7		65.52%

Table 2: Downs and Black Quality Appraisal

Study (Year)	Reporting (/11)	External Validity (/3)	Internal Validity – bias (/7)	Internal Validity – confounding (/6)	Power (/1)	Total Score	Total Score (%)
Abumossalam (2021)	8	0	6	4	0	18/28	64.3
Aquino (2016)	7	0	6	4	0	17/28	60.7
Dal Negro (2012)	7	0	7	2	0	16/28	57.1
Emery (1998)	8	0	6	3	0	17/28	60.7

Etnier (2001)	8	0	4	4	0	16/28	57.1
Kilic (2021)	7	1	5	4	1	18/28	64.3
Kozora (2002)	6	1	5	1	0	13/28	46.4
Kozora (2005)	6	0	5	2	0	13/28	46.4
Lavoie (2019)	7	0	6	3	0	16/28	57.1
Liu (2021)	7	1	5	4	0	17/28	60.7
NOTT (1980)	8	0	7	2	0	17/28	60.7
Rosenstein (2020)	8	0	7	3	0	18/28	64.3
van Beers (2021)	10	2	7	5	1	25/28	89.3

Mean per study (%) = 60.7

Mean Reporting (%) = 67.8

Mean External Validity (%) = 12.8

Mean Internal Validity—bias (%) = 83.5

Mean Internal Validity—confounding (%) = 52.6

Power (%) = 15.4

Appendix: Database Search Strategies (full electronic search strategy for Ovid MEDLINE)

Ovid MEDLINE(R) ALL <1946 to July 19, 2021>

Search history sorted by search number ascending

#	Searches	Results	Type
1	[COPD]	0	Advanced
2	exp Pulmonary Disease, Chronic Obstructive/	59509	Advanced
3	Lung Diseases, Obstructive/ [previous term]	18233	Advanced
4	Coad.mp.	548	Advanced
5	Copd.mp.	50878	Advanced
6	(centriacinar adj2 emphysema*).mp.	34	Advanced
7	(centrilobular adj2 emphysema*).mp.	221	Advanced
8	(chronic adj3 obstructive bronchopulmonary disease*).mp.	55	Advanced
9	(chronic adj3 airflow obstruction*).mp.	703	Advanced
10	(chronic adj3 bronchitis).mp.	11518	Advanced
11	(chronic adj3 obstructive airway disease*).mp.	410	Advanced
12	(chronic adj3 obstructive lung disease*).mp.	4820	Advanced
13	(chronic adj3 obstructive lung disorder*).mp.	12	Advanced
14	(chronic adj3 obstructive pulmonary disease*).mp.	53814	Advanced
15	(chronic adj3 obstructive pulmonary disorder*).mp.	270	Advanced
16	(chronic adj3 obstructive respiratory disease*).mp.	133	Advanced
17	(chronic adj3 obstructive respiratory tract disease*).mp.	47	Advanced
18	(focal adj2 emphysema*).mp.	52	Advanced
19	(lung adj3 chronic obstructive disease*).mp.	13	Advanced
20	(panacinar adj2 emphysema*).mp.	100	Advanced
21	(panlobular adj2 emphysema*).mp.	122	Advanced
22	(pulmonary adj2 emphysema*).mp.	17727	Advanced
23	or/1-22	112100	Advanced
24	[Cognitive Function]	0	Advanced
25	exp Cognition/	172778	Advanced
26	exp Cognitive Dysfunction/	23687	Advanced
27	Cognition Disorders/ [previous heading, not exploded]	65227	Advanced
28	exp Fatigue/	32539	Advanced
29	exp Sleep/	84998	Advanced

30	exp Sleep Wake Disorders/	96281	Advanced
31	exp Sleep Apnea Syndromes/	38264	Advanced
32	exp Anxiety/	93802	Advanced
33	Depression/	130129	Advanced
34	exp Anxiety Disorders/	82716	Advanced
35	exp Depressive Disorder/	113657	Advanced
36	Affective Symptoms/	13376	Advanced
37	exp Neuropsychological Tests/	183890	Advanced
38	Executive Function/	16503	Advanced
39	exp learning/	402627	Advanced
40	exp Memory/	142987	Advanced
41	exp Verbal Behavior/	45172	Advanced
42	Sleepiness/	483	Advanced
43	Polysomnography/	22728	Advanced
44	exp Emotions/	263871	Advanced
45	exp Motivation/	177964	Advanced
46	cognition.mp.	218459	Advanced
47	cognitive.mp.	405865	Advanced
48	sleep*.mp.	224246	Advanced
49	fatigue*.mp.	118184	Advanced
50	anxiety.mp.	259963	Advanced
51	depression.mp.	431942	Advanced
52	emotion*.mp.	243652	Advanced
53	mood*.mp.	91229	Advanced
54	(affective adj2 symptom*).mp.	15847	Advanced
55	memory.mp.	301372	Advanced
56	learning.mp.	441337	Advanced
57	neurocognitive.mp.	32120	Advanced
58	tired*.mp.	6241	Advanced
59	insomnia*.mp.	24152	Advanced
60	hypersomnia*.mp.	2135	Advanced
61	Polysomnography.mp.	28124	Advanced
62	osa.mp.	15903	Advanced
63	mini-mental state exam*.mp.	15580	Advanced

64	MMSE.mp.	12045	Advanced
65	Executive function.mp.	27584	Advanced
66	(neuropsychological adj2 test*).mp.	103855	Advanced
67	Mini Mental Status Exam*.mp.	1313	Advanced
68	3MS.mp.	391	Advanced
69	Abbreviated Mental Test*.mp.	319	Advanced
70	Wisconsin Card Sorting Test*.mp.	2294	Advanced
71	WCST.mp.	1503	Advanced
72	Stroop Color Word test.mp.	577	Advanced
73	SCWT.mp.	149	Advanced
74	Trail Making Test.mp.	3839	Advanced
75	Wechsler Adult Intelligence Scale.mp.	2077	Advanced
76	WAIS.mp.	2972	Advanced
77	digit span test.mp.	499	Advanced
78	(verbal adj2 fluency).mp.	6228	Advanced
79	Clock Drawing Test.mp.	930	Advanced
80	Mini-Cog Test.mp.	41	Advanced
81	Six-Item Screener.mp.	52	Advanced
82	6CIT.mp.	25	Advanced
83	(nighttime adj2 symptom*).mp.	378	Advanced
84	STAI.mp.	3810	Advanced
85	Motivation.mp.	121499	Advanced
86	Apathy.mp.	5728	Advanced
87	or/24-86	2397241	Advanced
88	[exercise capacity and muscle performance]	0	Advanced
89	exp Exercise Test/	67196	Advanced
90	Exercise Tolerance/	13581	Advanced
91	exp Exercise/	213451	Advanced
92	exp gait/	31648	Advanced
93	exp muscle strength/	37724	Advanced
94	exp Psychomotor Performance/	116678	Advanced
95	Quadriceps Muscle/	5797	Advanced
96	exp muscle contraction/	202566	Advanced
97	muscle fatigue/	8595	Advanced

98	exp Athletic Performance/	57686	Advanced
99	exp Respiratory Muscles/	27278	Advanced
100	maximal respiratory pressures/	163	Advanced
101	respiratory function tests/ [previous heading not exploded]	47610	Advanced
102	exercise*.mp.	408895	Advanced
103	(physical adj2 activit*).mp.	128506	Advanced
104	(muscle* adj2 strength*).mp.	41650	Advanced
105	(muscle* adj2 contraction*).mp.	109793	Advanced
106	(muscle* adj2 fatigue*).mp.	12310	Advanced
107	(physical adj2 function*).mp.	35351	Advanced
108	(physical adj2 fitness*).mp.	33696	Advanced
109	(athletic adj2 performance*).mp.	14754	Advanced
110	(motor adj2 performance*).mp.	10093	Advanced
111	(motor adj2 strength*).mp.	1038	Advanced
112	(motor adj2 control*).mp.	17009	Advanced
113	walking.mp.	89795	Advanced
114	balance.mp.	274540	Advanced
115	dual-task.mp.	5094	Advanced
116	walk-test.mp.	10098	Advanced
117	6MWT.mp.	3387	Advanced
118	6MWD.mp.	1886	Advanced
119	(Muscle adj2 function*).mp.	19097	Advanced
120	Gait.mp.	65663	Advanced
121	(grip adj2 strength*).mp.	13212	Advanced
122	(hand adj2 strength*).mp.	18117	Advanced
123	(motor adj2 coordination*).mp.	6146	Advanced
124	(motor adj2 performance*).mp.	10093	Advanced
125	(psychomotor adj2 performance*).mp.	67039	Advanced
126	quadriceps.mp.	19075	Advanced
127	rectus femoris.mp.	4009	Advanced
128	vastus intermedius.mp.	503	Advanced
129	vastus lateralis.mp.	8508	Advanced
130	vastus medialis.mp.	2494	Advanced
131	CPET.mp.	1652	Advanced

132 BODE index.mp.	430	Advanced
133 Cycling.mp.	67342	Advanced
134 Treadmill.mp.	33720	Advanced
135 "timed up and go test".mp.	2916	Advanced
136 (Tug adj2 test).mp.	1783	Advanced
137 (Respiratory adj2 muscle*).mp.	10739	Advanced
138 (Ventilatory adj2 muscle*).mp.	308	Advanced
139 (intercostal adj2 muscle*).mp.	2886	Advanced
140 diaphragm.mp.	38825	Advanced
141 (maximal adj2 expiratory pressure*).mp.	509	Advanced
142 (maximal adj2 inspiratory pressure*).mp.	1215	Advanced
143 (maximal adj2 respiratory pressure*).mp.	364	Advanced
144 (maximum adj2 expiratory pressure*).mp.	297	Advanced
145 (maximum adj2 inspiratory pressure*).mp.	545	Advanced
146 (maximum adj2 respiratory pressure*).mp.	71	Advanced
147 PImax.mp.	600	Advanced
148 PEmax.mp.	310	Advanced
149 Cognitive interference.mp.	316	Advanced
150 or/88-149	1382327	Advanced
151 23 and 87	8916	Advanced
152 150 and 151	2848	Advanced
153 animals/ not (animals/ and humans/)	4828969	Advanced
154 152 not 153	2818	Advanced
155 limit 154 to ("all infant (birth to 23 months)" or "all child (0 to 18 years)")	69	Advanced
156 limit 154 to "all adult (19 plus years)"	1829	Advanced
157 154 not 155	2749	Advanced
158 156 or 157	2804	Advanced
159 limit 158 to english language	2521	Advanced
160 remove duplicates from 159	2514	Advanced