Supplementary material

File E1. Methodology

Search strategy

PubMed

(cystic fibrosis OR cystic fibrosis[MeSH Terms]) AND (phys* acti* OR "physical inactivity" OR "physical activity level" OR "daily living activity" OR "activities of daily living" OR physical activity[MeSH Terms] OR activities of daily living[MeSH Terms]) AND (Human)

Web of Science

(TS=((cystic fibrosis) AND (phys* acti* OR "physical inactivity" OR "physical activity level" OR "daily living activity" OR "activities of daily living") AND (Human)))

PsycArticles

(cystic fibrosis) AND (phys* acti* OR "physical inactivity" OR "physical activity level" OR "daily living activity" OR "activities of daily living") AND (Human)

Risk of bias

The following adaptations to the NOS scale were made:

- For all studies, item 4 was not scored as it is impossible not to measure PA ("Demonstration that outcome of interest is not present at start study")
- Regarding the first research question item 8 was not scored as a follow up is not needed to explore the difference in PA between patients with CF and healthy peers ("Adequacy of follow up of cohorts")
- Regarding the second research question both item 2 and 5 were not scored because no control group was present ("Selection of non-exposed cohort" and "Comparability of cohorts," respectively).

Table E1. Classifying variables regarding strength of evidence of association

Studies supporting association (%)	**Summary code**	**Meaning code**
0-33	0	No association
34-59	?	Indeterminate
60-100	+ -	Positive association Negative association

Table E2. Characteristics of included studies

Reference Study design	N	Sex (male), N (%)		Age (y), mean (SD)	BMI (kg/m^2), mean (SD)	FEV1 (%pred), mean (SD)	Selection criteria		Measure of PA	
							Inclusion	Exclusion	Direct method	Indirect method
Tejero, S. 2011, Chest CS	50	23 (46)		25 (19-30)[1^^] 24 (20-27)[1^]	21 (19-23)[1^^] 21 (19-23)[1^]	47 (35-81)[1^^] 61 (33-83)[1^]	– ≥ 16 y – Spain	– Transplant – Antiresporptive medication previous 3 y – Clinical instability	**SenseWear** – Outcome: (min/d); PA at diff. I.; daily steps – Classification: LPA, 3 – 4.8 METs; MPA, 4.8-7.2 METs; VPA, > 7.2 METs	NA
Cox,S. 2019, J Cardiopulm Rehabil Prev CS	47	28 (60)		29 (8)	22 (21-24)[1]	60 (50-82)[1]	– >18 y – Clinical stable – Melbourne, Australia	NR	**SenseWear** – Outcome: MVPA (min/d) – Classification: MVPA ≥ 4.8 METs	NA
Boucher,G. 1997, Am J Phys Med Rehabil CS	36	15 (42)		12 (4)	*BMP* 99 (15)	86 (20)	– 6 - 16 y	NR	NA	**HAES** – Outcome: (min/d); PA at diff. I. – Classification: inactive; somewhat inactive; somewhat active; very active
Jantzen, A. 2016, Pediatr Pulmonol CS	131	CF: 66	37 (58)	11 (9-16)[1]	17 (15-21)[1]	91 (73-99)[1]	– > 3 y – Clinical Stable – Germany and Switzerland	– non-CF chronic diseases – (Waiting for) lung transplantation	**Actigraph GR1M** – Outcome: (h/d); PA at diff. I. – Classification: (cpm); very low, 0-500; low, 501-1000; moderate, 1001-2000; strenuous, 2001-4000; very strenuous, > 4001	NA
		HC: 65	39 (60)	10 (7-19)[1]	17 (15-21)[1]	NR	NR	NR		
Gilljam,H.1990, Respir Med CS	32	NR		10,5 (NR)	NR	NR	– 1 - 20 y – Huddinge Hospital	– Not living with a family – Lived to far away to be interviewed	NA	**Interview, standard questionnaire** – Outcome: # activities/w – Classification: highly active, ≥ 4; less active, 0-3

Britto,M.T. 2000, Pediatr Pulmonol CS	NR	CF: 115	56 (49)	15 (NR)[1]	NR	NR	– 12-19 y – Nort Carolina	NR	NA	**YRBS** – Outcome: VPA (d/w) – Classification: VPA, activities that make you sweat and breathe hard
		HC: NR	NR	NR	NR	NR	– Matched for age, sex, race – North Carolina	NR		
Wells,G.D.2008, Pediatr Pulmonol CS	14	7 (50)		16 (4)	NR	74 (19)	– Clinical stable – No AE in preceding 3m – FEV1 > 60% – Toronto, Canada	– Unable to participate in HPA	**Actigraph Model 7164** – Outcome: (min/d); PA at diff. I. – Classification: (cpm); inactive < 2000; somewhat inactive, 2001-5500; somewhat active, 5501-9500; very active, > 9501	**HAES** – Outcome: PA at diff. I. (min/d) – Classification: inactive; somewhat inactive; somewhat active; very active **Activity diary**
Cox, N.S. 2016, Respirology LS	65	34 (52)		28 (8)	22 (3)	68 (20)	– ≥ 18 y – Melbourne, Australia	– IV antibiotics 1m prior to study – Co-morbidities limiting PA – Burkholderia cepacian infection – Pregnant – Lung transplant	**SenseWear (n=61)** – Outcome: MVPA (min/d) – Classification: MPA, 4.8 METs	NA
Cherobin, I.A. 2018, Clin Respir J CS	28	12 (43)		25 (6)	21 (3)	47 (21)	– ≥ 18 y – Porto	– AE – Any cardiac, orthopedic or trauma complications preventing 6MWT	**Actigraph GT3X** – Classification: cpm; LPA, 100-1951 counts; MPA, 1952-5724; VPA, 5725-9498 counts; VVPA, > 9498 counts – Outcome: PA at diff I (min/d); daily steps	**IPAQ** – Outcome: # participants in diff. PA I. – Classification: high, ≥3d/ w VPA (or combi equivalent to 3000 MET min/w); moderate, ≥ 3d of VPA for ≥20 min (or combi equivalent to 600 MET min/w); low, others
Elce,A. 2018,Clin Respir J LS	118	CF: 59	30 (51)	31 (NR)	22 (3)	64 (27)	– > 18 y – Regularly active – Italy	NR	NA	– Rapporting type of physical exercise and weekly sessions
		CF Sed: 59	NR	31 (NR)	22 (4)	62 (25)	– Age and sex matched – Not perform exercise last 3 y	NR		NA

Mackintosh, K.A. 2018, J Phys Act Health CS	36	CF: 18	10 (56)	12 (3)	19 (3)	80 (9)	– 6-17 y – Mild to moderate CF – Clinically stable – Wales (UK)	– Unstable non-pulmonary comorbidities – Acute infections	**ActiGraph GT3X** – Outcome: PA at diff I (min/d); daily steps – Classification: (cpm); ST, < 100; LLPA, 100 - 799; HLPA, 800 - < 4 METs; MPA, 4 - 5.99 METs; VPA, > 6 METs	NA
		HC: 18	10 (56)	13 (3)	21 (4)	89 (17)	– Age and sex matched – Non-clinical – Local schools	NR		
Troosters,T. 2009, Eur Respir J CS	40	CF: 20	NR	25 (5)	NR	72 (18)	– No conditions interfering with testing procedures – Leuven, Belgium	– AE in last 6w – (waiting for) Lung transplant	**SenseWear (n=20 CF)** – Outcome: PA at diff I (min/d); daily steps – Classification: LPA, > 3 METs; MPA, > 4.8 METs; VPA, > 7.2 METs	NA
		HC: 20	11 (55)	24 (5)	NR	104 (11)	– Free from chronic diseases – Volunteered to participate in the study	NR		
Wieboldt,J. 2012, J Cyst Fibros LS	38	CF AE: 13	11 (85)	30 (9)	21 (3)	54 (8)	Admitted to hospital with AE	– Conditions ↓ mobility – Not expected to be discharged	**SenseWear** – Classification: NA – Outcome: daily steps	NA
		CF: 25	15 (60)	34 (12)	22 (2)	64 (23)	– Clinical stable	NR		
Ward, N. 2013, Respir Med LS	24	15 (63)		28 (8)	21 (2)	53 (16)	– ≥ 18 y – AE – Royal Adelaide Hospital	– Unable to commit to the 1m follow-up measurements – MSS condition – Terminal medical condition	**SenseWear Pro3** – Classification: (1) Troosters et al. ;(2) MPA, 3-6 METs; VPA, 6-9 METs; VVPA, > 9 METs – Outcome: PA in diff. I (min/d); daily steps	NA
Thobani, A. 2015, Pulm Med LS	27	13 (48)		32 (12)	24 (4)	78 (23)	– ≥ 18 y – Ambulatory – Clinical stable	– AE – hospitalization	**DIGI-WALKER (n=24)** – Outcome: daily steps	NA
Nixon, P.A. 2001, Med Sci Sports	60	CF: 30	18 (60)	11 (3)	98 (11)[#]	96 (24)	– 7 - 17 y – Pittsburgh	NR	NA	**MAQ** – Outcome: Total h/w; METh/w;

Exerc CS		HC: 30	17 (57)	11 (2)	112 (21)[#]	NR	– Siblings/ friends of CF participants	NR		vigorous h/w – Classification: VPA > 6 METs
Savi,D. 2013, Respir Med CS	31	CF: 20	15 (75)	33 (8)	22 (2)	68 (16)	– Adult – Clinical stable – Rome, Italy	– AE, 4w prior to testing – (waiting for) lung transplant	**SenseWear** – Outcome: PA in diff. I (min/d); daily steps – Classification: LPA, >3 METs; MPA, >4.8 METs; VPA, >7.2 METs	**HAES** – Classification: inactive; somewhat inactive; somewhat active; very active
		HC: 11	7 (64)	30 (4)	22 (3)	108 (11)	– Adult – no CR diseases – Staff/ colleagues from the same hospital	NR		
Baker, C.F. 2006, journal of pediatric nursing RCT	16	8 (50)		14 (NR)	18 (NR)	80 (NR)	– 12 - 18 y	– AE, IV antibiotics 1m prior to study	NA	**30-day PAR** – Outcome: MET h score – Classification: LPA, < 3 METs; MPA, 3-5.9 METs; hard, 6-8.9 METS; very hard, ≥ 9 METs
Loutzenhiser, J.K and Clark,R. 1993, J Pediatr Nurs CS	36	17 (48)		6-19[§]	NR	89 (28)	– 6-19 y – CF centers	NR	NA	**7 item Likert Scaled Children's Activity questionnaire** – Outcome: total activity score
Wieltisback, M. 2020, PLoS One CS	111	58 (52)		35 (29-41)[2]	20 (18-22)[2]	NR	– ≥ 15 y – ≥ 6 m after lung transplant – German and/or French – Switzerland	NR	NA	**IPAQ - SF** – Outcome: (METmin/w); PA in diff. I
Hebestreit, H. 2014, BCM Pulm Med RCT	76	39 (51)		21 (6)	20 (3)	69 (19)	– ≥ 12 y – FEV1 ≥ 35% – Clinical Stable	NR	**MTI/CSA 7164 accelerometer** – Outcome: MVPA (h/w) – Classification: MVPA > 1000 cpm	**7D-PAR** – Outcome: (h/w); hard; very hard

Hebestreit, H. 2006, Eur Respir J CS	71	35 (49)		21 (6)	NR	66 (21)	– 12 - 40 y – Clinical Stable – Germany and Switzerland	– Medical problems precluding max. exercise testing	**MTI/CSA 7164 accelerometer** – Classification: MVPA > 1000 cpm – Outcome: MVPA (h/w)	NA
Rasekaba, T.M. 2013, J Cyst Fibros CS	136	CF: 101	NR (55)	29 (9)	22 (4)	60 (23)	– ≥18 y – Clinical stable – Melbourne, Australia	NR	NA	**IPAQ** – Outcome: PA (MET min/w) in work, transport, domestic and leisure – Classification: IPAQ scoring protocol
		HC: 35	NR (31)	32 (10)	23 (3)	101 (130)	– ≥18 y – No underlying CR condition	NR		
Tejero, S. 2016, Braz J Phys Ther CS	50	23 (46)		24 (19-28)[1]	20,5 (19-22)[1]	60 (35-81)[1]	– >16 y	– (waiting for) Lung transplant – AE, antibiotics within 6w prior to study	**SenseWear** – Classification: LPA > 3 MET; MPA > 4,8 MET; VPA > 7,2 METs – Outcome: PA at diff. I (min/d); daily steps	NA
Aznar,S. 2014, J Cyst Fibros CS	86	CF: 47	24 (51)	12 (3)	19 (3)	NR	– 6-17 y – Madrid	– FEV1 < 50% – clinically unstable – Burkholderia cepacia infection – condition impairing testing	**Actigraph GT3X** – Classification: by Evenson et al: ST 0-100 cpm, LPA 101-2295 cpm; MPA 2296-4011 cpm; VPA > 4012 cpm – Outcome: PA at diff. I (min/d)	NA
		HC: 39	23 (59)	12 (2)	20 (2)	NR	– age - and sex matched – Madrid	NR		
Schneiderman-Walker, J. 2005, J Pediatr LS	109	53 (49)		12 (3)^^ 12 (3)^	NR	84 (17)^^ 84 (18)^	– 7-17 y – Montreal	NR	NA	**HAES** – Outcome: (h/d); inactive; somewhat inactive; somewhat active; very active **Activity Diary** – Outcome: (h/d); PA at diff. I. – Classification: MPA, spent in I categories 4 to 5; VPA spent in I categories 6-9

Paranjape, S.M. 2012, J Cyst Fibros RCT	78	45 (58)		10 (6-16)[1]	56 (2-96)[1]	99 (32-132)[1]	– 6 - 16 y – Ability to perform exercise	– >10% ↓in FEV1 compared to previous clinic visit – AE, oral or IV antibiotics	NA	**HAES** – Outcome: % of time engaged in M(V)PA
Quon, B.S. 2012, J Cyst Fibros. CS	30	13 (43)		22 (7)	NR	57 (25)	– ≥ 12 y – Washington and Seattle	– Transplantation	**New-Lifestyles Digi-Walker Pedometer (Model SW-401)** – Outcome: daily steps	NA
Savi,D. 2015, BCM Pulm Med LS	60	35 (58)		34 (11)	23 (3)	73 (20)	– ≥ 18 y – Rome, Italy and London, UK	– AE within 1m prior to study – (waiting for) lung transplant	**SenseWear Pro3** – Output: PA at diff. I (min/d); daily steps – Classification: LPA, 3-4.8 METs; MPA, 4.8-7.2 METs; VPA, >7.8 METs	NA
Schneiderman, J.E. 2014, Eur Respir J. LS	212	104 (49)		12 (3)	NR	86 (17)	– 7 - 17 y – Toronto, Canada	NR	NA	**HAES** – Outcome: (h/d); inactive; somewhat inactive; somewhat active; very active
Savi, D. 2018, BCM Pulm Med CS	34	DH: 24	NR (79)	34 (9)	23 (2)	68 (19)	– ≥ 18 y – FEV1 ≥ 80% or 40-80% – Rome, Italy	– Clinically unstable – Other disorders that could interfere with exercise testing – Oxygen therapy – (waiting for) lung transplant	**SenseWear Pro3** – Output: PA at diff. I (min/d); daily steps – Classification: LPA, 3-4.8 METs; MPA, 4.8-7.2 METs; VPA, > 7.8 METs	NA
		NDH: 10	NR (40)	31 (7)	22 (3)	73 (19)				
Savi, D. 2015, BCM Pulm Med CS	45	CF: 30	20 (67)	33 (9)	23 (3)	71 (19)	– FEV1 50-90% – Rome, Italy	– Clinically unstable – Other disorders interfering with testing – (Waiting for) lung transplantation	**SenseWear Pro3** – Output: PA at diff. I (min/d); daily steps – Classification: LPA, 3-4.8 METs; MPA, 4.8-7.2 METs; VPA, > 7.8 METs	NA
		HC: 15	10 (67)	29 (5)	24 (3)	109 (11)	– FEV1 ≥ 80% and FEV1/FVC ≥ 0,7 – staff and colleagues of the same hospital	NR		

Ruf, K.C. 2012, BMC Med Res Methodol CS	41	18 (44)		16 (5)^^ 17 (6)^	NR	76 (21)^^ 78 (6)^	– ≥ 12 y – Wuerzburg, Germany and Zurich Switzerland	– Multiresistant bacetria – AE	**ActiGraph GT1M** – Outcome: : PA at diff. I (min/d) – Classification: (cpm); MVPA, ≥ 1000; MPA, 1000-1999; VPA, ≥ 2000	**7D PAR** – Outcome: (min/d); "moderate", "hard" and "very hard" **HAES** – Outcome: (min/d); somewhat active; active **LRC** – Outcome: 1, very low active; 4, high active
Mackintosh, K.A. 2019, J Sports Sci CS	43	CF: 21	24 (56)	12 (3)	19 (3)	80 (10)	– 7-17 y – Mild to moderate CF – Clinically stable	– Unstable non-pulmonary comorbidities – Acute infections	**ActiGraph GT3X** – Outcome: (min/d); PA at diff. I; daily steps – Classification: (cpm); ST, 100; LPA, >100 to the MPA cut point; MPA, 4-5.66 METs; VPA, ≥ 6 METs	NA
		HC: 22		12 (3)	19 (4)	92 (14)	– Age - and sex matched – Local schools	NR		
Burtin, C. 2013, Resp Research LS	29	AE CF: 19	13 (63)	25 (6)	21 (3)	55 (19)	– Adult – AE – Leuven, Belgium	NR	**SenseWear Pro** – Outcome: (min/d); PA at diff. I; daily steps – PA classification: MPA, > 4.8 METs	NA
		CF: 10	6 (60)	29 (8)	20 (2)	72 (22)	– Clinically stable	– Comorbidities limiting testing – AE operation in inguinal region in previous 2m – Structured exercise program		
Bhudhikanok, G.S. 1996, pediatrics CS	49	19 (39)		19 (10)^^ 22 (9)^	19 (3)^^ 18 (3)^	NR	– > 8 y – Stanford	NR	NA	**3 day activity diary + self-report** Outcome: (non-) weight-bearing exercise (h/w)
Groeneveld I.F. 2012, Qual Life Res CS	28	14 (50)		12 (3)	47 (26)°	85 (21)	– 6-17 y – Clinical Stable – Low to moderate severity	– FEV1 < 40% – Hospitalization previous 3m – burkholderia Cepacia infection	**ActiGraph 7164** Outcome: cpm Classification: NR	

Orava, C. 2018, physiotherapy Canada CS	22	10 (46)	33 (18-67)[1]	22 (18-28)[1]	64 (27-100)[1]	– > 18 y – Toronoto	– AE, oral or IV antibiotics 1m prior to study – (waiting for) Lung transplant	NA	**HAES** – Outcome: (h/d); inactive; somewhat inactive; somewhat active; very active – Classification: very active, sweating, dramatic increase in HR and heavy breathing; somewhat active, movement and increased HR; somewhat inactive, any activity performed sitting down; inactive, any activity performed lying down
Currie, S. 2017, physiotherapy Canada CS	18	10 (56)	41 (9)	23 (3)	58 (21)	– > 18 y – diagnosed CFRD – Toronto	– transplant – no English – IV antibiotics/corticosteroid 3m prior to study – liver disease – pregnant – hospitalized	NA	**7D PAR** – Outcome: PA (MET min/w) – Classification: sleep, 1 MET; LPA, 1.5 METs; MPA, 4 METs; VPA, 6 METs; VVPA, 10 METs
Kilbride, E. 2012, ISRN pulmonoly CS	115	CF: 16	9 (56)	11 (0)^^ 11 (0)^	18 (1)^^ 17 (2)^	84 (3)^^ 82 (4)^	– 10 - 12 y – Dublin	NR	**triaxial accelerometer** – Classification: (cpm); inactive 0-99; LPA, 100-970; MPA, 971-2333; VPA, > 2334 – Outcome: % of total time worn	**MAQ** – Outcome: PA (MET h/d)
		HC: 99	47 (47)	11 (0)^^ 11 (0)^	19 (0)^^ 20 (1)^	92 (1)^^ 90 (1)^	– Primary schools – Dublin	NR		
Swisher A,K. 2007, Cardiopulm Phys Ther CS	55	CF: 31	14 (45)	12 (4)	17 (3)	78 (25)	– 5-18 y – West Virginia	– > pulmonary symptoms in previous m	NA	**MAQ for adolescents** – Outcome: PA (METh/w)
		HC: 24	14 (58)	10 (4)	19 (3)	94 (14)	– free of any CP disease	NR		
Burton, K. 2019, physio theory and practice LS	31	18 (56)		29 (18-62)[1]	22 (4)	59 (23)	– > 18 y – AE in hospital – Brisbane	– < 18 y – pregnant – home based IV antibiotics	**SenseWear** – Classification: MPA, > 3 MET – Outcome: daily average METs; MPA (h/d; min/d); daily steps	NA

Cherobin, I.A. 2016 CS	62	CF: 31	11 (35)	26 (9)	21 (2)	55 (21)	– > 15 y – stable – Porto Algere, Southern Brazil	– pregnant – conditions impairing testing	NA	**IPAQ** – Outcome: PA (METmin/w) during work, at home, transport and leisure time – Classification: high I; VPA ≥ 3d/w or combi equivalent to 3000 MET min/w; moderate I: VPA ≥ 3d/w for ≥ 20 min or combi of 600 MET min/week; others low I
		HC: 31	NR (NR)	26 (9)	23 (3)	93 (12)	– age, sex and ethnicity matched	– pregnant – acute respi. symptoms – smoking – conditions impairing testing		
Buntain H.M. 2003, thorax CS	302	CF: 153	84 (55)	5-56[§]	NR	Children 84 (15) Adolescents 78 (24) Adults 57 (20)	– > 5 y – Brisbane	NR	NA	**physical activity questionnaire for older children** Outcome: total activity score **interview** – Outcome: PA (h) and ST (h)
		HC: 149	66 (44)	6-48[§]	NR	NR	– local schools and friends	– chronic illness affecting BMD – a period of immobility ≥ 2w in preceding 12m		
Valencia-Peris A. 2021, Int. J. Environ. Res. Public Health CS	89	CF: 44	20 (45)	11 (3)	18 (3)	NR	– 6-17 y	– FEV1% < 30 – Clinically unstable – Any condition impairing exercise testing	**ActiGraph GT3X** Outcome: PA at diff. I (min/d); ST Classification: (cpm); LPA, 100-2219; MPA, 2220-4135; VPA, > 4136	**Sport participation** – Free questions
		HC: 45	21 (47)	11 (3)	19 (3)	NR	– sex, age and SES matched	NR		
McNarry MA. 2021, Pediatr Pulmonol CS	56	CF: 28	NR	12 (3)	19 (3)	82 (12)	– children and adolescents	– Unstable nonpulmonary comorbidities Acute infections	**ActiGraph GT3X** Outcome: PA at diff. I (min/d); ST Classification: Hildebrand et al. equation	NA
		HC: 28	NR	12 (3)	18 (2)	98 (11)	– sex and age matched – Free from any chronic disease	NR		

AE, acute pulmonary exacerbation; BMI, body mass index; BMP, body mass percentile; CP, cardiopulmonary; cpm, counts per minute; CS, cross-sectional study; CV, cardiovascular; d, day; diff., different; h, hour; HAES, habitual activity estimation scale; I, intensity; IPAQ, international physical activity questionnaire; IV, intravenous; LPA, light physical activity; LRC, lipid research clinics; LS, longitudinal study; m, months; MAQ, modifiable activity questionnaire; MET, metabolic equivalent of task; min, minute; MPA, moderate physical activity; MSS, musculoskeletal; MVPA, moderate-to-vigorous physical activity; NA, not applicable; NR, not reported; PA, physical activity; PAR, physical activity recall questionnaire; RCT, randomized controlled trial; ST, sedentary time; (V)VPA, (very) vigorous physical activity; w, weeks; y, year; YRBS, Youth Risk Behavior Survey; °, BMI percentile; §, range; 1, median (interquartile range); #, % predicted; ^^, male; ^, female; >, more; <, less

Table E3. Results of included studies for research question 1

Reference	Variable	Results	
		significant	**non-significant**
Children and adolescents			
Britto,M.T. 2000, Pediatr Pulmonol	PA		No sign. diff. between CF and HC in participating ≥ 3/w in VPA (63% vs 67%; p=0.37) No sign. diff. between CF and HC in participation in physical education class (59% vs 61%; p=0.81) No sign. diff. between CF and HC in participating in community or school sports teams (52% vs 61%; p=0.10) No sign. diff. in VPA (d/w) between CF and HC (3.5 vs 3.9) (t=1.32; p=0.187) No sign. diff. in participation to strengthen or tone muscles (d/w) between CF and HC (2.6 vs 2.9) (t=0.90; p=0.368)
	Age		No sign. diff. in decline of PA participation (i.e. VPA, PA education, sport team) among those aged ≥ 17 between CF and HC
Mackintosh, K.A. 2018, J Phys Act Health	PA	*Trend* for ↑ LPA (min/d) in CF (222.7 (12.8) vs 207.3 (12.4)) (p>0.05)	No sign. diff. in PA levels and patterns of accumulation between CF and HC
	Week vs WE	Sign. ↑ levels of PA (LPA, MPA, MVPA) during weekdays compared to WE days in both groups (p's<0.05)	
	PA guidelines		No sign. diff. in meeting MVPA guidelines between CF and HC during weekdays and WE days (38.9% vs 44.4%; 30.6% vs 44.4% resp.) (p<0.05)
Nixon, P.A. 2001, Med Sci Sports Exerc	PA	Sign. ↓ VPA (h/w) in CF (2.00 (2.5) vs 3.7 (2.8)) (p=0.014)	No sign. diff. in total PA (h/w) in past year between CF and HC (8.6 (6.4) vs 8.5 (5.6)) No sign. diff. in PA (MET h/w) between CF and HC (43.4 (32.6) vs 49.7 (31.3))
Aznar,S. 2014, J Cyst Fibros	PA	Sign. diff. in all week PA between CF and HC: - Sign. ↑ total PA (min/d) for CF (363 (85) vs 280 (58)) (p=0.001) - Sign. ↑ LPA (min/d) for CF (319 (71) vs 226 (44)) (p=0.040) - Sign. ↓ MVPA (min/d) for CF (44 (28) vs 54 (15)) (p=0.020) - Sign. ↓ VPA (min/d) for CF (9 (6) vs 17 (9)) (p=0.001) Sign. ↓ CF achieving MVPA guidelines (2.1% vs 34.4%) (p<0.001)	
	ST	Sign. ↓ ST time for CF for all week, week days and WE days (p's< 0.001)	
Mackintosh, K.A. 2019, J Sports Sci	PA		No sign. diff. between CF and HC for: - LPA (min/d) (225.5 (50.4) vs 220.6 (52.3)) - MVPA (min/d) (58.9 (36.9) vs 62.2 (30.3))

	ST		No sign. diff in ST (min/d) between CF and HC (555.8 (59.9) vs 576.5 (69.9))
Kilbride, E. 2012, ISRN pulmonoly	PA		No sign. diff. between CF and HC for PA (h/day): (boys 0.8 (0.2); girls 0.6 (0.2) vs boys 1.0 (0.1); girls 0.8 (0.1)) No sign. diff. between CF and HC for PA (METh/day): (boys 5.5 (1.1); girls 3.1 (0.9) vs boys 7.3 (0.6); girls 4.4 (0.4))
Swisher A,K. 2007, Cardiopulm physical therapy J	PA	Sign. ↓ PA (MET h/w) in CF (p=0.03)	No sign. diff. in PA (h/w) between CF and HC (p=0.21)
Valencia-Peris A. 2021, Int. J. Environ. Res. Public Health	PA	Sign. ↑ CF regularly engaging in > 3 activities than HC (22.7% vs 4,4%) (p<0.05)	No sign. diff. between CF and HC for: - LPA (min/d): 240 (64) vs 230 (63) - MPA (min/d): 39 (20) vs 41 (15) - MVPA (min/d): 54 (31) vs 59 (27) - VPA (min/d): 15 (13) vs 17 (15)
McNarry MA. 2021, Pediatr Pulmonol	PA	Sign. ↓ LPA (min/d) for CF (111.5 (59.0) vs 132.1 (57.5)) Sign. ↓ MVPA (min/d) for CF (9.6 (11.1) vs 17.1 (15.9))	
Adults			
Troosters,T. 2009, Eur Respir J	PA	Sign. ↓ MPA (min/d) for CF (14.8 (8.6-36.8) vs 34.5 (20.6-53.8)) (p=0.03) Trend for ↓ VPA (min/d) in CF (p=0.09)	No sign. diff. in daily steps between CF and HC (9398 (6317-12970) vs 10281 (7928-12360)) No sign. diff. in # participants having < 7500 daily steps (35% CF vs 15% HC) (p=0.14) No sign. diff. in LPA between CF and HC (p=0.37)
Savi,D. 2013, Respir Med	PA		No sign. diff. in PA (SW accelerometer) between CF and HC No sign. diff. in PA (Q) between CF and HC
Cherobin, I.A. 2016	PA	Sign. ↓ IPAQ levels for CF (NR) (p=0.035)	
Buntain H.M. 2003, thorax	PA	Sign. ↓ activity Q score in CF adults (3.2 (0.1) vs 3.7 (0.1)) (p=0.005) Sign. ↓ total PA (h) in CF adults (30.6 (4.1) vs 53.2 (4.1)) (p<0.001)	No sign. diff. in activity Q score between CF and HC children (2.9 (0.1) vs 2.8 (0.1)) (p=0.41) No sign. diff. in total PA (h) between CF and HC children (16.7 (1.8) vs 13.1 (1.4)) (p=0.12)

Rasekaba, T.M. 2013, J Cyst Fibros	PA	Sign. ↓ total IPAQ for CF (5309 (6277) vs 7808 (5493)) (p=0.011) Sign. ↓ work related PA (METmin/w) for CF (1887 (4285) vs 3707 (5292)) (p=0.003) Sign. ↓ transport related PA (METmin/w) for CF (613 (1018) vs 1315 (1123)) (p<0.001) Sign. ↓ PA acquired from walking (METmin/w) for CF (1287 (1593) vs 2394 (2505)) (p=0.004) CF were ↓ likely to acquire their weekly PA through transport related activities compared to other domains (p<0.001) 3 activity types (walking, MPA and VPA), HC achieved a greater proportion of their total PA from VPA (p=0.001)	No sign. diff. in performing vigorous tasks at work between CF and HC (76% vs 88% resp.) (Chi-sq=1.95; df=1; p=0.197) CF had a similar contribution from all activity intensities (walking, MPA and VPA) (p=0.178) No sign. diff. in the proportion of participants achieving 150 min/w of walking, MPA or VPA (93% each group, p=0.97)
	Sex		No sign. diff. between males and females on IPAQ total and domain scores (p's>0.05)
	Diagnosis		No sign. association between PA level (moderate or high) and diagnosis (CF vs non-CF) (p=0.22)
Savi, D. 2015, BCM Pulm Med.	PA		No sign. diff. between CF and HC for: - Daily steps (9160.5 (3825.6) vs 9160.5 (3825.6)) (p=0.25) - LPA (min/d): (159 (100-246) vs 147 (77-205)) (p=0.22) - MPA (min/d): (13 (9-29) vs 11 (7-16)) (p=0.34) - MVPA (min/d): (16 (9-29) vs 12 (8-27)) (p=0.43) - VPA (min/d): (1 (0-3) vs 1 (0-5)) (p=0.94)
Mixed population			
Jantzen, A. 2016, Pediatr Pulmonol	PA		No sign. diff. in PA performed on week and WE days between CF and HC (NR) No diff. in PA (h/d) between CF and HC for the total group (-0.15 (-0.32,0.02))
	Age	Sign. ↓ time in at least strenuous PA (h/d) for CF children aged 6-13 y (Adj. diff activity -0.43 (95% CI -0.69 - -0.17))	No sign. diff. in at least strenuous PA (h/d) for children between 3-6 y and >13 y (-0.12 (-0.37,0.13); 0.21 (-0.12, 0.55))

CF, cystic fibrosis; Diff.,: difference; HC, healthy controls; LPA, light physical activity; MET, metabolic equivalent of Tasks; MPA, moderate physical activity; MVPA, moderate-to-vigorous physical activity; PA, physical activity; Sign., significant; VPA, vigorous physical activity; w, week; WE, weekend; #, number; <, less(er); ↓, lower; ↑, higher

Table E4. Results of included studies for research question 2

Reference	Variable	significant	non-significant
Tejero, ST. 2011, Chest	VO_2 Peak	Pos. association between VO_2 peak and: - LPA (R=0.4) (p<0.05) - MPA (R=0.38) (p<0.05) - VPA (R=0.42) (p<0.05)	
	6MWT	Pos. association with LPA, MPA and VPA (R=0.36) (p<0.05)	
	BMD	Pos. association between Z score BMD lumbar column and LPA or MPA (R=0.36, p<0,01; R=0.59, p<0,001) Pos. association between Z score BMD Femur neck and LPA or MPA (R=0.51, p<0.001; R=0.72, p<0.001) Pos. association between Z score BMD total hip and LPA or MPA (R=0.54, p<0.001; R=0.74, p<0.001)	No sign. association with daily steps (p=0.07) No sign. association with VPA
Cox,S. 2019, J Cardiopulm Rehabil Prev	Sleep	Neg. association between WASO and MVPA (R=-0.337, p=0.020) Pos. association between RT and MVPA (R=0.3, p=0.04) Multi regression model (incl. age, sex, BMI and FEV1): WASO significant for predicting total PA and MVPA (R2=0.3; R2=0.26; p<0.02) < WASO sign. independent predictor of ↑ total PA (bèta=-1.0, SE of bèta=-0.4, p=0.02) and tended toward sign. for predicting ↑ MVPA (bèta=-0.3; SE of bèta=-0.26, p=0.08) All regression models predicting accumulation of 30min of MVPA throughout the day were sign. (R2=0.29-0.32, p's=0.007-0.014)	No sign. association between any sleep parameter and attainment of 30min MVPA MVPA is not predicted by TST, SOL and SE (p=0.05 to p=0.70)
Boucher,G. 1997, Am J Phys Med Rehabil	Sex and BMP	Neg. association between AL and BMP in female CF (R=-0.466, p=0.033)	No sign. sex difference in time spent "at least somewhat active" (P>0.1)
	FEV1% and BMP	P with FEV1≥75%: pos. association between BMP and AL (R=0.675, p=0.023)	No sign. association between FEV1% and AL No sign. association between BMP and AL P with sign. lung disease: AL was not related to lung function (R=0.21, p>0.1)
	Perception AL child by the Parents	AL reported by parents was on average 24.1% ↓than that reported by their children (R=0.758; p=0.004) Neg. association between age of the child and AL reported by their parents (R=-0.633; p=0.027)	
Jantzen, A. 2016, Pediatr Pulmonol	Sex	Sign. ↓ VPA (h/d) for female P compared to male (1.0 h (0.76-1.34) vs 1.3 (0.98-1.58)(p=0.008))	
	BMI		No sign. association with VPA
	ABPA, Pseudomonas		No sign. association with VPA

	Aeruginosa or PI		
	CFRDM		No sign. association with VPA
	Sex, FEV1% and CFRLD	**Crude diff** in at least strenuous PA (h/d): sign. associations with strenuous to very strenuous PA and: - Sex (female) (-0.30, 95% CI (-0.58 to -0.02)) - FEV1% (0,10, 95% CI (0.02 – 0.17)) - CFRLD (-0.53, 95% CI (-1.05 - -0.000) **Mutually adjusted model**: sign. association between FEV1% and strenuous to very strenuous PA (h/d) (0.08, 95% CI (0.01 – 0.16))	sensitivity analysis of multivariate model: no sign. association between FEV1% and PA (0.03, 95% CI (-0.03 - 0.10))
Gilljam,H.1990, Respir Med	Passive smoking	The active children had fewer days of hospital treatment than the less active (p<0.02) Children with high PA living in families who smoked needed sign ↓ antibiotic treatment than the inactive children	
Britto,M.T.2000, pediatric pulmonology	Sex	Males were more likely than females to participate in team sports (X2 = 6.40, p=0.001)	males were more likely than females to report VPA, but the diff. was not sign.
	health status	Sign. association between CF who participated in VPA and health status (z=-3.70; p<0.001) Sign. association between CF who participated in sport teams and health status (z=-3.16, p<0.001)	Participation in physical education classes did not differ by health status (Z= -1.12, p=0.26)
	Age	For al the activities (i.e. vigorous PA, PA education, sport team), participation declined among those aged ≥ 17 y After adjusting for health status and gender: - young adolescents (<14y) were 32 times more likely to participate in physical education classes than older adolescents - Drop in both VPA and sports team participation (OR = 4.5, 95% CI (17.7-12.1); OR = 6.5, 95% CI (2.3-18.5)) from early to late adolescence	
Wells,G.D.2008, Pediatr Pulmonol	Sex		No sign. diff. between female and male activity levels measured by the HAES for either weekday (p=0.42) or WE (p=0.87) No sign. diff. between female and male activity levels measured by the activity diary for either weekday (p=0.69) or WE (p=0.74) No sign. diff. between female and male activity levels measured by the accelerometer for either weekday (p=0.19) or weekend (p=0.72)
Cox, N.S. 2016, Respirology	Sex	Sign. > males undertook ≥30 MVPA daily (n=22 vs 11, P=0.02) Sign. > PA in males compared to females at: - hospital discharge (median 74 min/d vs 11min/d, p=0.04) - 1m post discharge (median 24min/d vs 7min/d, p=0.02)	

	Disease severity		No sign. diff. in MVPA across categories of disease severity (X2(2)=1.89, p=0.6)
	Lung function	Sign. association between MVPA and FEV1 (absolute) at baseline (Rs=0.4, p=0.004) Sign. association between MVPA and FEV1 (absolute) at 12m (Rs=0.4, p=0.006) Sign. association between lung function and P who performed ≥30 MVPA daily at baseline (p=0.01) Sign. association between lung function and P who performed ≥30 MVPA daily at 12m (p=0.001) Sign. association between lung function and P who achieved MVPA-B at baseline (P=0.03) Sign. association between lung function and P who achieved MVPA-B at 12m (P=0.02)	
	Exercise capacity	Sign. association between MVPA and exercise capacity (MST) at baseline (Rs=0.4, p>0.001) Sign. association between MVPA and exercise capacity (MST) at 12m (Rs=0.4, p=0.002) Multiple linear regression model: exercise capacity was a sign independent predictor of whether ≥30 MVPA daily would be performed (standerdized bèta=0.59, p=0.002) Sign. association between exercise capacity and P who performed ≥30 MVPA daily (BL p<0.001, 12m p=0.001) Sign. association between exercise capacity and P who performed MVPA-B (BL p=0.003, 12m p=0.006)	
	Hospitalization	Effect of hospitalization: there was a 43% reduction in MVPA from discharge to 1m post discharge (p=0.045) Sign. association between MVPA and hospital admissions at 12m (Rs= -0.3, p=0.05; Rs= -0.3, p=0.01) Trend towards longer time to first admission when MVPA-B was achieved (Xé(2)=3.06, p=0.08) Sign. association between MVPA (incl. ≥30 MVPA daily and MVPA-B) and hospital time at 12 months (Pt=0.04; Pt=0.04)	No sign. diff. in time to first hospitalization between those who performed ≥30 MVPA and those who did not (X2(2) =2.18, P=0.14)
	QoL	Sign. ↑ scores for QoL in participants who performed ≥30 MVPA daily and MVPA-B compared to those who performed <30 MVPA daily	

Cherobin, I.A. 2018, Clin Respir J.	FEV1	Sign. association with: - MPA (R2= 0.558, p<0.001) - VPA (R2= 0.563, p<0.001) - MVPA (R2= 0.623, p<0.001) - MVPA (R2= 0.620, p<0.001) Sign. neg association with - MVPA (r=0.723, p<0.001) - data obtained by IPAQ (R=-0.282, p=0.073)	Sign. association with: - total METS (R2=0.80, p=0.146) - IPAQ classification (R2=0.81, p=0.141)
	thoracic kyphosis cervical lordosis	Sign. association with MVPA and - thoracic kyphosis (R=0.484, p=0.031) - cervical lordosis (R=0.531, p=0.016)	
	6MWT	Sign. association with MVPA (R=0.564, p= 0.010)	
Elce,A. 2018, Clin Respir J	(Decline of) FEV1%	P of the exercise group showed sign. slower decline of FEV1% compared to the CF sedentary group (p=0.04)	No sign. diff. in current FEV1% between the two groups
	SCL, P. aeruginosa, S. Malthophilia and B. cepacia, CFRLD		No sign. diff. in SCL, colonization by P. aeruginosa, S. maltophilia and B. cepacia and CFRLD between the two groups
	PI		No sign. diff. in # of P with PI between the two groups (76.3% vs 72.9%)
	Anthropometric parameters	Sign. higher # of P with altered BMI in the sedentary group (p=0.05) Sign. higher # of P with increased waist circumference in the sedentary group. (p=0.03) Sign. higher # of P with reduced arm circumference in the exercise group (p=0.03)	No sign. diff. in weight, height and BMI between the two groups No sign. diff. in waist and arm circumferences between the two groups
	Biomechanical parameters	Lipid metabolism: sign. ↓ in P of the exercise group: - serum total cholesterol/HDL cholesterol ratio (p=0.05) - non - HDL cholesterol/HDL cholesterol ratios (p=0.05) - triglycerides (p=0.02) Glucose metabolism**:** sign. ↑ levels of serum fasting glucose in P of the sedentary group (p=0.03), and in this group, we found a sign. ↑ # of P with impaired glucose tolerance (p=0.03) Nutritional data: sign. ↑ levels of serum vitamin D in exercise group (p=0.05)	Lipid metabolism**:** no sign. diff. in plasma levels of campesterol and sitosteral between the two groups Nutritional data: no sign. diff. in serum albumin, vitamin A and vitamin E levels between two groups

Mackintosh, K.A. 2018, J Phys Act Health	FEV1%	FEV1 was predicted by height and LPA when both groups were pooled for analysis (F2.31=62.93, p<0.001, R2= 0.80) Low LPA sign. predicted FEV1 (F2.31=68.07, p<0.001, R2=0.82) both groups separately: FEV1 predicted by height and High LPA in CF (F2.14=79.60, p<0.001, R=0.92)	
Troosters,T. 2009, Eur Respir J	FEV1	Trend for an association between daily steps and lung function: - FEV1 (R=0.39, P=0.08) - FVC (R=0.42, p=0.07)	
	Qc force	Sign. association with: - MPA (R=0.48, p=0.03) - VPA (R=0.52, p=0.02)	No sign. association with LPA or number of steps
	VO_2 Peak	Sign. association with: - MPA (R=0,56, p<0.02) - VPA (R=0.52, p<0.02) - Daily steps (R=0.47, p<0.05)	
	6MWT	Sign. association with VPA (R=0.45, p=0.04)	
Wieboldt,J. 2012, J Cyst Fibros	Exacerbation	Exacerbation group: sign. diff. in daily steps between discharge and 1m and between admission and 1m (p<0.008; p<0.001)	No sign. diff. in activity parameters and daily steps between CF stable and CF 1m post exacerbation (p=0.89) Exacerbation group: no sign. diff. in daily steps between admission and discharge (p=0.13)
	Anthropometrics		Total group (stable + acute exacerbation group): no sign. associations between daily steps and anthropometrics
	Lung function		Total group (stable + acute exacerbation group): no sign. association between daily steps and lung function
	Strength		Total group (stable + acute exacerbation group): no sign. associations between daily steps and any measure of strength
	Blood parameters		Total group (stable + acute exacerbation group): no sign. associations between daily steps and any blood test parameter
Ward, N. 2013, Respir Med	Exacerbation	Sign. ↓ in ST from admission to one month following discharge (p<0.001), with a sign. ↑ in overall PA over time (p<0.001)	No sign. ↓ in ST from admission to one month discharge (p=0.4)
	age, FEV1, BMI		linear regression: change scores (baseline to followup) for PA and MST were not sign. affected by age, FEV1 or BMI (p>0.25)
	sex	Females had 78 min smaller ↑ in PA compared to males (p=0.055)	
Thobani, A. 2015, Pulm Med	FEV1	Sign. association between FEV1 and daily steps - at baseline (R=0.39, p<0.04) - at one-year (R=0.40, p=0.04)	
Nixon, P.A. 2001,	aerobic fitness		total CF group: no sign. associations between PA and aerobic fitness

Med Sci Sports Exerc	Pulmonary function		total CF group: no sign. associations between PA and pulmonary function
	Body mass		total CF group: no sign. associations between PA and body mass
	FEV1	P with FEV1<80%: - sign. association between VPA and FEV1 (R=0.78, p=0.008) - sign. association between METh/w and FEV1%, (R=0.72, p<0.019)	No sign. diff. in PA according to disease severity based on % of FEV1
	VO_2 peak	P with FEV1<80%: sign. association between VPA and VO2 peak (r=0.83, p=0.003)	No sign. association with METh/wk (R=0.19, p=0.603)
	BMI		No sign. diff. in PA between P with BMI<90% and P with BMI ≥90% Undernourished P: none of PA measures was related to aerobic fitness or pulmonary function The degree of undernutrition (BMI% pred) was not related to PA
Savi,D. 2013, Respir Med	VO_2 peak Watt max	Sign. pos association between relative VO_2 peak and MPA (R=0.503, p=0.02), particularly during weekday (R=0.588, p=0.006) Sign. association between absolute VO_2 peak and: - MPA (r=0.503, p=0.02) - MVPA (r=0.515, p=0.02) Sign. association between VO_2 peak (% predicted) and weekday MPA (r=0.508, p=0.02) Sign. association between Watt Max and weekday MPA (r=0.459, p=0.04) Sign. association with VPA and VO_2 peak (R=0.545, p=0.01) Sign. association with VPA and Watt Max (R=0.547, p=0.01) CF achieving ≥ 30 min M(V)PA daily had ↑ VO_2 peak	No sign. association between VO2 peak and weekdays and weekend activity categories detected by the HEAS No sign. association between watt max and weekdays or weekend activity categories detected by the HEAS
	Max V'e	Sign. association with MPA during week and weekend (R=0.436, p=0.05; R=0.435, p=0.05) Sign. association with VPA during week (R=0.568, p=0.008)	
	6MWT	Sign. association with daily steps (R=0.488, p=0.02)	No sign. associations with other PA outcome measurements
	Week vs WE	Sign. ↑ "somewhat inactive" categories during weekday for CF (z=2.651, p=0.008) Sign. ↑ "somewhat active" categories during WE for CF (z=-2.651, p=0.008) Sign. ↑ total time spent in activity during WE for CF (z=-2.203, p=0.02) Sign. ↑ total inactivity on weekdays for CF (z=2.464, p=0.01) Trend for ↑ VPA during week compared to WE for CF (z=1.790, p=0.07)	

Loutzenhiser, J.K and Clark,R. 1993, J Pediatr Nurs	Exercise capacity		No sign. association between activity scores and VO_2 max absolute (R=0.18) No sign. association between activity scores and VO_2 max relative (R=0.16)
Baker, C.F. 2006, journal of pediatric nursing	Sex	Sign. ↑ METh in hard intensity for boys (318.8 vs 97.4, Z=2.838, p=0.005) Sign. ↑ total VPA METs (hard + very hard) in boys (531.6 vs 293,5, Z=2.1, p=0.036) Trend for ↑ Total METh for boys at baseline (796.8 vs 555.2, Z=1.785, p=0.074)	Mean METh scores were higher for girls at LPA and were higher for boys at MPA and very hard intensities, but they were not sign. diff. (Z= -0.735, p=0,462; Z= -0,105, p=0.916)
	Attitudes PA		Total sample: - no association between attitude and METh (R=0.2, p=0.47) - no association between attitude and (V)VPA (P=0.59) No association between attitude and METh according to sex (Boys R=0.45, p=0.27; Girls R=0.3, p=0.47) No association between attitude and (V)VPA according to sex (Boys P=0.23; Girls P=0.54)
	VO_2 Peak	Sign. association with METh in (V)VPA (R=0.49, p=0.05)	
Wieltisback, M. 2020, PLoS One	Lung allograft dysfunction	Sign ↓ METmin/w for P with LAD compared to those without LAD (1796 (371 - 3067) vs 3372 (1613 - 6933) MET min/w, p=0.009)	
Hebestreit, H. 2014, BMC Pulm Med	Sex	Sign. sex difference in PA (h/w) at baseline (male 9.5 (10.6) vs female 5.8 (6.4), p<0.05)	
	QoL	Sign. association between the QoL scale "social role" and reported PA (R=0.292, p<0.05)	No association between objectively measured PA and any QoL scale
Hebestreit,H. 2006, Eur Respir J.	VO_2 max	Sign. association between total daily acceleromter counts and relative VO_2 max (R=0.45, p<0.001) Sign. association between total daily accelerometer counts and VO_2 max % predicted (R=0.32, p<0.01) Sign. association between MVPA and relative VO2 max (R=0.55, p<0.001) Sign association between VO_2 max as % of predicted and MVPA (R=0.42, p<0.001) Multiple linear regression: - Sign. association between total accelerometer counts per day and VO2 max (R=0.89, R2=0.79) - Sign. association between MVPA and VO2 max (R=0.89, R2=0.80)	
Rasekaba, T.M.	Sex		No sign. sex diff. on IPAQ total and domain scores (p>0.05)

2013, journal of Cystic Fibrosis	Age	CF females: sign. association between PA accumulated from domestic activities and age (R=0.55, P=0.005)	No sign. diff. in age between the CFs in the high and low PA category CF males: no association between HPA intensity category and demographic features such as age
	BMI	CF Females: sign association between MPA and BMI (R=-0.47, P=0.022)	No sign. diff. in BMI between the CFs in the high and low PA category CF males: no association between PA intensity category and demographic features such BMI
	Lung function	Sign. pos. association between PA and respiratory function (Rs 0.18-0.23, p<0.05) CF Females: sign association between VPA and FEV1% (R=0.34, p<0.05)	No sign. diff. in lung function between the CFs in the high and low PA category
Tejero, S. 2016, Braz J Phys Ther	Sex	Sign. ↑ MPA for CF male (p=0.045)	
	BMD	Sign. pos. association between: - MPA and total hip BMD (R=0.74, p<0.001) - MPA and femoral neck BMD (R=0.72, p<0.001) - MPA and Lumbar spine BMD (R=0.58, p<0.001) - VPA and Total hip BMD (R=0.49, p<0.001) - VPA and femoral neck BMD (R=0.34, p=0.016) - MPA and P1NP (R=0.35, p=0.013) - VPA and P1NP (R=0.42, p = 0.003) - MPA and PICP (R=0.32, p=0.023) - VPA and PICP (R=0.53, p<0.001)	
Aznar,S. 2014, journal of Cystic Fibrosis	VO_2 Peak	Sign. association with - all week MVPA (R=0.46, p=0.003) - all week VPA (R=0.39, p<0.05) - week MVPA (R=0.41, p=0.009) - WE MVPA (R=0.39, p<0.05) - Week VPA (R=0.38, p<0.05) - WE VPA (R=0.35, p<0.05)	
Paranjape, S.M. 2012, J Cyst Fibros.	Week vs WE	Sign. ↑ self - reported activity on typical WE than on weekdays (median 63.2% vs 55.7%, p=0.004)	
Schneiderman-	sex	Sign. ↑ weekday total activity for male (5.4 (2.5) vs 6.5 (2.9), p<0.05)	

Walker, J. 2005, J Pediatr	FEV1	Sign. association between activity quartile and FEV1, significantly dependent on sex (p=0.02) Girls: - Sign. association between weekday total activity quartiles and rate of decline in FEV1 (p=0.02) - Sign. more rapid rate of decline in FEV1 for girls in the two lowest activity quartiles compared to those in the two highest quartiles (-3.4%, -3.05% pred; 0.93%, 1.17% pred; p=0.02)	Boys: no sign. association between weekday total activity quartiles and rate of decline in FEV1 (p=0.86)
	Season	Seasonal averages of weekday total activity (h/d) for summer, fall, winter and spring were: 7.13 (3.2), 4.53 (2.7), 4.86 (2.6) and 4.81 (2.4) (p<0.001), with more active time in summer	No diff. in weekday very active (h/d) across seasons (average range 1.8 to 2.5 (1.4 – 2.3)
Quon, B.S. 2012, J Cyst Fibros.	Health status	Sign. ↑ mean pedometer-recorded step rate during the well state compared to the ill state (increased 35% or 137 steps/h, p=0.015)	No sign. diff. in lung function of P whose mean step rate decresed from the ill to the well period (p=0.11)
	Sex		No sign. diff. in mean step rate between sexes (mean diff. 78 steps/h)
	lung function	Well period: mean step rate increased by 9.4 steps/h with every 1 unite increase in baseline FEV1 predicted (R=0.53, p=0.014)	
	Age	Well period: sign. ↑ mean step rate for adolescents compared to adults (377 steps/h higher)	
Savi,D. 2015, BCM Pulm Med.	sex	Sign. > average METs for men (1.6 (0.2) vs 1.8 (0.3), p<0.05) Sign. > VPA for men (p=0.01)	No sign. diff. in MPA between female and male (10 (6-24) min vs 19 (9-33) resp., p=0.16) No sign. diff. in total PA duration between female and male (184 (115) vs 233 (149), p=0.17)
	Pulmonary exacerbation	Sign. ↓ Daily Pa in P with > 2 exacerbations/y (p=0.01) Sign. ↓ LPA in P with > 2 exacerbations/y (p=0.01) Sign. ↓ average METs in those with > frequent exacerbations (p=0.01)	No sign. diff. for activities with at least moderate and vigorous intensity among the three groups (p=0.3; p=0.88) No sign. association the # of exacerbations in the preceding year and PA variables when corrected for clinical covariates (age, sex, BMI, FEV1% pred, infection with P aeruginosa, genotype, diabetes and PI)
	Seks FEV1%	Daily PA was independently associated with sex and airflow obstruction (NR) PA above threshold of moderate and vigorous intensity were also related to sex and FEV1% pred (p=0.007, p=0.04) Trend towards lower number of steps in those with lower FEV1% pred (p=0.09)	
Schneiderman, J.E. 2014, Eur	sex	Sign. ↑ PA for males compared to females (5.06 (2.69) vs 5.9 (2.87), p=0.028)	

Respir J.	follow up	Adjusting for the potential confounders of sex, baseline age and FEV1, mucoid P. aeruginosa and CFRD: sign. ↑ in PA of 0.28 (0.03) h/d per y (p<0.0001) over the study period	
	VO_2 peak		No sign. association between VO_2 peak and PA (p=0.7457)
	FEV1%	↑ in activity was associated with a slower rate of ↓ in lung function over the study period (R=0.19, p<0.007) Mixed model analysis results: sign. less steep rate of ↓ of FEV1 for the high group compared to the low group (-1.39% pred/y vs -1.90% pred/y, p=0.0001) Sign. less steep rate of ↓ in FEV1 for P who increased their HPA compared to those with reduced HPA (-0.58% pred/y vs -2.15% pred/y, p=0.0231)	
	confounders vs high/low activity		No sign. diff. in the following confounders between P in the high and low PA group: ABPA (p=0.4101), mPA (p=0.2800), CFRD (p=0.5717), PI (p=0.1534), female sex (p=0.3375), age (p=0.5367), FVC% pred (p=0.2098), FEV1% pred (p=0.0967), z-BMI (p=0.1397), FEF25-75% (p=0.2192) the high group had a rate of ↑ in PA of 0.59 h/d per y, the low group had a rate of ↓ of activity of 0.15 h/d per y over the study period (NR)
Savi, D. 2018, BCM Pulm Med	DH	Sign. ↑ time in PA above vigorous I for P with evidence of DH (p=0.01)	A trend for ↑ time in PA above moderate I in the DH group (p=0.196)
	VO_2 peak	Total group: - Sign. association between MPA and VO_2 peak (absolute) (R=0.44, p=0.002) - Sign. association between MPA and VO_2 peak (relative) (R=0.52, p<0.001) Multivariate linear regression: VO_2 peak and gender as independent predictor of PA	
Savi, D. 2015, BCM Pulm Med	VO_2 peak Watt Max	Sign. association between MPA and VO_2 peak (relative) (R=0,49, p=0,005) Sign. association between MVPA and VO_2 peak (absolute) (R=0.41, p=0.02) Sign. association between MVPA and VO_2 peak (relative)(R=0.51, p=0.003) Time spent in MVPA was correlated to Watt max (R=0.35, p=0.05)	
Ruf, K.C. 2012, BMC Med Res	Sex	Sign. ↑ MVPA in males compared to females (70.8 (35.4) vs 97.2 (36.5)) Sign. ↑ VPA in males compared to females (28.6 (14.1) vs 47.7 (24.7))	No sign. diff. between sexes in PA assessed by the questionnaires No sign. diff. in MPA between sexes

Methodol	VO_2 peak Watt Max	Sign. moderate association between LRC showed and Wmax (R=0.46, p=0.002) Sign. weak association between LRC and VO_2 peak (R=0.32, p=0.041)	No sgin. Association between results of the exercise test and the results of the HAES and 7D PAR (data not shown)
Burtin, C. 2013, Resp Research	Exacerbation	Sign. ↓ daily steps and time in M(V)PA during exacerbation (p<0.05)	
	Hospital vs home		No sign. diff in PA between P receiving IVAT in hospital vs IVAT at home - Hospital: 4283 (3276-5629) steps/d and 6 (2-17) min spent in activities > 4.8 METs - Home: 3517 (2411-7468) steps/d and 4 (2-18) min spent in activities > 4.8 METs
	Sex		No diff. in activity levels between sexes (NR)
	Qc force	Sign. association between Qc twitch force and MPA during exacerbation (R=0.61, p=0.007) 70% of P who spent <10min/d MPA showed a decrease in Qc twitch force, compared to 25% of P with > MPA (p=0.057)	No sign. association between Qc twitch force and daily number of steps (R=-0.15, p=0.55) No sign. association between PA and Max voluntary contraction during exacerbation: - MPA (R=0.29, p=0.24) - Daily steps (R=-0.009, p=0.72)
Orava, C. 2018, physiotherapy Canada	Fatigue	Controlling for FEV1 and depression: - sign. negative association between general fatigue and total active hours (bèta=-0.735, p=0.003) - Trend towards negative association between # of total active hours and score on physical fatigue (bèta=-0.579, p=0.09)	No sign. association between total activity hours and the scores from the five different fatigue domains
Currie, S. 2017, physiotherapy Canada	CDA guidelines	Sign. ↑ METmin/w for P achieving CDA guidelines compared to those who do not (p=0.05) Trend towards a diff. in the amount of sleep between P achieving CDA guidelines and those who do not (p=0.07)	no sign. diff in blood glucose control between adults with CFRD who met the CDA guidelines and those who did not (p=0.34)
Kilbride, E. 2012, ISRN pulmonoly	sex		No sign. diff. in PA between boys and girls
Cherobin, I.A. 2016	classification PA	Sign. more HC were classified as high physically active compared to CF (0 vs 6 patients) IPAQ score	Participants categorized as mild or moderate PA: no sign diff between CF and HC for the following variables: age, BMI, FEV1 6MWT...
Bhudhikanok, G.S. 1996, pediatrics		Sign. pos. correlation between intensity of physical exertion (MET score) and bone mass at all sites except femoral neck BMAD Sign. correlation between time spent in weight bearing activity and lumbar spine BMAD trend for correlation between time spent in weight bearing activity and lumbar spine BMD Sign. weak correlations between time spent in weight bearing activity (excl walking) and BMD z scores both at the lumbar spine and femoral neck	No sign. association between bone mass at any site and time spent in exercise and time spent in weight bearing activity (excl walking)

Burton, K. 2019, physio theory and practice	plasma	Sign. association between daily average METS and plasma concentrations of - Interleukine 6 (r=-0,48; p<0,02) - Interleukine 8 (r=-0,5;p<0,01) - Tumor necrosis factor alfa (r=-0,47, p<0,01) Sign. low negative correlation with daily average ≥3 METs and plasma concentrations of: - Interleukine 6 (R=-0.4, p=0.02) - InterLeukine 8 (R=-0.37; p=0.04) - Tumor Necrosis Factor alfa (R=-0.4, p=0.03) Sign. low positive correlation between sputum TNF alfa and daily average steps (R=0.36, p=0.05)	No sign. association between plasma cytokines and daily average steps No sign. associations between sputum cytokines and measures of PA
	FEV1	Sign. association between daily average steps and FEV1 (R=0.45, p<0.05)	
	Sex		No sign. diff. in PA between sexes
	BMI	Sign. low positive correlation between BMI and daily average steps (R=0.39, p<0.05)	
Buntain H.M. 2003, thorax	BMD	Children: sign. pos. univariate associations between activity questionnaire score and: - Principal component BMD - LS BMD Adults: sign. association between principal component BMD and activity questionnaire score Sign. association between LS BMD and: - the activity questionnaire score - PA/sedentary ratio Multivariate model: activity questionnaire score was the only predictor of LS BMD	
Valencia-Peris A. 2021, Int. J. Environ. Res. Public Health	Sex	Sign. ↑ MPA in boys (30 (13) vs 49 (22)) Sign. ↑ VPA in boys (10 (7) vs 20 (17)) Sign. ↑ MVPA in boys (40(19) vs 70(36)) (P's<0.001)	
	age	Sign. diff. in PA between younger children (6-9 y) older children (14-17 y) (67 min/d vs 40 min/d)	
Groeneveld I.F. 2012, Qual Life Res	QoL		No sign. associations between PA and HRQoL

AL, activity level; BMD, bone mineral density; BMI, body mass index; CFRDM, cystic fibrosis related diabetes mellitus; CFRLD, cystic fibrosis related liver disease; d, day; DH, dynamic hyperinflation; diff., difference; FEV1, forced expiratory volume in one second; h, hour; HAES, habitual activity estimation scale; I, intensity; incl., inclusive; IPAQ, international physical activity questionnaire; LPA, light physical activity; m, months; Max., maximal; MET, metabolic equivalent of task; min, minute; MPA, moderate physical activity; MST, modified shuttle test; MVPA, moderate-to-vigorous physical activity; neg., negative; NR, not reported; PA, physical activity; PI, pancreatic insufficiency; pos., positive; Qc, quadriceps; QoL, quality of life; sign., significant; ST, sedentary time; (V)VPA, (very) vigorous physical activity; w, weeks; WASO, wakefulness after sleep onset; WE, weekend; y, year; 6MWT, six-minute walking test; #, number; ↑, higher/increase; ↓, lower/decline

Table E5. Qualitative synthesis of included studies using NOS scale for the quality of cohort studies included in research question 1.

Study	Items						LoE
	Selection			Comparability	Exposure		
	1	2	3	5	6	7	
Aznar,S. et al. 2014	+	+	-	-	+	+	B
Britto,M.T. et al. 2000	+	+	+	+	-	-	B
Buntain H.M. et al. 2003	+	+	+	+	-	-	B
Cherobin, I.A. et al. 2016	+	+	+	+	-	-	B
Jantzen, A. et al. 2016	+	+	+	-	+	+	B
Kilbride, E. et al. 2012	+	+	+	-	-	-	C
Mackintosh, K.A. et al. 2018	+	+	+	+	+	+	B
Mackintosh, K.A. et al 2019	+	+	+	+	+	+	B
McNarry et al.	+	+	+	+	+	+	B
Nixon, P.A. et al. 2001	+	+	-	-	-	-	C
Rasekaba, T.M. et al. 2013	+	+	-	-	-	-	C
Savi,D. et al. 2013	+	+	-	+	+	-	B
Savi,D. et al. 2015	+	+	-	+	+	-	B
Swisher A,K. et al. 2007	+	+	+	+	-	-	B
Troosters,T. et al. 2009	+	+	-	+	+	-	B
Valencia-Peris A. et al. 2021	+	+	+	+	+	+	B

Newcastle-Ottawa Quality Assessment Scale (NOS) for cohort studies: Selection of cohort(s): 1: Representativeness of the exposed cohort; 2: Selection of the non-exposed cohort; 3: Ascertainment of exposure; 5: Comparability of cohorts; 6: Assessment of outcome; 7: Follow up long enough for outcomes to occur;. +, yes; -, no; LoE, level of evidence

Table E6. Qualitative synthesis of included studies using NOS scale for the quality of cohort studies included in research question 2.

Study	Items					LoE
	Selection		Exposure			
	1	3	6	7	8	
Tejero et al. 2011	+	+	+	-	-	C
Cox et al. 2019	+	-	+	+	-	C
Boucher et al. 1997	+	-	-	-	-	C
Gilljam et al. 1990	+	-	-	-	-	C
Wells et al. 2008	+	-	+	+	-	C
Cox et al. 2016	+	-	+	-	-	C
Cherobin et al. 2018	+	+	+	-	-	C
Elce et al. 2018	+	+	-	-	+	B
Wieboldt et al. 2012	+	-	+	+	+	B
Ward et al. 2013	+	-	+	-	+	B
Thobani et al. 2015	+	-	+	-	+	B
Baker et al. 2006	+	-	-	-	-	C
Loutzenhiser et al. 1993	+	-	-	-	-	C
Wieltisback et al. 2020	+	-	-	-	-	C
Hebestreit et al. 2014	+	-	+	+	-	C
Hebestreit et al. 2006	+	-	+	+	-	C
Tejero et al. 2016	+	+	+	-	-	C
Schneiderman-Walker et al. 2005	+	-	-	-	+	A2
Paranjape et al. 2012	+	-	-	-	-	C
Quon et al. 2012	+	+	+	+	-	C
Schneiderman et al. 2014	+	-	-	-	+	A2
Savi et al. 2018	+	+	+	-	-	C
Savi et al. 2015	+	+	+	-	-	B
Ruf et al. 2012	+	+	+	+	-	C
Burtin et al. 2013	+	+	+	+	+	B
Orava et al. 2018	+	+	-	-	-	C
Currie et al. 2017	+	+	-	-	-	C
Bhudhikanok et al. 1996	+	+	-	-	-	C
Burton et al. 2019	+	-	+	-	+	B
Groeneveld et al. 2012	+	+	+	?	-	C

Newcastle-Ottawa Quality Assessment Scale (NOS) for cohort studies: Selection of cohort(s): 1: Representativeness of the exposed cohort; 3: Ascertainment of exposure; 6: Assessment of outcome; 7: Follow up long enough for outcomes to occur; 8: Adequacy of follow up of cohorts. +, yes; -, no; ?, not reported; LoE, level of evidence