

Appendix 3: Spirometric Indices as Correlate of Physical Activity, Alternate Models

1 In this Appendix we evaluate possible mediators, confounders and drivers of any relationship
2 between spirometric indices and physical activity. To maximize comparability between models,
3 all potential predictors were chosen a priori and left in the model regardless of statistical
4 significance.

5
6 Tables 1.1, 1.2, and 1.3 consider different subsets of confounders to check for effect
7 modification. Tables 2.1, 2.2, and 2.3 assess possible confounding by air pollution. Tables 3.1
8 and 3.2 consider relationship between PA measures and spirometric flows (PEF, FEF25, FEF50,
9 and FEF75).

10 11 **Overview of tables:**

12 13 **Tables 1: Spirometric Indices as Correlate of Physical Activity (N=895) in Models of** 14 **Varying Complexity**

15 Table 1.1 Crude Model (corrected for sex, age and height)

16 Table 1.2 Basic Model (corrected for sex, age, height, weight, BMI, study centre,
17 accelerometer wear-time, nutritional intervention, and parental education)

18 Table 1.3 Main Model (corrected for sex, age, height, weight, BMI, study centre,
19 accelerometer wear-time, nutritional intervention, parental education, birthweight, breastfeeding,
20 and pre- and postnatal tobacco-smoke exposure up to age 6).

21 22 **Tables 2: Confounding Effect of Air Pollution (PM2.5, NOx)**

23 Table 2.1 Main Model of raw spirometric indices (measured in mL and mL/sec) as correlate
24 of PA measures, PM 2.5 and NOx; N=858

25 Table 2.2 Main Model of raw spirometric indices as correlate of PA measures, PM 2.5 and
26 NOx, with outliers excluded. Model contains all subjects with complete data whose (moderate,
27 vigorous, MVPA, FEV1, FVC and FEV1/FVC) are all within 2 standard deviations of the sex-
28 specific mean; N=710

29 Table 2.3 Main Model of GLI z-scores, instead of raw spirometric values, as correlate of PA
30 measures, PM2.5, and NOx; N=858

31 32 **Tables 3: Expiratory Flow Parameters as Correlate of Physical Activity (N=895);**

33 Z-scores do not exist for these indices

34 Table 3.1 Main model of raw spirometric indices (measured in mL and mL/sec)

35 Table 3.2 Main model with outliers excluded; contains the 743 subjects whose (moderate,
36 vigorous, MVPA, FEV1, FVC and FEV1/FVC) are all within 2 standard deviations of the sex-
37 specific mean.

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Spirometric Indices as Correlate of Physical Activity Crude (Simplest) Model

Table 1.1 Crude Model: Spirometric Indices as Correlate of Physical Activity								
Corrected for age, sex, and height at spirometry								
	FEV1 (mL)		FVC (mL)		FEV1/FVC (%)		FEF2575 (mL/sec)	
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P
Daily mean minutes								
Moderate	1.58	0.12	2.23	0.065	-0.0010	0.95	2.72	0.21
Vigorous	0.34	0.78	1.97	0.20	-0.027	0.15	-0.66	0.81
MVPA	0.73	0.25	1.49	0.060	-0.0077	0.43	0.99	0.48
MVPA quintile ¹	--	0.073	--	0.11	--	0.085	--	0.042
1 ²	0	--	0	--	0	--	0	--
2 ²	0.063	1.0	56.7	0.25	-1.29	0.034	-157	0.076
3 ²	73.0	0.10	92.4	0.062	-0.35	0.56	50.7	0.56
4 ²	-7.59	0.86	52.1	0.29	-1.45	0.017	-126	0.15
5 ²	88.5	0.046	128	0.0098	-0.62	0.31	49.5	0.57
Percent days with MVPA >								
30 min	126	0.015	131	0.023	0.112	0.87	174	0.090
45 min	93.3	0.090	113	0.065	-0.218	0.77	135	0.22
60 min	57.5	0.38	113	0.12	-1.19	0.18	21.5	0.87
Any sport	8.22	0.81	10.6	0.78	-0.048	0.92	1.57	0.98
Any active transportation ³	-9.36	0.74	6.31	0.84	-0.350	0.37	-35.4	0.53

1) Top row is p-value for global null hypothesis (i.e. all quintiles equal.) Quintiles stratified by sex.
2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
3) Active transportation defined as commuting to school by walking or cycling at least once during accelerometry. Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2]
Bold text if p<0.05

Appendix 3: Spirometric Indices as Correlate of Physical Activity, Alternate Models

Spirometric Indices as Correlate of Physical Activity Basic Model

	FEV1 (mL)		FVC (mL)		FEV1/FVC (%)		FEF2575 (mL/sec)	
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P
Daily mean minutes								
Moderate	1.07	0.31	1.58	0.17	-0.0079	0.59	1.35	0.53
Vigorous	1.08	0.41	2.86	0.045	-0.0357	0.050	-0.630	0.81
MVPA	0.751	0.27	1.45	0.051	-0.0131	0.17	0.403	0.77
MVPA quintile ¹	--	0.22	--	0.16	--	0.019	--	0.058
1 ²	0	--	0	--	0	--	0	--
2 ²	-6.30	0.88	58.2	0.21	-1.47	0.013	-174	0.045
3 ²	43.3	0.31	64.5	0.17	-0.491	0.41	8.83	0.92
4 ²	-17.6	0.68	55.1	0.23	-1.78	0.0026	-157	0.070
5 ²	67.2	0.12	119	0.011	0.0985	0.097	2.92	0.97
Percent days with MVPA >								
30 min	98.1	0.050	122	0.026	-0.432	0.54	108	0.29
45 min	73.8	0.16	105	0.070	-0.566	0.44	90.6	0.40
60 min	51.1	0.42	113	0.099	-1.384	0.11	3.33	0.98
Any sport	32.7	0.33	44.6	0.22	-0.192	0.68	21.9	0.75
Any active transportation ³	22.3	0.42	36.4	0.22	-0.195	0.61	13.0	0.82

1) Top row is p-value for global null hypothesis (i.e. all quintiles equal.) Quintiles stratified by sex.
2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
3) Active transportation defined as commuting to school by walking or cycling at least once during accelerometry. Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2]
Bold text if p<0.05

Appendix 3: Spirometric Indices as Correlate of Physical Activity, Alternate Models

Spirometric Indices as Correlate of Physical Activity

Main (Fully-Corrected) Model

From Table 2, main text

Table 1.3 Spirometric Indices as Correlate of Physical Activity								
Corrected for age, sex, height, study centre, nutritional intervention, device wear time, BMI, parental education, birthweight, exclusive breastfeeding, prenatal tobacco, tobacco at home up to age 6								
	FEV1 (mL)		FVC (mL)		FEV1/FVC (%)		FEF2575 (mL/sec)	
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P
Daily mean minutes								
Moderate	1.01	0.34	1.34	0.24	-0.0048	0.75	1.58	0.46
Vigorous	0.98	0.46	2.64	0.066	-0.034	0.060	-0.44	0.87
MVPA	0.70	0.31	1.30	0.084	-0.011	0.23	0.55	0.69
MVPA quintile ¹	--	0.22	--	0.21	--	0.022	--	0.050
1 ²	0	--	0	--	0	--	0	--
2 ²	-5.52	0.90	58.1	0.21	-1.45	0.014	-172	0.048
3 ²	43.4	0.31	63.0	0.18	-0.46	0.44	10.1	0.91
4 ²	-19.0	0.66	51.1	0.27	-1.73	0.0033	-155	0.073
5 ²	67.0	0.12	113	0.016	-0.86	0.15	16.1	0.85
Percent days with MVPA >								
30 min	96.1	0.056	113	0.038	-0.33	0.64	117	0.26
45 min	72.3	0.18	95.5	0.10	-0.43	0.56	106	0.33
60 min	48.0	0.45	98.7	0.15	-1.20	0.17	23.6	0.86
Any sport	34.3	0.30	46.6	0.20	-0.19	0.68	22.5	0.74
Any active transportation ³	23.9	0.39	40.0	0.18	-0.19	0.68	11.9	0.83

1) P-value for global null hypothesis (all quintiles equal.) Quintiles stratified by sex.
2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
3) Active transportation defined as commuting to school by walking or cycling at least once during accelerometry.
Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2].
Bold text if p<0.05

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Sensitivity to Air Pollution

Main (Fully-Corrected) Model of **Spirometric Indices** as Correlate of Physical Activity,
Corrected for Air Pollution (PM2.5 and NOx)

Table 2.1 Spirometric Indices as Correlate of Physical Activity									
Corrected for age, sex, height, study centre, nutritional intervention, device wear time, BMI, parental education, birthweight, exclusive breastfeeding, prenatal tobacco, tobacco at home up to age 6, PM2.5 and NOx (mean annual exposure at home address at age 15)									
	FEV1 (mL)		FVC (mL)		FEV1/FVC (%)		FEF2575 (mL/sec)		
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	
Daily mean minutes									
Moderate	1.21	0.26	1.31	0.26	0.0005	0.98	2.22	0.31	
Vigorous	1.60	0.23	3.15	0.030	-0.030	0.10	0.430	0.88	
MVPA	0.956	0.17	1.42	0.061	-0.0080	0.41	1.07	0.45	
MVPA quintile ¹	--	0.082	--	0.17	--	0.023	--	0.024	
1 ²	0	--	0	--	0	--	0	--	
2 ²	-16.7	0.70	43.6	0.36	-1.45	0.015	-182	0.040	
3 ²	37.8	0.39	47.0	0.32	-0.29	0.63	20.5	0.82	
4 ²	-23.7	0.58	39.4	0.40	-1.62	0.0066	-148	0.093	
5 ²	84.5	0.057	119	0.014	-0.60	0.32	48.3	0.59	
Percent days with MVPA >									
30 min	114	0.027	120	0.032	-0.0734	0.92	147	0.16	
45 min	92.7	0.090	106	0.073	-0.173	0.82	143	0.20	
60 min	78.7	0.22	123	0.079	-0.937	0.29	74.7	0.57	
Any sport	37.1	0.27	44.3	0.23	-0.079	0.87	38.7	0.58	
Any active transportation ³	23.9	0.41	28.2	0.37	-0.043	0.91	37.4	0.52	

1) P-value for global null hypothesis (all quintiles equal.) Quintiles stratified by sex.
 2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
 3) Active transportation defined as walking or cycling to school at least once during accelerometry.
 Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2].
 Data on air pollution from ESCAPE study; 858 subjects (96%) had data on air pollution. Details on data collection and definitions available in [3-7]
Bold text if p<0.05

Baseline concentrations (mean (median); 5th, 95th percentile) were 15.0 (14.1); 12, 18 µg/m³ for PM2.5, 33.6 (32.7); 24, 46 µg/m³ for NOx.

Appendix 3: Spirometric Indices as Correlate of Physical Activity, Alternate Models

Sensitivity to Air Pollution; Outliers Excluded

Main (Fully-Corrected) Model of Spirometric Z-scores as Correlate of Physical Activity, Corrected for Air Pollution (PM2.5 and NOx)

Table 2.2 Spirometric Z-Scores as Correlate of Physical Activity, PM2.5 and NOx, Outliers Excluded Corrected for age, sex, height, study centre, nutritional intervention, device wear time, BMI, parental education, birthweight, exclusive breastfeeding, prenatal tobacco, tobacco at home up to age 6, PM2.5 and NOx (mean annual exposure at home address at age 15) Moderate, vigorous, MVPA, FEV1, FVC and FEV1/FVC all within 2 standard deviations of sex-specific mean; N=710								
	FEV1 * 1000		FVC * 1000		FEV1/FVC * 1000		FEF2575 * 1000	
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P
Daily mean minutes								
Moderate	2.04	0.14	1.31	0.26	0.0055	0.78	3.13	0.28
Vigorous	2.51	0.19	3.15	0.030	-0.040	0.13	-2.06	0.61
MVPA	1.55	0.10	1.42	0.062	-0.0071	0.59	0.96	0.62
MVPA quintile ¹	--	0.17	--	0.16	--	0.017	--	0.057
1 ²	0	--	0	--	0	--	0	--
2 ²	22.2	0.57	84.3	0.053	-1.28	0.023	-135	0.11
3 ²	42.8	0.29	52.8	0.22	-0.27	0.63	26.3	0.76
4 ²	-2.79	0.95	61.3	0.16	-1.52	0.0078	-135	0.11
5 ²	103	0.031	120	0.018	-0.053	0.94	80.1	0.42
Percent days with MVPA >								
30 min	117	0.027	128	0.024	0.028	0.97	119	0.28
45 min	108	0.071	107	0.096	0.298	0.72	129	0.30
60 min	99.0	0.20	164	0.048	-1.170	0.28	-17.4	0.91
Any sport	-10.4	0.76	16.3	0.65	-0.615	0.18	-43.0	0.53
Any active transportation ²	-9.36	0.74	-3.57	0.91	-0.170	0.66	-38.5	0.51

1) Top row is p-value for global null hypothesis (i.e. all quintiles equal.) Quintiles stratified by sex.
 2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
 3) Active transportation defined as commuting to school by walking or cycling at least once during accelerometry.
 Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2]
 Data on air pollution from ESCAPE study. Details on data collection and definitions available in [3-7]
 Extreme values are those 152 subjects whose (FEV1, FVC, FEV1/FVC, moderate, vigorous, or MVPA) was more than 2 standard deviations from sex-specific mean. Of the remaining 743 (83% of 895), 710 had data on air pollution.
Bold text if p<0.05

Baseline concentrations (mean (median); 5th, 95th percentile) were 15.0 (14.1); 12, 18 µg/m³ for PM2.5, 33.6 (32.7); 24, 46 µg/m³ for NOx.

Appendix 3: Spirometric Indices as Correlate of Physical Activity, Alternate Models

Sensitivity to Air Pollution

Spirometric Z-Scores as Correlate of Physical Activity

Main (Fully-Corrected) Model, Corrected for PM2.5 and NOx

	FEV1 * 1000		FVC * 1000		FEV1/FVC * 1000		FEF2575 * 1000	
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P
Daily mean minutes								
Moderate	2.29	0.33	2.43	0.28	-0.030	0.99	2.23	0.25
Vigorous	3.48	0.24	6.64	0.020	-5.18	0.088	-0.31	0.92
MVPA	1.93	0.21	2.85	0.055	-1.42	0.37	0.87	0.58
MVPA quintile ¹	--	0.085	--	0.13	--	0.019	--	0.030
1 ²	0	--	0	--	0	--	0	--
2 ²	-30.7	0.75	95.7	0.30	-250	0.011	-198	0.042
3 ²	102	0.29	119	0.20	-71.4	0.47	33.1	0.73
4 ²	-37.0	0.70	103	0.26	-282	0.0040	-156	0.11
5 ²	189	0.052	250	0.0079	-114	0.26	42.6	0.67
Percent days with MVPA >								
30 min	254	0.025	261	0.017	-23.2	0.84	128	0.29
45 min	198	0.099	222	0.055	-34.4	0.78	142	0.30
60 min	152	0.28	245	0.073	-173	0.23	-29.5	0.87
Any sport	69.8	0.35	78.9	0.27	-40.8	0.60	-55.6	0.47
Any active transportation ²	65.3	0.30	58.6	0.34	7.92	0.90	-34.7	0.59

1) Top row is p-value for global null hypothesis (i.e. all quintiles equal.) Quintiles stratified by sex.
2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
3) Active transportation defined as commuting to school by walking or cycling at least once during accelerometry.
Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2]
Bold text if p<0.05
Extreme values are those 152 subjects whose (FEV1, FVC, FEV1/FVC, moderate, vigorous, or MVPA) was more than 2 standard deviations from sex-specific mean. Of the remaining 743 (83% of 895), 710 had data on air pollution.

Baseline concentrations (mean (median); 5th, 95th percentile) were 15.0 (14.1); 12, 18 µg/m³ for PM2.5, 33.6 (32.7); 24, 46 µg/m³ for NOx.

Appendix 3: Spirometric Indices as Correlate of Physical Activity, Alternate Models

Alternate Outcomes: Spirometric Flows as Correlate of Physical Activity Main (Fully-Corrected) Model

Table 3.1 Spirometric Flows as Correlate of Physical Activity									
Corrected for age, sex, height, study centre, nutritional intervention, device wear time, BMI, parental education, birthweight, exclusive breastfeeding, prenatal tobacco, and tobacco at home up to age 6									
	PEF (ml/s)		FEF25 (ml/s)		FEF50 (ml/s)		FEF75 (ml/s)		
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	
Daily mean minutes									
Moderate	4.03	0.12	1.75	0.50	2.80	0.25	-0.611	0.72	
Vigorous	6.65	0.037	3.51	0.28	0.020	0.99	-2.31	0.29	
MVPA	3.54	0.034	1.71	0.32	1.20	0.45	-0.892	0.43	
MVPA quintile ¹	--	0.075	--	0.20	--	0.029	--	0.066	
1 ²	0	--	0	--	0	--	0	--	
2 ²	-107	0.30	-196	0.064	-208	0.034	-133	0.056	
3 ²	-49.7	0.63	-20.2	0.85	49.7	0.61	-44.8	0.52	
4 ²	-109	0.29	-97.4	0.36	-133	0.18	-178	0.010	
5 ²	151	0.15	32.4	0.76	41.3	0.68	-45.7	0.52	
Percent days with MVPA >									
30 min	164	0.18	135	0.28	159	0.17	21.3	0.80	
45 min	173	0.18	126	0.34	149	0.23	11.5	0.90	
60 min	212	0.17	99.1	0.53	55.9	0.70	-96.1	0.35	
Any sport	99.2	0.22	75.8	0.36	74.4	0.33	-29.5	0.59	
Any active transportation ³	17.9	0.79	24.7	0.72	9.54	0.88	16.2	0.72	

1) Top row is p-value for global null hypothesis (i.e. all quintiles equal.) Quintiles stratified by sex.
2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
3) Active transportation defined as commuting to school by walking or cycling at least once during accelerometry. Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2].
Bold text if p<0.05.

Appendix 3: Spirometric Indices as Correlate of Physical Activity, Alternate Models

Alternate Outcomes: Spirometric Flows as Correlate of Physical Activity Main (Fully-Corrected) Model, Outliers Excluded

Table 3.2 Spirometric Flows as Correlate of Physical Activity Corrected for age, sex, height, study centre, nutritional intervention, device wear time, BMI, parental education, birthweight, exclusive breastfeeding, prenatal tobacco, and tobacco at home up to age 6 Moderate, vigorous, MVPA, FEV1, FVC and FEV1/FVC all within 2 standard deviations of sex-specific mean (N=743, 83% of 895)								
	PEF (ml/s)		FEF25 (ml/s)		FEF50 (ml/s)		FEF75 (ml/s)	
	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P	Parameter estimate	P
Daily mean minutes								
Moderate	2.11	0.55	2.91	0.42	4.28	0.19	-0.328	0.88
Vigorous	2.26	0.63	-1.43	0.77	-2.83	0.52	4.28	0.19
MVPA	1.52	0.52	0.960	0.69	1.23	0.58	-2.83	0.52
MVPA quintile ¹	--	0.070	--	0.26	--	0.063	--	0.080
1 ²	0	--	0	--	0	--	0	--
2 ²	-94.1	0.36	-183	0.084	-152	0.12	-96.0	0.15
3 ²	-109	0.29	-52.4	0.62	58.8	0.54	-42.2	0.52
4 ²	-124	0.24	-90.6	0.40	-96.4	0.32	-169	0.012
5 ²	181	0.13	65.4	0.59	119	0.29	-7.79	0.92
Percent days with MVPA >								
30 min	126	0.35	104	0.44	170	0.17	16.9	0.84
45 min	133	0.38	73.1	0.63	173	0.22	21.1	0.83
60 min	104	0.60	5.63	0.98	7.62	0.97	-185	0.14
Any sport	-28.8	0.73	-47.3	0.58	-4.79	0.95	-84.8	0.12
Any active transportation ³	-78.0	0.26	-53.2	0.45	-67.3	0.29	-19.3	0.66

1) Top row is p-value for global null hypothesis (i.e. all quintiles equal.) Quintiles stratified by sex.
 2) P-value and parameter estimate for each quintile compared with the lowest (reference.)
 3) Active transportation defined as walking or cycling to school at least once during accelerometry.
 Moderate, vigorous and moderate-to-vigorous PA (MVPA) imputed for diaried nonwear time due to sport. Accelerometric cutpoints using Freedson's algorithm from [1, 2].
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