SUPPLEMENTARY MATERIAL

Normal values of respiratory oscillometry in South African children and adolescents

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Table S1: Demographic data stratified by age

Years	3 (n=104)	4 (n=131)	5 (n=114)	6 (n=128)	7 (n=103)	8 (n=9)	9 (n=7)	10 (n=12)	11 (n=23)	12 (n=11)	13 (n=11)	14 (n=10)	15 (n=9)	16 (n=9)	17 (n=11)	Total (n=692)
Site																
CTAAC	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	9 (90.0%)	9 (100%)	9 (100%)	11 (100%)	38 (5.5%)
HCSOC	0 (0.0%)	0 (0.0%)	1 (0.9%)	0 (0.0%)	6 (5.8%)	9 (100%)	7 (100%)	12 (100%)	23 (100%)	11 (100%)	11 (100%)	1 (10.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	81 (11.7%)
DCHS	104 (100%)	131 (100%)	113 (99.1%)	128 (100%)	97 (94.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	573 (82.8%)
Sex																
Female	52 (50.0%)	69 (52.7%)	53 (46.5%)	63 (49.2%)	48 (46.6%)	6 (66.7%)	3 (42.9%)	4 (33.3%)	9 (39.1%)	3 (27.3%)	5 (45.4%)	3 (30.0%)	5 (55.6%)	5 (55.6%)	47 (63.6%)	335 (48.4%)
Male	52 (50%)	62 (47.33%)	61 (53.51%)	65 (50.78%)	55 (53.40%)	3 (33.33%)	4 (57.14%)	8 (66.67%)	14 (60.87%)	8 (72.73%)	6 (54.55%)	7 (70%)	4 (44.44%)	4 (44.44%)	4 (36.36%)	357 (51.59%)
Weight (kg)*	13.50 (12.6; 14.3)	15.3 (14.4; 17.1)	17.8 (16.1; 19.5)	19. 5 (17.4; 21.9)	21.1 (19.2; 23.9)	29.5 (25.5; 30.0)	28.5 (26.4; 37.0)	36.2 (31.0; 40.8)	35.7 (30.7; 42.9)	41.0 (31.1; 49.8)	45.2 (34.2; 49.8)	49.0 (44.0; 62.0)	52.0 (41.0; 69.0)	55.0 (49.0; 61.0)	55.0 (49.0; 61.0)	18.2 (15.3; 23.1)
WAZ*	-0.54 (-1.11; -0.02)	-0.58 (-1.05; 0.25)	-0.37 (-1.09; 0.31)	-0.50 (-1.38; 0.34)	-0.63 (-1.37; 0.34)	0.66 (-0.07; 1.19)	-0.17 (-0.61; 1.33)	0.88 (-0.10; 1.56)	0.28 (-0.74; 0.80)	0.21 (-1.34; 1.10)	0.31 (-1.40; 0.63)	-0.11 (-0.51; 0.91)	-0.77 (-1.58; 1.42)	0.08 (-1.28; 0.62)	-0.04 (-1.42; 0.95)	-0.42 (-1.11; 0.35)
Height (cm)*	92.3 (89.0; 95.0)	101.0 (97.0; 104.5)	107.0 (104.0; 111.4)	114.0 (110.0; 117.5)	120.0 (115.5; 124.0)	127.0 (126.0; 131.0)	132.0 (120.0; 145.0)	140.3 (138.3; 145.0)	141.0 (136.7; 146.0)	151.0 (143.0; 152.0)	144.0 (142.0; 158.5)	156.8 (153.0; 161.0)	158.0 (151.0; 159.0)	160.5 (156.6; 163.0)	161.0 (157.5; 167.0)	110.0 (101.0; 120.0)
HAZ*	-1.18 (-2.00; -0.49)	-0.69 (-1.51; 0.04)	-0.69 (-1.40; 0.16)	-0.64 (-1.26; 0.13)	-0.41 (-1.25; 0.29)	0.01 (-0.38; 0.47)	-0.42 (-1.79; 1.62)	0.27 (-0.22; 0.82)	-0.46 (-1.29; 0.09)	0.03 (-1.13; 0.53)	-1.33 (-1.99; 0.58)	-0.79 (-1.37; -0.20)	-1.46 (-1.49; -0.49)	-0.82 (-1.82; -0.22)	-0.31 (-1.61; -0.14)	-0.65 (-1.43; 0.05)
BMI (kg/m²)*	15.7 (15.0; 16.9)	15.3 (14.5; 16.3)	15.2 (14.4; 16.0)	15.0 (13.9; 16.2)	14.7 (14.1; 15.8)	16.9 (15.6; 18.5)	16.4 (15.4; 19.4)	17.9 (16.6; 20.3)	18.9 (15.6; 20.1)	19.4 (15.9; 21.8)	18.7 (17.0; 24.0)	19.4 (18.0; 24.7)	19.6 (18.4; 27.8)	21.8 (17.9; 23.7)	21.8 (17.9; 23.7)	15.5 (14.5; 17.0)
BMI-Z*	0.22 (-0.38; 1.09)	0.00 (-0.62; 0.73)	-0.04 (-0.61; 0.56)	-0.27 (-1.01; 0.53)	-0.45 (-1.15; 0.19)	0.55 (-0.14; 1.21)	0.10 (-0.44; 1.33)	0.71 (0.10; 1.47)	0.82 (-0.88; 1.27)	0.39 (-0.85; 1.59)	0.15 (-0.87; 1.58)	0.23 (-0.62; 1.67)	-0.09 (-0.63; 1.88)	0.37 (-1.15; 0.86)	0.47 (-0.46; 1.10)	-0.04 (-0.70; 0.76)

CTAAC: Cape Town Adolescent Antiretroviral Cohort; HCSOC: Healthy children at surgical outpatient clinics; DCHS: Drakenstein Child Health Study; BMI: Body mass index; WAZ: weight for age z-score; HAZ: height for age z-score; BMI-Z: Body mass index z-score.
*Median (interquartile range)

Table S2: Summary of respiratory impedance variables stratified by age

	Standard											Intrabreath					
years	**R_6**	**R_8**	**R_{10}**	**X_6**	**X_8**	**X_{10}**	**R_6-R_{20}**	**F_{res}**	**Ax**	**R**	**C**	**R_{eE}**	**R_{eI}**	**X_{eE}**	**X_{eI}**	**ΔR**	**ΔX**
3	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**	**n=51**	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**	**n=104**
	13.23 (11.81; 15.35)	12.50 (11.31; 14.29)	12.05 (10.83; 13.65)	-4.56 (-5.63; -3.57)	-3.79 (-4.69; -3.08)	-3.07 (-3.76; -2.41)	2.76 (1.95; 3.63)	25.21 (22.71; 27.84)	45.22 (34.66; 61.22)	11.39 (10.09; 12.95)	5.05 (4.21; 5.78)	11.69 (10.47; 13.63)	10.29 (9.26; 12.43)	-2.30 (-3.13; -1.48)	-3.10 (-3.75; -2.35)	1.22 (0.66; 2.43)	0.80 (-0.01; 1.37)
4	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**	**n=89**	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**	**n=131**
	11.71 (9.96; 13.23)	10.72 (9.48; 12.34)	10.27 (9.16; 12.00)	-3.45 (-4.67; -2.67)	-2.91 (-3.88; -2.02)	-2.28 (-3.29; -1.60)	2.47 (1.57; 3.48)	22.01 (18.25; 24.69)	28.90 (19.64; 48.27)	9.70 (8.73; 10.93)	6.03 (4.66; 7.61)	10.02 (8.77; 11.73)	9.23 (8.11; 10.62)	-1.51 (-2.57; -0.78)	-2.33 (-3.12; -1.68)	0.76 (-0.18; 1.62)	0.69 (0.01; 1.41)
5	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**	**n=83**	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**	**n=114**
	10.14 (8.60; 12.20)	9.58 (8.26; 10.98)	9.20 (7.93; 10.63)	-2.91 (-3.76; -2.38)	-2.48 (-3.37; -1.95)	-2.04 (-2.73; -1.44)	2.17 (1.51; 3.11)	21.02 (18.15; 25.08)	28.26 (16.37; 40.02)	8.40 (7.36; 9.85)	6.79 (5.67; 8.39)	8.66 (7.37; 10.26)	7.94 (6.86; 9.62)	-1.28 (-2.32; -0.73)	-1.95 (-2.60; -1.45)	0.42 (-0.22; 1.20)	0.52 (0.07; 0.97)
6	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**	**n=109**	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**	**n=128**
	9.05 (8.13; 10.47)	8.58 (7.57; 9.94)	8.30 (7.31; 9.59)	-2.74 (-3.52; -2.15)	-2.18 (-2.74; -1.50)	-1.68 (-2.16; -1.17)	1.86 (1.27; 2.72)	20.71 (17.93; 23.73)	20.08 (14.48; 29.75)	7.68 (6.76; 8.80)	7.44 (6.38; 9.34)	7.71 (6.69; 9.08)	7.54 (6.35; 8.90)	-1.17 (-1.60; -0.56)	-1.70 (-2.18; -1.15)	0.41 (-0.34; 1.03)	0.57 (0.10; 0.87)
7	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**	**n=88**	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**	**n=103**
	7.62 (6.52; 9.38)	7.33 (6.15; 8.56)	6.90 (6.14; 8.47)	-2.03 (-2.98; -1.69)	-1.61 (-2.31; -1.31)	-1.39 (-1.92; -0.90)	1.71 (1.10; 2.46)	19.28 (16.29; 22.93)	16.48 (9.94; 27.34)	6.43 (5.63; 7.67)	9.66 (7.60; 11.16)	6.57 (5.57; 7.97)	6.30 (5.44; 7.38)	-0.80 (-1.78; -0.36)	-1.39 (-1.91; -0.96)	0.29 (-0.19; 0.63)	0.54 (0.07; 0.89)
8	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=4**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**
	7.14 (6.46; 9.05)	6.30 (5.93; 8.56)	5.78 (5.65; 7.60)	-2.02 (-3.32; -1.95)	-2.44 (-3.50; -2.00)	-2.34 (-3.42; -1.60)	2.29 (1.01; 4.00)	21.07 (17.74; 25.69)	35.40 (17.57; 60.76)	5.76 (5.36; 6.18)	7.41 (5.53; 10.94)	6.10 (5.27; 7.22)	6.44 (4.43; 6.73)	-2.17 (-3.23; -1.20)	-1.57 (-2.51; -1.20)	0.55 (0.06; 1.67)	0.004 (-0.66; 0.45)
9	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**	**n=5**	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**	**n=7**
	7.02 (5.48; 10.79)	6.46 (4.87; 9.72)	5.89 (4.43; 9.21)	-2.36 (-4.19; -1.36)	-2.54 (-2.96; -1.44)	-1.93 (-3.42; -0.72)	2.40 (1.13; 3.34)	20.17 (17.48; 25.79)	32.12 (8.70; 54.33)	5.04 (3.98; 8.38)	6.99 (5.29; 13.70)	6.11 (3.89; 8.07)	5.12 (4.12; 8.14)	-1.35 (-2.64; -0.50)	-1.71 (-2.91; -0.42)	0.22 (-0.07; 1.00)	-0.08 (-0.28; 0.27)
10	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**	**n=8**	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**	**n=12**
	5.86 (4.67; 6.63)	5.74 (4.36; 6.58)	5.56 (4.51; 6.16)	-2.32 (-3.26; -1.32)	-1.55 (-2.59; -1.18)	-1.23 (-2.24; -0.85)	1.04 (0.65; 2.21)	19.97 (18.11; 23.99)	20.41 (10.63; 39.11)	5.31 (3.84; 5.80)	9.51 (7.14; 14.92)	5.12 (3.99; 6.90)	4.67 (3.72; 5.33)	-1.16 (-2.31; -0.35)	-1.17 (-1.84; -0.76)	0.75 (0.06; 1.38)	-0.13 (-0.37; 0.26)
11	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**	**n=21**	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**	**n=23**
	5.15 (4.34; 5.85)	4.62 (3.83; 5.64)	4.42 (3.79; 5.22)	-1.92 (-2.43; -1.46)	-1.61 (-2.04; -1.19)	-1.29 (-1.89; -0.87)	1.64 (0.88; 2.43)	18.57 (16.46; 20.98)	15.77 (10.44; 24.20)	3.89 (3.41; 4.51)	9.84 (7.22; 13.01)	3.98 (3.72; 4.58)	3.55 (3.16; 4.18)	-0.93 (-1.41; -0.51)	-0.89 (-1.58; -0.52)	0.40 (0.20; 0.77)	-0.09 (-0.34; 0.10)
12	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=10**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**

	4.50 (3.73; 6.61)	4.35 (3.75; 6.70)	4.18 (3.33; 5.66)	-1.96 (-2.16; -1.05)	-1.15 (-2.12; -0.81)	-0.91 (-1.70; -0.17)	1.09 (0.36; 2.30)	19.71 (16.04; 24.87)	18.22 (6.17; 19.35)	4.16 (2.44; 5.42)	13.42 (8.91; 17.85)	4.24 (3.14; 5.22)	3.42 (2.51; 3.83)	-0.55 (-0.91; -0.40)	-0.48 (-1.29; -0.36)	0.54 (0.36; 1.79)	-0.10 (-0.20; 0.02)
13	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=9**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**
	4.19 (3.51; 5.57)	3.91 (3.25; 4.53)	3.99 (3.24; 4.20)	-1.56 (-1.89; -1.32)	-1.22 (-1.95; -0.97)	-0.86 (-1.40; -0.60)	0.86 (0.38; 1.61)	17.59 (14.45; 19.18)	11.80 (5.98; 20.48)	3.33 (3.11; 3.85)	12.52 (10.51; 15.45)	3.58 (2.89; 3.96)	2.56 (2.33; 3.79)	-0.69 (-1.05; 0.03)	-0.74 (-1.29; -0.36)	0.58 (0.34; 1.08)	0.07 (-0.31; 0.43)
14	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**	**n=10**
	4.50 (3.51; 5.30)	4.30 (3.23; 5.04)	4.29 (3.30; 4.84)	-1.22 (-1.62; -0.90)	-0.94 (-1.01; -0.35)	-0.63 (-0.83; -0.56)	0.41 (0.01; 0.77)	15.74 (13.00; 20.58)	6.11 (1.40; 9.42)	4.08 (3.42; 4.82)	16.98 (15.29; 18.07)	3.43 (2.98; 4.00	3.27 (2.49; 3.66)	-0.28 (-0.73; 0.31)	-0.50 (-0.67; -0.20)	0.27 (0.11; 0.57)	0.23 (0.15; 0.43)
15	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=8**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**
	3.77 (3.16; 4.74)	4.00 (3.31; 4.66)	3.86 (3.35; 4.54)	-1.19 (-1.47; -0.92)	-0.94 (-1.13; -0.50)	-0.67 (-0.81; -0.43)	0.05 (-0.04; 0.53)	14.00 (11.95; 15.27)	4.77 (3.07; 6.80)	3.82 (3.43; 4.55)	17.27 (14.48; 18.07)	3.63 (3.06; 4.19)	2.78 (2.55; 3.53)	-0.17 (-0.46; 0.16)	-0.45 (-0.54; -0.14)	0.57 (0.34; 0.76)	0.08 (-0.001; 0.27)
16	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=8**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**	**n=9**
	3.39 (3.01; 4.11)	3.02 (2.93; 3.78)	3.18 (2.74; 3.79)	-1.23 (-1.40; -1.19)	-0.66 (-0.70; -0.59)	-0.37 (-0.66; -0.28)	0.23 (0.01; 0.58)	14.83 (13.26; 15.94)	4.18 (4.36; 4.33)	3.19 (2.67; 3.83)	19.24 (17.78; 19.75)	2.97 (2.46; 3.84)	2.50 (2.20; 3.32)	-0.02 (-0.25; -0.02)	-0.42 (-0.75; -0.13)	0.29 (0.15; 0.67)	0.30 (0.03; 0.46)
17	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**	**n=11**
	3.41 (2.88; 4.59)	3.29 (2.32; 4.34)	3.13 (2.39; 4.08)	-1.23 (-1.50; -1.11)	-0.79 (-1.07; -0.38)	-0.39 (-0.77; -0.15)	0.47 (0.06; 0.58)	14.56 (12.23; 16.45)	4.16 (2.23; 7.62)	3.31 (2.37; 4.18)	15.89 (13.85; 17.98)	2.70 (2.00; 3.33)	2.22 (2.01; 2.93)	-0.28 (-0.39; 0.12)	-0.44 (-0.64; -0.07)	0.23 (-0.04; 0.42)	0.17 (0.05; 0.32)
Total	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**	**n=514**	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**	**n=692**
	9.62 (7.19; 12.26)	9.15 (6.90; 11.33)	8.88 (6.65; 10.79)	-2.83 (-3.95; -1.97)	-2.34 (-3.31; -1.51)	-1.84 (-2.77; -1.18)	2.01 (1.15; 2.99)	20.67 (17.16; 24.57)	24.30 (14.26; 39.53)	8.11 (6.08; 10.11)	7.20 (5.48; 9.85)	8.22 (6.22; 10.60)	7.85 (5.97; 9.62)	-1.23 (-2.23; -0.55)	-1.87 (-2.68; -1.13)	0.53 (-0.04; 1.22)	0.50 (-0.05; 0.97)

R_6, R_8 and R_{10}: resistance at 6, 8 and 10 Hz; X_6, X_8 and X_{10}: reactance at 6, 8 and 10 Hz; F_{res}: resonance frequency; R_6-R_{20}: difference between resistance at 6 Hz and resistance at 20 Hz; Ax: area under the reactance curve; R: resistance from model fitting; C: compliance from model fitting; R_{eI}: resistance at end inspiration; R_{eE}: resistance at end expiration; ΔR: R_{eE}-R_{eI} ; X_{eI}: reactance at end inspiration, R_{eE}: reactance at end expiration; ΔX: X_{eE}-X_{eI}.

Median (IQR) values.

Units: R and X variables: $hPa.L.s^{-1}$; C: $L.hPa^{-1}$; F_{res}: Hz; Ax: $hPa.L^{-1}$.

Table S3 : Comparison between models adjusted for height only and height, sex and ethnicity

	Model with height only (n=692)			Model with height, sex, and ethnicity (n=692)				
	Height Coefficient (95% CI)	BIC value	Adj. R^2	Height Coefficient (95% CI)	Sex Coefficient (95% CI)	Ethnicity Coefficient (95% CI)	BIC value	Adj. R^2
R_6	**-0.019 (-0.020; -0.018)**	-156.50	0.723	**-0.019 (-0.020; -0.018)**	**-0.032 (-0.064; -0.000)**	0.008 (-0.024; 0.041)	-147.55	0.724
R_8	**-0.019 (-0.020; -0.018)**	-187.05	0.735	**-0.019 (-0.020; -0.018)**	-0.028 (-0.059; 0.003)	0.006 (-0.026; 0.038)	-177.12	0.735
R_{10}	**-0.019 (-0.020; -0.018)**	-227.68	0.747	**-0.019 (-0.020; -0.018)**	-0.023 (-0.054; 0.007)	0.019 (-0.012; 0.049)	-218.14	0.745
X_6	**-727 (-793; -661)**	2189.17	0.405	**-731 (-797; -665)**	0.089 (-0.085; 0.264)	0.166 (-0.009; 0.341)	2197.61	0.407
X_8	**-646 (-702; -590)**	1967.53	0.425	**-649 (-795; -593)**	**0.182 (0.034; 0.330)**	**0.163 (0.014; 0.311)**	1969.75	0.433
X_{10}	**-530 (-583; -478)**	1886.30	0.359	**-533 (-586; -480)**	0.118 (-0.022; 0.258)	**0.141 (0.001; 0.281)**	1892.48	0.364
F_{res}	**-0.006 (-0.007; -0.005)**	-131.29	0.230	**-0.006 (-0.007; -0.005)**	-0.010 (-0.047; 0.026)	-0.004 (-0.042; 0.033)	-119.20	0.227
R_6-R_{20}	**-0.031 (-0.036; -0.026)**	2258.30	0.177	**-0.031 (-0.037; -0.026)**	-0.092 (-0.275; 0.092)	-0.152 (-0.336; 0.033)	2267.66	0.179
Ax	**-0.029 (-0.031; -0.026)**	1322.14	0.416	**-0.029 (-0.031; -0.026)**	-0.052 (-0.146; 0.041)	-0.014 (-0.108; 0.080)	1333.89	0.416
R	**-0.019 (-0.020; -0.018)**	-220.75	0.739	**-0.019 (-0.019; -0.018)**	-0.025 (-0.055; 0.006)	0.023 (-0.008; 0.054)	-212.14	0.740
C	**0.017 (0.016; 0.018)**	284.34	0.523	**0.017 (0.016; 0.018)**	0.038 (-0.006; 0.082)	0.045 (0.000; 0.089)	290.30	0.526
X_{eE}	**-409 (-476; -343)**	2201.57	0.174	**-408 (-474; -341)**	**0.197 (0.021; 0.373)**	0.055 (-0.121; 0.232)	2209.31	0.178
X_{eI}	**-577 (-630; -524)**	1894.15	0.397	**-579 (-632; -526)**	**0.184 (0.044; 0.325)**	0.137 (-0.004; 0.277)	1896.54	0.404
ΔR	**-0.014 (-0.020; -0.009)**	2307.58	0.040	**-0.014 (-0.020; -0.009)**	0.058 (-0.132; 0.249)	-0.101 (-0.292; 0.091)	2319.28	0.039
ΔX	**-0.012 (-0.016; -0.008)**	1870.89	0.050	**-0.012 (-0.016; -0.008)**	0.012 (-0.127; 0.151)	-0.090 (-0.230; 0.050)	1882.34	0.049

R_6, R_8 and R_{10}: resistance at 6, 8 and 10 Hz; X_6, X_8 and X_{10}: reactance at 6, 8 and 10 Hz; F_{res}: resonance frequency; R_6-R_{20}: difference between resistance at 6 Hz and resistance at 20 Hz; Ax: area under the reactance curve; R: resistance from model fitting; C: compliance from model fitting; R_{eI}: resistance at end inspiration; R_{eE}: resistance at end expiration; ΔR: R_{eE}-R_{eI} ; X_{eI}: reactance at end inspiration, R_{eE}: reactance at end expiration; ΔX: X_{eE}-X_{eI}. BIC: Bayesian Information Criterion; Adj R^2: adjusted R^2. Statistically significant results are printed in bold.

Units: R and X variables: $hPa.L.s^{-1}$; C: $L.hPa^{-1}$; F_{res}: Hz; Ax: $hPa.L^{-1}$.

Table S4: Reference equations for children 3 to 7 years of age from the DCHS cohort

Outcome	Equation	Adj R^2	SEE
R_6 (hPa.s.L^{-1})	exp(4.23 - 0.0178·Ht)	0.466	0.203
R_8 (hPa.s.L^{-1})	exp(4.17 - 0.0178·Ht)	0.479	0.198
R_{10} (hPa.s.L^{-1})	exp(4.14 - 0.0179·Ht)	0.490	0.194
X_6 (hPa.s.L^{-1})	5.06-888·Ht^{-1}	0.333	1.211
X_8 (hPa.s.L^{-1})	4.81 -798·Ht^{-1}	0.366	1.011
X_{10} (hPa.s.L^{-1})	3.72 -630/Ht	0.291	0 .946
F_{res} (Hz)	exp(3.85 - 0.0074·Ht)	0.116	0.204
R_6-R_{20} (hPa.s.L^{-1})	5.69 - 0.0316·Ht	0.066	1.248
AX (hPa.L^{-1})	exp(7 - 0.0353·Ht)	0.309	0.561
R (hPa.s.L^{-1})	exp(4.12 - 0.0184·Ht)	0.510	0.192
C (L.hPa^{-1})	exp(-0.30 + 0.0207·Ht)	0.385	0.279
R_{eE} (hPa.s.L^{-1})	exp(4.30 - 0.0198·Ht)	0.486	0.216
R_{eI} (hPa.s.L^{-1})	exp(3.93 - 0.0170·Ht)	0.408	0.218
X_{eE} (hPa.s.L^{-1})	3.11 - 502·Ht^{-1}	0.139	1.199
X_{eI} (hPa.s.L^{-1})	3.96 - 651·Ht^{-1}	0.301	0.955
ΔR (hPa.s.L^{-1})	4.96 - 0.0403·Ht	0.095	1.316
ΔX (hPa.s.L^{-1})	1.97 - 0.0132·Ht	0.018	0.989

R_6, R_8 and R_{10}: resistance at 6, 8 and 10 Hz; X_6, X_8 and X_{10}: reactance at 6, 8 and 10 Hz; F_{res}: resonance frequency; R_6-R_{20}: difference between resistance at 6 Hz and resistance at 20 Hz; Ax: area under the reactance curve; R: resistance from model fitting; C: compliance from model fitting; R_{eI}: resistance at end inspiration; R_{eE}: resistance at end expiration; ΔR: R_{eE}-R_{eI} ; X_{eI}: reactance at end inspiration, R_{eE}: reactance at end expiration; ΔX: X_{eE}-X_{eI};. Adj R^2: adjusted R^2; SEE: standard error of the estimate.

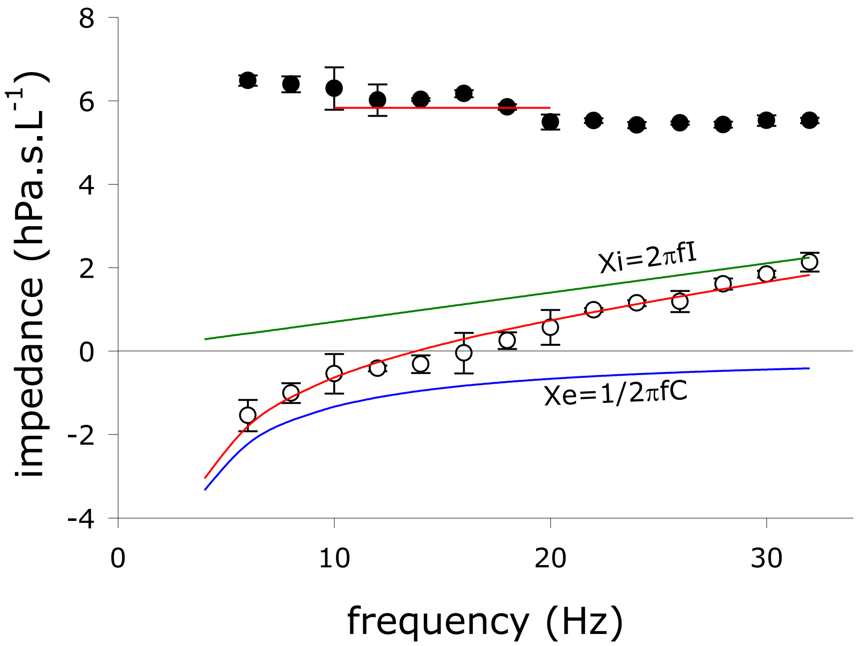

Figure S1: Illustration of the resistance (R) - inertance (I) – compliance (C) model fitting to measured impedance data. Mean values of resistance (●) and reactance (○) from repeated measurements, whiskers indicate standard deviation. Model fitting curves are plotted in red. R was obtained as the mean value in the 10-20-Hz frequency (f) range; I and C were obtained from fitting the reactance (X) data by the model $X = 2\pi fI - 1/(2\pi fC)$. Green and blue lines, respectively, illustrate the inertial (Xi) and elastic (Xe) components of the total X.

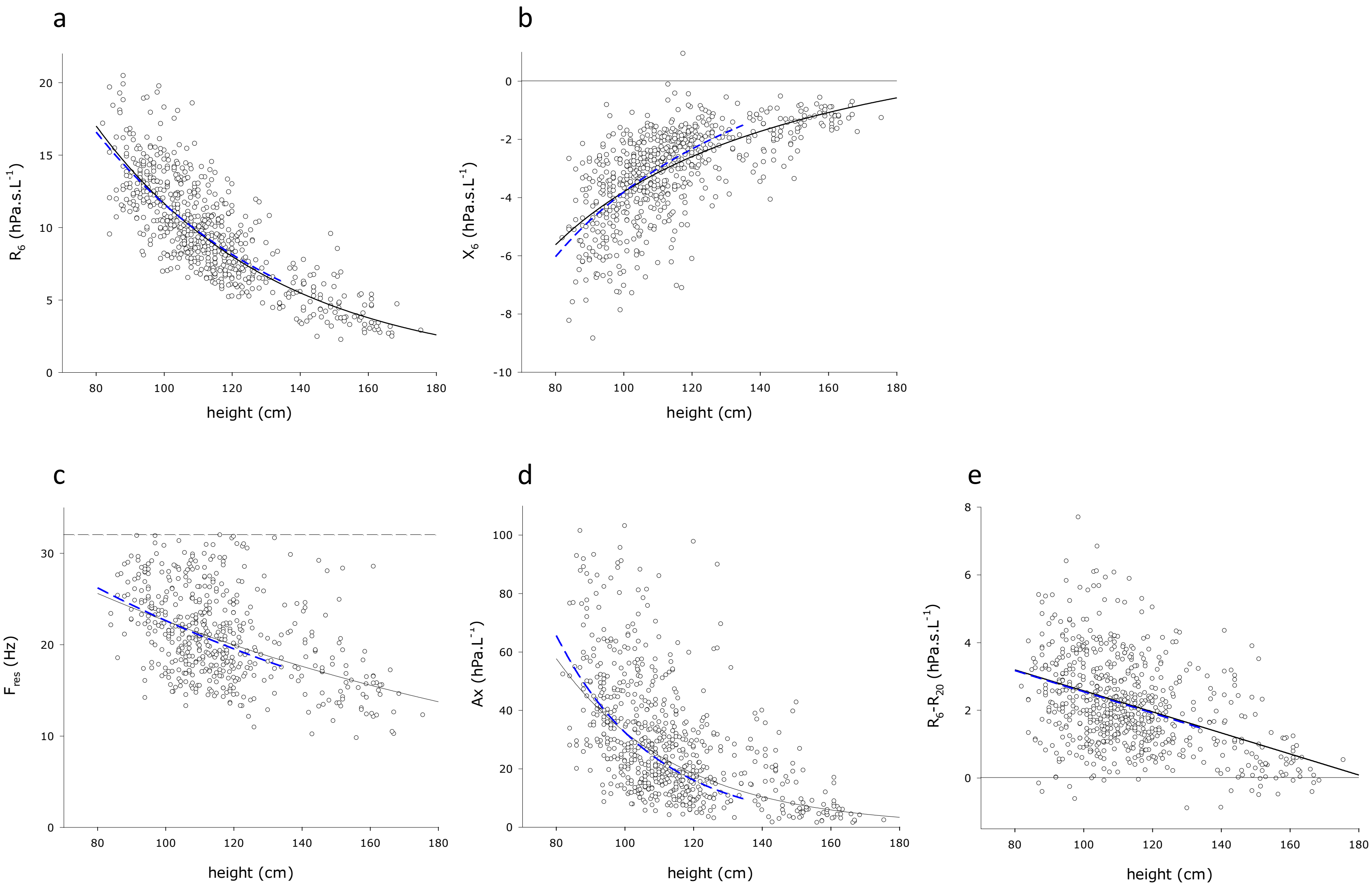

Figure S2: Conventional oscillometry measures *vs* height: a) resistance at 6 Hz (R_6) , b) reactance at 6 Hz (X), c) resonance frequency (F_{res}), d) area under the reactance curve (Ax) and e) frequency dependence of resistance (R_6-R_{20}). Solid and dashed lines, respectively, indicate prediction equations for the 3-17-yr and 3-7-yr ranges.

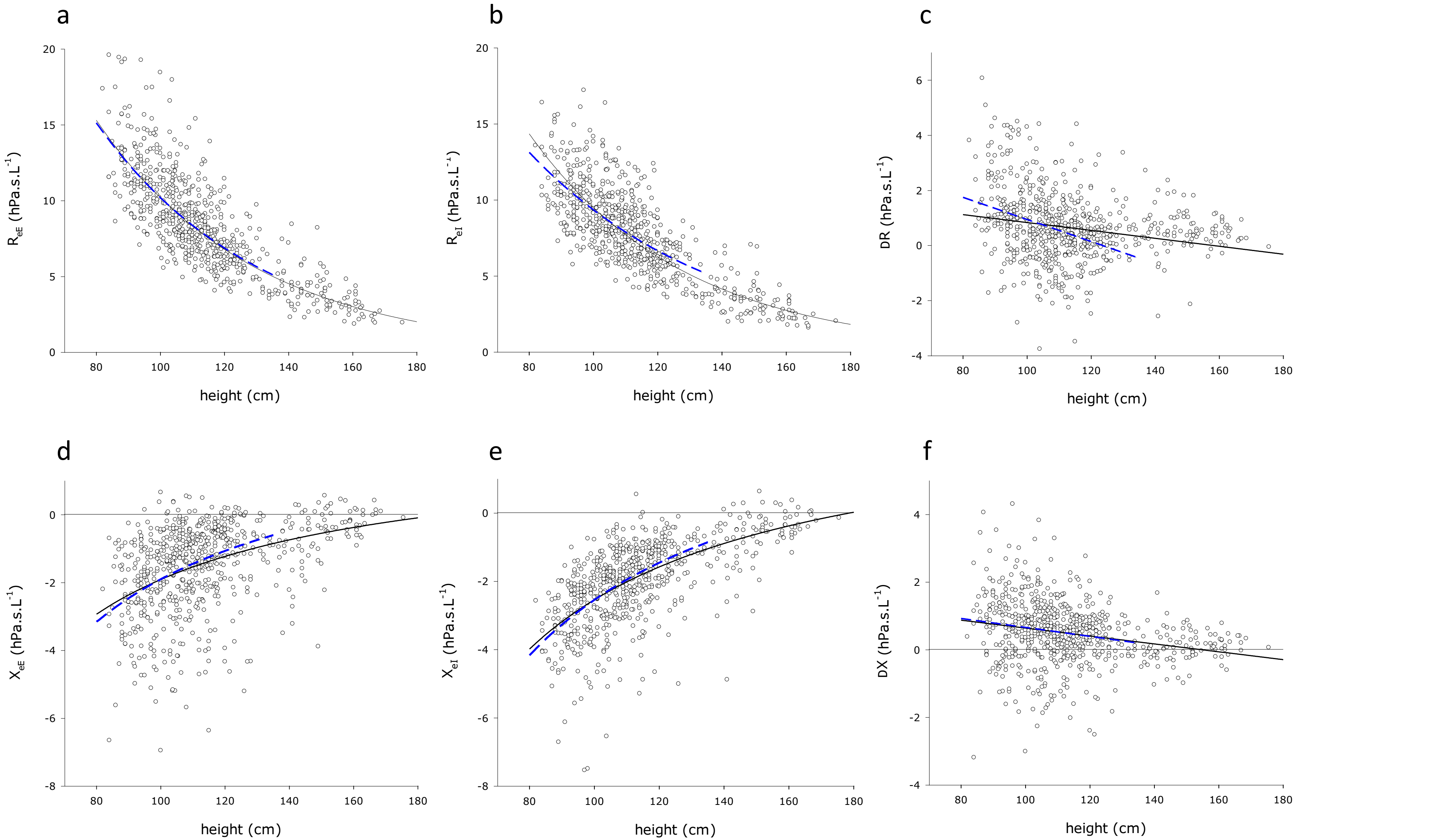

Figure S3: Intra-breath oscillometry measures ~~measures~~ vs height: a) resistance at end expiration (R_{eE}) , b) resistance at end inspiration (R_{eI}), c) tidal change in resistance $\Delta R=R_{eE}-R_{eI}$, d) reactance at end expiration (X_{eE}), e) reactance at end inspiration (X_{eI}) and f) tidal change in reactance ($\Delta X=X_{eE}-X_{eI}$). Solid and dashed lines, respectively, indicate prediction equations for the 3-17-yr and 3-7-yr ranges.

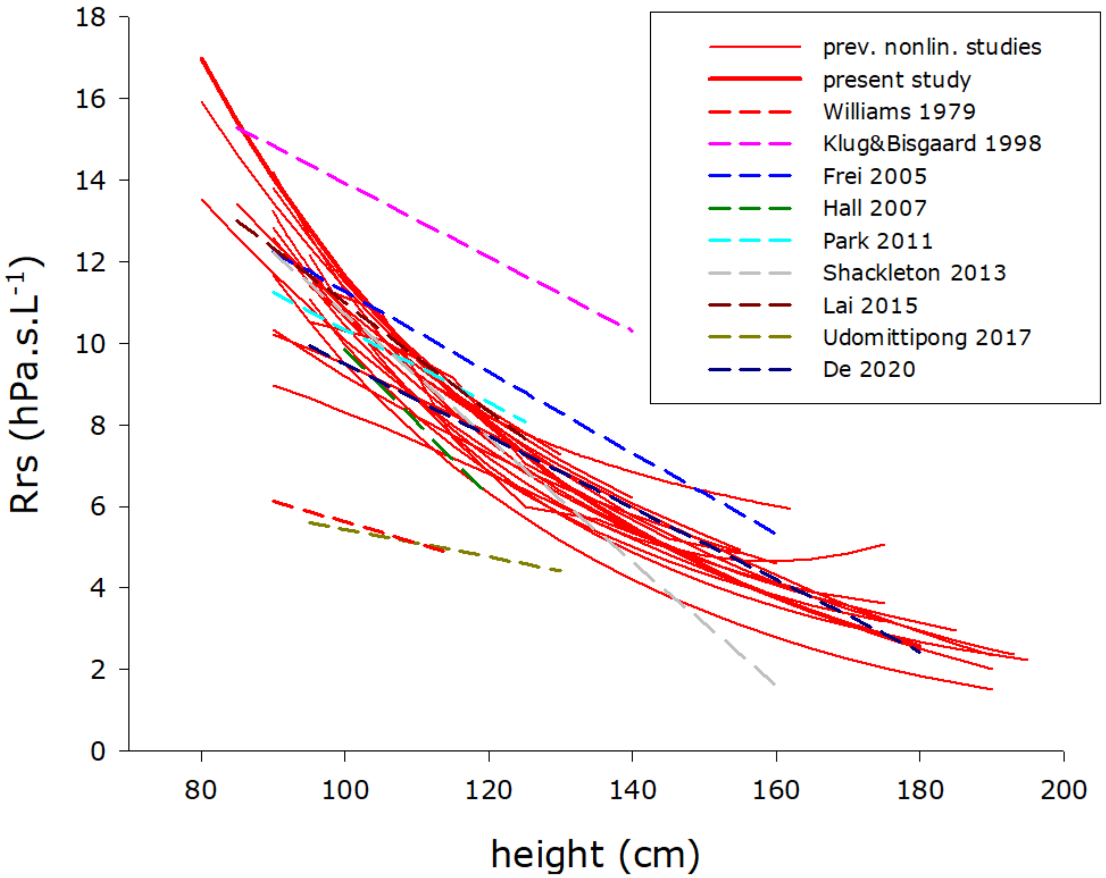

Figure S4: Comparison of respiratory resistance (Rrs) *vs* height (Ht) relationships with previous studies using linear regression between Rrs and Ht (see References). For the individual studies reporting nonlinear Rrs vs Ht relationships, see Figure 2 in the main document.

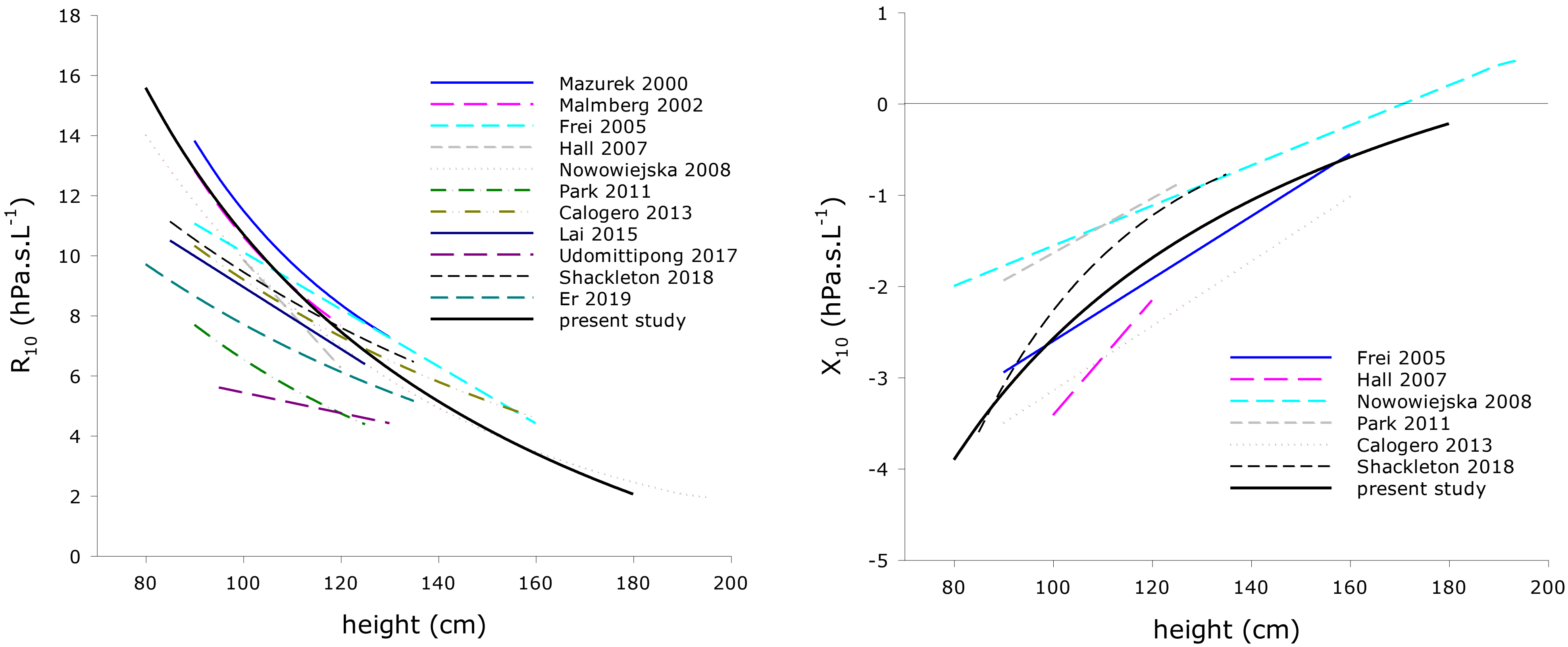

Figure S5: Comparison of at 10-Hz resistance (R_{10}, left) and reactance (X_{10}, right) *vs* height (Ht) relationships with previous studies (see References).

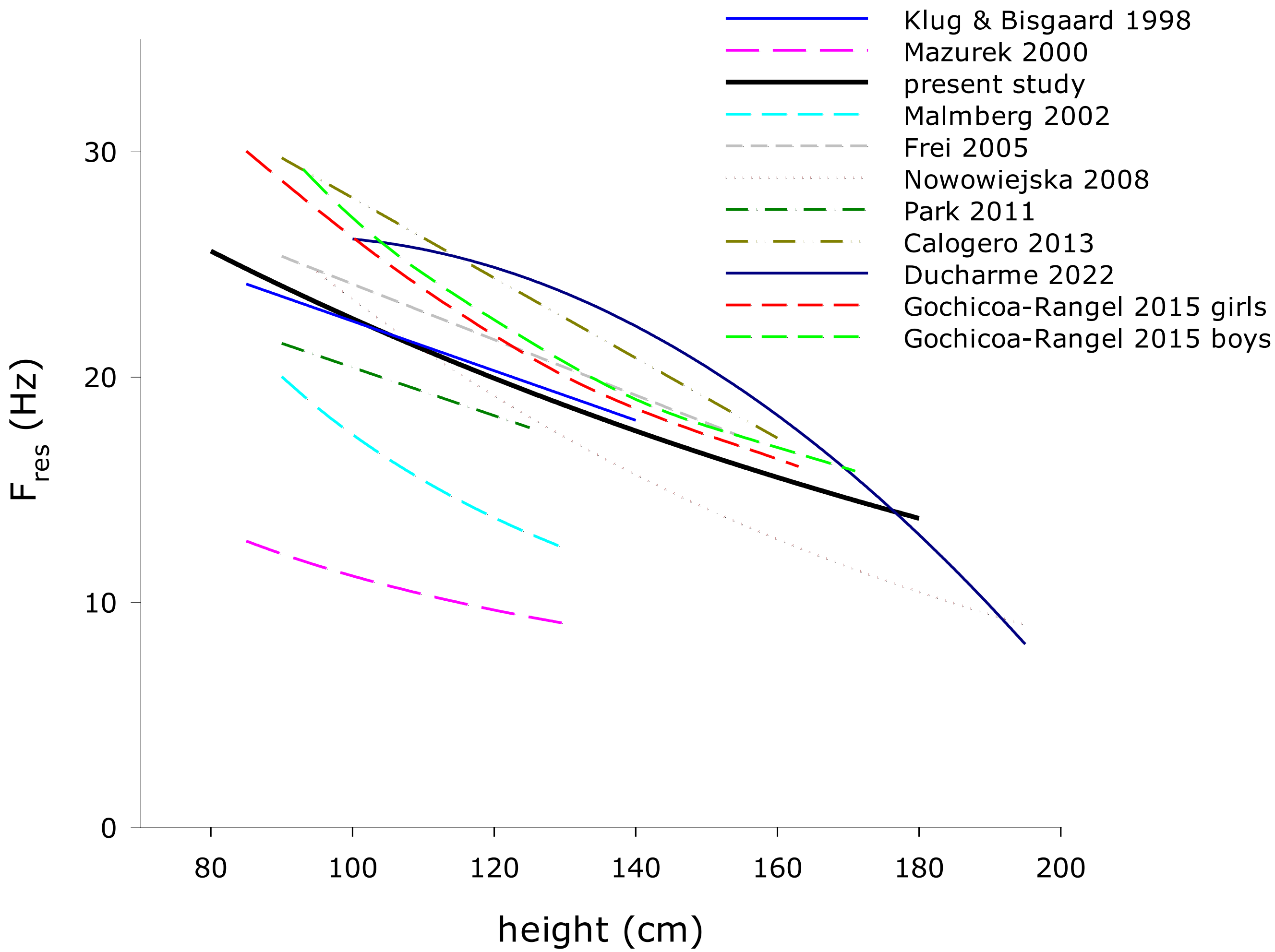

Figure S6: Comparison of resonance frequency (F_{res}) *vs* height (Ht) relationships with previous studies (see References).

Table S5 : Summary of reference studies on resistance (R) vs height (Ht) relationships

Author(s) [ref]	year	frequency (Hz)	device	country/race	no. of subjects	age range (yr)	reference equation	units (Zrs; Ht)
Mansell et al. [1]	1972	5	custom made	Canada	79	3-17	R5=exp(1.877-0.0089·Ht)	$cmH_2O.s.L^{-1}$; cm
Cogswell [2]	1973	5-7	custom made	UK	204	3-12	R5-7 *vs* Ht range data	$cmH_2O.s.L^{-1}$; cm
Stanescu et al. [3]	1979	4-9	custom made	Belgium	130	3-14	R4 *vs* Ht range data	$cmH_2O.s.L^{-1}$; cm
Solymar et al. [4]	1985	2-12	custom made	Sweden	218	2-18	R4=antilog(1.053-2.18·log(Ht))	$kPa.s.L^{-1}$; m
Hordvik et al. [5]	1985	2-26	custom made	USA/C	138	2-16	$R6=9.2·Ht^2-34.1·Ht+35.2$	$cmH_2O.s.L^{-1}$; cm
Hantos et al. [6]	1985	3-10	custom made	Hungary	121	4-16	$R(3-10)=1.28·10^5·Ht^{-2.05}$	$cmH_2O.s.L^{-1}$; cm
Duiverman et al. [7]	1985	2-26	custom made	The Netherlands/C	255	2.3-12.5	$R6=0.0017·Ht^2-0.541·Ht+47.73$	$cmH_2O.s.L^{-1}$; cm
Ducharme et al. [8]	1998	8-16	Custo Vit R	Canada/mixed	199	3-17	R8=exp(10.99-2.37·ln(Ht))	$kPa.s.L^{-1}$; cm
Mazurek et al. [9]	2000	4-32	custom made	Poland	127	2.5-7.5	R6=exp(2.4422-1.7447·ln(Ht))	$hPa.s.L^{-1}$; m
Malmberg et al.[10]	2002	5-35	Jaeger IOS	Finland	109	2-7	R5=exp(2.115-1.786·ln(Ht))	$kPa.s.L^{-1}$; cm
Dencker et al. [11]	2006	5-35	Jaeger IOS	Finland-Sweden/C	360	2-11	R5 *vs* Ht curve	$kPa.s.L^{-1}$; cm
Nowowiejska et al. [12]	2008	5-35	Jaeger IOS	Poland	626	3-18	R5=exp(-0.0169·Ht+1.818)	$kPa.s.L^{-1}$; cm
Calogero et al. [13]	2013	4-48	Chess i2M	Australia-Italy/C	760	2-13	R6=exp(3.3738-0.01155·Ht)	$hPa.s.L^{-1}$; cm
Shackleton et al. [][14]	2018	6-26	custom made**	Australia/Hungary	319	3-6	R6= exp(3.3501-0.01033·Ht)	$hPa.s.L^{-1}$; cm
AlBlooshi et al. [15]	2018	5-37	tremoflo C-100	UAE/Emirati	291	4-12	R5=exp(3.786-0.014·Ht)	$cmH_2O.s.L^{-1}$; cm
Er et al. [16]	2019	5-35	Jaeger IOS	Turkey/Turkish	151	3-7	R5=antilog(0.527-0.005·Ht)	$kPa.s.L^{-1}$; cm
Ducharme et al. [17]-1	2022	5-37	Resmon Pro	Canadian/mixed	271	3-17	$R5=exp(-0.1509+0.00809·Ht-0.0000824·Ht^2)$	$kPa.s.L^{-1}$; cm
Ducharme et al. [17]-2	2022	5-37	tremoflo C-100	Canadian/mixed	292	3-17	$R5=exp(-0.0252+0.00809·Ht-0.0000817·Ht^2)$	$kPa.s.L^{-1}$; cm
Frei et al. [18]	2005	5-35	Jaeger IOS	Canada	222	3-10	R5=2.117-0.0099·Ht	$kPa.s.L^{-1}$; cm
Hall et al. [19]	2007	4-48	Chess i2M	Australia	149	2-7	R6=27.86-0.18·Ht	$hPa.s.L^{-1}$; cm
Park et al. [20]	2011	5-35	Jaeger IOS	Korea/Korean	133	3-6	R5=1.934-0.009·Ht	$kPa.s.L^{-1}$; cm
Shackleton et al. [21]	2013	4-48	Chess i2M	Mexico/Mexican	584	3-5	R6=25.918-0.152·Ht	$hPa.s.L^{-1}$; cm
Lai et al. [22]	2015	5-35	Jaeger IOS	Taiwan/Taiwanese	150	2-6	R5=2.4395-0.0134·Ht	$kPa.s.L^{-1}$; m
Udomittipong et al. [23]	2017	4-48	Quark i2M	Thailand/Thai	233	3-7	R6=8.834-0.034·Ht	$hPa.s.L^{-1}$; cm
De et al. [24]	2020	5-19	Resmon Pro	India/Indian	159	5-17	R5=18.683-0.09·Ht (boys)	$cmH_2O.s.L^{-1}$; cm

Nonlinear and linear predictions; C: Caucasian

Online reference tool: See attached excel document

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