sensors

MDPI

Table S1. Inter-rater agreement regarding the quality classification and the presence of adventitious sounds by location, age group and diagnostic group.

			Agreement %	Cohens' k	95% CI	p
Quality	Location	Trachea (n=272)	97	0.88	0.81 – 0.95	<0.001
		Right Anterior Chest (n=262)	93	0.84	0.77 – 0.91	<0.001
		Right Posterior Base (n=267)	91	0.81	0.74 – 0.88	<0.001
		Left Posterior Base (n=259)	90	0.77	0.69 – 0.85	<0.001
	Age group	Children (n=710)	93	0.80	0.75 – 0.85	<0.001
		Adults (n=350)	93	0.86	0.80 – 0.92	<0.001
	Diagnostic group	Cystic Fibrosis (n=354)	92	0.80	0.73 – 0.87	<0.001
		Other Respiratory Diseases (n=309)	81	0.93	0.88 – 0.98	<0.001
		Asthma (n=272)	88	0.73	0.64 – 0.82	<0.001
		No Respiratory Diseases (n=125)	94	0.85	0.74 – 0.96	<0.001
		Total (n=1060)	93	0.82	0.78 – 0.86	<0.001
Presence of adventitious sounds	Location	Trachea (n=223)	93	0.72	0.59 – 0.85	<0.001
		Right Anterior Chest (n=189)	87	0.54	0.38 – 0.70	<0.001
		Right Posterior Base (n=173)	91	0.67	0.52 – 0.82	<0.001
		Left Posterior Base (n=184)	93	0.72	0.57 – 0.87	<0.001
	Age group	Children (n=531)	90	0.61	0.52 – 0.70	<0.001
		Adults (n=238)	93	0.75	0.64 – 0.86	<0.001
	Diagnostic group	Cystic Fibrosis (n=273)	90	0.41	0.22 – 0.60	<0.001
		Other Respiratory Diseases (n=231)	90	0.87	0.80 – 0.94	<0.001
		Asthma (n=183)	87	0.38	0.18 – 0.58	<0.001
		No Respiratory Diseases (n=92)	92	0.63	0.38 – 0.88	<0.001
		Total (n=769)	91	0.66	0.59 – 0.73	<0.001

Table S2. Proportions of participants with recordings with quality, recordings with adventitious sounds, and stethoscope identified adventitious sounds by location, age group and diagnostic group.

			With quality or adventitous sounds	No quality or no adventitious sounds	Proportion (%)
Recordings with quality	Age group	Children (n=92)	84	8	95
		Adults (n=42)	39	3	93
	Diagnostic group	Cystic Fibrosis (n=42)	39	3	93
		Other Respiratory Diseases (n=39)	37	2	95
		Asthma (n=37)	32	5	87
		No Respiratory Diseases (n=16)	15	1	94
		Total (n=134)	123	11	92
Recordings with adventitious sounds	Age group	Children (n=84)	29	55	35
		Adults (n=39)	14	25	36
	Diagnostic group	Cystic Fibrosis (n=39)	10	29	26
		Other Respiratory Diseases (n=37)	20	17	54
		Asthma (n=32)	9	23	28
		No Respiratory Diseases (n=15)	4	11	27
		Total (n=123)	43	80	35
Stethoscope identified adventions sounds	Age group	Children (n=84)	12	72	14
		Adults (n=39)	20	19	51
	Diagnostic group	Cystic Fibrosis (n=39)	14	25	36
		Other Respiratory Diseases (n=37)	18	19	49
		Asthma (n=32)	0	32	0
		No Respiratory Diseases (n=15)	0	15	0
		Total (n=123)	32	91	26

Table S3. Comparison of the proportions of participants with recordings with quality, recordings with adventitious sounds, and stethoscope identified adventitious sounds between age group or diagnostic group.

		Comparison		Chi-Square
Recordings with quality	Age group	Children	Adults	0.761
	Diagnostic group	Diagnostic group overall comparison		0.569
Recordings with adventitious sounds	Age group	Children	Adults	0.882
	Diagnostic group	Diagnostic group overall comparison		0.036*
		Cystic Fibrosis	Other Respiratory Diseases	0.011
		Cystic Fibrosis	Asthma	0.814
		Cystic Fibrosis	No Respiratory Diseases	0.939
		Other Respiratory Diseases	Asthma	0.030
		Other Respiratory Diseases	No Respiratory Diseases	0.073
		Asthma	No Respiratory Diseases	0.917
Stethoscope identified adventions sounds	Age group	Children	Adults	<0.001*
	Diagnostic group	Diagnostic group overall comparison		<0.001*
		Cystic Fibrosis	Other Respiratory Diseases	0.260
		Cystic Fibrosis	Asthma	<0.001*
		Cystic Fibrosis	No Respiratory Diseases	0.007*
		Other Respiratory Diseases	Asthma	<0.001*
		Other Respiratory Diseases	No Respiratory Diseases	<0.001*
		Asthma	No Respiratory Diseases	†

* A statistically significant difference was found.

† Chi-Square could not be calculated because the stethoscope's findings were constant in both groups (no adventitious sounds were found).

Table S4. Comparison of the proportions of recordings with quality with adventitious sounds between auscultation location, age group or diagnostic group.

		Comparison		Chi-Square
Quality	Location	Auscultation location overall comparison		<0.001*
		Trachea	Right Anterior Chest	0.007*
		Trachea	Right Posterior Base	<0.001*
		Trachea	Left Posterior Base	0.003*
		Right Anterior Chest	Right Posterior Base	0.069
		Right Anterior Chest	Left Posterior Base	0.782
		Right Posterior Base	Left Posterior Base	0.125
	Age group	Children	Adults	0.020*
	Diagnostic group	Diagnostic group overall comparison		0.052
Presence of adventitious sounds	Location	Auscultation location overall comparison		0.420
	Age group	Children	Adults	0.211
	Diagnostic group	Diagnostic group overall comparison		<0.001*
		Cystic Fibrosis	Other Respiratory Diseases	<0.001*
		Cystic Fibrosis	Asthma	0.208
		Cystic Fibrosis	No Respiratory Diseases	0.312
		Other Respiratory Diseases	Asthma	<0.001*
		Other Respiratory Diseases	No Respiratory Diseases	<0.001*
		Asthma	No Respiratory Diseases	0.989

Table S5. Comparison between the findings of conventional auscultation and smartphone auscultation regarding the participants and the recordings.

			Agreement %	Cohens' k	95% CI	p
Participants	Age group	Children (n=84)	70	0.24	0.04 – 0.44	0.011
		Adults (n=39)	54	0.084	-0.21 – 0.38	0.584
	Diagnostic group	Cystic Fibrosis (n=39)	59	0.049	-0.26 – 0.36	0.754
		Other Respiratory Diseases (n=37)	62	0.25	-0.06 – 0.56	0.134
		Asthma (n=32)	72	0†		
		No Respiratory Diseases (n=15)	73	0†		
		Total (n=123)	65	0.18	0 – 0.36	0.038
Recordings	Location	Trachea (n=223)	85	0.052	-0.08 – 0.19	<0.001
		Right Anterior Chest (n=189)	86	0.46	0.29 – 0.63	<0.001
		Right Posterior Base (n=173)	82	0.36	0.18 – 0.54	<0.001
		Left Posterior Base (n=184)	88	0.46	0.28 – 0.64	<0.001
	Age group	Children (n=531)	87	0.35	0.23 – 0.47	<0.001
		Adults (n=238)	81	0.34	0.19 – 0.49	<0.001
	Diagnostic group	Cystic Fibrosis (n=273)	83	0.094	-0.06 – 0.24	0.091
		Other Respiratory Diseases (n=231)	81	0.53	0.40 – 0.66	<0.001
		Asthma (n=183)	90	0†		
		No Respiratory Diseases (n=92)	90	0†		
		Total (n=769)	85	0.35	0.26 – 0.44	<0.001