

Online supplement

Table A1. Regression coefficients of adjusted model with physiological SAD score and individual SADT-items

Q	Coeff	P	Q	Coeff	P	Q	Coeff	P	Q	Coeff	P
1	0.032	0.283	17	0.138	0.000	33	-0.011	0.727	50	0.062	0.094
2	0.078	0.178	18	0.122	0.001	34	-0.041	0.208	51	-0.088	0.029
3	-0.024	0.408	19	0.050	0.090	35	-0.043	0.128	52	-0.013	0.784
4	-0.078	0.006	20	0.097	0.000	36	-0.044	0.124	53	-0.092	0.002
5	-0.064	0.046	21	0.082	0.003	37	0.059	0.063	54	-0.071	0.015
6	0.077	0.008	22	0.076	0.007	38	-0.060	0.039	55	-0.073	0.009
7	-0.136	0.000	23	0.108	0.000	39	0.008	0.817	56	-0.091	0.001
8	0.155	0.000	24	0.024	0.391	40	-0.066	0.024	57	-0.029	0.289
9	0.002	0.948	25	0.009	0.748	42	-0.096	0.001	58	0.090	0.001
10	0.004	0.873	26	0.069	0.020	43	0.055	0.094	59	0.091	0.001
11	0.023	0.403	27	0.059	0.075	44	-0.047	0.103	60	0.067	0.015
12	0.024	0.390	28	0.033	0.234	45	0.058	0.037	61	0.043	0.124
13	-0.010	0.790	29	0.012	0.681	46	0.161	0.000	62	0.021	0.640
14	-0.038	0.201	30	0.038	0.175	47	0.069	0.023	63	-0.005	0.871
15	0.076	0.006	31	0.013	0.679	48	-0.064	0.036	50	0.062	0.094
16	0.115	0.000	32	-0.028	0.382	49	-0.029	0.406			

Adjusted for age, age at asthma diagnosis, sex, and height; Q: SADT-item number; Coeff: Linear regression coefficient; P: P-value of regression coefficient; Red font: negative association and p-value <0.05.

Table A2. Area under the receiver operating curve (AUC) and positive likelihood ratio (LR+) of prediction models with different number of SADT-items, based selection frequency, with SAD group as outcome.

Min. freq	Number of selected questions	AUC		LR+		Selected questions
		Value	Gain	Value	Gain	
60	0	0.685		2.4		
	1	0.703	0.017	2.3	0.0	8
50	3	0.708	0.023	2.6	0.3	8, 16, 46
40	7	0.712	0.026	2.3	-0.1	8, 16, 46, 21, 43, 52, 34
30	11	0.713	0.028	2.3	-0.1	8, 16, 46, 21, 43, 52, 34, 9, 3, 22, 28
20	14	0.715	0.030	2.1	-0.2	8, 16, 46, 21, 43, 52, 34, 9, 3, 22, 28, 27, 17, 26
10	31	0.698	0.013	2.0	-0.4	8, 16, 46, 21, 43, 52, 34, 9, 3, 22, 28, 27, 17, 26, 29, 24, 39, 62, 1,
5	45	0.684	-0.002	1.5	-0.8	35, 10, 23, 11, 14, 18, 49, 60, 31, 33, 15, 36,
						All except 20, 58, 6, 57, 47

Gain = Difference with model without questions

Table A3. Overview of achievable area under the receiver operating curve (AUC) and positive likelihood ratio (LR+) for the three prediction models (Bronze, Silver, Gold, and the independent parameters within each model) for 3 combinations of selected SADT-items (Item 8, Item 8 and 17, Item 8 and 16).

	#	Ag	Ad	B	Q	F	R	X	Item 8		Interactions		Item 8 and 17		Interactions		Item 8 and 16		Interactions	
									AUC	LR+	AUC	LR+	AUC	LR+	AUC	LR+	AUC	LR+	AUC	LR+
Bronze	1								0.616	1.8	0.616	1.8	0.616	1.8	0.616	1.8	0.616	1.8	0.616	1.8
	2								0.693	2.0	0.696	1.9	0.693	2.0	0.696	1.9	0.693	2.0	0.696	1.9
	3								0.668	2.1	0.669	2.1	0.668	2.1	0.669	2.1	0.668	2.1	0.669	2.1
	4								0.718	2.3	0.730	2.4	0.718	2.3	0.730	2.4	0.718	2.3	0.730	2.4
	5								0.660	1.8	0.664	1.9	0.666	2.0	0.668	2.0	0.671	2.2	0.669	1.8
	6								0.709	2.1	0.713	2.1	0.711	2.2	0.722	2.2	0.715	2.2	0.719	2.0
	7								0.693	2.3	0.696	2.2	0.699	2.4	0.710	2.2	0.695	2.3	0.701	2.2
	8								0.729	2.3	0.744	2.3	0.731	2.4	0.749	2.6	0.732	2.4	0.744	2.4
Silver	9								0.833	4.1	0.839	4.1	0.833	4.1	0.840	4.2	0.833	4.4	0.840	4.5
	10								0.830	4.0	0.836	4.3	0.830	4.0	0.836	4.3	0.830	4.0	0.836	4.3
	11								0.862	5.2	0.872	5.0	0.861	5.3	0.870	5.1	0.862	4.9	0.869	4.9
	12								0.862	5.3	0.872	5.0	0.862	5.3	0.872	5.0	0.862	5.3	0.872	5.0
Gold	13								0.912	6.4	0.920	7.3	0.912	6.4	0.921	7.6	0.911	6.4	0.921	7.3
	14								0.913	6.5	0.921	7.0	0.913	6.5	0.921	7.0	0.913	6.5	0.921	7.0
	15								0.920	7.7	0.934	8.1	0.920	7.9	0.936	7.5	0.920	7.4	0.935	8.1
	16								0.921	8.0	0.935	8.5	0.921	8.0	0.935	8.5	0.921	8.0	0.935	8.5
	17								0.948	10.3	0.950	9.5	0.948	9.8	0.954	13.5	0.947	10.2	0.951	9.7
	18								0.948	10.0	0.951	9.5	0.948	10.0	0.951	9.5	0.948	10.0	0.951	9.5
	19								0.950	9.7	0.957	12.8	0.951	9.9	0.960	14.0	0.949	9.1	0.957	12.1
	20								0.950	9.7	0.957	13.6	0.950	9.7	0.957	13.6	0.950	9.7	0.957	13.6

AUC, Area under the receiver operating curve; LR+, Positive likelihood ratio; Ag, Age; Ad, Age at asthma diagnosis; B, BMI; Q, SADT-item(s), Item 8, Item 8 and 17, Item 8 and 16, respectively; F, FEV_{1pp}; R, R5-R20; X, AX. Shaded: the parameter is included in the model. BMI, age and age at asthma diagnosis represented by splines at quintiles. Plain, Model without interactions. The classification statistics (AUC, LR+) are based on a probability cut-off of 0.5 and are corrected for optimism through 500 bootstrap samples.

Table A4 Comparison of results with recoded dichotomous answer options (yes, no/unknown) and original categorical answer options (yes, no, unknown).

Model	Data availability	N/Y			N/Y/UKN	
		N	AUC	LR+	AUC	LR+
Bronze	Age, Age at asthma diagnosis, BMI, Question 8	763	0.744 (0.710-0.777)	2.32 (2.11-2.52)	0.740 (0.706-0.773)	2.41 (2.20-2.61)
Silver	+ FEV ₁ % predicted	757	0.872 (0.847-0.896)	5.00 (4.77-5.23)	0.870 (0.845-0.894)	4.77 (4.55-5.00)
Gold	+ R5-R20 + AX	506	0.957 (0.946-0.968)	12.76 (12.35-13.18)	0.958 (0.948-0.969)	10.72 (10.34-11.10)

AUC: Area under the ROC curve; LR+: Positive Likelihood Ratio; Complete case analysis. N/Y: Recoded question; N/Y/UKN: original, 3-categories SADT-item 8. The statistics (AUC, LR+) are corrected for optimism through 500 bootstrap samples.

Table A5 Selection frequencies in 100 bootstrap models with individual dichotomised SAD parameters as outcome.

Q	RV/TLC	AX	R5-R20	S _{sdic} *VT	FEF ₅₀	FEF ₂₅₋₇₅	SADT-Item
8	59	94	97	17	25	60	I sometimes wheeze when I am sitting or lying quietly
26	72	7	23	21	88	85	My tonsils or adenoids have been removed
46	42	20	29	30	80	20	I almost always feel slightly asthmatic and I take a rescue puff regularly
47	25	41	39	68	11	8	In stressful situations, I become especially short of breath
52	9	77	61	19	14	7	My shortness of breath symptoms and eczema alternate
21	50	15	19	10	63	19	When I become short of breath when exercising, it is very often due to the environment (grass, trees, pollen)
59	12	5	6	5	60	82	I become short of breath when I suddenly enter a cold environment
33	40	11	6	10	75	25	Sometimes, when I'm short of breath, it can be a relief to burp
16	6	24	10	57	38	24	As a child, I always participated in all games and sports
27	70	15	40	6	9	17	When I am short of breath, I often also suffer from a sore throat
11	54	28	13	24	21	17	I usually get a cold first, and afterwards I start coughing
50	18	7	42	25	27	37	I often get car sick or travel sick
36	54	61	11	7	10	10	When I am short of breath, I sometimes feel bloated
24	50	8	27	20	23	13	I have suffered from bronchitis
17	44	15	27	20	24	6	I am able to walk a long distance without having to rest
62	8	11	14	66	11	26	I get eczema because of weather changes
39	25	15	8	49	24	4	When I am short of breath, I feel it in my chest
43	19	58	24	10	8	5	There are often periods of time when I don't feel asthmatic and don't need rescue puffs
3	4	33	35	10	19	18	I cannot stand woolen blankets or clothes
37	16	10	7	7	7	70	When I am short of breath, I often have a sensation of tightness or pressure
28	9	30	13	10	13	38	When I am short of breath, it often comes with symptoms of my throat, nose, ears or eyes
12	27	9	46	6	8	11	When I am short of breath, I almost always have symptoms comparable to a cold
35	50	15	5	23	6	5	When I am short of breath, I feel a stab or a sting in my back or my ribs
45	17	9	19	16	21	21	I can suddenly become short of breath without having any other symptoms
44	9	45	19	15	9	5	I can see it coming when I become short of breath
32	8	5	6	15	41	27	Sometimes I get asthma symptoms or short of breath because of heartburn
57	61	7	11	8	7	8	I tire more rapidly due to weather changes
60	15	22	6	11	31	15	My breathing becomes easier in cold air
58	20	22	8	15	26	8	I become short of breath more rapidly due to weather changes
34	14	14	10	15	13	30	Sometimes I have stomach problems which can make me short of breath
49	13	19	13	22	18	11	I always sleep with an open window, otherwise I become short of breath
6	10	16	25	13	24	8	I'm not able to breathe in deeply when I am short of breath
15	24	7	13	10	11	30	I usually have runny or painful eyes when I have hay fever
23	11	16	8	12	24	20	Actually, I cannot perform strenuous exercise or sport, because I will become short of breath
13	37	10	2	8	17	17	My ears are often painful
20	12	13	27	21	3	11	When I'm physically active (like walking up the stairs), I sometimes wheeze
9	9	38	12	9	8	9	I only wheeze when I am very short of breath
30	4	18	11	33	7	11	I often have a shallow, tickly cough before I get bothered by coughing more deeply
18	9	6	16	13	21	15	When I'm not ill, I can easily do physical activities such as walking up the stairs
22	20	3	12	8	26	9	Physical activities always make my asthma worse
2	12	14	4	4	20	16	I have an immediate allergic reaction to birds
63	12	7	15	20	7	9	When I become short of breath when exercising, it is very often due to the weather
61	6	5	11	29	11	8	My asthma worsens in autumn
1	11	9	8	8	24	5	I have an immediate allergic reaction to cats
10	7	8	5	12	15	11	My shortness of breath symptoms come on after the flu or a cold
14	10	8	7	2	5	23	I often have runny or painful eyes without having hay fever
31	2	6	10	11	15	9	In stressful situations I have physical symptoms, for instance of the nose, throat or voice
25	12	6	8	10	6	8	I frequently have a hoarse or husky voice
29	13	8	8	8	7	3	I often cough unexpectedly
19	4	8	9	10	6	8	Sometimes I go running or jogging

Q: SADT-item