BTS Guideline for diagnosing and monitoring paediatric sleep disordered breathing

Online Appendix 1 Question 1 Evidence Review and Protocol

Q1 What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Contents

Question Evidence Review

Q1 What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Background

Healthcare professionals rely on a range of techniques to decide whether a child has sleep disordered breathing (SDB) including history taking, the use of sleep questionnaires, examination, a review of video/audio recordings and the use of formal sleep studies. Polysomnography (PSG) is regarded as the gold standard for diagnosing sleep disordered breathing (SDB) and measures a wide range of modalities including oximetry, airflow, electrocardiogram (ECG), CO_2, electroencephalogram (EEG), electrooculogram (EOG) and electromyogram (EMG), but this is an expensive resource and requires a high level of expertise to interpret the findings. The ability to accurately diagnose SDB using sleep questionnaires, sleep video or sleep audio recordings would be of great benefit, so this review will investigate the diagnostic accuracy of sleep questionnaires, sleep video recording and sleep audio recording to diagnose SDB in children.

Outcomes

Diagnostic accuracy of sleep questionnaires, sleep video recording and sleep audio recording to diagnose SDB in children

Evidence Review

The initial search yielded 260 potentially relevant abstracts, of which 29 studies were relevant to the review.[1-29] Exclusions included non-diagnostic accuracy studies, studies including adults in their population and studies which did not publish all necessary data to include in a meta-analysis. As all included studies only focused on obstructive sleep apnoea (OSA), this is the focus of the review.

Sleep questionnaires (all)

Nineteen questionnaires, with a range of different scoring cut-offs, were evaluated from 21 studies.[1-6,9-12,14-22,25,29] Meta-analysis of all questionnaire types and cut-offs (60 datasets) gave a sensitivity and specificity of 0.66 [0.59, 0.71] and 0.56 [0.51, 0.62] respectively [95% confidence intervals] (Figure 1a).

Sleep questionnaires (AHI ≥1)

Sub-analysis of the diagnostic accuracy of sleep questionnaires for diagnosing an apnoea-hypopnoea index (AHI) ≥1 in children with suspected SDB gave a pooled estimate sensitivity of 0.64 [0.55 to 0.72] and specificity of 0.59 [0.48 to 0.69] [95% confidence intervals] (Figure 1b).[1-3,5,6,9,15,16,18,20,22,25]

Sleep questionnaires (AHI ≥5)

When using sleep questionnaires to diagnose moderate-to-severe SDB in children (AHI ≥5), the pooled estimate sensitivity and specificity were 0.70 [0.59, 0.80] and 0.49 [0.39, 0.59] respectively [95% confidence intervals] (Figure 1c).[1,6,9,10,14,17,19-21,25,29]

Sleep questionnaires (AHI ≥10)

When using sleep questionnaires to diagnose severe SDB in children (AHI ≥ 10), the pooled estimate sensitivity and specificity were 0.60 [0.46, 0.72] and 0.67 [0.58, 0.78] respectively [95% confidence intervals] (Figure 1d).[9,12,17,20]

A summary of the combined questionnaire results is shown in Table 1a.

Table 1a: Diagnostic accuracies of sleep questionnaires for diagnosing sleep disordered breathing in children

Included data	No. of datasets	Sensitivity [95% CI]	Specificity [95% CI]
Questionnaires – all data	60	0.66 [0.59, 0.71]	0.56 [0.51, 0.62]
Questionnaires (AHI ≥1)	20	0.64 [0.56, 0.72]	0.58 [0.47, 0.68]
Questionnaires (AHI ≥5)	18	0.70 [0.59, 0.80]	0.49 [0.39, 0.59]
Questionnaires (AHI ≥10)	15	0.60 [0.46, 0.72]	0.67 [0.58, 0.78]

CI – confidence intervals; AHI ≥1 – includes AHI >1 data; AHI ≥5 – includes AHI >5 data; AHI ≥10 – includes AHI >10 data

Meta-analyses were also performed for each questionnaire type, and relative cut offs (Figures 1e – 1s). A summary of all analyses that included datasets from at least two studies (some studies reported more than one dataset within an individual publication) is shown in Table 1b and a summary of the 'all data' diagnostic accuracies of included questionnaire types and cut offs, including single study results, is available in Summary table of individual sleep questionnaires.

Table 1b: Diagnostic accuracies of individual sleep questionnaires and cut offs for diagnosing sleep disordered breathing in children reported in ≥ 2 studies

Questionnaire / cut off	No. datasets	No. subjects	Sensitivity [95% CI]	Specificity [95% CI]
All data				
SRBD-PSQ (cut off ≥0.33)	10	824	0.78 [0.72, 0.83]	0.46 [0.37, 0.56]
OSA-18 (cut off ≥60)	10	1327	0.69 [0.56, 0.80]	0.53 [0.42, 0.64]
AHI ≥1				
SRBD-PSQ (cut off ≥0.33)	5	410	0.75 [0.68, 0.80]	0.55 [0.42, 0.68]
OSA-18 (cut off ≥60)	4	542	0.54 [0.49, 0.59]	0.66 [0.46, 0.82]
AHI ≥5				
SRBD-PSQ (cut off ≥0.33)	3	255	0.84 [0.72, 0.91]	0.37 [0.29, 0.46]
OSA-18 (cut off ≥60)	3	392	0.77 [0.49, 0.92]	0.43 [0.27, 0.60]
AHI ≥10				
SRBD-PSQ (cut off ≥0.33) [20]	1	97	0.86 [0.68, 0.96]	0.32 [0.22, 0.45]
OSA-18 (cut off ≥60)	2	176	0.69 [0.56, 0.80]	0.53 [0.44, 0.62]

CI – confidence intervals; OSA – obstructive sleep apnoea; SRBD-PSQ – sleep-related breathing disorder scale of the paediatric sleep questionnaire

Sleep questionnaire and clinical assessment

Combining clinical assessment data with sleep questionnaire data may improve the diagnostic accuracy of using sleep questionnaires to diagnose SDB in children. Six studies investigated the diagnostic accuracy of sleep questionnaires (Figure 1t) combined with a clinical assessment [7,8,23,26-28], with 4 studies evaluating the Sleep Clinical Record (SCR) questionnaire (Figure 1u) [23,26-28] and 2 studies evaluating the Cleveland Adolescent Sleepiness (CAS-15) questionnaire (Figure 1v) [7,8]. The SCR combines the findings of a physical examination with the results of questionnaires evaluating symptoms of SDB and behavioural or cognitive problems. The score, based on a combination of these findings, was computed using an algorithm and took about 30 minutes to complete. The CAS-15 is a simpler assessment based on scores from 15 items, 10 of which are acquired by clinical history and five from a physical examination. A summary of the results is shown in Table 1c.

Table 1c: Diagnostic accuracies of using a sleep questionnaire and clinical assessment to diagnose sleep disordered breathing in children

Included data	No. of datasets	No. subjects	Sensitivity [95% CI]	Specificity [95% CI]
All	6	1213	0.83 [0.70, 0.91]	0.57 [0.49, 0.65]
SCR ≥6.5*	4	890	0.86 [0.70, 0.95]	0.53 [0.41, 0.64]
CAS-15 ≥32†	2	323	0.71 [0.65, 0.77]	0.63 [0.52, 0.73]

* All studies in the SCR meta-analysis regarded AHI >1 as a positive diagnosis of SDB

† Both studies in the CAS-15 meta-analysis regarded AHI >2 as a positive diagnosis of SDB

CAS – Cleveland adolescent sleepiness; CI – confidence intervals; SCR – sleep clinical record

Sleep video recording

One study directly investigated the diagnostic accuracy of sleep video recording for diagnosing SDB in children and reported a sensitivity and specificity of 0.94 [0.81, 0.99] and 0.68 [0.45, 0.86] respectively [95% confidence intervals]. [24]

Sleep audio recording

Similarly, one study evaluated the diagnostic accuracy of audio recording to diagnose SDB in children. The study investigated the presence of struggle sounds, respiratory pauses, or both within the audio recording (as separate analyses) and meta-analysis of these three analyses gave a pooled sensitivity of 0.52 [0.37, 0.67] and pooled specificity of 0.80 [0.66, 0.89] [95% confidence intervals] (Figure 1w).[13]

Evidence statements

Sleep questionnaires appear to have moderate sensitivity and low specificity for diagnosing sleep disordered breathing in children (**Very low**)

Sleep-related breathing disorder scale of the paediatric sleep questionnaires (SRBD-PSQ, with a cut-off of ≥0.33) appears to have a high specificity and low sensitivity for diagnosing moderate-to-severe sleep disordered breathing (AHI ≥5) in children (**Low**)

Obstructive sleep apnoea-18 item questionnaires (OSA-18), with a cut-off of ≥0.60, appear to have a moderate specificity and low sensitivity for diagnosing moderate-to-severe sleep disordered breathing (AHI ≥5) in children (**Low**)

There was not enough evidence to make specific considerations on the use of sleep questionnaires for children under two years of age and children with comorbidities

Sleep questionnaires and “protocol driven” clinical assessment appear to have a high sensitivity and a low specificity for diagnosing sleep disordered breathing in children (**Low**)

There is not enough evidence to make a consideration on sleep video recording or sleep audio recording for diagnosing sleep disordered breathing in children

Recommendations

- Sleep-related breathing disorder scale of the paediatric sleep questionnaires (SRBD-PSQ), with a cut-off of ≥0.33, or obstructive sleep apnoea-18 item questionnaires (OSA-18), with a cut-off of ≥0.60, can be considered for diagnosing moderate-to-severe sleep disordered breathing in children of at least two years of age with no comorbidities. If a test questionnaire is inconsistent with clinical features, or if a higher degree of diagnostic certainty is required, further tests, such as pulse oximetry, cardiorespiratory sleep studies or polysomnography are recommended (**Conditional**)
- Sleep questionnaires combined with clinical assessment can be considered as a first line diagnostic test for diagnosing sleep disordered breathing in children, but it should be noted that sleep clinical record (SCR) is labour intensive, taking approximately 30 minutes to complete. If a test questionnaire is inconsistent with

clinical features, or if a higher degree of diagnostic certainty is required, further tests, such as pulse oximetry, cardiorespiratory sleep studies or polysomnography are recommended (**Conditional**)

Good Practice Points

- ✓ Clinical questionnaires, combined with clinical examination, can identify moderate or severe SDB with a sensitivity of 75-85% and a specificity of 35-65%. This may be considered adequate for example in relation to deciding whether, or not to pursue surgery to improve the airway, e.g. tonsillectomy
- ✓ The clinical assessment score-15 (CAS-15) combined sleep questionnaire and "protocol driven" clinical assessment may also be considered for diagnosing sleep disordered breathing in children. In contrast to the sleep clinical record (SCR), the CAS-15 takes 10 minutes to complete, but has a reduced sensitivity of moderate
- ✓ Sleep questionnaires should not be considered for diagnosing sleep disordered breathing in children under two years of age, or if mild sleep disordered breathing is suspected

Research Recommendation

- Further research is needed into investigating the diagnostic accuracy of clinically applicable sleep questionnaires, clinically applicable combined sleep questionnaires and clinical assessment, sleep video recording and sleep audio recording for diagnosing sleep disordered breathing in infants and children

Meta-analyses

Diagnostic accuracy table contents and summary receiver operating characteristic (SROC) curve legend

Table contents

Pooled sensitivity [95% confidence intervals]

Pooled specificity [95% confidence intervals]

Likelihood ratio of a positive test result (LR+) [95% confidence intervals]

Likelihood ratio of a negative test result (LR-) [95% confidence intervals]

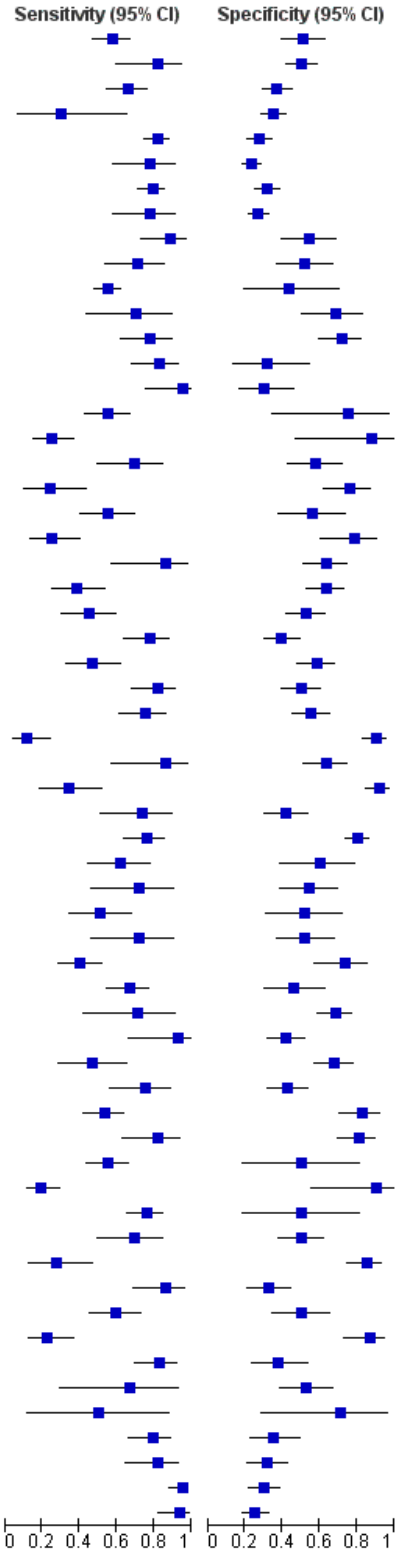
Diagnostic odds ratio (DOR, an indicator of the likelihood of a positive test result) [95% confidence intervals]

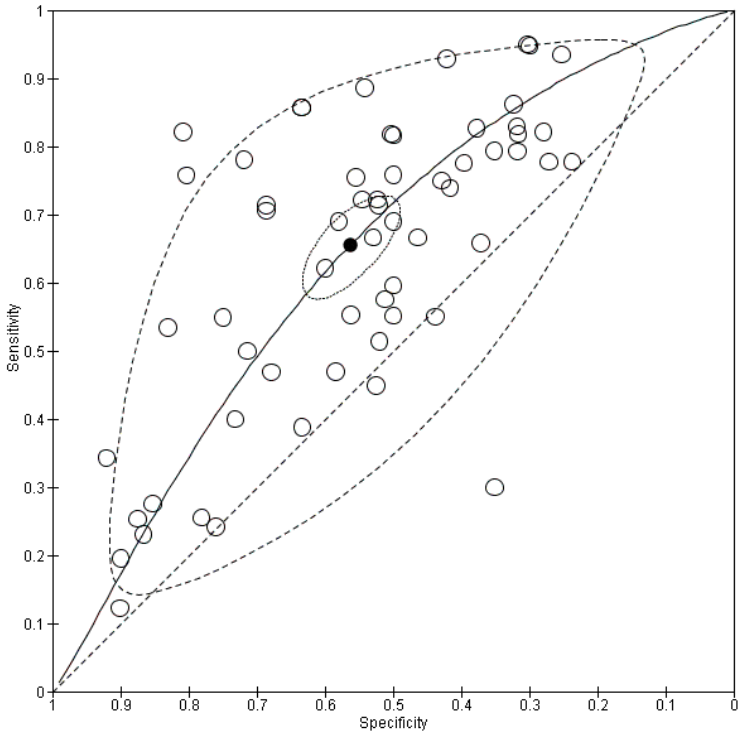
Summary receiver operating characteristic (SROC) curve legend

——	SROC
○	Study estimate
●	Summary point
·····	95% confidence region
- - -	95% prediction region

Figure 1a Sleep questionnaires (all data)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Abumuamar 2018 (6item-1)	57	39	42	41	0.58 [0.47, 0.67]	0.51 [0.40, 0.63]
Abumuamar 2018 (6item-5)	18	78	4	79	0.82 [0.60, 0.95]	0.50 [0.42, 0.58]
Abumuamar 2018 (IFC3-1)	52	98	27	58	0.66 [0.54, 0.76]	0.37 [0.30, 0.45]
Abumuamar 2018 (IFC3-5)	3	146	7	79	0.30 [0.07, 0.65]	0.35 [0.29, 0.42]
Abumuamar 2018 (IFP3-1)	115	134	25	52	0.82 [0.75, 0.88]	0.28 [0.22, 0.35]
Abumuamar 2018 (IFP3-5)	21	228	6	71	0.78 [0.58, 0.91]	0.24 [0.19, 0.29]
Abumuamar 2018 (IMP3-1)	111	127	29	59	0.79 [0.72, 0.86]	0.32 [0.25, 0.39]
Abumuamar 2018 (IMP3-5)	21	218	6	81	0.78 [0.58, 0.91]	0.27 [0.22, 0.33]
Bertran 2015 (SRBD 0.1)	31	22	4	26	0.89 [0.73, 0.97]	0.54 [0.39, 0.69]
Bertran 2015 (SRBD 0.33)	25	23	10	25	0.71 [0.54, 0.85]	0.52 [0.37, 0.67]
Borgstrom 2013	115	9	94	7	0.55 [0.48, 0.62]	0.44 [0.20, 0.70]
Chau 2008	12	11	5	24	0.71 [0.44, 0.90]	0.69 [0.51, 0.83]
Chervin 2007	32	18	9	46	0.78 [0.62, 0.89]	0.72 [0.59, 0.82]
Ferry 2020 (AHI1)	34	15	7	7	0.83 [0.68, 0.93]	0.32 [0.14, 0.55]
Ferry 2020 (AHI5)	19	30	1	13	0.95 [0.75, 1.00]	0.30 [0.17, 0.46]
Ishman 2015 (AHI1 60)	39	2	32	6	0.55 [0.43, 0.67]	0.75 [0.35, 0.97]
Ishman 2015 (AHI1 80)	18	1	53	7	0.25 [0.16, 0.37]	0.88 [0.47, 1.00]
Ishman 2015 (AHI10 60)	20	21	9	29	0.69 [0.49, 0.85]	0.58 [0.43, 0.72]
Ishman 2015 (AHI10 80)	7	12	22	38	0.24 [0.10, 0.44]	0.76 [0.62, 0.87]
Ishman 2015 (AHI5 60)	26	14	21	18	0.55 [0.40, 0.70]	0.56 [0.38, 0.74]
Ishman 2015 (AHI5 80)	12	7	35	25	0.26 [0.14, 0.40]	0.78 [0.60, 0.91]
Kadmon 2013	12	26	2	45	0.86 [0.57, 0.98]	0.63 [0.51, 0.75]
Kadmon 2014 (IC3)	19	37	30	64	0.39 [0.25, 0.54]	0.63 [0.53, 0.73]
Kadmon 2014 (IFC3)	22	48	27	53	0.45 [0.31, 0.60]	0.52 [0.42, 0.63]
Kadmon 2014 (IFP3)	38	61	11	40	0.78 [0.63, 0.88]	0.40 [0.30, 0.50]
Kadmon 2014 (IMC3)	23	42	26	59	0.47 [0.33, 0.62]	0.58 [0.48, 0.68]
Kadmon 2014 (IMP3)	40	51	9	51	0.82 [0.68, 0.91]	0.50 [0.40, 0.60]
Kadmon 2014 (IP3)	37	45	12	56	0.76 [0.61, 0.87]	0.55 [0.45, 0.65]
Kadmon 2014 (STOP-BNG)	6	10	43	91	0.12 [0.05, 0.25]	0.90 [0.83, 0.95]
Kaewkul 2018 (AHI10)	12	26	2	45	0.86 [0.57, 0.98]	0.63 [0.51, 0.75]
Kaewkul 2018 (OSA-18)	12	7	23	81	0.34 [0.19, 0.52]	0.92 [0.84, 0.97]
Lavi 2020	17	42	6	30	0.74 [0.52, 0.90]	0.42 [0.30, 0.54]
Li 2006	50	32	16	131	0.76 [0.64, 0.85]	0.80 [0.73, 0.86]
Longlalerng 2019 (AHI1)	23	10	14	15	0.62 [0.45, 0.78]	0.60 [0.39, 0.79]
Longlalerng 2019 (AHI4)	13	20	5	24	0.72 [0.47, 0.90]	0.55 [0.39, 0.70]
Longlalerng 2019 (AHI1-mod)	19	12	18	13	0.51 [0.34, 0.68]	0.52 [0.31, 0.72]
Longlalerng 2019 (AHI4-mod)	13	21	5	23	0.72 [0.47, 0.90]	0.52 [0.37, 0.68]
Masoud 2020 (AHI1.5-6Q)	30	11	45	30	0.40 [0.29, 0.52]	0.73 [0.57, 0.86]
Masoud 2020 (AHI1.5-PSQ9)	50	22	25	19	0.67 [0.55, 0.77]	0.46 [0.31, 0.63]
Masoud 2020 (AHI10-6Q)	10	32	4	70	0.71 [0.42, 0.92]	0.69 [0.59, 0.77]
Masoud 2020 (AHI10-PSQ9)	13	59	1	43	0.93 [0.66, 1.00]	0.42 [0.32, 0.52]
Masoud 2020 (AHI5-6Q)	15	27	17	57	0.47 [0.29, 0.65]	0.68 [0.57, 0.78]
Masoud 2020 (AHI5-PSQ9)	24	48	8	36	0.75 [0.57, 0.89]	0.43 [0.32, 0.54]
Mousailidis 2014	47	9	41	44	0.53 [0.42, 0.64]	0.83 [0.70, 0.92]
Nguyen 2017	23	13	5	55	0.82 [0.63, 0.94]	0.81 [0.70, 0.89]
Overland 2019 (AHI1-OSA18-60)	48	5	39	5	0.55 [0.44, 0.66]	0.50 [0.19, 0.81]
Overland 2019 (AHI1-OSA18-80)	17	1	70	9	0.20 [0.12, 0.29]	0.90 [0.55, 1.00]
Overland 2019 (AHI1-PSQ)	66	5	21	5	0.76 [0.65, 0.84]	0.50 [0.19, 0.81]
Overland 2019 (AHI10-OSA18-60)	20	34	9	34	0.69 [0.49, 0.85]	0.50 [0.38, 0.62]
Overland 2019 (AHI10-OSA18-80)	8	10	21	58	0.28 [0.13, 0.47]	0.85 [0.75, 0.93]
Overland 2019 (AHI10-PSQ)	25	46	4	22	0.86 [0.68, 0.96]	0.32 [0.22, 0.45]
Overland 2019 (AHI5-OSA18-60)	31	23	21	23	0.60 [0.45, 0.73]	0.50 [0.35, 0.65]
Overland 2019 (AHI5-OSA18-80)	12	6	40	39	0.23 [0.13, 0.37]	0.87 [0.73, 0.95]
Overland 2019 (AHI5-PSQ)	43	28	9	17	0.83 [0.70, 0.92]	0.38 [0.24, 0.53]
Pires 2019	6	24	3	27	0.67 [0.30, 0.93]	0.53 [0.38, 0.67]
Plomp 2012	3	2	3	5	0.50 [0.12, 0.88]	0.71 [0.29, 0.96]
Soh 2018 (AHI1)	46	35	12	19	0.79 [0.67, 0.89]	0.35 [0.23, 0.49]
Soh 2018 (AHI5)	27	54	6	25	0.82 [0.65, 0.93]	0.32 [0.22, 0.43]
Walter 2016 (AHI2)	91	84	5	36	0.95 [0.88, 0.98]	0.30 [0.22, 0.39]
Walter 2016 (AHI5)	43	127	3	43	0.93 [0.82, 0.99]	0.25 [0.19, 0.33]

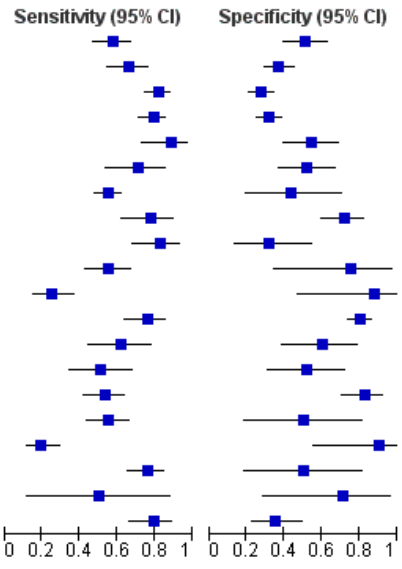


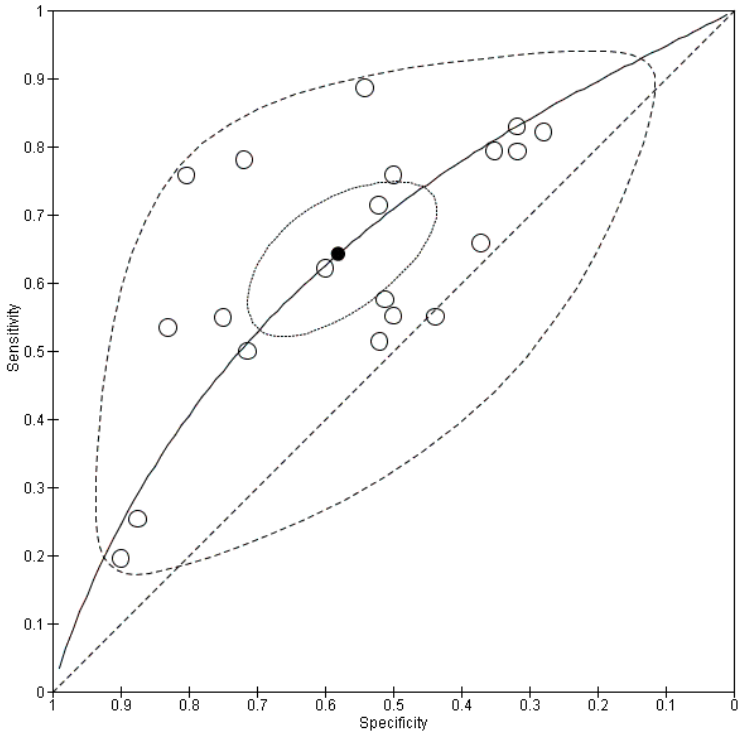


Pooled Sensitivity	0.655	[0.594, 0.712]
Pooled Specificity	0.563	[0.506, 0.618]
LR+	1.499	[1.363, 1.648]
LR-	0.612	[0.539, 0.696]
DOR	2.447	[2.004, 2.988]

Figure 1b Sleep questionnaires (AHI ≥1)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Abumuamar 2018 (6item)	57	39	42	41	0.58 [0.47, 0.67]	0.51 [0.40, 0.63]
Abumuamar 2018 (IFC3)	52	98	27	58	0.66 [0.54, 0.76]	0.37 [0.30, 0.45]
Abumuamar 2018 (IFP3)	115	134	25	52	0.82 [0.75, 0.88]	0.28 [0.22, 0.35]
Abumuamar 2018 (IMP3)	111	127	29	59	0.79 [0.72, 0.86]	0.32 [0.25, 0.39]
Bertran 2015 (c/o 0.1)	31	22	4	26	0.89 [0.73, 0.97]	0.54 [0.39, 0.69]
Bertran 2015 (c/o 0.33)	25	23	10	25	0.71 [0.54, 0.85]	0.52 [0.37, 0.67]
Borgstrom 2013	115	9	94	7	0.55 [0.48, 0.62]	0.44 [0.20, 0.70]
Chervin 2007	32	18	9	46	0.78 [0.62, 0.89]	0.72 [0.59, 0.82]
Ferry 2020	34	15	7	7	0.83 [0.68, 0.93]	0.32 [0.14, 0.55]
Ishman 2015 (c/o 60)	39	2	32	6	0.55 [0.43, 0.67]	0.75 [0.35, 0.97]
Ishman 2015 (c/o 80)	18	1	53	7	0.25 [0.16, 0.37]	0.88 [0.47, 1.00]
Li 2006	50	32	16	131	0.76 [0.64, 0.85]	0.80 [0.73, 0.86]
Longlalerng 2019 (AHI1)	23	10	14	15	0.62 [0.45, 0.78]	0.60 [0.39, 0.79]
Longlalerng 2019 (AHI1-mod)	19	12	18	13	0.51 [0.34, 0.68]	0.52 [0.31, 0.72]
Mousailidis 2014	47	9	41	44	0.53 [0.42, 0.64]	0.83 [0.70, 0.92]
Overland 2019 (AHI1-OSA18-60)	48	5	39	5	0.55 [0.44, 0.66]	0.50 [0.19, 0.81]
Overland 2019 (AHI1-OSA18-80)	17	1	70	9	0.20 [0.12, 0.29]	0.90 [0.55, 1.00]
Overland 2019 (AHI1-PSQ)	66	5	21	5	0.76 [0.65, 0.84]	0.50 [0.19, 0.81]
Plomp 2012	3	2	3	5	0.50 [0.12, 0.88]	0.71 [0.29, 0.96]
Soh 2018	46	35	12	19	0.79 [0.67, 0.89]	0.35 [0.23, 0.49]

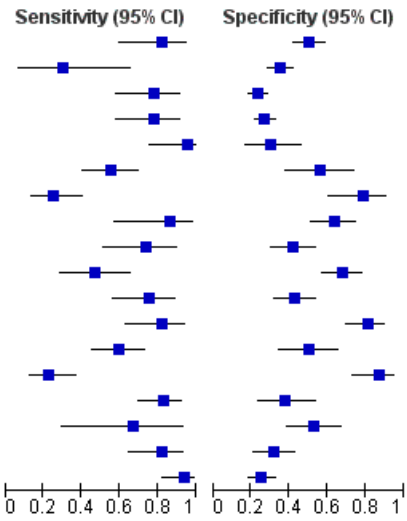


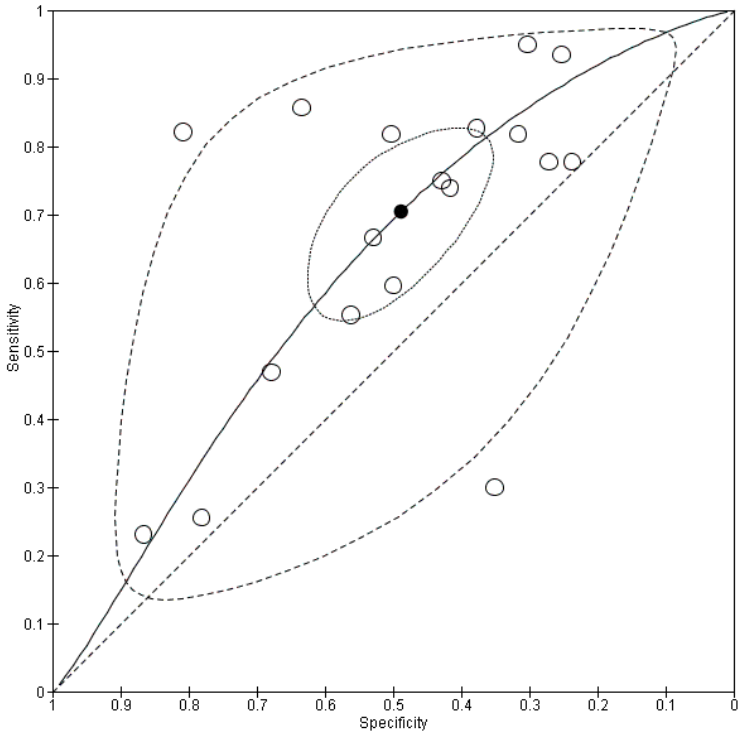


Pooled Sensitivity	0.642	[0.554, 0.722]
Pooled Specificity	0.581	[0.474, 0.681]
LR+	1.533	[1.251, 1.877]
LR-	0.616	[0.505, 0.750]
DOR	2.489	[1.722, 3.599]

Figure 1c Sleep questionnaires (AHI ≥5)

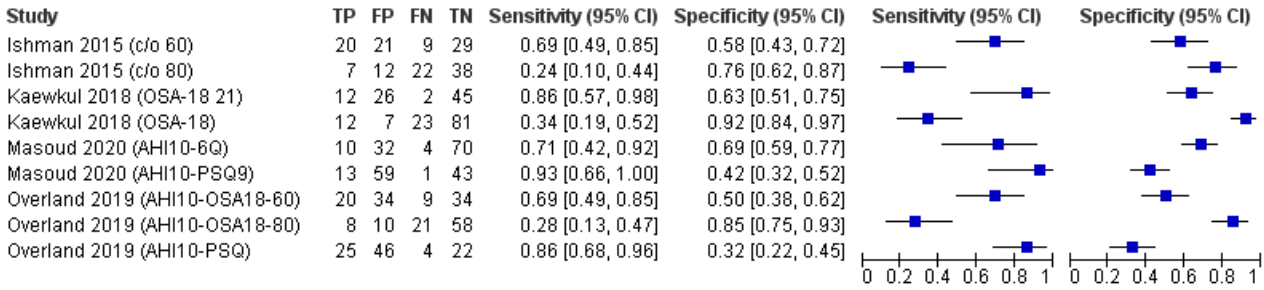
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Abumuamar 2018 (6item)	18	78	4	79	0.82 [0.60, 0.95]	0.50 [0.42, 0.58]
Abumuamar 2018 (IFC3)	3	146	7	79	0.30 [0.07, 0.65]	0.35 [0.29, 0.42]
Abumuamar 2018 (IFP3)	21	228	6	71	0.78 [0.58, 0.91]	0.24 [0.19, 0.29]
Abumuamar 2018 (IMP3)	21	218	6	81	0.78 [0.58, 0.91]	0.27 [0.22, 0.33]
Ferry 2020	19	30	1	13	0.95 [0.75, 1.00]	0.30 [0.17, 0.46]
Ishman 2015 (c/o 60)	26	14	21	18	0.55 [0.40, 0.70]	0.56 [0.38, 0.74]
Ishman 2015 (c/o 80)	12	7	35	25	0.26 [0.14, 0.40]	0.78 [0.60, 0.91]
Kadmon 2013	12	26	2	45	0.86 [0.57, 0.98]	0.63 [0.51, 0.75]
Lavi 2020	17	42	6	30	0.74 [0.52, 0.90]	0.42 [0.30, 0.54]
Masoud 2020 (AHI5-6Q)	15	27	17	57	0.47 [0.29, 0.65]	0.68 [0.57, 0.78]
Masoud 2020 (AHI5-PSQ9)	24	48	8	36	0.75 [0.57, 0.89]	0.43 [0.32, 0.54]
Nguyen 2017	23	13	5	55	0.82 [0.63, 0.94]	0.81 [0.70, 0.89]
Overland 2019 (AHI5-OSA18-60)	31	23	21	23	0.60 [0.45, 0.73]	0.50 [0.35, 0.65]
Overland 2019 (AHI5-OSA18-80)	12	6	40	39	0.23 [0.13, 0.37]	0.87 [0.73, 0.95]
Overland 2019 (AHI5-PSQ)	43	28	9	17	0.83 [0.70, 0.92]	0.38 [0.24, 0.53]
Pires 2019	6	24	3	27	0.67 [0.30, 0.93]	0.53 [0.38, 0.67]
Soh 2018	27	54	6	25	0.82 [0.65, 0.93]	0.32 [0.22, 0.43]
Walter 2016	43	127	3	43	0.93 [0.82, 0.99]	0.25 [0.19, 0.33]

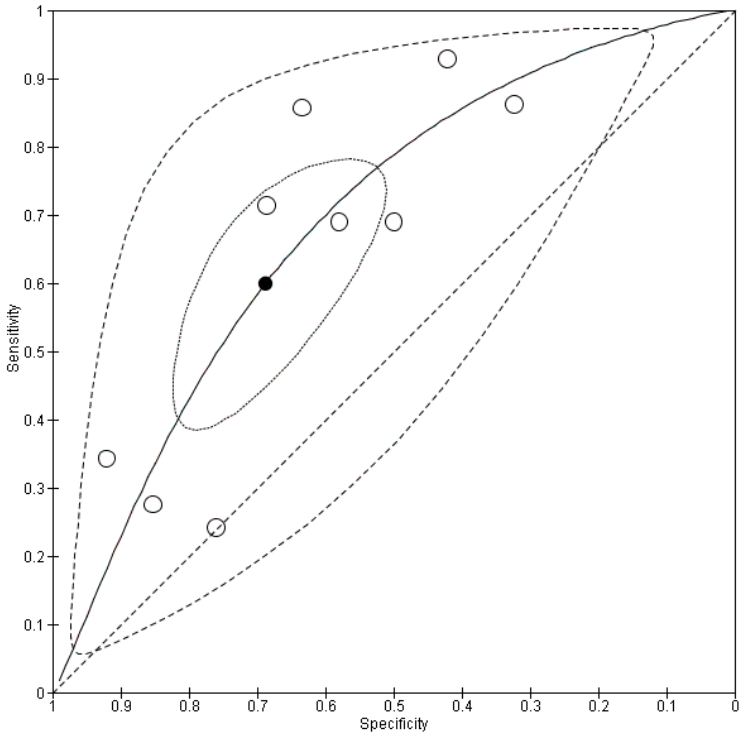




Pooled Sensitivity	0.704	[0.590, 0.798]
Pooled Specificity	0.489	[0.389, 0.589]
LR+	1.377	[1.175, 1.615]
LR-	0.605	[0.457, 0.800]
DOR	2.277	[1.514, 3.425]

Figure 1d Sleep questionnaires (AHI ≥10)



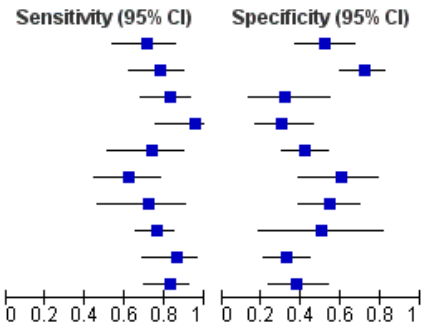


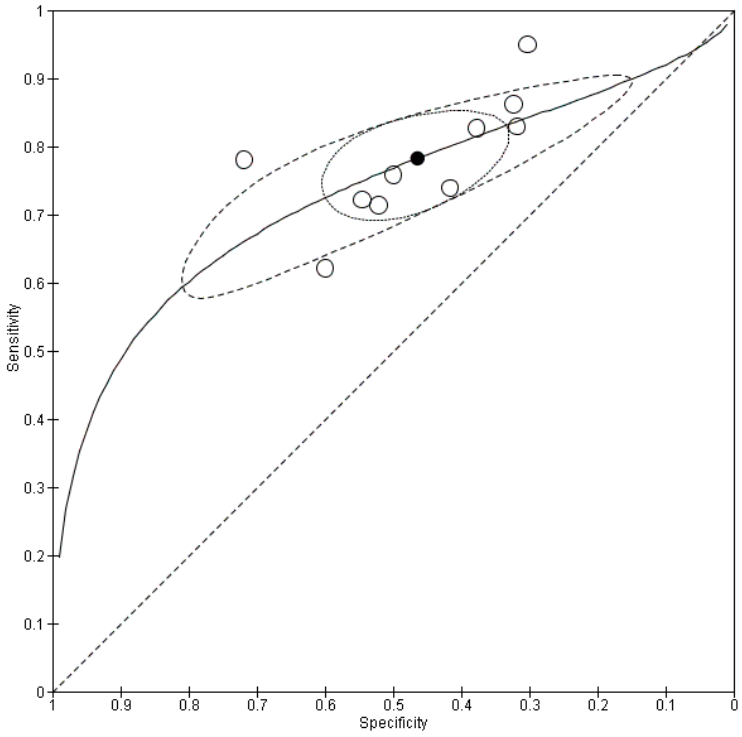
Pooled Sensitivity	0.600	[0.462, 0.723]
Pooled Specificity	0.688	[0.578, 0.780]
LR+	1.922	[1.529, 2.417]
LR-	0.582	[0.453, 0.747]
DOR	3.303	[2.222, 4.911]

Figures 1e – 1s Individual sleep questionnaires and cut offs

Figure 1e SRBD-PSQ (cut off ≥0.33) (all data)

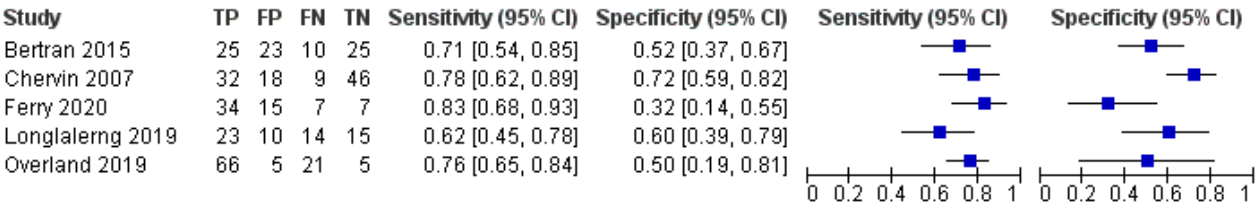
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Bertran 2015	25	23	10	25	0.71 [0.54, 0.85]	0.52 [0.37, 0.67]
Chervin 2007	32	18	9	46	0.78 [0.62, 0.89]	0.72 [0.59, 0.82]
Ferry 2020 (AHI1)	34	15	7	7	0.83 [0.68, 0.93]	0.32 [0.14, 0.55]
Ferry 2020 (AHI5)	19	30	1	13	0.95 [0.75, 1.00]	0.30 [0.17, 0.46]
Lavi 2020	17	42	6	30	0.74 [0.52, 0.90]	0.42 [0.30, 0.54]
Longlalerng 2019 (AHI1)	23	10	14	15	0.62 [0.45, 0.78]	0.60 [0.39, 0.79]
Longlalerng 2019 (AHI4)	13	20	5	24	0.72 [0.47, 0.90]	0.55 [0.39, 0.70]
Overland 2019 (AHI1-PSQ)	66	5	21	5	0.76 [0.65, 0.84]	0.50 [0.19, 0.81]
Overland 2019 (AHI10-PSQ)	25	46	4	22	0.86 [0.68, 0.96]	0.32 [0.22, 0.45]
Overland 2019 (AHI5-PSQ)	43	28	9	17	0.83 [0.70, 0.92]	0.38 [0.24, 0.53]

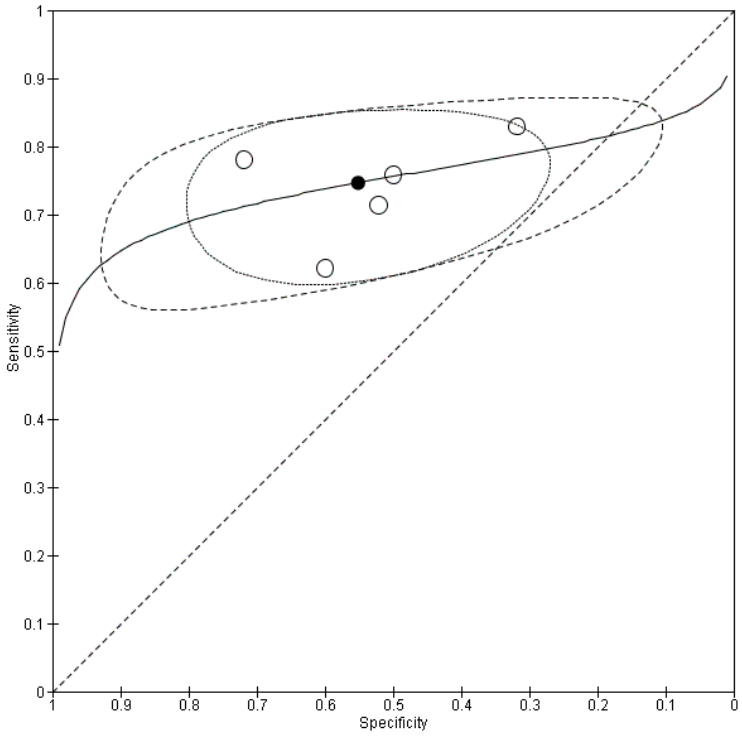




Pooled Sensitivity	0.783	[0.725, 0.831]
Pooled Specificity	0.464	[0.374, 0.557]
LR+	1.461	[1.251, 1.706]
LR-	0.468	[0.370, 0.593]
DOR	3.118	[2.166, 4.489]

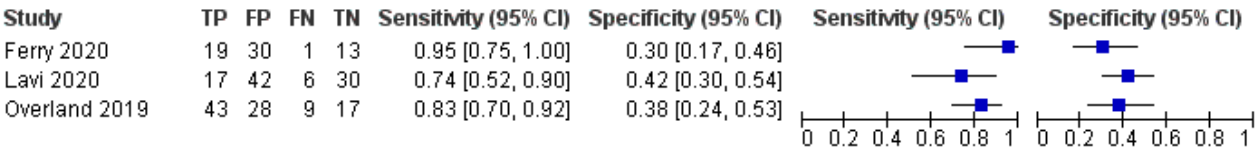
Figure 1f SRBD-PSQ (cut off ≥0.33) (AHI ≥1)





Pooled Sensitivity	0.747	[0.684, 0.800]
Pooled Specificity	0.551	[0.418, 0.678]
LR+	1.664	[1.245, 2.225]
LR-	0.460	[0.342, 0.617]
DOR	3.621	[2.070, 6.335]

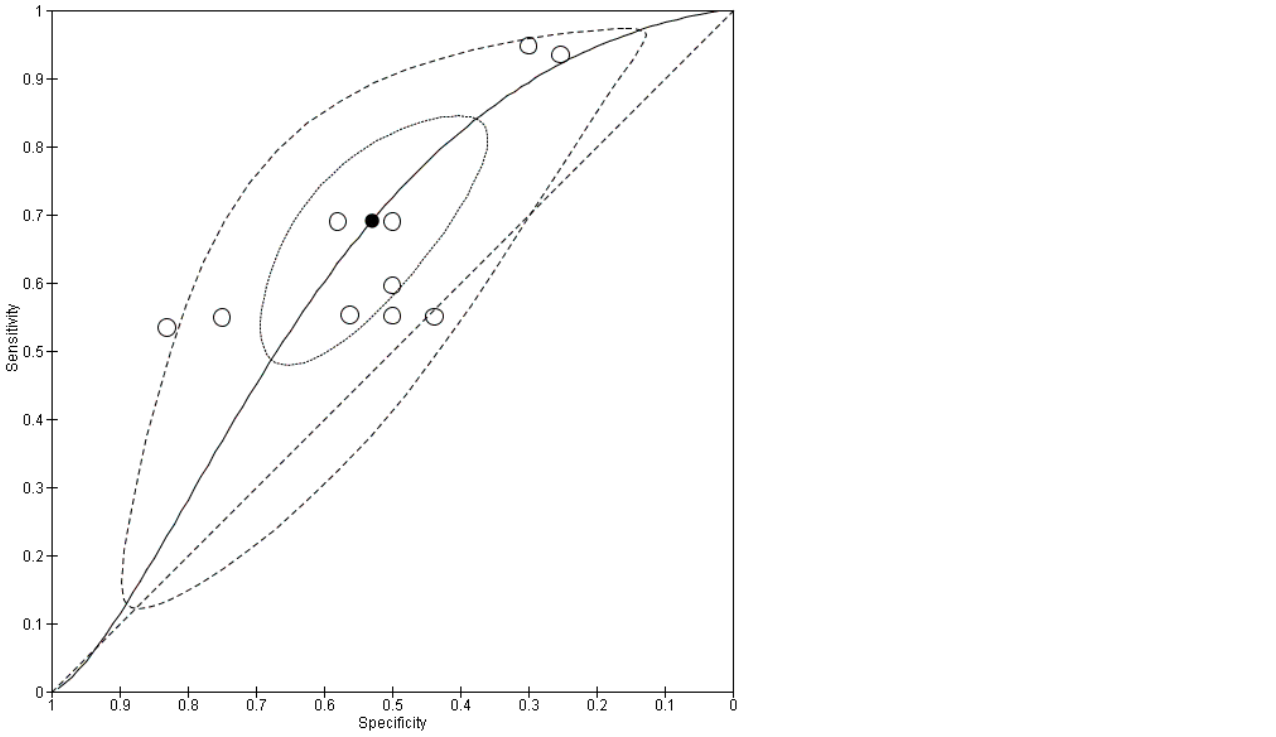
Figure 1g SRBD-PSQ (cut off ≥0.33) (AHI ≥5)



Pooled Sensitivity	0.837	[0.722, 0.910]
Pooled Specificity	0.371	[0.292, 0.457]
LR+	1.331	[1.142, 1.551]
LR-	0.439	[0.250, 0.774]
DOR	3.029	[1.509, 6.077]

Figure 1h OSA-18 (cut off ≥60) (all data)

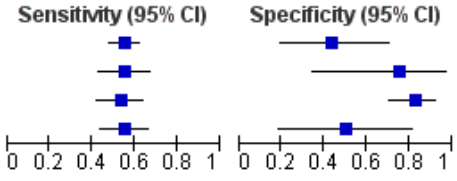
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Borgstrom 2013	115	9	94	7	0.55 [0.48, 0.62]	0.44 [0.20, 0.70]
Ishman 2015 (AHI1)	39	2	32	6	0.55 [0.43, 0.67]	0.75 [0.35, 0.97]
Ishman 2015 (AHI10)	20	21	9	29	0.69 [0.49, 0.85]	0.58 [0.43, 0.72]
Ishman 2015 (AHI5)	26	14	21	18	0.55 [0.40, 0.70]	0.56 [0.38, 0.74]
Mousailidis 2014	47	9	41	44	0.53 [0.42, 0.64]	0.83 [0.70, 0.92]
Overland 2019 (AHI1-OSA18-60)	48	5	39	5	0.55 [0.44, 0.66]	0.50 [0.19, 0.81]
Overland 2019 (AHI10-OSA18-60)	20	34	9	34	0.69 [0.49, 0.85]	0.50 [0.38, 0.62]
Overland 2019 (AHI5-OSA18-60)	31	23	21	23	0.60 [0.45, 0.73]	0.50 [0.35, 0.65]
Walter 2016 (AHI2)	91	84	5	36	0.95 [0.88, 0.98]	0.30 [0.22, 0.39]
Walter 2016 (AHI5)	43	127	3	43	0.93 [0.82, 0.99]	0.25 [0.19, 0.33]

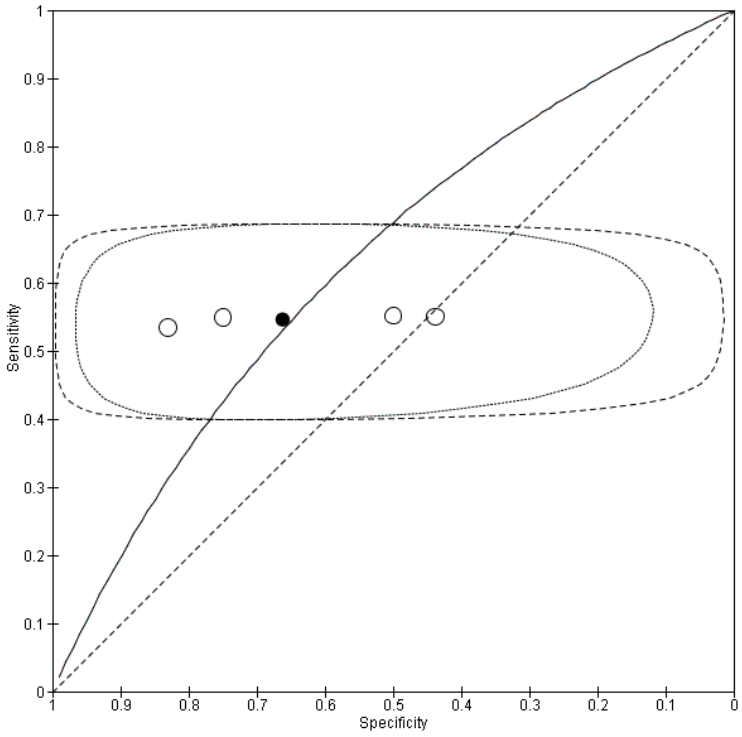


Pooled Sensitivity	0.691	[0.555, 0.801]
Pooled Specificity	0.530	[0.416, 0.640]
LR+	1.469	[1.245, 1.733]
LR-	0.583	[0.438, 0.778]
DOR	2.518	[1.687, 3.760]

Figure 1i OSA-18 (cut off ≥60) (AHI ≥1)

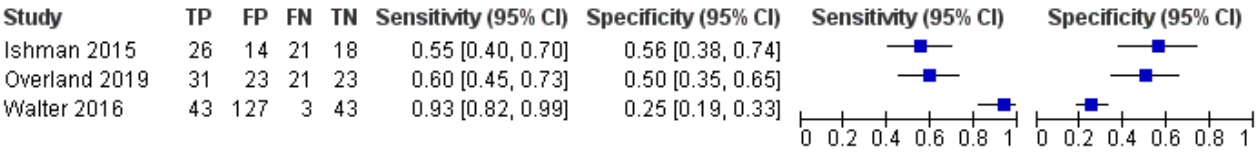
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Borgstrom 2013	115	9	94	7	0.55 [0.48, 0.62]	0.44 [0.20, 0.70]
Ishman 2015	39	2	32	6	0.55 [0.43, 0.67]	0.75 [0.35, 0.97]
Mousailidis 2014	47	9	41	44	0.53 [0.42, 0.64]	0.83 [0.70, 0.92]
Overland 2019	48	5	39	5	0.55 [0.44, 0.66]	0.50 [0.19, 0.81]





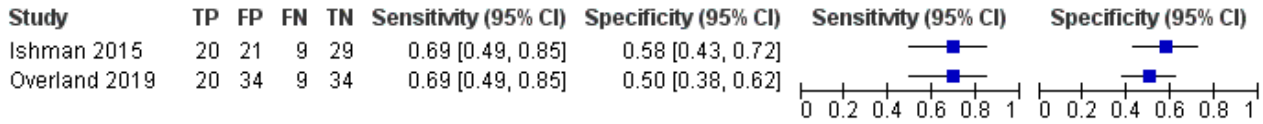
Pooled Sensitivity	0.546	[0.499, 0.593]
Pooled Specificity	0.662	[0.455, 0.821]
LR+	1.616	[0.918, 2.846]
LR-	0.685	[0.508, 0.925]
DOR	2.358	[0.997, 5.581]

Figure 1j OSA-18 (cut off ≥60) (AHI ≥5)



Pooled Sensitivity	0.766	[0.494, 0.917]
Pooled Specificity	0.427	[0.269, 0.601]
LR+	1.336	[1.124, 1.588]
LR-	0.548	[0.291, 1.035]
DOR	2.436	[1.159, 5.119]

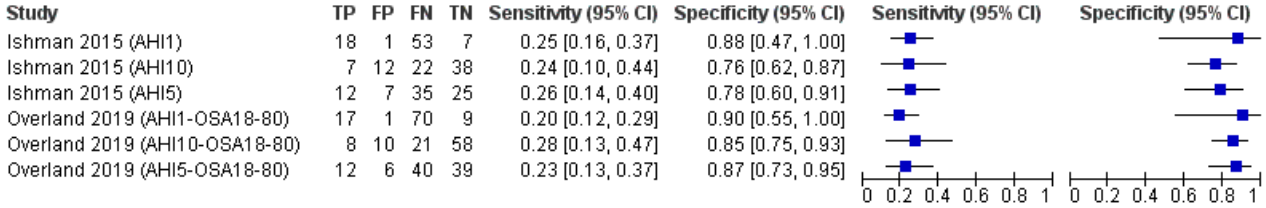
Figure 1k OSA-18 (cut off ≥60) (AHI ≥10)



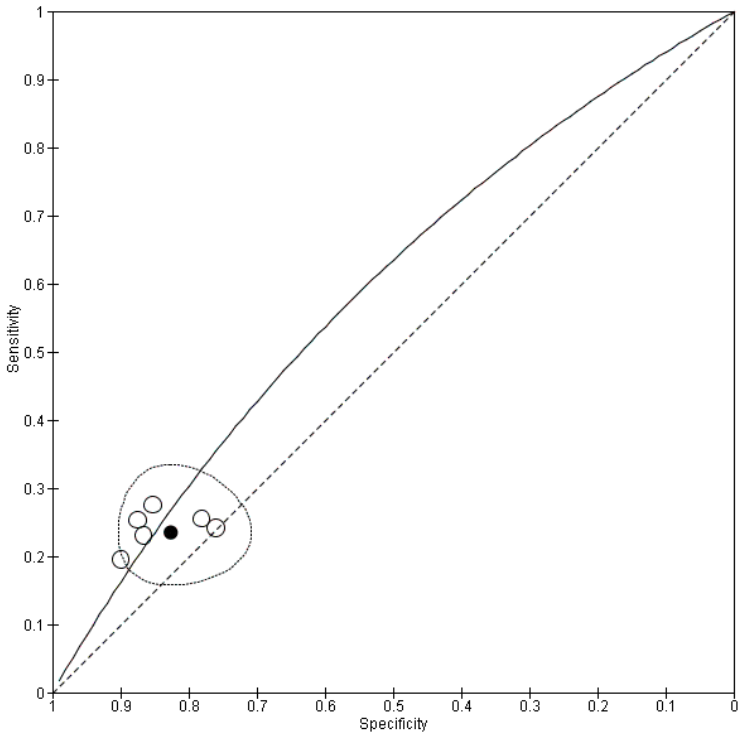
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Ishman 2015	20	21	9	29	0.69 [0.49, 0.85]	0.58 [0.43, 0.72]
Overland 2019	20	34	9	34	0.69 [0.49, 0.85]	0.50 [0.38, 0.62]

Pooled Sensitivity	0.690	[0.560, 0.795]
Pooled Specificity	0.534	[0.444, 0.622]
LR+	1.480	[1.142, 1.917]
LR-	0.581	[0.382, 0.884]
DOR	2.545	[1.311, 4.942]

Figure 1l OSA-18 (cut off ≥80)



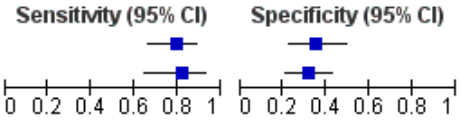
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Ishman 2015 (AHI1)	18	1	53	7	0.25 [0.16, 0.37]	0.88 [0.47, 1.00]
Ishman 2015 (AHI10)	7	12	22	38	0.24 [0.10, 0.44]	0.76 [0.62, 0.87]
Ishman 2015 (AHI5)	12	7	35	25	0.26 [0.14, 0.40]	0.78 [0.60, 0.91]
Overland 2019 (AHI1-OSA18-80)	17	1	70	9	0.20 [0.12, 0.29]	0.90 [0.55, 1.00]
Overland 2019 (AHI10-OSA18-80)	8	10	21	58	0.28 [0.13, 0.47]	0.85 [0.75, 0.93]
Overland 2019 (AHI5-OSA18-80)	12	6	40	39	0.23 [0.13, 0.37]	0.87 [0.73, 0.95]



Pooled Sensitivity	0.235	[0.191, 0.285]
Pooled Specificity	0.826	[0.769, 0.871]
LR+	1.352	[0.949, 1.927]
LR-	0.926	[0.849, 1.010]
DOR	1.461	[0.941, 2.268]

Figure 1m OSA-5 (cut off ≥5)

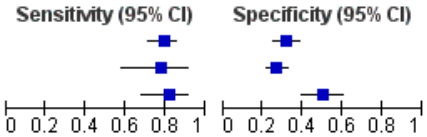
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Soh 2018 (AHI1)	46	35	12	19	0.79 [0.67, 0.89]	0.35 [0.23, 0.49]
Soh 2018 (AHI5)	27	54	6	25	0.82 [0.65, 0.93]	0.32 [0.22, 0.43]



Pooled Sensitivity	0.802	[0.708, 0.872]
Pooled Specificity	0.331	[0.256, 0.415]
LR+	1.199	[1.010, 1.387]
LR-	0.598	[0.311, 0.884]
DOR	2.005	[0.742, 3.268]

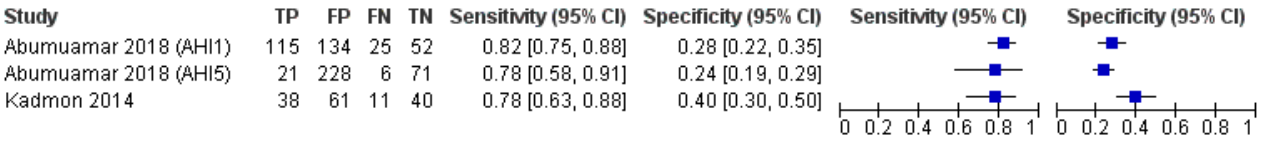
Figure 1n IM-Sleepy (Parent) (cut off ≥3)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Abumuamar 2018 (AHI1)	111	127	29	59	0.79 [0.72, 0.86]	0.32 [0.25, 0.39]
Abumuamar 2018 (AHI5)	21	218	6	81	0.78 [0.58, 0.91]	0.27 [0.22, 0.33]
Kadmon 2014	40	51	9	51	0.82 [0.68, 0.91]	0.50 [0.40, 0.60]



Pooled Sensitivity	0.797	[0.736, 0.847]
Pooled Specificity	0.352	[0.245, 0.465]
LR+	1.230	[0.992, 1.469]
LR-	0.576	[0.314, 0.838]
DOR	2.136	[0.760, 3.512]

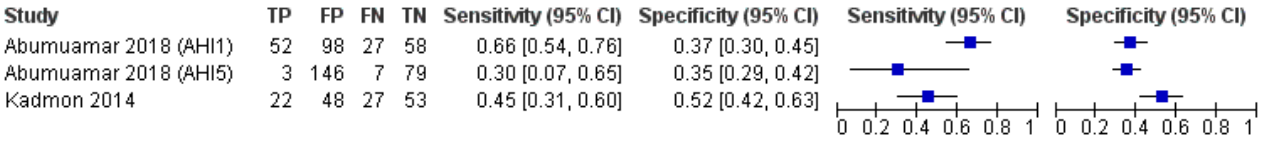
Figure 1o IF-Sleepy (Parent) (cut off ≥3)



Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Abumuamar 2018 (AHI1)	115	134	25	52	0.82 [0.75, 0.88]	0.28 [0.22, 0.35]
Abumuamar 2018 (AHI5)	21	228	6	71	0.78 [0.58, 0.91]	0.24 [0.19, 0.29]
Kadmon 2014	38	61	11	40	0.78 [0.63, 0.88]	0.40 [0.30, 0.50]

Pooled Sensitivity	0.806	[0.747, 0.853]
Pooled Specificity	0.293	[0.227, 0.368]
LR+	1.139	[1.003, 1.275]
LR-	0.664	[0.423, 0.906]
DOR	1.714	[0.893, 2.535]

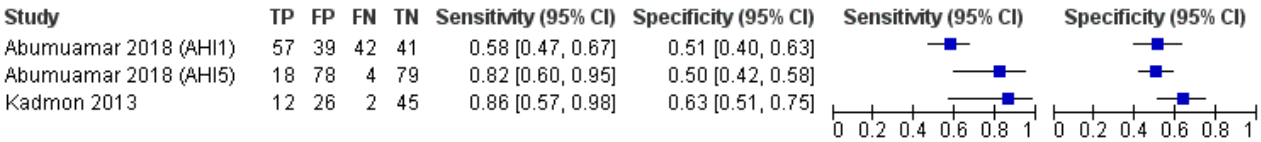
Figure 1p IF-Sleepy (Child) (cut off ≥3)



Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Abumuamar 2018 (AHI1)	52	98	27	58	0.66 [0.54, 0.76]	0.37 [0.30, 0.45]
Abumuamar 2018 (AHI5)	3	146	7	79	0.30 [0.07, 0.65]	0.35 [0.29, 0.42]
Kadmon 2014	22	48	27	53	0.45 [0.31, 0.60]	0.52 [0.42, 0.63]

Pooled Sensitivity	0.558	[0.436, 0.674]
Pooled Specificity	0.407	[0.325, 0.494]
LR+	0.941	[0.769, 1.112]
LR-	1.087	[0.831, 1.343]
DOR	0.865	[0.504, 1.227]

Figure 1q 6-Item questionnaire (cut off ≥1)

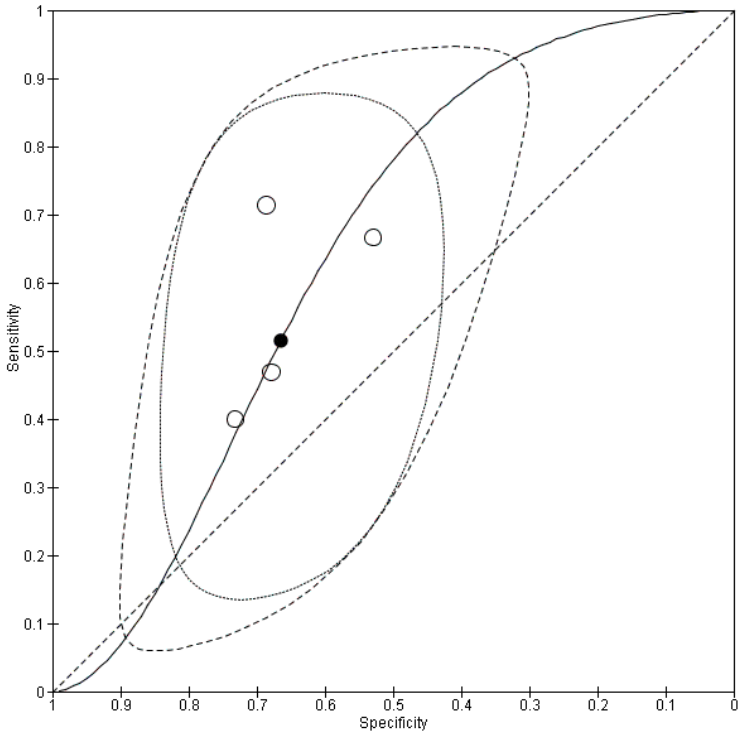


Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Abumuamar 2018 (AHI1)	57	39	42	41	0.58 [0.47, 0.67]	0.51 [0.40, 0.63]
Abumuamar 2018 (AHI5)	18	78	4	79	0.82 [0.60, 0.95]	0.50 [0.42, 0.58]
Kadmon 2013	12	26	2	45	0.86 [0.57, 0.98]	0.63 [0.51, 0.75]

Pooled Sensitivity	0.738	[0.526, 0.877]
Pooled Specificity	0.535	[0.470, 0.600]
LR+	1.587	[1.075, 2.100]
LR-	0.490	[0.128, 0.852]
DOR	3.238	[-0.175, 6.651]

Figure 1r Pediatric OSA Screening Tool (score > 2.72)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Masoud 2020 (AHI1.5-6Q)	30	11	45	30	0.40 [0.29, 0.52]	0.73 [0.57, 0.86]
Masoud 2020 (AHI10-6Q)	10	32	4	70	0.71 [0.42, 0.92]	0.69 [0.59, 0.77]
Masoud 2020 (AHI5-6Q)	15	27	17	57	0.47 [0.29, 0.65]	0.68 [0.57, 0.78]
Pires 2019	6	24	3	27	0.67 [0.30, 0.93]	0.53 [0.38, 0.67]



Pooled Sensitivity	0.515	[0.366, 0.662]
Pooled Specificity	0.665	[0.592, 0.731]
LR+	1.536	[1.127, 2.095]
LR-	0.730	[0.539, 0.987]
DOR	2.106	[1.153, 3.845]

Figure 1s SRBD-PSG (≥ 9 positive responses)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Masoud 2020 (AHI1.5-PSQ9)	50	22	25	19	0.67 [0.55, 0.77]	0.46 [0.31, 0.63]
Masoud 2020 (AHI10-PSQ9)	13	59	1	43	0.93 [0.66, 1.00]	0.42 [0.32, 0.52]
Masoud 2020 (AHI5-PSQ9)	24	48	8	36	0.75 [0.57, 0.89]	0.43 [0.32, 0.54]

Pooled Sensitivity	0.727	[0.562, 0.847]
Pooled Specificity	0.432	[0.368, 0.499]
LR+	1.281	[1.009, 1.626]
LR-	0.631	[0.359, 1.109]
DOR	2.030	[0.914, 4.510]

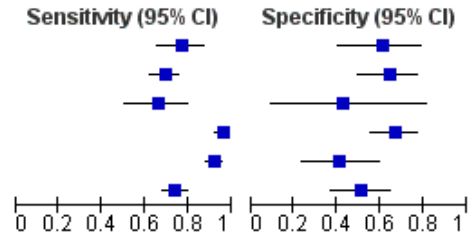
Summary table of individual sleep questionnaires (all data only)

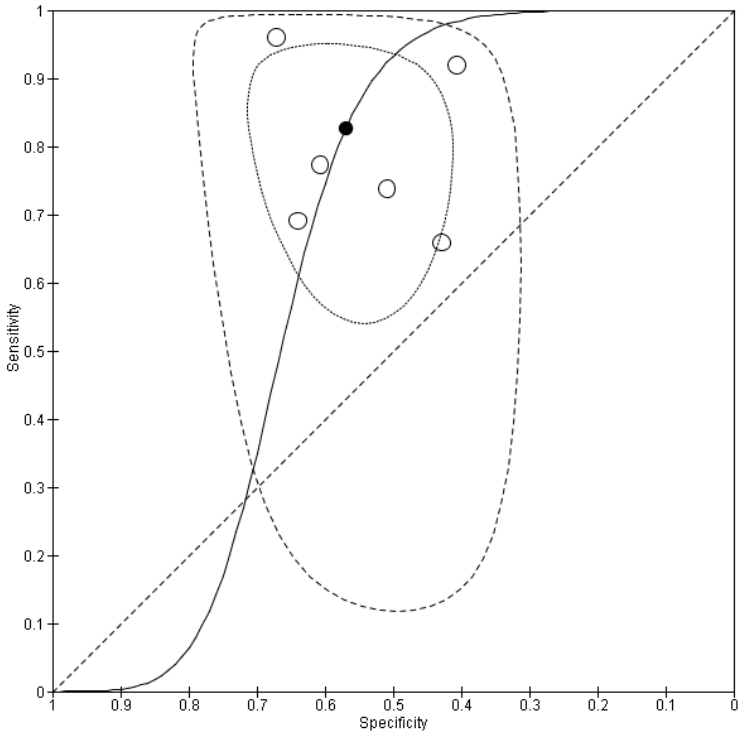
Questionnaire / cut off	No. datasets	No. subjects	Sensitivity [95% CI]	Specificity [95% CI]
Included datasets from > 2 studies				
SRBD-PSQ (cut off ≥0.33)	10	824	0.78 [0.72, 0.83]	0.46 [0.37, 0.56]
OSA-18 (cut off ≥60)	10	1327	0.69 [0.56, 0.80]	0.53 [0.42, 0.64]
Included datasets from ≤ 2 studies				
IF-Sleepy (Parent) (cut off ≥3)	3	802	0.81 [0.75, 0.85]	0.29 [0.23, 0.37]
IM-Sleepy (Parent) (cut off ≥3)	3	803	0.80 [0.74, 0.85]	0.35 [0.25, 0.47]
OSA-5 (cut off ≥5)	2	224	0.80 [0.71, 0.87]	0.33 [0.26, 0.42]
6-item questionnaire (cut off ≥1)	3	443	0.74 [0.53, 0.88]	0.54 [0.47, 0.60]
SRBD-PSG (≥ 9 positive responses)	3	348	0.73 [0.56, 0.85]	0.43 [0.37, 0.50]
IF-Sleepy (Child) (cut off ≥3)	3	620	0.56 [0.44, 0.67]	0.41 [0.33, 0.49]
Pediatric OSA Screening Tool (score >2.72)	4	408	0.52 [0.37, 0.66]	0.67 [0.59, 0.73]
OSA-18 (cut off ≥80)	6	528	0.24 [0.19, 0.29]	0.83 [0.77, 0.87]
Single datasets				
SRBD-PSQ sub-scale (cut off >0.1) [2]	1	83	0.89 [0.73, 0.97]	0.54 [0.39, 0.69]
SHS [19]	1	96	0.82 [0.63, 0.94]	0.81 [0.70, 0.89]
HK-CSQ (3 item) [15]	1	229	0.76 [0.64, 0.85]	0.80 [0.73, 0.86]
I-Sleepy (Parent) (cut off ≥3) [11]	1	150	0.76 [0.61, 0.87]	0.55 [0.45, 0.65]
SQ ≥9 [4]	1	52	0.71 [0.44, 0.90]	0.69 [0.51, 0.83]
Brouillette Score ≥1 [22]	1	13	0.50 [0.12, 0.88]	0.71 [0.29, 0.96]
IM-Sleepy (Child) (cut off ≥3) [11]	1	150	0.47 [0.33, 0.62]	0.58 [0.48, 0.68]
OSA-18 (cut off ≥65) [12]	1	123	0.40 [0.24, 0.58]	0.76 [0.66, 0.85]
I-Sleepy (Child) (cut off ≥3) [11]	1	150	0.39 [0.25, 0.54]	0.63 [0.53, 0.73]
Modified short OSA-18 [12]	1	123	0.34 [0.19, 0.52]	0.92 [0.84, 0.97]
STOP-BNG (Modified) [11]	1	150	0.12 [0.05, 0.25]	0.90 [0.83, 0.95]

HK-CSQ – Hong Kong children sleep questionnaire; OSA – obstructive sleep apnoea; SHS – sleep health scale; SQ – sleep questionnaire; SRBD-PSQ – sleep-related breathing disorder scale of the paediatric sleep questionnaire; STOP-BNG – snoring, tired, observed, pressure, body mass index, age, neck size, gender

Figure 1t Sleep questionnaires and clinical assessment

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Goldstein 2012	51	11	15	17	0.77 [0.65, 0.87]	0.61 [0.41, 0.78]
Goldstein 2020	123	18	55	32	0.69 [0.62, 0.76]	0.64 [0.49, 0.77]
Shafiek 2020	29	4	15	3	0.66 [0.50, 0.80]	0.43 [0.10, 0.82]
Villa 2013	195	25	8	51	0.96 [0.92, 0.98]	0.67 [0.55, 0.77]
Villa 2015	217	19	19	13	0.92 [0.88, 0.95]	0.41 [0.24, 0.59]
Villa 2016	175	27	62	28	0.74 [0.68, 0.79]	0.51 [0.37, 0.65]

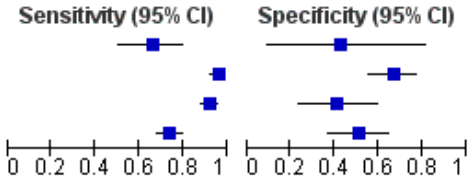


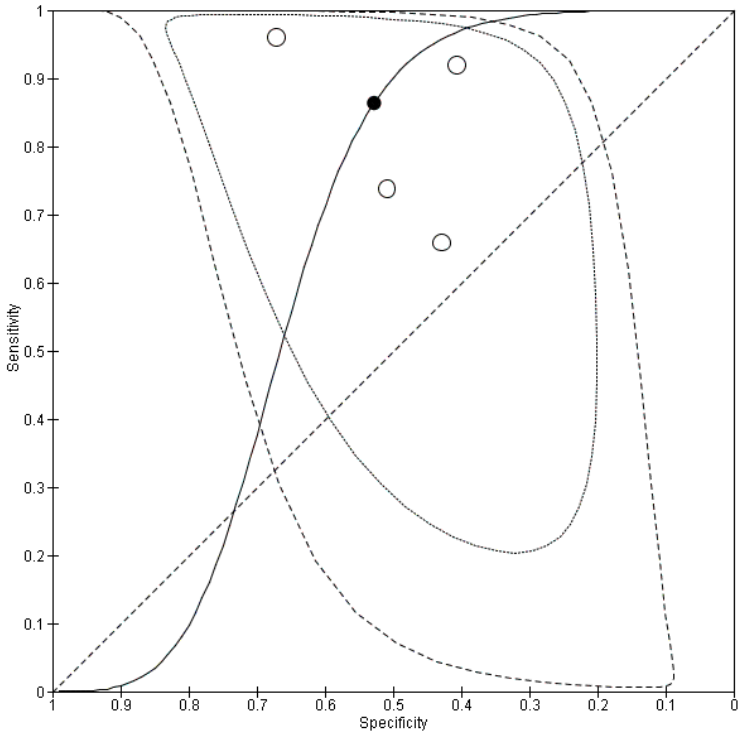


Pooled Sensitivity	0.827	[0.695, 0.909]
Pooled Specificity	0.569	[0.486, 0.649]
LR+	1.919	[1.499, 2.457]
LR-	0.305	[0.159, 0.584]
DOR	6.301	[2.663, 14.909]

Figure 1u SCR (score ≥ 6.5)

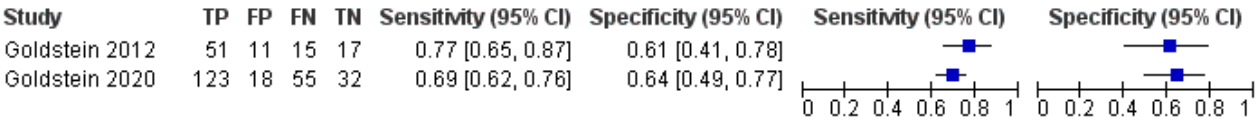
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Shafiek 2020	29	4	15	3	0.66 [0.50, 0.80]	0.43 [0.10, 0.82]
Villa 2013	195	25	8	51	0.96 [0.92, 0.98]	0.67 [0.55, 0.77]
Villa 2015	217	19	19	13	0.92 [0.88, 0.95]	0.41 [0.24, 0.59]
Villa 2016	175	27	62	28	0.74 [0.68, 0.79]	0.51 [0.37, 0.65]





Pooled Sensitivity	0.864	[0.696, 0.946]
Pooled Specificity	0.528	[0.410, 0.643]
LR+	1.830	[1.288, 2.600]
LR-	0.258	[0.092, 0.722]
DOR	7.093	[1.832, 27.4.96]

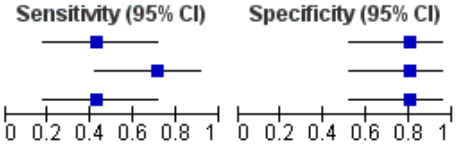
Figure 1v CAS-15 (score ≥ 32)



Pooled Sensitivity	0.713	[0.653, 0.766]
Pooled Specificity	0.628	[0.516, 0.728]
LR+	1.918	[1.422, 2.587]
LR-	0.457	[0.352, 0.593]
DOR	4.200	[2.456, 7.182]

Figure 1w Sleep audio recordings

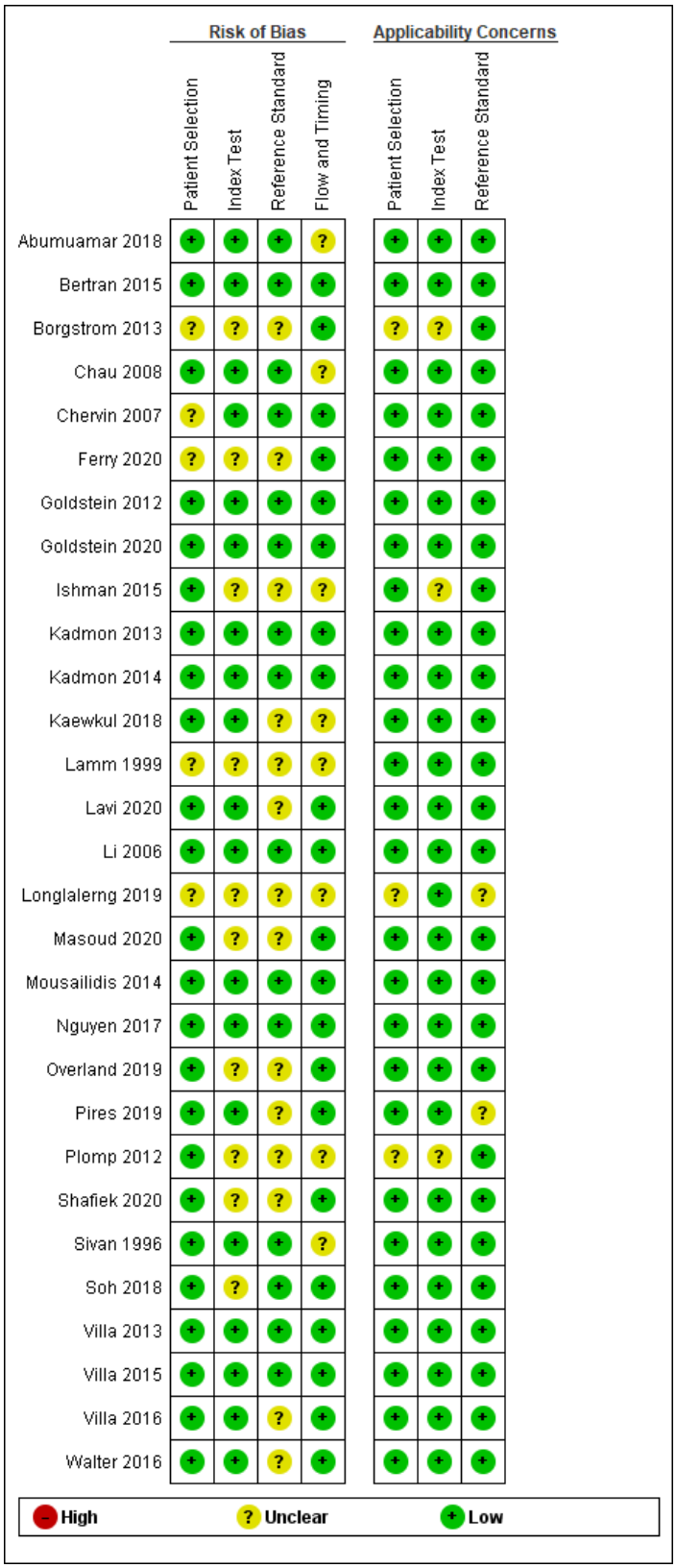
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Lamm 1999 (P)	6	3	8	12	0.43 [0.18, 0.71]	0.80 [0.52, 0.96]
Lamm 1999 (S)	10	3	4	12	0.71 [0.42, 0.92]	0.80 [0.52, 0.96]
Lamm 1999 (S/P)	6	3	8	12	0.43 [0.18, 0.71]	0.80 [0.52, 0.96]



P – pause; S – struggle; S/P – struggle and pause

Pooled Sensitivity	0.524	[0.374, 0.670]
Pooled Specificity	0.800	[0.658, 0.893]
LR+	2.619	[0.909, 4.329]
LR-	0.595	[0.368, 0.805]
DOR	4.401	[0.208, 8.593]

Risk of bias summary



GRADE analyses

Sleep questionnaires (all data)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: Sleep questionnaires

Pooled sensitivity: 0.66 (95% CI: 0.60 to 0.71) | **Pooled specificity**: 0.56 (95% CI: 0.51 to 0.62)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**264** (236 to 284)	2951 (60)	⨁◯◯◯ **VERY LOW** a,b,c
False negatives	**136** (116 to 164)		
True negatives	**336** (306 to 372)	4781 (60)	⨁◯◯◯ **VERY LOW** a,b,c
False positives	**264** (228 to 294)		
	Prevalence 60%* Typically seen in		
True positives	**396** (354 to 426)	2951 (60)	⨁◯◯◯ **VERY LOW** a,b,c
False negatives	**204** (174 to 246)		
True negatives	**224** (204 to 248)	4781 (60)	⨁◯◯◯ **VERY LOW** a,b,c
False positives	**176** (152 to 196)		
	Prevalence 80%* Typically seen in		
True positives	**528** (472 to 568)	2951 (60)	⨁◯◯◯ **VERY LOW** a,b,c
False negatives	**272** (232 to 328)		
True negatives	**112** (102 to 124)	4781 (60)	⨁◯◯◯ **VERY LOW** a,b,c
False positives	**88** (76 to 98)		

CI: Confidence interval

Explanations

a. Some risk of bias across studies
b. Serious inconsistency across the studies, several datasets do not overlap the point estimates
c. Some imprecision across the studies with much variation in confidence intervals

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

Sleep questionnaires (AHI ≥1)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: Sleep questionnaires

Pooled sensitivity: 0.64 (95% CI: 0.56 to 0.72) | **Pooled specificity**: 0.58 (95% CI: 0.48 to 0.68)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**256** (220 to 288)	1514 (20)	⨁◯◯◯ **VERY LOW** [a,b,c,d]
False negatives	**144** (112 to 180)		
True negatives	**348** (282 to 408)	1179 (20)	⨁◯◯◯ **VERY LOW** [a,b,c,d]
False positives	**252** (192 to 318)		
	Prevalence 60%* Typically seen in		
True positives	**384** (330 to 432)	1514 (20)	⨁◯◯◯ **VERY LOW** [a,b,c,d]
False negatives	**216** (168 to 270)		
True negatives	**232** (188 to 272)	1179 (20)	⨁◯◯◯ **VERY LOW** [a,b,c,d]
False positives	**168** (128 to 212)		
	Prevalence 80%* Typically seen in		
True positives	**512** (440 to 576)	1514 (20)	⨁◯◯◯ **VERY LOW** [a,b,c,d]
False negatives	**288** (224 to 360)		
True negatives	**116** (94 to 136)	1179 (20)	⨁◯◯◯ **VERY LOW** [a,b,c,d]
False positives	**84** (64 to 106)		

CI: Confidence interval

Explanations

a. Some risk of bias across studies
b. Some indirectness across studies
c. Some inconsistency in the data, but most datasets cross the point estimates
d. Moderate confidence intervals in some datasets

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

Sleep questionnaires (AHI ≥5)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: Sleep questionnaires

Pooled sensitivity: 0.70 (95% CI: 0.59 to 0.80) | **Pooled specificity**: 0.49 (95% CI: 0.39 to 0.59)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**282** (236 to 319)	573 (18)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**118** (81 to 164)		
True negatives	**293** (233 to 353)	1902 (18)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**307** (247 to 367)		
	Prevalence 60%* Typically seen in		
True positives	**422** (354 to 479)	573 (18)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**178** (121 to 246)		
True negatives	**196** (156 to 236)	1902 (18)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**204** (164 to 244)		
	Prevalence 80%* Typically seen in		
True positives	**563** (472 to 638)	573 (18)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**237** (162 to 328)		
True negatives	**98** (78 to 118)	1902 (18)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**102** (82 to 122)		

CI: Confidence interval

Explanations

a. Some risk of bias across studies
b. Serious inconsistency across the studies
c. Moderate confidence intervals in some datasets

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

Sleep questionnaires (AHI ≥10)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: Sleep questionnaires

Pooled sensitivity: 0.60 (95% CI: 0.46 to 0.72) | **Pooled specificity**: 0.69 (95% CI: 0.58 to 0.78)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**240** (185 to 289)	222 (9)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**160** (111 to 215)		
True negatives	**413** (347 to 468)	667 (9)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**187** (132 to 253)		
	Prevalence 60%* Typically seen in		
True positives	**360** (277 to 434)	222 (9)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**240** (166 to 323)		
True negatives	**275** (231 to 312)	667 (9)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**125** (88 to 169)		
	Prevalence 80%* Typically seen in		
True positives	**480** (370 to 578)	222 (9)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**320** (222 to 430)		
True negatives	**138** (116 to 156)	667 (9)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**62** (44 to 84)		

CI: Confidence interval

Explanations

a. High risk of bias across studies
b. Serious inconsistency across the studies
c. Moderate sensitivity confidence intervals

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

SRBD-PSQ questionnaire (cut off ≥0.33) (all data)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: SRBD-PSQ sleep questionnaire

Pooled sensitivity: 0.78 (95% CI: 0.73 to 0.83) | **Pooled specificity**: 0.46 (95% CI: 0.37 to 0.56)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**312** (292 to 332)	383 (10)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**88** (68 to 108)		
True negatives	**276** (222 to 336)	441 (10)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**324** (264 to 378)		
	Prevalence 60%* Typically seen in		
True positives	**468** (438 to 498)	383 (10)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**132** (102 to 162)		
True negatives	**184** (148 to 224)	441 (10)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**216** (176 to 252)		
	Prevalence 80%* Typically seen in		
True positives	**624** (584 to 664)	383 (10)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**176** (136 to 216)		
True negatives	**92** (74 to 112)	441 (10)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**108** (88 to 126)		

CI: Confidence interval

Explanations

a. Some risk of bias across studies
b. Some inconsistency across studies
c. Moderate confidence intervals in some datasets

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

SRBD-PSQ questionnaire (cut off ≥0.33) (AHI ≥1)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: SRBD-PSQ sleep questionnaire

Pooled sensitivity: 0.75 (95% CI: 0.68 to 0.80) | **Pooled specificity**: 0.55 (95% CI: 0.42 to 0.68)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**300** (272 to 320)	241 (5)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**100** (80 to 128)		
True negatives	**330** (252 to 408)	169 (5)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**270** (192 to 348)		
	Prevalence 60%* Typically seen in		
True positives	**450** (408 to 480)	241 (5)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**150** (120 to 192)		
True negatives	**220** (168 to 272)	169 (5)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**180** (128 to 232)		
	Prevalence 80%* Typically seen in		
True positives	**600** (544 to 640)	241 (5)	⨁◯◯◯ **VERY LOW** [a,b,c]
False negatives	**200** (160 to 256)		
True negatives	**110** (84 to 136)	169 (5)	⨁◯◯◯ **VERY LOW** [a,b,c]
False positives	**90** (64 to 116)		

CI: Confidence interval

Explanations

a. Some risk of bias across studies
b. Some inconsistency across studies
c. Moderate confidence intervals in some datasets

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

SRBD-PSQ questionnaire (cut off ≥0.33) (AHI ≥5)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: SRBD-PSQ sleep questionnaire

Pooled sensitivity: 0.84 (95% CI: 0.72 to 0.91) | **Pooled specificity**: 0.37 (95% CI: 0.29 to 0.46)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**335** (289 to 364)	95 (3)	⨁⨁◯◯ **LOW** [a]
False negatives	**65** (36 to 111)		
True negatives	**223** (175 to 274)	160 (3)	⨁⨁◯◯ **LOW** [a]
False positives	**377** (326 to 425)		
	Prevalence 60%* Typically seen in		
True positives	**502** (433 to 546)	95 (3)	⨁⨁◯◯ **LOW** [a]
False negatives	**98** (54 to 167)		
True negatives	**148** (117 to 183)	160 (3)	⨁⨁◯◯ **LOW** [a]
False positives	**252** (217 to 283)		
	Prevalence 80%* Typically seen in		
True positives	**670** (578 to 728)	95 (3)	⨁⨁◯◯ **LOW** [a]
False negatives	**130** (72 to 222)		
True negatives	**74** (58 to 91)	160 (3)	⨁⨁◯◯ **LOW** [a]
False positives	**126** (109 to 142)		

CI: Confidence interval

Explanations

a. High risk of bias across studies

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

OSA-18 questionnaire (cut off ≥60) (all data)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: OSA-18 sleep questionnaire

Pooled sensitivity: 0.69 (95% CI: 0.56 to 0.80) | **Pooled specificity**: 0.53 (95% CI: 0.42 to 0.64)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**276** (222 to 320)	754 (10)	⨁◯◯◯ **VERY LOW** a,b,c
False negatives	**124** (80 to 178)		
True negatives	**318** (250 to 384)	573 (10)	⨁◯◯◯ **VERY LOW** a,b,c
False positives	**282** (216 to 350)		
	Prevalence 60%* Typically seen in		
True positives	**415** (333 to 481)	754 (10)	⨁◯◯◯ **VERY LOW** a,b,c
False negatives	**185** (119 to 267)		
True negatives	**212** (166 to 256)	573 (10)	⨁◯◯◯ **VERY LOW** a,b,c
False positives	**188** (144 to 234)		
	Prevalence 80%* Typically seen in		
True positives	**553** (444 to 641)	754 (10)	⨁◯◯◯ **VERY LOW** a,b,c
False negatives	**247** (159 to 356)		
True negatives	**106** (83 to 128)	573 (10)	⨁◯◯◯ **VERY LOW** a,b,c
False positives	**94** (72 to 117)		

CI: Confidence interval

Explanations

a. Some risk of bias across the studies
b. Some indirectness across studies
c. Inconsistency in two studies

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

OSA-18 questionnaire (cut off ≥60) (AHI ≥1)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: OSA-18 sleep questionnaire

Pooled sensitivity: 0.55 (95% CI: 0.50 to 0.59) | **Pooled specificity**: 0.66 (95% CI: 0.46 to 0.82)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**218** (200 to 237)	455 (4)	⨁◯◯◯ **VERY LOW** a,b,c,d
False negatives	**182** (163 to 200)		
True negatives	**397** (273 to 493)	87 (4)	⨁◯◯◯ **VERY LOW** a,b,c,d
False positives	**203** (107 to 327)		
	Prevalence 60%* Typically seen in		
True positives	**328** (299 to 356)	455 (4)	⨁◯◯◯ **VERY LOW** a,b,c,d
False negatives	**272** (244 to 301)		
True negatives	**265** (182 to 328)	87 (4)	⨁◯◯◯ **VERY LOW** a,b,c,d
False positives	**135** (72 to 218)		
	Prevalence 80%* Typically seen in		
True positives	**437** (399 to 474)	455 (4)	⨁◯◯◯ **VERY LOW** a,b,c,d
False negatives	**363** (326 to 401)		
True negatives	**132** (91 to 164)	87 (4)	⨁◯◯◯ **VERY LOW** a,b,c,d
False positives	**68** (36 to 109)		

CI: Confidence interval

Explanations

a. High risk of bias across the studies
b. Some indirectness across studies
c. Some inconsistency in specificities
d. Some imprecision in specificity with moderate confidence intervals

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

OSA-18 questionnaire (cut off ≥60) (AHI ≥5)

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: OSA-18 sleep questionnaire

Pooled sensitivity: 0.77 (95% CI: 0.49 to 0.92) | **Pooled specificity**: 0.43 (95% CI: 0.27 to 0.60)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**306** (198 to 367)	145 (3)	⨁⨁◯◯ **LOW** [a,b]
False negatives	**94** (33 to 202)		
True negatives	**256** (161 to 361)	248 (3)	⨁⨁◯◯ **LOW** [a,b]
False positives	**344** (239 to 439)		
	Prevalence 60%* Typically seen in		
True positives	**460** (296 to 550)	145 (3)	⨁⨁◯◯ **LOW** [a,b]
False negatives	**140** (50 to 304)		
True negatives	**171** (108 to 240)	248 (3)	⨁⨁◯◯ **LOW** [a,b]
False positives	**229** (160 to 292)		
	Prevalence 80%* Typically seen in		
True positives	**613** (395 to 734)	145 (3)	⨁⨁◯◯ **LOW** [a,b]
False negatives	**187** (66 to 405)		
True negatives	**85** (54 to 120)	248 (3)	⨁⨁◯◯ **LOW** [a,b]
False positives	**115** (80 to 146)		

CI: Confidence interval

Explanations

a. Some risk of bias across the studies
b. Inconsistency in one dataset

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

OSA-18 questionnaire (cut off ≥60) (AHI ≥10)

What is the diagnostic accuracy of using sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: OSA-18 sleep questionnaire

Pooled sensitivity: 0.69 (95% CI: 0.56 to 0.80) | **Pooled specificity**: 0.53 (95% CI: 0.44 to 0.62)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**276** (224 to 318)	58 (2)	⨁◯◯◯ **VERY LOW** [a,b]
False negatives	**124** (82 to 176)		
True negatives	**320** (266 to 373)	118 (2)	⨁◯◯◯ **VERY LOW** [a,b]
False positives	**280** (227 to 334)		
	Prevalence 60%* Typically seen in		
True positives	**414** (336 to 477)	58 (2)	⨁◯◯◯ **VERY LOW** [a,b]
False negatives	**186** (123 to 264)		
True negatives	**214** (178 to 249)	118 (2)	⨁◯◯◯ **VERY LOW** [a,b]
False positives	**186** (151 to 222)		
	Prevalence 80%* Typically seen in		
True positives	**552** (448 to 636)	58 (2)	⨁◯◯◯ **VERY LOW** [a,b]
False negatives	**248** (164 to 352)		
True negatives	**107** (89 to 124)	118 (2)	⨁◯◯◯ **VERY LOW** [a,b]
False positives	**93** (76 to 111)		

CI: Confidence interval

Explanations

a. High risk of bias across the studies
b. Some indirectness across studies

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

Sleep questionnaires and clinical assessment

What is the diagnostic accuracy of using a sleep questionnaire, a combined sleep questionnaire and clinical assessment, sleep video recording or sleep audio recording to identify sleep disordered breathing in with suspected sleep disordered breathing?

Patient or population: Children (<17 years) with suspected sleep disordered breathing

New test: Sleep questionnaires and clinical assessment

Pooled sensitivity: 0.83 (95% CI: 0.69 to 0.91) | **Pooled specificity**: 0.57 (95% CI: 0.49 to 0.65)

Test result	Number of results per 1,000 patients tested (95% CI)	Number of participants (studies)	Certainty of the Evidence (GRADE)
	Prevalence 40%* Typically seen in		
True positives	**331** (278 to 364)	964 (6)	⨁⨁◯◯ **LOW** [a,b]
False negatives	**69** (36 to 122)		
True negatives	**341** (292 to 389)	248 (6)	⨁⨁◯◯ **LOW** [a,b]
False positives	**259** (211 to 308)		
	Prevalence 60%* Typically seen in		
True positives	**496** (417 to 545)	964 (6)	⨁⨁◯◯ **LOW** [a,b]
False negatives	**104** (55 to 183)		
True negatives	**228** (194 to 260)	248 (6)	⨁⨁◯◯ **LOW** [a,b]
False positives	**172** (140 to 206)		
	Prevalence 80%* Typically seen in		
True positives	**662** (556 to 727)	964 (6)	⨁⨁◯◯ **LOW** [a,b]
False negatives	**138** (73 to 244)		
True negatives	**114** (97 to 130)	248 (6)	⨁⨁◯◯ **LOW** [a,b]
False positives	**86** (70 to 103)		

CI: Confidence interval

Explanations

a. Some risk of bias in two studies
b. Imprecision in specificity across studies

* 40% typically seen in district general hospitals; 60% typically seen in general respiratory clinics; 80% typically seen in sleep clinics

Recommendation Tables

Question Details

POPULATION:	Children (<17 years) with suspected sleep disordered breathing
INDEX TESTS:	Sleep questionnaires, SRBD-PSQ* questionnaire (cut off ≥0.33), combined sleep questionnaire and clinical assessment
GOLD STANDARD:	Polysomnography (PSG)
OUTCOME:	Diagnostic accuracy of sleep questionnaires and combined sleep questionnaires and clinical assessment for diagnosing sleep disordered breathing in children

* Sleep-related breathing disorder scale of the pediatric sleep questionnaires

Sleep Questionnaires

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
PROBLEM	No	Probably no	Probably yes	**Yes**		Varies	Don't know
TEST ACCURACY	Very inaccurate	Inaccurate	**Accurate**	Very accurate		Varies	Don't know
DESIRABLE EFFECTS	Trivial	Small	**Moderate**	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	**Very low**	Low	Moderate	High			No included studies
BALANCE OF EFFECTS	Favours the comparison	Probably favours the comparison	Does not favour the intervention or the comparison	**Probably favours the intervention**	Favours the intervention	Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	**Conditional recommendation against the intervention**	Conditional recommendation for either the intervention or the comparison	Conditional recommendation for the intervention	Strong recommendation for the intervention
☐	☒	☐	☐	☐

CONCLUSIONS

Recommendation

Sleep questionnaires alone are not recommended for diagnosing sleep disordered breathing in children (Conditional)

Justification

Sleep questionnaires have a moderate sensitivity and moderate specificity for diagnosing sleep disordered breathing in children (Very low)

Subgroup considerations

There were not enough data for subgroup consideration (typically developing children <2 years, typically developing children 2-16 years, children with comorbidities <2 years, children with comorbidities 2-16 years)

Research priorities

Further research is needed into determining which sleep questionnaire(s) have the best diagnostic accuracy for diagnosing sleep disordered breathing in children

SRBD-PSQ questionnaire (cut off ≥0.33)

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
PROBLEM	No	Probably no	Probably yes	**Yes**		Varies	Don't know
TEST ACCURACY	Very inaccurate	Inaccurate	**Accurate**	Very accurate		Varies	Don't know
DESIRABLE EFFECTS	Trivial	Small	**Moderate**	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	Very low	**Low**	Moderate	High			No included studies
BALANCE OF EFFECTS	Favours the comparison	Probably favours the comparison	Does not favour the intervention or the comparison	**Probably favours the intervention**	Favours the intervention	Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	**Conditional recommendation for the intervention**	Strong recommendation for the intervention
☐	☐	☐	☒	☐

CONCLUSIONS

Recommendation

Sleep-related breathing disorder scale of the paediatric sleep questionnaires (SRBD-PSQ, with a cut-off of ≥0.33) can be considered for diagnosing moderate-to-severe sleep disordered breathing in children of at least two years of age with no comorbidities

Justification

Sleep-related breathing disorder scale of the paediatric sleep questionnaires (SRBD-PSQ, with a cut-off of ≥0.33) have a high specificity and low sensitivity for diagnosing moderate-to-severe sleep disordered breathing (AHI ≥5) in children (Low)

Subgroup considerations

There were not enough data for subgroup consideration (typically developing children <2 years, typically developing children 2-16 years, children with comorbidities <2 years, children with comorbidities 2-16 years)

Research priorities

Further research is needed into determining which sleep questionnaire(s) have the best diagnostic accuracy for diagnosing sleep disordered breathing in children

OSA-18 questionnaire (cut off ≥0.60)

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
PROBLEM	No	Probably no	Probably yes	**Yes**		Varies	Don't know
TEST ACCURACY	Very inaccurate	Inaccurate	**Accurate**	Very accurate		Varies	Don't know
DESIRABLE EFFECTS	Trivial	Small	**Moderate**	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	Very low	**Low**	Moderate	High			No included studies
BALANCE OF EFFECTS	Favours the comparison	Probably favours the comparison	Does not favour the intervention or the comparison	**Probably favours the intervention**	Favours the intervention	Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	**Conditional recommendation for the intervention**	Strong recommendation for the intervention
☐	☐	☐	☒	☐

CONCLUSIONS

Recommendation

Obstructive sleep apnoea-18 item questionnaires (OSA-18, with a cut-off of ≥0.60) can be considered for diagnosing moderate-to-severe sleep disordered breathing in children of at least two years of age with no comorbidities

Justification

Obstructive sleep apnoea-18 item questionnaires (OSA-18, with a cut-off of ≥0.60) have a moderate specificity and low sensitivity for diagnosing moderate-to-severe sleep disordered breathing (AHI ≥5) in children (Low)

Subgroup considerations

There were not enough data for subgroup consideration (typically developing children <2 years, typically developing children 2-16 years, children with comorbidities <2 years, children with comorbidities 2-16 years)

Research priorities

Further research is needed into determining which sleep questionnaire(s) have the best diagnostic accuracy for diagnosing sleep disordered breathing in children

Sleep questionnaires and clinical assessment

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
PROBLEM	No	Probably no	Probably yes	**Yes**		Varies	Don't know
TEST ACCURACY	Very inaccurate	Inaccurate	**Accurate**	Very accurate		Varies	Don't know
DESIRABLE EFFECTS	Trivial	Small	**Moderate**	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	Very low	**Low**	Moderate	High			No included studies
BALANCE OF EFFECTS	Favours the comparison	Probably favours the comparison	Does not favour the intervention or the comparison	**Probably favours the intervention**	Favours the intervention	Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	**Conditional recommendation for the intervention**	Strong recommendation for the intervention
☐	☐	☐	☒	☐

CONCLUSIONS

Recommendation

Sleep questionnaires combined with clinical assessment can be considered as a first line screening test for diagnosing sleep disordered breathing in children (Conditional)

Justification

Sleep questionnaires and clinical assessment have a high sensitivity and a low specificity for diagnosing sleep disordered breathing in children (Low)

Subgroup considerations

There were not enough data for subgroup consideration (typically developing children <2 years, typically developing children 2-16 years, children with comorbidities <2 years, children with comorbidities 2-16 years)

Research priorities

Further research is needed into investigating the diagnostic accuracy of clinically applicable combined sleep questionnaires and clinical assessment

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Question Protocol

Field	Content
Review Question	What is the diagnostic accuracy of using a sleep questionnaire, sleep video recording or sleep audio recording to identify sleep disordered breathing in children with suspected sleep disordered breathing?
Type of review question	Diagnostic accuracy
Objective of the review	Currently there is uncertainty as to whether SDB can be accurately diagnosed using sleep questionnaires, sleep video recording or sleep audio recording The review aims to determine the diagnostic accuracy of sleep questionnaires, sleep video recording and sleep audio recording in predicting SDB The recommendations might cover: • The role of sleep questionnaires, sleep video and sleep audio recording as part of a diagnostic pathway • Any differences in the accuracy of these investigations between typically developing children and children with comorbidities • Whether sleep questionnaires, sleep video and sleep audio recording might provide a filter for referral from primary to secondary care • In which circumstances questionnaires, sleep video recording and sleep audio recording are unhelpful • Aim to include the appropriateness of these investigations in a flow pathway
Eligibility criteria – population / disease / condition / issue / domain	Children (<17 years) with suspected sleep disordered breathing
Eligibility criteria – index test(s)	Sleep questionnaire Sleep video Sleep audio recording
Eligibility criteria – gold standard	Polysomnography
Outcomes and prioritisation	Diagnostic accuracy
Eligibility criteria – study design	Meta-analyses Randomised controlled trials – questionnaire versus no questionnaire, video versus no video, audio versus no audio

	Prospective Cohort Studies Retrospective Case Note Reviews
Other inclusion /exclusion criteria	Non-English language excluded unless full English translation Conference abstracts, Cochrane reviews, systematic reviews, reviews Cochrane reviews and systematic reviews can be referenced in the text, but **DO NOT** use in a meta-analysis
Proposed sensitivity / subgroup analysis, or meta-regression	Typically developing children <2 years Typically developing children 2-16 years Children with comorbidities <2 years Children with comorbidities 2-16 years
Selection process – duplicate screening / selection / analysis	Agreement should be reached between Guideline members who are working on the question. If no agreement can be reached, a decision should be made by the Guideline co-chairs. If there is still no decision, the matter should be brought to the Guideline group and a decision will be made by consensus
Data management (software)	RevMan5 Meta-analysis data input. Evidence review/considered judgement. Storing Guideline text, tables, figures, etc. MetaDTA Data meta-analyses Gradepro Quality of evidence assessment / Recommendations
Information sources – databases and dates	MEDLINE, Embase, PubMED, Central Register of Controlled Trials and Cochrane Database of Systematic Reviews No date restrictions
Methods for assessing bias at outcome / study level	RevMan5 diagnostic accuracy full review template (based on QUADAS2) (follow instructions in '*BTS Guideline Process Handbook - Diagnostic Accuracy*')
Methods for quantitative analysis – combining studies and exploring (in)consistency	If 3 or more relevant studies: RevMan5 for forest plots, summary ROC plot MetaDTA to combine studies (pooled specificity, sensitivity, likelihood ratios, diagnostic odds ratio and confidence intervals) and calculate RevMan parameters for summary ROC plot (follow instructions in '*BTS Guideline Process Handbook - Diagnostic Accuracy*')

Meta-bias assessment – publication bias, selective reporting bias	GRADEpro Diagnostic accuracy quality of evidence assessment for each index test (follow instructions in '*BTS Guideline Process Handbook - Diagnostic Accuracy*')
Rationale / context – what is known	Health professionals currently use a range of techniques to decide whether a child has obstructive sleep apnoea. These include history taking, the use of sleep questionnaires and review of video/audio recordings. In 2015 the ERS taskforce evaluated the role of history taking in identifying OSA and identified that frequent loud snoring, witnessed apnoeas, restless sleep and mouth breathing are associated with the presence of obstructive SDB. Questionnaires: David Gozal and Karen Spruyt published a review in 2011 of sleep questionnaires concluding that many had not been validated. Current literature suggests that questionnaires poorly predict OSA in typically developing children. There is an absence of literature around the utility of questionnaires in children with comorbidities. Very limited information is available in relation to audio and video recordings with a lack of controlled studies in this area.