ORIGINAL ARTICLE

Are sleep problems under-recognised in general practice?

S Blunden, K Lushington, B Lorenzen, T Ooi, F Fung, D Kennedy

Arch Dis Child 2004;**89**:708–712. doi: 10.1136/adc.2003.027011

See end of article for authors' affiliations

Correspondence to: Dr S Blunden, University of South Australia, Centre for Sleep Research, 5th Floor, Basil Hetzel Institute, Queen Elizabeth Hospital, Woodville Road, Woodville, SA 5011, Australia; sblunden_sleepclinic@hotmail.com

Accepted 8 December 2003

Aims: To evaluate the frequency of sleep problems in Australian children aged 4.5–16.5 years, and to determine whether the frequency of sleep problems on questionnaire predicts the reporting of sleep problems at consultation.

Methods: Parents of 361 children (aged 4.5–16.5 years) attending their general practitioner for ''sick'' visits were asked to assess their child's sleep over the previous six months using the Sleep Disturbance Scale for Children, from which six sleep ''disorder'' factors and a total sleep problem score were obtained.

Results: The percentage of children with a total sleep problem score indicative of clinical significance (T score >70 or >95th centile) was 24.6% (89/361). Despite this high frequency, parents only addressed sleep problems in 4.1% (13/317) of cases and reported that GPs discussed sleep problems in 7.9% (25/317) of cases. Of the 79 children who reported total sleep problem T scores in the clinical range, only 13.9% (11/79) discussed sleep with their general practitioner within the previous 12 months. Regression analyses revealed an age related decrease in problems with sleep-wake transition and sleep related obstructive breathing; sleep hyperhydrosis, initiating and maintaining sleep, and excessive daytime sleepiness did not significantly decrease with age. No significant gender differences were observed.

Conclusions: Results suggest that chronic sleep problems in Australian children are significantly under-reported by parents during general practice consultations despite a relatively high frequency across all age groups. Given the impact on children and families, there is a need for increased awareness of children's sleep problems in the community and for these to be more actively addressed at consultation.

Childhood is characterised by considerable changes in the organisation, timing, and structure of sleep[1] with a high incidence of transient sleep problems such as bedtime struggles and sleep related anxiety.[2 3] What is less well recognised is that chronic sleep problems are also common, affecting up to 30% of children.[4–7] These include problems with sleep related breathing (snoring, sleep apnoea), initiating and maintaining sleep (sleep onset insomnia, night-time awakenings, etc), parasomnias including sleep-wake transition disorders (restless legs, rhythmic movement disorders, etc) and arousal disorders (sleep walking, night terrors, etc), and excessive daytime sleepiness. Chronic sleep problems are reported to have negative effects on families and on children's academic, neurocognitive, and behavioural performance.[8–12] However, despite the relatively high prevalence rates and the potential for daytime sequelae, chronic sleep problems in children are reportedly under-diagnosed at the primary care level.[13 14] A contributing factor may be the lack of community awareness of the negative effects of sleep problems on daytime functioning in children and hence the under-reporting by parents at medical consultation.

To assess whether sleep problems are under-reported at general practitioner consultation, we undertook a prospective study in which parents of children aged 4.5–16.5 years attending for ''sick visits'', reported by questionnaire the frequency of their sleep problems over the previous six months; we compared this to the frequency with which sleep problems were discussed with general practitioners. As sleep problems are reported to be higher in younger children[1 11] and possibly males,[7 15] we also investigated the effects of age and gender on the frequency of reported sleep problems.

METHODS

Between July 2000 and March 2001, parents of children aged 4.5–16.5 years, attending their general practitioner (GP) for ''sick'' visits in five general practices in the northern suburbs of Adelaide, completed the Sleep Disturbance Scale for Children (SDSC)[16] while awaiting consultation. The SDSC was chosen because of its robust factor structure on principle component analyses, the availability of standardised norms, and the overlap of the normative age group with that assessed in the present study.[16] It is also one of the few available child instruments with a measure of sleep hyperhydrosis, which, although being considered as a sleep disorder in children[17] remains under-investigated. In this study, the SDSC was used to assess sleep problems in children of a broader age range than the normative sample (6.5–15.3 years)—that is, children of school age in South Australia (4.5–16.5 years). The SDSC contains 26 items, two rated on a five point intensity scale: ''How many hours sleep does your child get on most nights?'' (1 = 9–11 h, 2 = 8–9 h, 3 = 7–8 h, 4 = 5–7 h, and 5 = <5 h); and ''How long after going to bed does your child usually fall asleep?'' (1 = <15 min, 2 = 15–30 min, 3 = 30–45 min, 4 = 45–60 min, and 5 = >60 min); and the remainder using a five point frequency scale (1 = never, 2 = occasionally (1–2 times per month), 3 = sometimes (1–2 times per week), 4 = often (3–5 times per week), and 5 = always).

The SDSC provides six sleep disturbance factors: ''disorders'' of (1) sleep breathing (frequency of snoring, sleep apnoea, and difficulty breathing), (2) initiating and maintaining sleep (prolonged sleep onset, night awakenings, etc), (3) arousal (sleepwalking, nightmares, and sleep terrors), (4) sleep-wake transition (hypnic jerks, restless legs, head banging, rocking, sleep talking, etc), (5) excessive somnolence (morning and daytime sleepiness, etc), and (6) sleep hyperhydrosis (night sweating). A total sleep problem score was derived by summing all sleep factor scores. Standardised norms were used to calculate T scores (mean = 50, SD = 10), with T scores greater than two standard deviations above the mean (T score >70) taken as clinically significant, and with these normative values (that is, for ages 6.5–15.3 years[16]) being applied to our sample of children 4.5–16.5 years. Parents were instructed to consider their child's sleep when well, over the previous six months.

Table 1 Percentage (n) of children with SDSC individual factor and total sleep problem T scores in the clinical range (T scores >70) according to age in two yearly intervals

Age in years (gender n)	Initiating and maintaining sleep	Sleep breathing	Arousal	Sleep wake transition	Excessive daytime sleepiness	Sleep hyperhydrosis	Total sleep problem
4.5–6.49 y (M56, F38)	18.0% (17)	24.4% (23)	19.1% (18)	27.3% (26)	11.5% (11)	8.4% (8)	30.4% (29)
6.5–8.49 y (M37, F42)	26.5% (21)	18.9% (15)	16.4% (13/)	25.3% (20)	12.6% (10)	8.8% (7)	27.8% (22)
8.5–10.49 y (M36, F22)	24.1% (14)	17.2% (10)	17.2% (10)	25.8% (15)	6.7% (4)	10.1% (6)	25.8% (15)
10.5–12.49 y (M25, F23)	18.7% (9)	14.5% (7/)	18.7% (9)	12.5% (6)	12.5% (6)	8.3% (4)	14.5% (7)
12.5–14.49 y (M24, F19)	27.9% (12)	7.0% (3)	4.6% (2)	11.6% (5)	18.6% (8)	6.9% (3)	25.5% (11)
14.5–16.5 y (M20, F19)	17.9% (7)	10.2% (4)	2.5% (1)	7.6% (3)	15.3% (6)	0.0% (0)	12.8% (5)
Total (M198, F163)	22.7% (80)	17.1% (62)	14.6% (53/)	20.7% (75)	12.5% (45)	7.7% (28)	24.6% (89)

To examine how often parents discussed their child's sleep problems at consultation, parents, while completing the SDSC, were asked to recall if they had sought medical advice (yes once, yes >once, and no) or had discussed sleep problems (yes, no, and don't know) during GP consultation within the previous 12 months. Similarly, immediately after the consultation on the day of questionnaire completion, GPs were asked to record if parents had raised sleep problems within the past 12 months (yes, no, don't know, and new patient). Parents and GPs were also asked to specify the reason for consultation (sleep, snoring, and other). For this study, snoring and sleep responses were combined. The snoring data are detailed in another study whose participants overlap with the present sample.[18]

Questionnaires were distributed on selected days over an eight month period by reception staff according to their availability. Completion of the questionnaire, which included a brief description of the study, was taken as informed consent and the study was approved by the Human Ethics Committee of the University of South Australia. The northern suburbs of Adelaide contain a high proportion of low income families.[19]

Statistical analysis

To examine whether children with sleep problems on questionnaire were more likely to report sleep problems at consultation, we divided children into three clinical categories according to their total sleep problem T scores: (1) normal (T scores <50); (2) borderline (T score 50–70); and (3) clinically significant (T score >70, that is, >95th centile). All T scores were based on normative data.[16] To assess if age and gender were predictive of increased frequency of sleep problems, logistic regression analyses were undertaken. For this purpose, each sleep disturbance factor score was converted to a binary variable: T scores in the normal range (that is, T scores $\leqslant$70) and T scores in the clinical range (that is, T scores >70). These binary variables were entered as dependent variables and age and gender were entered as independent variables. Pearson *r* correlations were used to explore the relation between SDSC factor raw scores with significance tested using Fisher's r-z transformations. Given the exploratory nature of the study, no corrections were made for multiple comparisons.

RESULTS

A response rate was not obtained, but 90% of questionnaires distributed were returned and based on GPs' calculations; we estimated that 26% of children presenting for consultation were sampled. We obtained 370 questionnaires from children who had at least one visit in the previous 12 months. From these, we omitted nine with two or more missing responses leaving a final sample of 361, consisting of 198 males (54.8%) and 163 females (45.1%) (mean (SD) age 9.2 (3.4) years, with 48.1% in the 4.5–8.5 year age range. No significant age difference was found between gender (mean (SD) age: males 9.1 (3.4) and females 9.4 (3.4) years; t (359) = 0.88, $p > 0.05$).

Table 1 presents the percentage of children with total sleep problem T scores in the clinically significant range (that is, T scores >70) according to age. Of note is that 24.6% (89) of the complete sample (n = 361) reported total sleep problem T scores in the clinical range. Analyses were also undertaken on a subset of the total sample (n = 248) that matched the age norms reported for the SDSC[16] (that is, 6.5–15.3 years). These revealed that 23.6% (59) of children reported total sleep problem T scores in the clinical range, with individual factors ranging in decreasing order from 24.1% (60) for initiating and maintaining sleep, 19.7% (49) sleep-wake transition, 14.5% (36) arousal disorders, 14.1% (35) sleep breathing, 13.3% (33) excessive sleepiness, and 8.0% (20) to sleep hyperhydrosis.

Table 2 shows results of the logistic regression. Findings revealed that age significantly predicted T scores in the clinical range for sleep breathing (SBD), arousal (AD), and sleep wake transition (SWTD) problems, with younger children reporting more frequent sleep problems than older children. Other SDSC sleep problems scores did not show a significant age related decrease. Apart from a non-significant trend for higher hyperhydrosis scores in males ($p = 0.07$), gender was not predictive of sleep problems.

Discussion of sleep problems on the day of questionnaire completion

To examine how many parents and GPs reported sleep problems at the current visit, questionnaires with missing responses were eliminated (parents = 35, GPs = 24, both missing = 15), leaving 317 cases. In this group we found that 4.1% (13/317) of children were visiting their general practitioner for sleep problems (seven sleep, six snoring). Of these 13 children, nine had recorded total sleep problem T scores in the clinical range and 11 were <8.5 years. Similarly, GPs reported that 3.8% (12/317) of children were visiting for sleep problems (four sleep, eight snoring). Of these 12 children, eight had recorded a total SDSC problem T score in the clinical range and seven were <8.5 years. Table 3 summarises these results. Of note is that of the 79 children

Table 2 Results of logistic regression analyses with total sleep problem scores (T scores ⩽70 or T scores >70) as dependent variables) and age and gender as independent variables

Dependent variable	Independent variable	R	χ^2	p value	Exp (coefficient)	95% lower	95% upper
Disorders of initiating and maintaining sleep	Age	−0.01	0.05	0.82	1.00	0.92	1.06
	Gender	−0.31	1.50	0.21	0.73	0.44	1.20
Sleep breathing disorders	Age	0.12	7.23	**0.007**	1.1	1.03	1.23
	Gender	0.07	0.08	8.78	1.08	0.62	1.87
Arousal disorders	Age	0.05	5.55	**0.02**	1.111.02	1.22	
	Gender	−0.09	0.10	0.74	0.90	0.50	1.63
Sleep-wake transition disorders	Age	0.04	10.27	**0.001**	1.14	1.05	1.24
	Gender	0.13	0.23	0.62	1.13	0.68	1.89
Excessive daytime sleepiness	Age	−0.04	0.73	0.39	0.96	0.88	1.05
	Gender	−0.37	1.37	0.24	0.68	0.36	1.28
Hyperhydrosis	Age	0.08	1.63	0.20	1.08	0.96	1.21
	Gender	0.77	3.20	0.07	2.17	0.93	5.08
Total sleep problem	Age	0.08	5.10	0.02	1.08	1.01	1.17
	Gender	0.13	0.29	0.59	1.14	0.70	1.80

with total problem T scores in the clinical range on questionnaire, only nine raised sleep problems with the GP on the day of questionnaire completion.

Discussion of sleep problems during the past 12 months

The frequency in which sleep problems were discussed by parents and GPs within the past 12 months is also summarised in table 3. When asked if sleep had been discussed during the previous 12 months, 5.7% (18) and 3.4% (11) of GPs responded ''don't know''. Overall, a trend was observed towards parents and GPs discussing more sleep problems during consultation in children who reported higher total sleep problem T scores on questionnaire. Despite this, over the past 12 months, sleep problems were only reported by parents in 13.9% (11/79) of children with total sleep problem T scores in the clinical range.

Further analyses were undertaken to examine which of the individual sleep problems might contribute to reporting sleep problems at consultation. Overall, when any individual sleep problem score was in the clinical range, parents and GPs were more likely to discuss sleep during consultation. Inspection of individual T scores revealed that parents of children with sleep breathing (SBD) problem scores in the clinical range were most likely to discuss sleep problems (SBD = 14.0 (7/50)), followed by those with excessive daytime sleepiness (SBD = 10.8% (4/37)); sleep wake transition problems (SBD = 10.0% (8/80)); initiating and maintaining sleep

Table 3 Percentage (n) of parents and doctors who sought advice or discussed sleep at consultations according to total sleep problem T scores (normal, borderline, or clinical range)

	% children with SDSC total sleep problem scores			
	Normal range (T scores <50) (n = 69)	Borderline range (T scores 50–70) (n = 169)	Clinically significant range (T scores >70) (n = 79)	% children combined (n = 317)
At current visit				
According to parents				
Parent sought advice for sleep problem?				
(Yes)	2.9% (2/69)	1.2% (2/169)	11.4% (9/79)	4.1% (13/317)
According to GPs				
Parent sought advice for sleep problem?				
(Yes)	1.4% (1/69)	1.8% (3/169)	10.1% (8/79)	3.8% (12/317)
During the past 12 months				
According to parents				
Parent sought advice for sleep problem?				
Yes once	2.9% (2/69)	0.0% (0/169)	6.3% (5/79)	2.2% (7/317)
Yes>once	0.0% (0/69)	0.6% (1/169)	7.6% (6/79)	2.2% (7/317)
No	97.1% (67/69)	99.4% (168/169)	86.1% (68/79)	95.5% (303/317)
General practitioner discussed sleep problem?				
Yes	7.2% (5/69)	7.1% (12/169)	10.1% (8/79)	7.9% (25/317)
No	91.3% (63/69)	87.6% (148/169)	79.7% (63/79)	86.4% (274/317)
Don't know	1.4% (1/69)	5.3% (9/169)	10.1% (8/79)	5.7% (18/317)
According to GPs				
Parent raised child's sleep at consultation?				
Yes	2.9% (2/69)	1.2% (2/169)	15.2% (12/79)	5.0% (16/317)
No	91.3% (63/69)	96.4% (163/169)	81.0% (64/79)	91.5% (290/317)
Don't know	5.8% (4/69)	2.4% (4/169)	3.8% (3/79)	3.5% (11/317)

problems (SBD = 9.7% (7/72)); hyperhydrosis (SBD = 8.3% (2/24)) and finally arousal problems (SBD = 6.2% (5/80)).

The correspondence between parental and GP recall of discussing sleep over 12 months was also examined. Parents recalled seeking medical advice for sleep problems in 4.4% (14/317, 7 once, 7 > once) of cases; of these, 11 children had total sleep problem T scores in the clinical range and nine were <8.5 years. GPs reported that 5.0% (16/317) of parents discussed sleep problems, 12 of whom reported a total sleep problem T score in the clinical range and 13 were <8.5 years. Overall, in only nine cases did both parents and GPs recall discussing sleep problems during a consultation for the same child over the past 12 months.

In summary, with parents' and doctors' responses considered together, sleep problems in symptomatic children were discussed in less than approximately 15% of cases.

The intercorrelation between sleep problems

The comorbidity between sleep problems was explored by intercorrelating SDSC raw scores. Results are reported in table 4. Although the magnitude of the correlations was low to moderate, all SDSC raw factors were significantly intercorrelated. Of specific note is that sleep wake transition scores moderately correlated with all other sleep problems scores and that ''disorders'' of initiating and maintaining sleep and excessive daytime sleepiness also showed a strong relation.

DISCUSSION

The main finding of this study was that chronic sleep problems were seldom raised during medical consultation. Specifically, parents of children with T scores in the clinical range (n = 79) raised sleep problems in only 13.9% (11/79) of cases during consultations in the past 12 months, with 11.4% (9/79) seeking advice for sleep problems on the day of the survey. This is despite a relatively high percentage of reported sleep disturbance on questionnaire, with 24.6% (89/361) of children reporting sleep problem scores in the clinical range. We also found that sleep problems were persistent across the whole 4.5–16.5 year age range, showing only a small age related decrease and apart from a trend for sleep hyperhydrosis, no strong gender differences.

The present study suggests that parents under-report sleep problems at consultation. Similar findings have been reported by Stein and colleagues,[20] who found that although 10.8% of 4–12 year olds (n = 472) reported persistent sleep problems (Sleep Behaviour Questionnaire) within the previous six months, less than 50% of parents discussed sleep at consultation. Similarly Smedje and colleagues[21] reported that while sleep problems were common in their sample of 1844 five to seven year olds, it was only raised at consultation by 6.7% of parents. Reasons for under-reporting of sleep problems may be multifactorial. While it is possible that under-reporting in the present study may be influenced by problems with parental recall and a range of other rater biases,[22] parental recall estimates were similar to those reported by GPs who had access to records in their case notes when completing their responses. Furthermore, it is possible that parental under-reporting was influenced by their limited awareness of the importance and potential sequelae of sleep problems in children, such as reduced academic performance, neurocognitive function, and increased problematic daytime behaviour.[4 8–12 20 23] This would indicate a need for wider community education regarding the importance of sleep in children and the timely recognition of sleep problems. More broadly, it has also been suggested that reliance on the biomedical model for history taking at consultation may also inhibit and thus decrease parental reporting of sleep problems.[24]

There is also evidence that medical practitioners may under-report sleep problems in children. For example, Chervin and colleagues[14] reported that only 15% of symptomatic children had documentation of sleep problems in case notes, with diagnosis recorded in 2% (2/86) and treatment not recorded at all. Owens[13] reported that only 34% of paediatricians (n = 626) were confident in evaluating sleep problems in children and adolescents, with only 25% confident to treat them. In the present study, parents reported that general practitioners raised sleep problems in only 10.1% (8/79) of symptomatic children. It may be the case that sleep problems are discussed during consultation but not documented, or alternatively, that busy general practitioners are less likely to discuss and document sleep during ''sick'' visits compared to ''well'' visits, concentrating instead on the problem at hand. Nonetheless, taken together these findings indicate significant gaps in the understanding of sleep problems in clinical practice. As has been suggested by Mindell and colleagues,[25] there is a need for increased instruction in sleep medicine despite the already overloaded medical curriculae. This is particularly important as the primary care physician is well placed to diagnose sleep problems and be an advocate for sleep education in the community,

As younger children are more likely to experience sleep disturbance[1] and given the inclusion of younger age groups compared to the normative sample, it is not surprising that the frequency of sleep problems was relatively high in this study. Nonetheless, the frequency estimates for the six sleep problems observed in the present study are broadly comparable to those reported in community[5–7 11 15] and general practice surveys.[14 20 21] Similarly, the finding of an age related decrease in problems with sleep-wake transition, sleep breathing, and arousal are consistent with previous reports.[5 11 15] Unlike previous studies however,[1 12] we did not observe an age related decrease in problems with initiating and maintaining sleep, nor excessive sleepiness. The failure

Table 4 Intercorrelation individual Sleep Disturbance Scale for Children raw factor scores

SDSC ''disorder''	''Disorders'' of sleep breathing	''Disorders'' of initiating and maintaining sleep	''Disorders'' of arousal	''Disorders'' of sleep-wake transition	''Disorders'' of excessive sleepiness	Sleep hyperhydrosis
''Disorders'' of sleep breathing	1.00					
''Disorders'' of initiating and maintaining sleep	0.19***	1.00				
''Disorders'' of arousal	0.25****	0.32****	1.00			
''Disorders'' of sleep-wake transition	0.39****	0.49****	0.49****	1.00		
''Disorders'' of excessive sleepiness	0.25****	0.50****	0.29****	0.47****	1.00	
Sleep hyperhydrosis	0.19***	0.20***	0.30****	0.39****	0.17**	1.00

*p<0.05, **p<0.005, ***p<0.0005, ****p<0.0001.

to find an age related decrease in initiating and maintaining sleep remains unexplained. The failure to find an age related decrease in daytime sleepiness in our sample may have been influenced by the common problem of later sleep phase timing and the curtailment of sleep in the morning common in adolescents in general[4] or by the high rate of comorbid sleep problems in our older children (for example, problems with initiating and maintaining sleep and/or sleep-wake transition). That is, the significant inter-correlation of other sleep problems observed in this study may also have contributed to the reports of excessive daytime sleepiness in this sample. Finally, there was a trend for a male predominance in sleep hyperhyrosis. Comparable findings have been reported by Bruni and colleagues[16] but remain unexplained.

The present study has several potential limitations. Estimates of sleep problems in this sample may have been affected by selection bias as not all families attending their GP received the questionnaires, a potential rater bias due to the use of parental report for data collection, and a possible recall bias for both parental and practitioner recall. The use of a sample of convenience (with children attending their GPs for ''sick'' visits) may have reduced reporting rates as GPs are less likely to discuss sleep during ''sick'' visits, although any impact is likely to have been small given that our prevalence estimates are similar to previous studies. There are also inherent difficulties in using sleep screening questionnaires in the absence of a detailed clinical history given their inadequacy as diagnostic tools. For example, a T score >70 which is greater than the 95th centile on the SDSC may be suggestive but not conclusive of clinical significance. The frequency response format of the SDSC may also have led to overestimation of some sleep problems such as sleep wake transition, while underestimating others such as arousal, although the use of T scores in this study would minimise this problem. We believe however, that these limitations do not sufficiently detract from the findings of this study which are that sleep problems are common in children but are infrequently reported and thereby remain untreated. Furthermore, there is a need for both increased professional and community awareness of sleep problems in children.

Authors' affiliations

S Blunden, K Lushington, University of South Australia, Centre for Sleep Research, 5th Floor, Basil Hetzel Institute, Queen Elizabeth Hospital, Woodville Road, Woodville, SA 5011, Australia
B Lorenzen, F Fung, T Ooi, Adelaide Northern Division of General Practice, 1st Floor, 13 Elizabeth Way, Elizabeth, SA 5112, Australia
D Kennedy, University of Adelaide, Department of Paediatrics/ Department of Pulmonary Medicine, Women's and Children's Hospital, 76 King William Rd, North Adelaide, SA 5066, USA

REFERENCES

1 **Sadeh A**, Raviv A, Gruber BL. Sleep patterns and sleep disruption in school age children. *Dev Psychol* 2000;**36**:291–301.
2 **Lozoff B**, Wolf AW, Davis NS. Sleep problems seen in pediatric practice. *Pediatrics* 1985;**75**:477–83.
3 **Kahn A**, Van de Merckt C, Rebuffat E. Sleep problems in healthy preadolescents. *Pediatrics* 1989;**84**:542–8.
4 **Stores G**. Children's sleep disorders: modern approaches, developmental effects, and children at special risk. *Dev Med Child Neurol* 1999;**41**:568–73.
5 **Klackenberg G**. Somnambulism in childhood—prevalence, course, and behavioural correlates. A prospective longitudinal study (6–16 years). *Acta Pediatr Scand* 1982;**71**:495–9.
6 **Laberge L**, Trembly RE, Vitaro F, *et al*. Development of parasomnias from early childhood to early adolescence. *Pediatrics* 2000;**106**:67–74.
7 **Teculescu DB**, Caillier I, Perrin P, *et al*. Snoring in French preschool children. *Paediatr Pulmonol* 1992;**13**:239–44.
8 **Blunden SL**, Lushington K, Kennedy D, *et al*. Behaviour and neurocognitive performance in children aged 5–10 years who snore compared to controls. *J Clin Exp Neuropsychol* 2000;**22**:554–68.
9 **Dahl R**. The impact of inadequate sleep on children's daytime cognitive function. *Semin Pediatr Neurol* 1999;**3**:44–50.
10 **Owens J**, Opipari L, Nobile C, *et al*. Sleep and behaviour in children with obstructive sleep apnea and behavioural sleep disorders. *Pediatrics* 1998;**102**:1178–84.
11 **Quine L**. Sleep problems in primary school children: comparison between mainstream and special school children. *Child Care Health Dev* 2001;**27**:201–20.
12 **Smedje H**, Broman JE, Hetta J. Associations between disturbed sleep and behavioural difficulties in 635 children aged six to eight years: a study based on parents' perceptions. *Eur Child Adolesc Psychiatry* 2001;**10**:1–9.
13 **Owens JA**. The practice of pediatric sleep medicine: results of a community survey. *Pediatrics* 2001;**108**:E51.
14 **Chervin RD**, Archbold KH, Panahi P, *et al*. Sleep problems seldom addressed at two general pediatric clinics. *Pediatrics* 2001;**107**:1375–80.
15 **Corbo GM**, Forastiere F, Agabiti N, *et al*. Snoring in 9–15 year old children: risk factors and clinical relevance. *Pediatrics* 2001;**108**:1149–54.
16 **Bruni O**, Ottaviano S, Guidetti MR, *et al*. The Sleep Disturbance Scale for Children: construction and validation of an instrument to evaluate sleep disturbance in childhood and adolescence. *J Sleep Res* 1996;**5**:251–61.
17 **Thorpy MC**. *International classification of sleep disorders. Diagnostic and coding manual*. Rochester, MN: American Sleep Disorder Association, 1990.
18 **Blunden SL**, Lushington K, Lorenzen B, *et al*. SBD symptoms are under-reported by parents at general practice consultations. *Sleep and Breathing*. In press..
19 **ABS**. *Australian standard classification of occupations*. Canberra: Australian Bureau of Statistics, Information Services, 1990.
20 **Stein MA**, Mendelsohn J, Obermeyer WH, *et al*. Sleep and behavior problems in school-aged children. *Pediatrics* 2001;**107**:E60.
21 **Smedje H**, Broman JE, Hetta J. Parents' reports of disturbed sleep in 5–7-year-old Swedish children. *Acta Paediatr* 1999;**88**:858–65.
22 **Scher A**, Epstein R, Sadeh A, *et al*. Toddlers' sleep and temperament: reporting bias or valid link. *J Child Psychol Psychiatry* 1992;**33**:1249–54.
23 **Gozal D**. Sleep-disordered breathing and school performance in children. *Pediatrics* 1998;**102**:616–20.
24 **Barrier PA**, Li JT, Jensen NM. Two words to improve physician-patient communication: what else? *Mayo Clinical Procedures* 2003;**78**:211–14.
25 **Mindell JA**, Moline ML, Zendell SM, *et al*. Pediatricians and sleep disorders: training and practice. *Pediatrics* 1994;**94**:194–200.