Development, validation (diagnostic accuracy) and audit of the Auckland Sleep Questionnaire:

a new tool for diagnosing causes of sleep disorders in primary care

Bruce Arroll MBChB, PhD;[1] **Antonio Fernando III** MD, Am Bd Cert Psych;[2] **Karen Falloon** MBChB, FRNZCGP;[1] **Guy Warman** PhD;[3] **Felicity Goodyear-Smith** MBChB, MGP, FRNZCGP[1]

[1] Department of General Practice and Primary Health Care, The University of Auckland, Auckland, New Zealand

[2] Department of Psychological Medicine, The University of Auckland

[3] Department of Anaesthesia, The University of Auckland, Auckland

ABSTRACT

INTRODUCTION: Sleep disorders are common in the community and in primary care populations. Epidemiological surveys generally report insomnia rather than specific diagnoses.

AIM: Our aim was to develop a questionnaire that could diagnose common sleep disorders in primary care in order to be able to make a diagnosis of primary insomnia by excluding other causes. Having created such a questionnaire, we then validated it (assessed the diagnostic accuracy).

METHODS: The questionnaire was developed from the International Classification of Sleep Disorders using the criteria to create operational criteria. This was used in a primary care survey. A sub-sample of 36 primary care patients (aged over 15 years) was chosen to give a spectrum of disorders. A second sample of 85 patients was taken from a sleep disorder private practice to act as an extra test of validity.

RESULTS: The response rate was 73% (36/49) for the primary care validation. The sensitivity and specificity of primary insomnia was 0.78 and 0.77, mood disorders 0.67 and 0.97, obstructive sleep apnoea 0.8 and 0.94, delayed sleep phase disorder was 0.8 and 0.97 and for health problems affecting sleep 0.92 and 0.76. There were a wider range of findings in the private practice audit.

DISCUSSION: The validity of the Auckland Sleep Questionnaire is promising. The second version of the questionnaire will use this study to improve its functionality.

KEYWORDS: Sleep disorders; validation studies; primary health care

Introduction

Our research group has been interested in assessing the effectiveness of treatments for primary insomnia in primary care. In order to offer treatment for this condition, it was necessary to make a diagnosis. It became apparent that, in order to diagnose primary insomnia, other common causes of sleep disorders needed to be ruled out. The aim of this project was to develop a screening questionnaire and a gold standard questionnaire against which to test it, and to use the questionnaire to diagnose a variety of conditions that can cause sleep disorders in primary care. The validation of the screening questionnaire will be published elsewhere. The study consists of a two-page sleep screening tool and a seven-page gold standard known as the Auckland Sleep Questionnaire (ASQ). Other gold standard questionnaires such as the Pittsburgh Sleep questionnaire were not suitable because they measure the severity of a sleep disorder rather than give specific diagnoses.[1] Ohayon has produced a computerised version of a sleep questionnaire and we have used his algorithm as the basis for making a diagnosis.[2] His studies so far have been in community populations, but the publications enabled us to decide what sleep

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CORRESPONDENCE TO:
Bruce Arroll,
Professor, Department of General Practice and Primary Health Care, The University of Auckland, PB 92019 Auckland 1142, New Zealand
b.arroll@auckland.ac.nz

disorder conditions should and should not be included in a primary care sample. The first aim of this study was to develop a tool (reference standard, i.e. ASQ) to make diagnoses of conditions that could cause sleep disorders in general medical settings in order to find those with primary insomnia through a process of exclusion. It was also planned that the ASQ could be used for epidemiological purposes. The second aim was to determine the sensitivity and specificity (diagnostic accuracy) of the tool for the common sleep disorders.

Methods

This project was conducted in three parts. The first part was the development of the ASQ as a reference standard. The second part was a validation study conducted according to the STARD statement for diagnostic tests.[3] The third part

Table 1. Definition of sleep and other disorders used in the study

Condition		Criteria
Sleep symptoms	**Reported sleep problem**	Problem getting to sleep, staying asleep OR Waking early (on at least 3 nights per week) interfering with activities on the following day
	Significant duration	Symptoms present for >1 month
Medical problem		Significant health problems affecting ability to sleep well occurring ≥3/week
Mood disorders	**Depression**	PHQ score ≥10
	Anxiety	GAD score ≥8
	Nightmares	Recurrent severe nightmares that wake occurring ≥3/week
	Night panic	Wake up at night having an anxiety or panic attack occurring ≥3/week
Breathing disorder	**Obstructive sleep apnoea**	Having ≥4 of: (i and ii must be present) i. Excessive daytime sleepiness ii. Pauses in between breaths during sleep iii. Morning headache iv. Dry mouth v. Loud snoring
Substance problem	**Alcohol**	CAGE score ≥ 2
	Drugs affecting sleep	Reported drugs affecting sleep or quality of sleep
Other sleep disorder (parasomnia and restless leg)	**Sleepwalking**	Reported sleepwalking, started before a teenager, difficulty arousing during episode and no subjective awareness
	Sleeptalking	Occurring ≥3/week causing disturbance to bed partner and no subjective awareness of episode
	Bruxism	Reported teeth grinding AND one of abnormal wear of teeth, sounds associated with grinding or jaw muscle discomfort occurring ≥3/week
	Restless leg	Unpleasant sensations (aches, pains or creeping) in legs affecting sleep, relieved by movement or rubbing occurring ≥3/week
Delayed sleep phase disorder		Three of the following: • Considers self to be an evening person, • Choosing to go to bed late, OR • Choosing to wake up late, AND • Has no medical problem, mood disorder, substance problem, breathing disorder or other sleeping disorder
Primary insomnia		Reported sleep problem for a significant duration (as defined above) AND has no medical problem, mood disorder, substance problem, breathing disorder, other sleep disorder or DSPD

PHQ = Patient Health Questionnaire
GAD = Generalised Anxiety Disorder Questionnaire
DSPD = Delayed sleep phase disorder

was an audit of the questionnaire as used by a psychiatrist trained in sleep disorders (PTS).

Part 1. The development of the ASQ

The ASQ was developed using the criteria from the International Classification of Sleep Disorders (2001) for conditions that were expected in primary care or else were considered potentially important in primary care.[4] In a community sample in Korea, Ohayon found that the common sleep problems were depression, anxiety disorders, primary insomnia, disorders of sleeping, substance-induced sleep disorder, sleep disorder due to a medical condition and circadian rhythm sleep disorders.[2] A similar study conducted in Italy added hypersomnia to the above list of diagnoses from Korea.[5] Our research team met to discuss how the criteria could be converted to a questionnaire format. In addition to these conditions, the research team added questions on parasomnias, nightmares, night panic, postmenopausal flushes and teeth grinding. For these latter conditions they needed to occur on at least three nights per week to be considered to be contributing to a sleep disorder. Caffeine use was not specifically asked about as it was thought this would come out in the open-ended questions in the questionnaire. Some arbitrary decisions were made to enable the diagnostic criteria to be put in to a written format (Table 1). For example, obstructive sleep apnoea (OSA) ultimately requires an overnight sleep study (polysomnography) as this is the gold standard for this condition. We considered a total of four or five criteria, i.e. (i) having both excessive daytime sleepiness ("Do you experience excessive sleepiness during the day, e.g. falling asleep in waiting rooms, lectures or when a passenger in a car?") and (ii) pauses in between breaths ("Do you experience frequent episodes of breathing pauses (or gasping for air) during sleep?" or "Has someone told you that you stop breathing while you are asleep?") and two of three of the following: (iii) morning headaches (iv) dry mouth and (v) loud snoring. Thus a score of four or five out of five would indicate probable OSA as a cause of the sleep disorder. Mood disorders included patients with either a score on the Patient Health Questionnaire (depression inventory) ≥10, a score ≥8 on the GAD (general anxiety disorder inventory which measures post-traumatic stress disorder, generalised anxiety disorder, panic disorder and social anxiety) or if they reported nightmares or night panic.[6,7]

WHAT GAP THIS FILLS

What we already know: There are two questionnaires that can determine the prevalence of different sleep disorders in clinical and community settings.

What this study adds: This is the first questionnaire that enables the diagnosis of multiple sleep disorders in primary care and which has been validated in a primary care population.

Table 2. Demographics for validation study; total participants N=36

Demographic	Number of participants
Age	
16–35 years	15
36–55 years	13
56–75 years	7
76–85 years	1
Gender	
Female	28
Male	8
Ethnicity	
European	27
Maori	1
Samoan	1
Other	7
No sleep disorder according to gold standard interview	9
Primary insomnia	7
Sleep disorder diagnoses not mutually exclusive as diagnosed by the gold standard interview	
Primary insomnia	24
Mood disorder*	6
Sleep apnoea	4
Delayed sleep phase disorder	5

* Includes depression and anxiety and night panic and nightmares but excludes bipolar disorder

Part 2. The validation study

This was conducted in conjunction with the use of the ASQ in a consecutive sample of primary care patients (aged over 15 years).[8] As the sample

was consecutive, the majority of patients were not attending for sleep issues and unpublished results found that many did not want help with their sleep problem even if they were concerned. A sub-sample of patients willing to be interviewed by a PTS was selected by one of the investigators (BA). This was chosen as the gold (reference) standard as we wished to validate the ASQ as a tool to enable primary care physicians to have a working diagnosis on which to act. They were purposively selected to ensure a range of patients with sleep problems as well as a reasonable proportion of those with no sleep problem. A random selection of patients would have potentially limited the number of conditions covered by the selection, especially as our resources only allowed for a small sample size. The aim was to get a prevalence of approximately 50% for sleep disorders in order to get similar confidence intervals around the sensitivity/specificity point estimates. A purely random sample would have made for a wide confidence interval around the sensitivity and a narrow one around the specificity. The information from the ASQ was not given to the PTS so that he was blind to the information according to best practice for diagnostic tests.[3] He was given contact details and conducted the interview by telephone and wrote down his diagnoses which were then compared with the diagnoses from the ASQ. The PTS interview took place between one and four weeks from the completion of the ASQ. The sensitivity and specificity and confidence intervals were calculated using the Centre for Evidence-Based Medicine at the University of Toronto website (www.cebm.utoronto.ca/).[9]

Part 3. The audit study

The study psychiatrist (AF), a PTS, used the questionnaire in his private practice. The patients completed the form before the face-to-face interview with him. He did not see the ASQ prior to making his diagnosis. The ASQ had the data entry conducted by a research assistant blind to the diagnosis of the patients. AF wrote down his diagnoses without consulting the ASQ. The ASQ was then matched with the PTS diagnosis. While this sample is not a primary care sample it provided another clinical situation in which to audit/validate the ASQ. Ethics approval for this study was given by the Northern Regional Ethics Committee NTX/07/05/038.

Results

Part 1: The questionnaire was piloted on 10 patients and changes were made to make it more readable.

Part 2: Forty-nine people were approached for the in-depth interview for the validation study. Eleven declined to be involved, four did not have sufficiently complete ASQ forms and nine were not included for a variety of administrative reasons—hence the number of participants interviewed was 36. For the demographics of these participants see Table 2.

Table 3 shows the ASQ versus the PTS gold standard for common causes of insomnia, and Table 4 presents the sensitivities, specificities, and positive and negative likelihood ratios of the ASQ screening tool against the gold standard. It can be seen that the test is highly specific for sleep disorders associated with mood, OSA and delayed sleep phase disorder (DSPD) along with high positive likelihood ratios.

Part 3. Audit of private practice

One hundred consecutive files were selected. Eleven did not have a complete ASQ, two patients came for non-sleep issues and one file could not be found—hence there are 85 patients in this analysis. Demographics of this sample are shown in Table 5.

Table 3. 2x2 tables for common causes of insomnia on ASQ versus PTS gold standard interview

	True positive	False negative	False positive	True negative
Primary insomnia	19	5	2	10
Mood	4	2	1	29
Obstructive sleep apnoea	4	1	2	29
Delayed sleep phase disorder	4	1	1	30
Health problem	3	8	0	25

Table 4. Measures of validity for common causes of insomnia on ASQ versus PTS gold standard interview

	Sensitivity 95% CI	Specificity 95% CI	Likelihood ratio +ve 95% CI	Likelihood ratio –ve 95% CI
Primary insomnia	0.78 (0.58–0.9)	0.77 (0.5–0.92)	3.39 (1.2–9.4)	0.28 (0.12–0.5)
Mood	0.67 (0.3–0.9)	0.97 (0.83–0.99)	20 (2.7–149)	0.35 (0.11–1.07)
Obstructive sleep apnoea	0.8 (0.35–0.96)	0.94 (0.79–0.98)	12.4 (3.0–50.8)	0.2 (0.04–1.2)
Delayed sleep phase disorder	0.8 (0.38–0.96)	0.97 (0.84–0.99)	24.8 (3.4–179.1)	0.21 (0.036–1.2)
Health problem*	0.92 (0.39–0.99)	0.76 (0.59–0.87)	3.81 (1.9–7.5)	0.12 (0.002–4.4)

* Health problem 0.25 put in false negative cell to allow calculator to work

Table 5. Demographics in the private practice audit sample; total participants N=85

Demographic	Participants
Age	Range 17 to 77 Median 42
Gender	
Female	40
Male	45
Ethnicity	
European	74
Maori	2
Niuean	3
Asian	3
Other	3
No sleep disorder according to gold standard interview	0
Primary insomnia	29
Sleep disorder diagnoses not mutually exclusive as diagnosed by the gold standard interview	
Bipolar affective disorder	1
Mood disorder*	42
Sleep apnoea	6
Bruxism	1
Delayed sleep phase	14
Sleep walking	3
Physical health reasons	4
Social causes	2
Alcohol cause	1
Idiopathic hypersomnia	5
Restless legs	0
Parasomnia	5
Night eating syndrome	1
Menopause	2
Fibromyalgia	2
Drug causes	2
Seizures	1

* Includes depression and anxiety and night panic and nightmares but excludes bipolar disorder

Table 6. 2x2 tables for common causes of insomnia on ASQ versus PTS private practice interview; n= 85

	True positive	False negative	False positive	True negative
Primary insomnia	10	17	9	49
Primary insomnia only*	8	11	11	55
Mood	27	4	30	24
Obstructive sleep apnoea†	3	3	6	73
Delayed sleep phase disorder	6	3	13	63
Alcohol sleep	0	2	2	81
Parasomnia	2	5	3	75

* This is against the gold standard when primary insomnia was the only diagnosis
† Obstructive sleep apnoea on Auckland Sleep Questionnaire at 4 or 5

Table 6 shows the ASQ versus the PTS gold standard for common causes of insomnia in private practice, and Table 7 presents the sensitivities, specificities, and positive and negative likelihood ratios of the ASQ screening tool against the gold standard in this context.

Discussion

The ASQ performs well on the five common causes of sleep disorder in primary care. The likelihood ratio positive for primary insomnia would increase the post-test probability by more then 20% while for mood, OSA and DSPD the likelihood would increase by more than 50%.[11] For the negative likelihood ratio the reduction in post-test probability for primary insomnia is about 25% and for mood 20%, OSA 45% and for DSPD less than 10%. Health issues are the other common cause of sleep disorders in primary care and it is probably better to assess by clinician questioning although it had a good negative likelihood ratio. The ASQ performed better overall in the validation sample than in the private practice. As it was designed for primary care, this is not a major concern.

A strength of this study is that it was conducted in the population in which it has and will be used, and that it was conducted using the STARD statement criteria for a diagnostic validation study.[3] Specifically, the ASQ was asked before the blinded gold standard interview. A weakness was

Table 7. Measures of validity for common causes of insomnia on ASQ versus PTS private practice interview

	Sensitivity (95% CI)	Specificity (95% CI)	Likelihood ratio +ve	Likelihood ratio -ve
Primary insomnia (all)*	0.37 (0.22–0.56)	0.85 (0.73–0.92)	2.4 (1.09–5.19)	0.75 (0.55–1.02)
Primary insomnia (only)†	0.42 (0.23–0.64)	0.83 (0.73–0.9)	2.5 (1.19–5.4)	0.7 (0.47–1.04)
Mood	0.87 (0.71–0.95)	0.44 (0.32–0.58)	1.57 (1.19–2.1)	0.29 (0.11–0.76)
Obstructive sleep apnoea‡	0.5 (0.19–0.81)	0.92 (0.84–0.97)	6.6 (2.2–20.0)	0.54 (0.24–1.21)
Delayed sleep phase disorder	0.67 (0.35–0.88)	0.83 (0.73–0.9)	3.9 (1.98–7.7)	0.4 (0.16–1.02)
Alcohol sleep§	0.11 (0.01–0.71)	0.98 (0.92–0.99)	4.6 (0.09–237)	0.91 (0.57–1.45)
Parasomnia	0.29 (0.08–0.64)	0.96 (0.89–0.99)	7.4 (1.5–37.3)	0.74 (0.46–1.19)

* This is against the gold standard when primary insomnia could be one of many diagnoses
† This is against the gold standard when primary insomnia was the only diagnosis
‡ Obstructive sleep apnoea on Auckland Sleep Questionnaire at 4 or 5
§ 0.25 put in true positive cell to facilitate a calculation without a cell containing zero

that some of the interviews were done up to one month after the ASQ was completed and some of the diagnoses may have changed. The other weakness was the small sample size. However, the resources of the project were limited and we plan to make changes to the ASQ and conduct a validation study on a larger population. Some of the questions did not delineate the severity of the question. For example, the question: "At night, do you get unpleasant sensations in your legs (aches, pains, creeping sensations) which affect your sleep?" was answered by more than 20% of the population, but we did not have a question to ask them about how many times it had affected their sleep in the past month. We also used the CAGE questionnaire for alcohol intake; this is considered in some quarters to have a high threshold for alcohol problems and in future we plan to use the AUDIT tool.[10] Finally, the ASQ does not diagnose idiopathic hypersomnia. We used an expert clinical interview as a gold standard for OSA. It could be argued that we should have used polysomnography or actigraphy. This would be a valid conclusion for epidemiological use of the ASQ, but for clinical evaluation we are attempting to get a clinical diagnosis to enable a primary care clinician to make a decision about what step to take next. Thus, we are not attempting, in the clinical setting, to achieve a secure diagnosis, but rather to increase the pre-test probability of OSA.

We are aware of two other studies that have had some validation. The Sleep-EVAL tool developed by Ohayon has been assessed by measures of agreement using kappa scores. Studies performed in the general population and in clinical settings show that Sleep-EVAL is a valid instrument in the assessment of sleep disorders. In the general population, a kappa of 0.85 was obtained in the recognition of any sleep problem, and a kappa of 0.70 was found for insomnia disorders when diagnoses obtained by two lay interviewers using Sleep-EVAL were compared against those obtained by two clinical psychologists. In clinical settings, a kappa of 0.93[12] and 0.92[13] were obtained on OSA syndrome and kappa of 0.78[12] and 0.71[13] were obtained on insomnia diagnoses between Sleep-EVAL's diagnoses and sleep specialists' diagnoses using polysomnography. The other questionnaire is the GSAQ (Global Sleep Assessment Questionnaire) which studied patients from primary care and sleep clinics and validated against a sleep specialist.[14] It reported sensitivities and specificities of 0.79 and 0.57 for primary insomnia, 0.83 and 0.51 for insomnia with a mental disorder, 0.93 and 0.58 for OSA. Our results are generally as good and usually better. The ASQ seems to validate well in a small primary care sample. The way one of us (BA) uses the ASQ in practice is to book a longer appointment time for those who say they have a sleep problem and ask the patient to complete the form before the consultation. Our plans are to improve the questionnaire so it can be used as a gold standard for other sleep work as well as an epidemiological tool for population studies.

Copies of the original ASQ version 1, 2008 are included in the web version of this paper. Please note that version 2 is currently being developed.

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COMPETING INTERESTS
None declared.

APPENDIX A: Main Sleep Questionnaire

Some of the questions here are repeats of previous questions. We would be grateful if you could do the repeat questions as this helps us with the evaluation of the questions—thank you.

Please tick appropriate box:

1. Gender:
   ☐ Male ☐ Female

2. Age in years:
   ☐ 16–25 ☐ 25–35 ☐ 36–45 ☐ 46–55 ☐ 56–65 ☐ 66–75 ☐ 76–85 ☐ over 85

3. What ethnic group do you belong to?
   ☐ NZ European ☐ Maori ☐ Cook Island Maori ☐ Samoan ☐ Tongan ☐ Niuean
   ☐ Chinese ☐ Indian ☐ Other (such as Dutch, Japanese, Tokelauan, Filipino)

   If 'other' ethnicity, please state which applies . . . . . .

4. What is your present marital status?
   ☐ Single ☐ De facto ☐ Civil union
   ☐ Married ☐ Divorced ☐ Widow / widower

5. What is your home phone number? . . . . . .

6. What is your mobile number? . . . . . .

7. What is your work number?. . . . . .

8. Which is the best time to contact you? . . . . . .

9. What is your email address . . . . . .

10. During the past month, how would you rate your sleep quality overall?
    a. Very good ☐
    b. Fairly good ☐
    c. Fairly bad ☐
    d. Very bad ☐

    Please answer the following:

11 a. Do you have problems getting to sleep, staying asleep or waking early such that it affects your work function the next day—this includes feeling excessively sleepy the next day? ☐ No ☐ Yes

    If **no**, go to **Q14**. If **yes**, please proceed to **11b**.

b. If **yes** to the above, how long has this been going on? (Please write)

. . . . . .

c. If **yes**, was there some event that caused this? (Please describe)

. . . . . .

. . . . . .

. . . . . .

. . . . . .

d. Were there specific reasons for your poor sleep, i.e. baby crying, sick family member, partying too late, work/school requirements?

. . . . . .

e. Are you currently working? ☐ No ☐ Yes

If **no**, go to **Q12**. If **yes**, please proceed to **11f** and **11g**.

f. In the past year, did you miss work because of poor sleep? ☐ No ☐ Yes

g. If **yes**, approximately how many days work did you miss? . . . . . days.

12. If you are having problems with your sleep, have you discussed this with a doctor? ☐ No ☐ Yes

If **no**, is there a reason for this? (Please tick one box)

a. The sleep problem started since last visit to GP ☐

b. Did not think it was important enough ☐

c. Did not think anything could be done for it ☐

d. Concerned I may be given medication for it ☐

Other reason (please write) . . . . . .

13. If you do have a problem with sleeping and you have not discussed it with a doctor do you plan to do this today?

a. ☐ No ☐ Yes If **no**, go to **Q14**.

b. If **yes** was this one of the reasons for you seeing your doctor today?

☐ No ☐ Yes

14. Over the last two weeks, how often have you been bothered by any of the following problems?
Please circle the number that applies to you, including not at all where that is the case

		Not at all	Several days	More than half the days	Nearly every day
1	Little interest or pleasure in doing things?	0	1	2	3
2	Feeling down, depressed, or hopeless	0	1	2	3
3	Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4	Feeling tired or having little energy	0	1	2	3
5	Poor appetite or overeating	0	1	2	3
6	Feeling bad about yourself, or that you are a failure or have let yourself or your family down	0	1	2	3
7	Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8	Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9	Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

If you have had any thoughts about harming yourself, please discuss this with your doctor as your doctor will not see this form but would like to know this information.

15. Over the last two weeks, how often have you been bothered by any of the following problems?
Please circle the number that applies to you, including not at all where that is the case.

		Not at all	Several days	More than half the days	Nearly every day
1	Feeling nervous, anxious or on edge	0	1	2	3
2	Not being able to stop worrying	0	1	2	3
3	Worrying too much about different things	0	1	2	3
4	Having trouble relaxing	0	1	2	3
5	Being so restless it is hard to sit still	0	1	2	3
6	Becoming easily annoyed or irritable	0	1	2	3
7	Feeling afraid as if something awful might happen	0	1	2	3

16. Are you a shift worker? ☐ No If **no**, go to **Q17**. ☐ Yes

    a. If **yes**, choose one of the answers below:

    b. Do you work the same shift? e.g. nights ☐ No ☐ Yes

    c. Do you do rotating shifts? ☐ No ☐ Yes

    d. If **yes**, do you have problems with your sleep that may be caused by being a shift worker? ☐ No ☐ Yes

17. Do you have any health problems that affect your ability to sleep well (such as pain, breathing difficulty or acid reflux or night cough or going to the toilet three or more times at night)? ☐ No ☐ Yes

    Please describe:

    . . . . . .

    . . . . . .

18. Regarding the use of alcohol:

    a. Have you ever felt you should cut down on your drinking? ☐ No ☐ Yes

    b. Have people annoyed you by criticising your drinking? ☐ No ☐ Yes

    c. Have you ever felt bad or guilty about your drinking? ☐ No ☐ Yes

    d. Have you ever had a drink first thing in the morning (as an 'eye opener') to steady your nerves or get rid of your hangover? ☐ No ☐ Yes

19. Women only **(men go to Q10a)**

    a. Are you postmenopausal? ☐ No If **no**, go to **Q20a**. ☐ Yes

    b. If **yes**, do you experience hot flushes? ☐ No If **no**, go to **Q20a** ☐ Yes

    c. If **yes**, how many times per night do you awaken due to hot flushes? . . . . . .

    d. If **yes**, do these significantly affect your sleep? ☐ No ☐ Yes

    e. If **yes**, how many nights per week do you experience insomnia due to the hot flushes? . . . . . .

20. **Both men and women continue from here.**

a. Do you experience excessive sleepiness during the day? (e.g. falling asleep in waiting rooms, lectures or when a passenger in a car?) ☐ No ☐ Yes

b. Do you experience frequent episodes of breathing pauses (or gasping for air) during sleep. Or "has someone told you that you stop breathing while you are asleep?" ☐ No ☐ Yes

c. Do you snore very loudly? ☐ No ☐ Yes

d. Do you get morning headaches? ☐ No ☐ Yes

e. Do you have a dry mouth upon awakening? ☐ No ☐ Yes

21 a. At night, do you get unpleasant sensations in your legs (aches, pains, creeping sensations) which affect your sleep? ☐ No ☐ Yes

b. If **yes**, are these sensations relieved by movement, rubbing or walking? ☐ No ☐ Yes

c. If you answered '**yes**' to either **21a** or **21b**, are these sensations severe enough to affect your sleep? ☐ No ☐ Yes

22 a. Do you consider yourself naturally a: *(tick one)*

☐ Morning person or a 'lark' (someone who normally wakes up early and feels sleepy before 11.00 pm?)

☐ Evening person or an 'owl' (someone who normally can stay up late, around midnight or later, and prefer to sleep in late in the morning?)

☐ Neither type, **or** in between

☐ Unsure

b. When you can choose (e.g. weekends or holidays), do you go to bed late at night, e.g. after midnight? ☐ No ☐ Yes

c. When you can choose, do you sleep in late in the morning, e.g. after 10.00 am? ☐ No ☐ Yes

d. What time do you usually go to bed . . . . . .

e. What time do you usually get up. . . . . .

f. How many hours do you actually sleep . . . . . .
(this can be different from the hours you spend in bed.)

23	a.	Do you sleepwalk?	☐ No	If **no**, go to **24a**	☐ Yes
	b.	Did this start before you were a teenager?	☐ No		☐ Yes
	c.	When you are walking in your sleep, is it difficult for others to wake you up?	☐ No		☐ Yes
	d.	Do you have trouble remembering the episode(s) of sleepwalking?	☐ No		☐ Yes
	e.	Do these sleepwalking episodes occur during the first third of your time asleep?	☐ No		☐ Yes
	f.	Does your sleepwalking affect you or people around you in any way?	☐ No		☐ Yes
		If yes, in what way?			
		. . . . .			
	g.	If you answered **yes** to either **23a** or **23b**, is your sleepwalking severe enough to affect your sleep?	☐ No		☐ Yes
24	a.	Do you talk or speak when you are asleep (others may say you do; if so answer yes) If **no**, go to **Q25a** otherwise **Q24b**.	☐ No		☐ Yes
	b.	I sleep talk: *(tick one)* ☐ Less than once per week? ☐ More than once per week, but less than nightly and they cause mild disturbance to my bed partner (if you have one)? ☐ I have had these symptoms nightly and they cause pronounced interruption to my bed partner's sleep (if you have one)?			
	c.	Do you remember talking in your sleep when you awaken?	☐ No		☐ Yes
	d.	If you answered **yes** to either **24a**, **24b**, **24c**, is your sleep talking severe enough to affect your sleep?	☐ No		☐ Yes
25	a.	Do you grind your teeth or clench your teeth when asleep? If **no**, go to **Q26**.	☐ No		☐ Yes
	b.	Do you have abnormal wear of your teeth?	☐ No		☐ Yes

c. Do you have sounds associated with teeth grinding? ☐ No ☐ Yes

d. Do you have jaw muscle discomfort? ☐ No ☐ Yes

e. If you answered **yes** to either **25a** or **25b**, is your teeth grinding severe enough to affect your sleep? ☐ No ☐ Yes

26. Do you have recurrent severe nightmares that wake you up? ☐ No ☐ Yes

If **yes**, how often does this happen. . . . . .

27. Do you wake up in the middle of the night having an anxiety or panic attack (palpitations, pounding heart, difficulty breathing, shaking, feeling faint?) ☐ No ☐ Yes

If **yes**, how often does this happen. . . . . .

28. Have you ever taken any of the following drugs to get high, to feel better or to change your mood over the past three months? ☐ No ☐ Yes

If **no**, you have completed the questionnaire—thank you very much.

If **yes**, please circle the one(s) you have used and write how often you use them, i.e daily, weekly, monthly in the how often column:

Name of drug		**How often**
Cannabis (marijuana, dope, grass, pot, weed, reefer, Hashish (hash), THC etc.)	No/yes	
Stimulants (amphetamines, ritalin, speed, 'P', diet pills, 'ice')	No/ yes	
Cocaine, crack, snorting, speedball	No/ yes	
Heroin, Morphine, Opium, Codeine, Methadone, DHC, Oxycontin	No/yes	
LSD, Ecstasy, PCP, Angel Dust, Fantasy, Datura, Mushrooms	No/yes	
Inhalants, Solvents (glue, petrol, amyl or butyl nitrate, 'poppers', nitrous oxide, laughing gas)	No/yes	
Other prescription medicines to get you high	No/yes	

29. Do you think the use of drugs is affecting your sleep either when you are taking them or after you stop taking them? ☐ No ☐ Yes

30. Do you think the use of these drugs affects your quality of sleep (while you are using them or after you stop taking them?) ☐ No ☐ Yes