

Sleep of Māori and non-Māori of Advanced Age

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ABSTRACT

AIM: To estimate prevalence and identify predictors and outcomes of reporting sleep problems in Māori and non-Māori of advanced age.

METHOD: Participants were 251 Māori, and 398 non-Māori adults (79–90 years) from *Te Puāwaitanga o Ngā Tapuwāe Kia Ora Tonu. Life and Living in Advanced Age: A Cohort Study in New Zealand*. Multiple logistic regression identified predictors of reporting a current sleep problem and investigated relationships between current sleep problems and physical and mental health.

RESULTS: 26.3% of Māori and 31.7% of non-Māori reported a current sleep problem. Reporting a current sleep problem was associated with ethnicity (non-Māori, adjusted OR=0.52, 95% CI=0.30–0.90), and reporting a past sleep problem (adjusted OR=2.67, 95% CI=1.25–5.72). Sleep problems were related to poorer physical and mental health, and falling.

CONCLUSION: Sleep problems are commonly reported and associated with poorer health. Early recognition and management of sleep problems could improve physical and mental health.

Getting older is generally associated with more sleep disturbances, with 20%–70% of 50–80 year olds reporting a sleep problem.^{1–4} Older women (aged ≥50 years) are more likely to report disturbed sleep with insomnia-type symptoms, whereas older men typically report more sleep-disordered breathing and daytime sleepiness.^{2,3,5} Studies that have measured sleep objectively corroborate these reports, showing that sleep quality and duration generally decrease with age.⁶ However, limited research has focused on the prevalence of sleep problems among people of advanced age (>80 years). A recent US-based study found that successful ageing (ie, living with good quality physical and mental health status despite physiological ageing) might be associated with a reduction in reporting sleep problems.⁷

Self-reported sleep problems and disorders are common in New Zealand.⁸ In a 2001 representative national survey of 4,000 adults aged 20–59 years (72.5% response rate), the estimated population prevalence of chronic sleep problems (lasting at least 6 months) was 28.6% for

Māori and 24.6% for non-Māori ($p=0.033$).⁹ There are also consistent relationships between poorer sleep health and greater socioeconomic deprivation as measured by the New Zealand Deprivation Index 2006 (NZDep 06, an area-based measure of socioeconomic deprivation).^{8,10}

Sleep problems are negatively associated with self-rated physical and mental well-being, mood, and quality of life.^{1,4,9} Poor sleep degrades daytime alertness and performance, thereby increasing the risk of incidents such as road traffic accidents and falls.^{11,12} The likelihood of sleep disturbances related to health problems increases with age.¹³ These include depression, pain, respiratory and cardio-vascular diseases, cognitive impairment and dementia.^{2,5} When older people are also required to care for someone with an illness, sleep problems are likely to be exacerbated.^{14,15} The proportion of older people in the population is increasing, and it is becoming more common for people to provide care to their family members at home,¹⁶ making the sleep of older carers of interest. People of advanced age are likely to have had

exceptionally good health,¹⁷ therefore the predictors and consequences of sleep problems may not be the same as for younger populations.

The current study used data from the inception interviews (Wave 1) of *Te Puāwaitanga o Ngā Tapuwae Kia Ora Tonu. Life and Living in Advanced Age: A Cohort Study in New Zealand* (“LiLACS NZ”). This is the first study of its kind, using face-to-face surveys to collect information on factors that contribute to successful ageing by Māori and non-Māori of advanced age.¹⁸ Sleep was not the primary focus of LiLACS NZ, but some general questions on sleep were included. These provide the first insights into sleep health during advanced age, which could contribute to better health services to recognise and manage geriatric sleep problems.

The aims of these analyses were to estimate the prevalence of self-reported sleep problems among Māori and non-Māori of advanced age; to investigate the independent associations between demographic and health-related factors, and self-reported sleep problems; and to determine whether self-reported current sleep problems increased the likelihood of reporting other adverse health-related outcomes.

Methods

This project was approved by the Northern X Regional Ethics Committee (NXT 09/09/088). The LiLACS NZ Wave 1 survey was completed with 421 Māori (aged 79–90 years) and 516 non-Māori (aged 84–86 years). The Māori cohort included participants who identified themselves as Māori, either alone or as one of multiple ethnicities. They had a broader age range than the non-Māori cohort to account for known differences in longevity between the two populations.^{19,20} The participants were living in the Bay of Plenty and Lakes District Health Board areas in 2010. All Māori born between 1 January 1 1920 and 31 December 31 1930, and all non-Māori born between 1 January and 31 December 1925, were identified from the electoral roll, primary care databases, word-of-mouth, Māori tribal networks, and through local publicity. The extensive use of local organisations meant that more difficult to reach populations (eg, those who had disabilities) were able

to be contacted and invited to participate by someone known to them.¹⁸ Those who gave informed consent completed the face-to-face survey in their own home with a trained interviewer using standardised techniques. An overall response rate of 57% was achieved.¹⁹ The populations recruited approximated the age and sex distribution of the underlying population, except that women were over-represented.¹⁸

The sample used for the present analyses included all participants who completed the question, “Do you have trouble with your sleeping (on at least 3 nights per week) such that it interferes with your activities the following day (eg, unrefreshed in the morning, fatigue, poor concentration, or irritability)?” This question gave an indication of current sleeping problems. Participants who answered “yes” to this question were asked to indicate the types of problems they were experiencing from a list of eight symptoms (waking up in the early hours of the morning; taking a long time to get to sleep; lying awake for most of the night; getting up at night to go to the toilet; worry keeping you awake at night; snoring; sleep walking/sleep talking; or other sleeping problems). Participants were also asked, “How much trouble did you have with sleeping when you were young?” Answers were dichotomised into “yes” (“a little”, “some”, or “a lot”) vs “no” (“none at all”) to give an indication of past sleeping problems.

Study procedures allowed for participants to complete a shortened core survey that did not include the sleep questions if, for example, they were considered by members of a whānau (extended family) to not be able to manage answering the interview questions for themselves or they were very disabled in residential care.²¹ Of the 937 participants in Wave 1, 261 completed the core survey only, and 5 did not complete either version of the survey. There were also 22 instances of participants who completed the full survey, but did not answer the sleep questions, giving a total of 288 participants who did not answer the sleep questions. The analyses presented here focus on the remaining 251 Māori and 398 non-Māori (the ‘sleep sample’).

Demographic variables included the following variables provided in the LiLACS NZ database: ethnicity (Māori vs

non-Māori); sex (male vs female), age (year increments); and socioeconomic deprivation, as measured using the NZDep 06 (decile 1 = least deprived to decile 10 = most deprived). Caregiving was defined by the question, “How often do you currently provide care or assistance for other people?” For this study, carers included those responding “occasionally”, “less than once a week”, “once a week”, “two to five times weekly”, or “daily” (six to seven times weekly). Non-carers were defined by answering “never”. Residential status (defined as “living alone”, “living with a spouse only”, “living with family including or not including spouse”, or “living in residential care”) was also described.

The physical and mental health variables considered for multivariate analyses included scores from the following standardised scales which were provided in the LiLACS NZ database: the Short-Form Health Survey (SF-12),²² as a measure of physical and mental quality of life, as well as pain that interferes with daytime functioning; the Mini Mental Status Exam (MMSE),²³ as a measure of cognitive functioning; the Geriatric Depression Scale (GDS-15),²⁴ as a measure of self-reported depression symptoms; the Pearlin Mastery Scale (PMS),²⁵ as a measure of perceived control; and the Physical Activity Scale for the Elderly (PASE).²⁶ Additional measures included: doctors records confirming a diagnosis of depression; a global score from a five-point Likert scale rating coping in different situations (“times of loss”, “financial hardship”, “on-going health problems”, “times of trouble for family and friends”, and “overall”); a five-point Likert scale rating the experience of ageing (“On the whole has growing older been a positive or negative experience for you?”); and single-item questions to define those who had fallen and how often, those who were a current or past smoker, and those who drank alcohol (four or more times a week versus monthly or less).

Analysis

The sleep sample and the participants who did not answer the sleep questions were compared by ethnicity, sex, age, and NZDep 06 using sequential logistic regression modelling with 98.3% of the total observations (n=922).

Differences in the proportion of Māori and non-Māori who reported each type of sleep problem were investigated using chi-square tests. A multivariable logistic regression model was used to investigate the independent associations between self-reported current sleep problems and a range of demographic, physical and mental health factors, and reporting a past sleep problem. The demographic variables of ethnicity, sex, age and NZDep 06 were included in the models, based on *a priori* evidence. This model included 89.7% of all observations. Due to limited available power, only those health-related factors that were significantly associated with the outcome at the univariate level ($p < 0.1$) were included. A version of the model was run with the interaction term “sex X ethnicity”, but the interaction was non-significant.

A series of multivariate logistic regression models were used to determine whether reporting a current sleeping problem was associated with reporting poorer physical or mental health, after controlling for ethnicity, age, sex, and NZDep 06. In these models, the outcome variables were dichotomised using validated cut-off scores (eg, < 25 on the MMSE, and > 8 on the GDS) or, in instances when validated cut-offs were unavailable, by scoring within the 25th percentile of the particular scale. Models included between 93.7% and 98.8% of all observations, due to missing values for some variables. Adjusted odds ratios (ORs) and 95% confidence intervals (95% CIs) were estimated for groups of interest. Analyses were undertaken in SAS® (2011, Version 9.3, Cary NC).

Results

Demographics

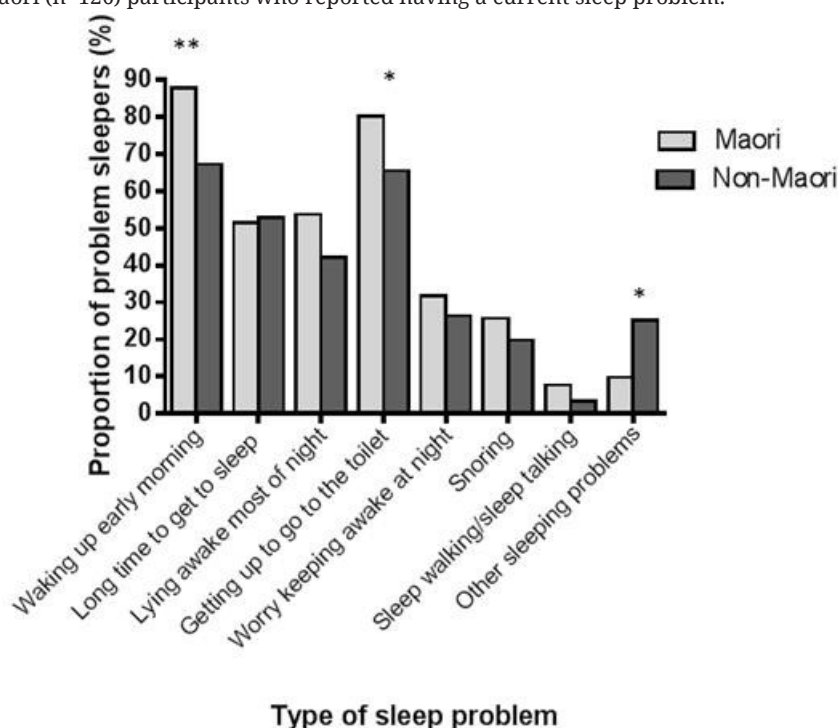
Of the 649 participants who responded to the question concerning a current sleep problem, 38.7% were Māori and 61.3% were non-Māori. Their demographic characteristics are summarised in Table 1. Sequential logistic regression analyses revealed that, after controlling for sex and NZDep 06, Māori were more likely to be within the group who did not answer the sleep question compared to non-Māori (OR=3.00, 95% CI=2.16–4.16, $p < 0.0001$). The likelihood of not answering the sleep question also increased with age (OR=1.18, 95% CI=1.10–1.27, $p < 0.0001$).

Table 1: Demographic characteristics of Māori and non-Māori participants in the sleep sample.

Variable	Māori (n=251) n (%)		Non-Māori (n=398) n (%)	
Females	153	(61.0%)	211	(53.0%)
Carers†	84	(33.5%)	107	(26.9%)
NZDep 06				
Decile 1 (Least deprived)	4	(1.6%)	12	(3.0%)
Decile 2	2	(0.8%)	13	(3.3%)
Decile 3	6	(2.4%)	28	(7.0%)
Decile 4	24	(9.6%)	47	(11.8%)
Decile 5	11	(4.4%)	16	(4.0%)
Decile 6	31	(12.4%)	85	(21.4%)
Decile 7	20	(8.0%)	67	(16.9%)
Decile 8	34	(13.6%)	59	(14.8%)
Decile 9	34	(13.6%)	37	(9.3%)
Decile 10 (Most deprived)	85	(33.9%)	34	(8.5%)
Residential status:				
Lives alone	104	(41.4%)	193	(48.5%)
Lives with spouse only	66	(26.3%)	153	(38.4%)
Lives with family (+/- spouse)	81	(32.3%)	52	(13.1%)
Lives in residential care	2	(0.8%)	19	(4.8%)

† n=249 for Māori carers, and 386 for non-Māori.

Figure 1: The proportion of sleep symptoms endorsed by Māori (n=66) and non-Māori (n=126) participants who reported having a current sleep problem.



* = p (chi-square) <0.05, ** = p (chi-square) <0.01.

Table 2: Independent predictors of self-reported current sleep problems within LILACS NZ (n=582).

Independent variables	Categories/range	Adjusted OR	95%CI
Ethnicity	Māori	0.52*	0.30–0.90
	Non Māori (Ref)		
Sex	Females	1.48	0.98–2.24
	Males (Ref)		
Age	79–90	0.94	0.82–1.07
Deprivation (NZDep 06)	1–10	1.05	0.96–1.14
Caregiving	Carer	1.52	0.99–2.32
	Non Carer (Ref)		
Past sleep problem	Yes	2.67*	1.25–5.72
	No (Ref)		
Mental health (SF-12)	14.9–79.3	0.95***	0.92–0.98
Cognition (MMSE)	2–30	0.96	0.89–1.03
Depression rating (GDS)	0–14	1.09	0.96–1.24
Depression diagnosis	Yes	1.37	0.73–2.54
	No (Ref)		
Perceived coping (PMS)	5–25	1.04	0.96–1.14
Perceived control	9–35	0.98	0.92–1.05
Physical health (SF-12)	6.0–65.8	0.97*	0.94–1.00
Pain interference (SF-12)	0–100	1.00	0.99–1.01
Number of Falls	0–3	1.14	0.92–1.42
Alcohol	Drinker	0.81	0.53–1.24
	Non drinker (Ref)		

* p<0.05, ** p<0.01, *** p<0.001

Covariates: ethnicity, age, sex, and NZDep 06.**Abbreviations:** SF-12 (Short Form 12 Item Survey), MMSE (Mini Mental State Exam), GDS (Geriatric Depression Scale), PMS (Pearlin Mastery Scale), OR (Odds Ratio), CI (confidence Interval), Ref (reference group).

Reporting sleep problems

In the sleep sample, 26.3% of Māori and 31.7% of non-Māori reported having a current sleep problem ($\chi^2=2.13$, $p=0.145$). Women were more likely to report a current sleep problem than men (33.0% vs 25.3%, $\chi^2=4.55$, $p=0.033$). Both Māori and non-Māori problem sleepers endorsed a median of three sleep symptoms. Of those who were Māori, 50.0% endorsed more than three symptoms compared to 34.9% of non-Māori ($\chi^2=4.10$, $p=0.043$). All of the participants reporting a current sleep problem endorsed at least one symptom of insomnia (waking up too early, taking a long time to get to sleep, and/or lying awake for most of the night). Figure 1 shows

the proportions of Māori and non-Māori reporting a sleep problem who endorsed each sleep symptom. “Other sleeping problems” included physical aches and pains, symptoms of restless legs, sleep disordered breathing, hallucinations, taking medicines, and providing care for others. Of the full sleep sample, 5.2% of Māori and 6.8% of non-Māori reported having a past sleep problem.

Table 2 shows the results of the multiple logistic regression analyses investigating factors associated with reporting a current sleep problem. This shows reduced likelihood for participants who were Māori vs non-Māori (OR=0.52, 95% CI=0.30–0.90). Those who also reported a past sleep

Table 3: Independent associations between reporting current sleep problems and poorer health.

Model	Health outcome variable	n, (%) with condition	Observations	Adjusted OR	95%CI
1	Depression, (GDS)	49 (7.6%)	641	4.42***	2.40–8.14
3	Depression diagnosis	62 (9.8%)	631	1.96*	1.15–3.37
5	Cognitive impairment	76 (12.1%)	629	1.49	0.89–2.61
7	Poor mental health	155 (25.5%)	608	2.45***	1.65–3.63
8	Poor coping	144 (23.5%)	612	1.80**	1.20–2.71
9	Poor control	167 (27.4%)	610	1.82**	1.23–2.68
10	Poor physical health	148 (24.3%)	608	1.64*	1.10–2.46
11	Fallen in last year	215 (34.5%)	624	1.64**	1.14–2.36
12	Reduced physical activity	147 (23.7%)	624	1.36	0.89–2.06
13	Increased pain interference	181 (29.2%)	619	1.89**	1.30–2.76

* p<0.05, ** p<0.001, *** 0<0.0001

Covariates: ethnicity, age, sex, and NZDep 06, caregiving status.

problem were more likely to also report a current sleep problem than those who did not (OR=2.67 95% CI=1.25–5.72). With each point of increase on the SF-12 mental health scale, there was a 6% reduction in the likelihood of reporting a sleep problem. With each point increase on the SF-12 physical health scale, there was a 3% reduction in the likelihood of reporting a sleep problem.

Table 3 summarises the findings from the logistic regression models investigating whether current sleep problems are independent risk factors for poorer health outcomes. These show significant associations between sleep problems and health outcomes. For example, those reporting a current sleep problem were more likely to also score highly for symptoms of depression on the GDS than those who did not report a current sleep problem (OR=4.42, 95% CI=2.40–8.14).

Discussion

This is the first study to estimate the prevalence of reporting sleep problems among Māori and non-Māori of advanced age. Among 251 Māori and 398 non-Māori aged 79–90 years, we found that 25.5% of Māori and of 31.7% non-Māori reported a sleep problem. Reporting a current sleep problem was more likely among non-Māori and among those who reported a past sleep problem, or poorer self-rated physical or mental health, after adjusting for demographic variables. The associations between sleep problems and health are likely to be

bi-directional,²⁷ highlighting the importance of sleep for the health-related quality of life of our rapidly ageing population.

In contrast to previous research involving 20–59 year olds,^{8,9} the present study found that Māori were less likely to report a current sleep problem than non-Māori. The reasons for this difference are unknown. However, it should be noted that, of those reporting a sleep problem, non-Māori were more likely to volunteer other sleep symptoms not specifically asked for in the study compared to Māori. This suggests that how sleep problems are understood and reported might differ between the two samples. Response biases may have also been a factor, since Māori were three times more likely than non-Māori to be amongst those who did not respond to the sleep questions, and people with poorer health were less likely to complete the full questionnaire with the sleep questions. The lower prevalence of reporting sleep problems among Māori could also reflect the fact that the LiLACS NZ sample includes exceptionally long-lived Māori, the majority of whom strongly identify with their culture (eg. many being fluent in speaking te reo Māori [Māori language], and frequently visiting a marae [sacred meeting place of a tribe]) compared to younger generations.²¹ Previous LiLACS NZ research has identified cultural engagement (but not socioeconomic status) as an independent predictor of better physical health-related quality of life.²¹ Further research is required to clarify whether or not lifestyle and cultural

engagement are associated with reporting sleep problems.

In further contrast to previous research,⁸ in the current study NZDep 06 was not associated with reporting sleep problems in the fully-adjusted models. The Māori participants in the present study were over-represented in the most deprived NZDep 06 deciles, whereas the non-Māori sample had a more normally distributed NZDep 06 profile. These distributions are similar in the general population of Māori and non-Māori aged over 50 years.²⁸ However, they differ from previous studies of 20–59 year olds, where non-Māori were over represented in the least deprived deciles.⁸ It is also possible that NZDep 06 alone is not the most reliable way to measure socioeconomic position in people of advanced age, who are more likely to live with family members or in rest homes or institutions that may not reflect their true socioeconomic position.²⁹ Alternatively, socioeconomic position may be less closely related to health-related quality of life in advanced age.²¹ Additional research using different methods of defining socioeconomic position is needed to clarify this.

The prevalence of reported sleep problems is lower in the LiLACS NZ sample than in previous studies of adults aged 60–80 years.^{2,4} Grandner et al⁷ propose that this pattern could be related to the exceptional health that leads to living longer, or a reduction in the effects of life or societal stressors on sleep in advanced age. Expectations and perceptions of good or acceptable health are also thought to change with age,³⁰ and older people as well as their family members may downplay, or be less likely to complain of sleep disruptions.¹⁵ It is therefore important for health-care professionals to actively ask their older patients about sleep.⁴

More symptoms were endorsed by those reporting sleep problems (a median of three for Māori and non-Māori) compared to previous studies.⁴ However, the list included trips to the toilet and waking early, which alone may not be considered problematic. All of the participants reporting a current sleep problem reported at least one insomnia symptom. Insomnia is common with ageing and reflects physiological and psychological changes that increase the likelihood of sleeplessness.⁴

Carers are considered likely to have disturbed sleep.^{14,15} However in the present study, caregiving (including carers providing any type or amount of care) was not associated with reporting a current sleep problem. Future research should consider gathering more detailed information on the type of care being provided and the time spent caregiving.

Those who reported having a past sleep problem were more likely to report a current sleep problem, although the definition of “younger” used in the survey is unclear. This relationship has been reported throughout the lifespan and highlights the importance of early diagnosis and treatment of sleep problems as a way of preventing any negative impact in later life.

The first set of regression analyses (presented in Table 2) sought to identify those health factors that increased the likelihood of reporting a current sleep problem. Findings indicate that poorer self-rated physical or mental health was associated with increased likelihood of reporting a sleep problem.

The second set of analyses (presented in Table 3) considered whether reporting a current sleep problem was an independent predictor for poorer health outcomes. Findings indicate that those who reported a current sleep problem had significantly poorer mental health status compared to those who did not. These participants were more likely to score within the lowest quartile for mental health-related quality of life, were also more likely to have depression, and have poorer perceived control than participants reporting no sleep problems. Reporting current sleep problems was also related to poorer physical health outcomes. This is indicated by these participants being more likely to score within the poorest quartiles for physical health-related quality of life, pain that interferes with daytime functioning, as well as being more likely to have fallen in the last year.

Together these analyses highlight that sleeping problems can have current and long-term effects on mental and physical health outcomes. Cognitive functioning and mood have consistently been related to sleep problems, and these relationships have been attributed to physiological

processes as well as to the effects of sleep deprivation.²⁷ Reporting sleep problems and cognitive impairment (considered as either a continuous or a dichotomous variable) were not significantly associated in the present study, possibly due to those with more severe impairment being less likely to have completed the long form of the survey which included the sleep questions.

The relationship between sleep and pain is likely to be multifactorial, as pain is common with ageing, and is also related to poorer physical and mental health, mobility problems, and quality of life.¹ Participants reporting a current sleep problem were more likely to have fallen in the past year than those who did not. Previous research indicates that this could be due to increased daytime sleepiness causing issues with balance and reaction times, getting out of bed while drowsy, or the residual effects of sleeping medications.¹²

A limitation of this study is that the LiLACS NZ survey was not designed with sleep as a primary focus and therefore the data are difficult to compare to previous studies using different questions. Future studies would be strengthened by the use of validated and standardised sleep questions and scales. Objective sleep monitoring would help identify any potential discrepancies with self-reported sleep problems, but such an intensive protocol may dissuade people of advanced age from participation.³¹

The present analyses did not address the use of sleeping medications, physical exercise, light exposure, doctor's visits, or co-morbidities. These factors have been highlighted as significantly associated with sleep problems in previous studies.^{1,2} Risk factors for, and symptoms of, sleep disordered breathing were also not examined in detail, although the proportion of snorers was small.

The current study is limited by a selection bias. Although the initial response rate was 57%, the rate of those then completing the full questionnaire including the sleep-related question was only 48.6%. Therefore,

the results cannot be generalised to the New Zealand population. Those of poorer health and cognitive capacity are under-represented. The logistic regression models are limited by an information bias due to missing observations, furthermore residual confounds are likely to remain. Lastly, due to the cross-sectional nature of these analyses, causality cannot be imputed. Further analyses of the future waves of LiLACS NZ would be of interest to clarify the relationships found here.

Despite these limitations and the potential biases, LiLACS NZ provides a large sample to investigate the factors related to reporting sleep problems in Māori and non-Māori of advanced age. The unique design and the researchers' commitment to engaging and recruiting this specific group has provided an outstanding opportunity for the first investigation of sleep of this age group in New Zealand.

Conclusions

These analyses show that 26.3% of Māori and 31.7% of non-Māori of advanced age report current sleep problems. All of these participants reported at least one symptom of insomnia (waking up too early, taking a long time to get to sleep, and/or lying awake for most of the night), whereas symptoms such as snoring or other sleeping problems were reported by 10–30% of the 'problem sleepers'. The presence of a past sleeping problem (reported by 5.2% of the Māori and 31.7% of the non-Māori participants) was a significant predictor for a current problem. Sleep problems are a significant marker for poorer mental and physical health status in advanced age, thus having the potential to jeopardise successful healthy ageing. It is important to raise public and clinical awareness with regards to the predictors and implications of sleep problems. It is recommended that clinicians as well as family members explore whether the elders in their care have sleep problems. The treatment of sleeping problems may reduce the likelihood of physical and mental health problems as well as the risk of falling.

Competing interests:

Nil

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