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Sleep Disturbance and Associated Factors in Older Adults Using Data from the Indonesian Family Life Survey

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SUMMARY

Objective: To examine the prevalence of sleep disturbances and to investigate the factors associated with sleep disturbance in Indonesian older adults.
Methods: This cross-sectional study utilized multicenter data from the Indonesian Family Life Survey-5 (IFLS-5) from 2014–2015. We included all subjects aged 60 years old and above from the IFLS-5.
Results: In total, 2,582 older adults were included in the analysis. Among the participants, 30.3% reported having sleep disturbance. Being female, having a disability in physical functioning, having more than one problem with Instrumental Activities of Daily Living (IADL), and having a high level of physical activity were positively associated with sleep disturbance among Indonesian older adults. Age was negatively associated with sleep disturbance.
Conclusions: The prevalence of sleep disturbance in Indonesian elderly populations is 30.3%. Age, female sex, disability in physical functioning, having more than one problem with IADL, and a high level of physical activity are factors associated with sleep disturbance. Key sociodemographic and health-related characteristics may enhance the identification of at-risk Indonesian older adults who would benefit from early screening and intervention efforts for sleep disturbance.

1. Introduction

Between 2000 and 2050, the global proportion of people over 60 is predicted to double from 6.9% to 16.4%.[1] The estimated increases in the number and proportion of older people are remarkable. Indonesia has the fourth-largest population of older adults globally and the third-largest among Asian nations, with approximately 21 million older adults (10.6%) in the population.[2] Therefore, older adults should pay particular attention to health problems.

Sleep disturbance, also known as sleep disorder, involves the quality of the time and amount of sleep resulting in pressure and dysfunction, which are linked to emotional and physical problems.[3] Konyagi et al. also reported that the age-adjusted prevalence of sleep problems in adults 50 years and older based on the World Health Organization Collaborative Research Study in nine countries, including Finland, Poland, Spain, China, Ghana, India, Mexico, Russia, and South Africa, ranged from 2.8% to 17.0%.[4]

Sleep disturbance has become a significant health problem among Indonesian older adults.[5] In Indonesia, approximately 28 million people have reported experiencing sleep disturbance, especially among older adults.[6] Peltzer et al. also showed that 10.0% of older adults experienced insomnia in Indonesia.[6] Only a few studies have reported the prevalence of sleep disturbance among older adults in Indonesia, and studies examining the prevalence among older adults in Indonesia are rarely conducted.[6]

Although previous studies have found several factors related to sleep disturbance in older adults, such as depression,[7] loneliness,[7] health conditions,[8] smoking behavior,[9] lack of physical exercise,[10] working status and environment,[8] there is a lack of comprehensive information and epidemiological research on sleep disturbance and associated factors in older adults in Indonesia. Therefore, this study aimed to examine the prevalence of sleep disturbance and its associated factors among Indonesian older adults using data from a national population-based community-dwelling sample of older adults who participated in the Indonesia Family Life Survey (IFLS-5).

2. Materials and methods

2.1. Study design, participants, and procedures

This was a cross-sectional study using secondary data. The data source was analyzed from the fifth wave of the Indonesian Family Life Survey (IFLS), hereafter referred to as IFLS-5. The IFLS-5 used a multistage stratified sampling method. The sample was representative of approximately 83% of the population of Indonesia and comprised more than 300,000 participants living in 13 of the 33 provinces. IFLS-5 was run with long-distance monitoring through the end of August 2015 between October 2014 and April 2015. The IFLS-5 was approved by the Institutional Review Boards (IRB) of

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RAND and the University of Gadjah Mada in Indonesia.[11] Informed consent was obtained from all respondents before the evaluations. A total of 314,710 participants completed the IFLS-5. After excluding participants under 60 (n = 312,128), 2,582 Indonesian adults aged 60 were included in the final study analysis.

2.2. Measures

In this study, the outcome variable was sleep disturbance. Sleep disturbance was assessed from the Patient Report Outcomes Measurement Information Systems (PROMIS).[12] Each item on the measure was rated using a 5-point Likert scale with a score ranging from 10 to 50.[13] The authors used a t-score table to identify the t-score related to the participant's total raw score, and the information was entered in the t-score row based on its value, with higher scores indicating greater sleep disturbances. In this study, the responses were dichotomized into 0 = no disturbance (participants with scores < 55) and 1 = having disturbance (participants with scores ≥ 55), which corresponded to a clinically meaningful difference from the norm, as determined by the general population.[12,14–16]

The exposure variables included sociodemographic factors, health conditions, physical functioning, health risk behaviors, and mental health (Figure 1). Sociodemographic characteristics included gender, working status, residence, living status, residence status, education level, marital status, income level, and age.

Health condition was assessed with the question, "Has a physician ever told you that you have one or more chronic condition(s)?" with specific chronic conditions consisting of hypertension, diabetes, tuberculosis, asthma, lung condition, heart attack, or other heart problems, liver, stroke, cancer, arthritis, cholesterol, prostate illness, kidney disease, stomach disease, emotional disease, and mental/memory problems.

Physical functioning measures were assessed by 11 items for physical functioning, five items for activities of daily living (ADL),[17] and six items from instrumental activity of daily living (IADL),[18] with satisfactory internal consistency reliability (Cronbach's alpha = 0.86–0.94).[19,20] ADL included the degree of difficulty performing dressing, eating, and other activities. IADL included the degree of difficulty in doing household chores, such as preparing meals and shopping.

Health risk behaviors were assessed by two items: (1) smoking behavior was assessed with the question, "Have you ever chewed tobacco, smoked a pipe, smoked self-enrolled cigarettes, or smoked cigarettes/cigars?"; (2) physical activity was assessed with a reliable questionnaire (test-retest reliability above 0.7), the "International Physical Activity Questionnaire (IPAQ) short version" for the last seven days.[21]

Mental health was measured by two items: (1) depression was assessed with the Centers for Epidemiologic Studies Depression Scale (CES-D), which was used to assess depressive symptoms.[22] (2) Loneliness was evaluated with the CES-D.[22] The self-reported question asked how often over the past week the participants felt lonely during the past seven days. The CES-D showed good reliability with test-retest correlation of 0.71.[22]

2.3. Data analysis

SPSS version 23 for Windows was used to conduct all analyses. The participant characteristics and all variables were described using means and standard deviations or frequencies and percentages, as appropriate. A chi-square test was applied to compare the distribution between nominal variables. An independent t-test was used to examine the mean score of two groups between continuous variables.

Multivariate logistic regression analyses were then used to adjust for significant factors (p < 0.25) from the univariate logistic regression analyses. However, if the exposure variable was considered an essential factor, it could be included in the multivariate logistic regression even if the p-value was greater than 0.25. The multivariate logistic regression model was tested using variance inflation factor (VIF) for multicollinearity.[23] The Hosmer-Lemeshow Goodness-of-fit test was used to examine the quality of the overall fit of the model.[24] A p-value less than or equal to 0.05 was considered statistically significant.
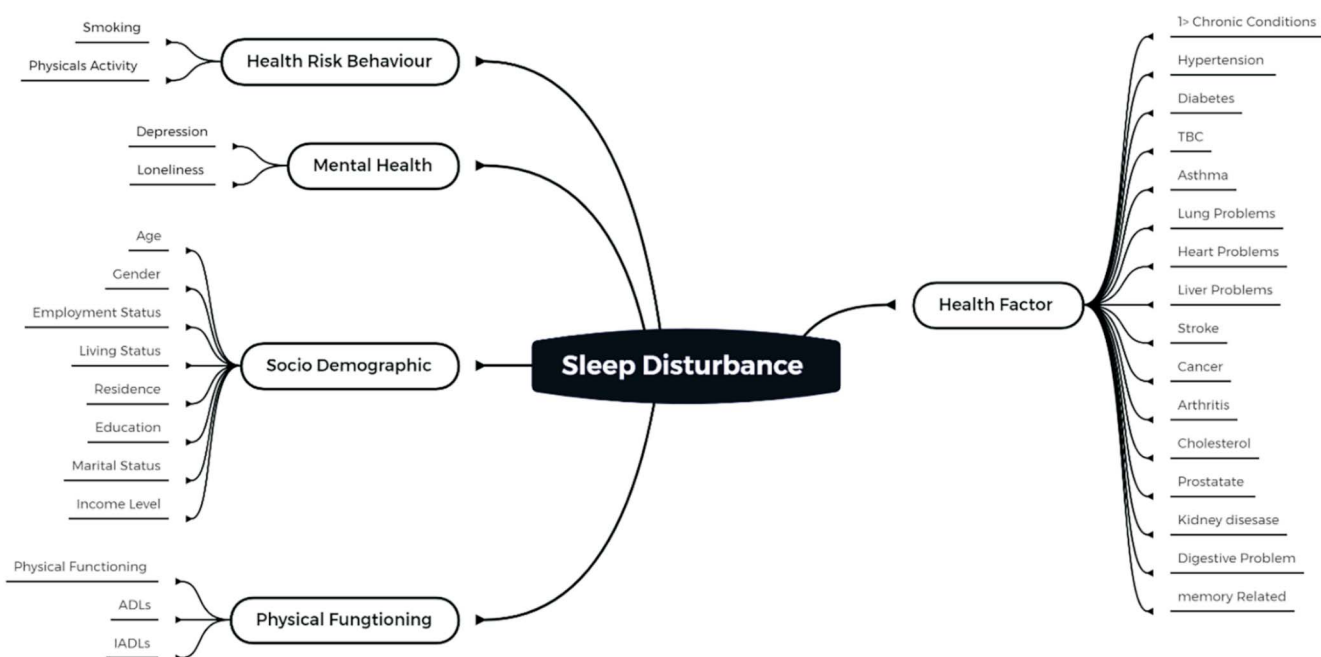

Figure 1. Schematic diagram of the key factors influencing sleep disturbance.

3. Results

3.1. Sociodemographic characteristics of the study subjects

In total, 2,582 older adults were included in the analysis. Among the participants, 783 older adults (30.3%) reported having sleep disturbance. Among those who had sleep disturbance, more than half of the participants were female (51.2%) and had an average age of 66.79 ± 5.9 years (Table 1).

The differences between sleep disturbance and health factors are shown in Table 2. Older adults with sleep disturbance were more likely to have more than one chronic condition (60.7%), consisting of hypertension (33.1%), diabetes (8.4%), asthma (5.4%), heart problems (6.5%), liver problems (1.9%), arthritis (18.4%), cholesterol (9.5%), and digestive problems (16.0%), compared with those without sleep disturbance (Table 2). Table 3 presents the distribution of health risks, physical functioning, and mental health. Compared with those without sleep disturbance, older adults with sleep disturbance were more likely to have disabilities in physical functioning (78.8%), one or more problems in ADLs (17.2%), one or more issues in IADL (30.5%), depression (9.2%), and occasional loneliness (9.1%) (Table 3).

3.2. Factors influencing sleep disturbance

After adjusting for all possible confounding factors, age (aOR = 0.978, 95% CI = 0.963–0.992), female older adults (aOR = 1.233, 95% CI = 1.023–1.487), disability in physical functioning (aOR = 1.482, 95% CI = 1.191–1.844), having more than one IADL (aOR = 1.252 95% CI = 1.012–1.549) and a high level of physical activity (aOR = 1.448, 95% CI = 1.056–1985) were associated with sleep disturbance.

Furthermore, those who had depression some days (aOR = 2.439, 95% CI = 1.687–3.527), occasionally (aOR = 2.278, 95% CI = 1.567–3.313), and most of the time (aOR = 1.800, 95% CI = 1.121–2.889) had a higher risk of having sleep disturbance after adjusting for all possible confounding factors. Similarly, those who had loneliness most of the time (aOR = 1.739, 95% CI = 1.209–2.501) had a higher risk of having sleep disturbance after adjusting for all possible confounding factors (Table 4). All VIFs of each variable were < 10, indicating no multicollinearity. The p-value of the Hosmer-Lemeshow Goodness-of-fit test was 0.85, indicating the good fitness of this model.

Table 1
Demographics by sleep disturbance.

Variable	Sleep disturbance				p-value
	No (n = 1,799)		Yes (n = 783)		
	N	%	N	%	
Age (years), mean (SD)	67.55 (6.4)		66.79 (5.9)		0.005*[a]
Gender					0.001*
Male	1001	55.6%	382	48.8%	
Female	798	44.4%	401	51.2%	
Education level					0.223
< 12	1521	84.5%	647	82.6%	
≥ 12 years	278	15.5%	136	17.4%	
Living status					0.089
Alone	785	43.6%	370	47.3%	
With family/other	1014	56.4%	413	52.7%	
Residence					0.380
Rural	962	53.5%	404	51.6%	
Urban	837	46.5%	379	48.4%	
Employment status					0.665
Working	584	32.5%	261	33.3%	
Retire	1215	67.5%	522	66.7%	
Marital status					0.879
Single	10	0.6%	6	0.8%	
Married	1197	66.8%	531	67.8%	
Separated	4	0.2%	1	0.1%	
Divorced	49	2.7%	22	2.8%	
Widow	532	29.7%	223	28.5%	
Income level					0.257
High income	541	30.1%	253	32.3%	
Low income	1258	69.9%	530	67.7%	

* p-value < 0.05.
[a] Independent t-test. [b] The p-values, when not otherwise specified, are the p-value for the chi-squared test.

Table 2
Health factors by sleep disturbance.

Variable	Sleep disturbance				p-value
	No (n = 1,799)		Yes (n = 783)		
	N	%	N	%	
Chronic condition					< 0.001*
No	993	55.2%	308	39.3%	
≥ 1 chronic condition	806	44.8%	475	60.7%	
Hypertension					< 0.001*
No	1339	74.4%	524	66.9%	
Yes	460	25.6%	259	33.1%	
Diabetes					0.008*
No	1698	94.4%	717	91.6%	
Yes	101	5.6%	66	8.4%	
Tuberculosis					0.530
No	1779	98.9%	772	98.6%	
Yes	20	1.1%	11	1.4%	
Asthma					0.001*
No	1750	97.3%	741	94.6%	
Yes	49	2.7%	42	5.4%	
Lung problems					0.096
No	1765	98.1%	760	97.1%	
Yes	34	1.9%	23	2.9%	
Heart problems					< 0.001*
No	1737	96.6%	732	93.5%	
Yes	62	3.4%	51	6.5%	
Liver problems					0.007*
No	1786	99.3%	768	98.1%	
Yes	13	0.7%	15	1.9%	
Stroke					0.525
No	1754	97.5%	760	97.1%	
Yes	45	2.5%	23	2.9%	
Cancer					0.655
No	1788	99.4%	777	99.2%	
Yes	11	0.6%	6	0.8%	
Arthritis					< 0.001*
No	1604	89.2%	639	81.6%	
Yes	195	10.8%	144	18.4%	
Cholesterol					0.001*
No	1695	94.2%	709	90.5%	
Yes	104	5.8%	74	9.5%	
Prostate					0.325
No	1766	98.2%	764	97.6%	
Yes	33	1.8%	19	2.4%	
Kidney disease					0.269
No	1773	98.6%	767	98.0%	
Yes	26	1.4%	16	2.0%	
Digestive problems					< 0.001*
No	1629	90.6%	658	84.0%	
Yes	170	9.4%	125	16.0%	
Psychiatric problem					0.130
No	1799	100.0%	782	99.9%	
Yes	0	0.0%	1	0.1%	
Memory related problem					0.253
No	1796	99.8%	783	100.0%	
Yes	3	0.2%	0	0.0%	

* p-value < 0.05.

Table 3
Health risk, physical functioning, and mental health by sleep disturbance.

Variable	Sleep disturbance				p-value
	No (n = 1799)		Yes (n = 783)		
	N	%	N	%	
Smoking					0.237
No	908	50.5%	415	53.0%	
Yes	891	49.5%	368	47.0%	
Physical activity					0.178
Never	296	16.5%	111	14.2%	
Low	592	32.9%	253	32.3%	
Moderate	605	33.6%	261	33.3%	
High	306	17.0%	158	20.2%	
Physical functioning					< 0.001*
Non disability	598	33.2%	166	21.2%	
Disability	1201	66.8%	617	78.8%	
ADLs					< 0.001*
Non disability	1582	87.9%	648	82.8%	
One or more problems	217	12.1%	135	17.2%	
IADL					0.001*
Non disability	1367	76.0%	544	69.5%	
One or more problems	432	24.0%	239	30.5%	
Depression					< 0.001*
Rarely or none	1623	90.2%	603	77.0%	
Some days	66	3.7%	72	9.2%	
Occasionally	66	3.7%	69	8.8%	
Most of the time	44	2.4%	39	5.0%	
Loneliness					< 0.001*
Rarely or none	1546	85.9%	602	76.9%	
Some days	81	4.5%	43	5.5%	
Occasionally	92	5.1%	71	9.1%	
Most of the time	80	4.4%	67	8.6%	

* p-value < 0.05.
Abbreviations: IADL, Instrumental Activities of Daily Living; ADLs, activities of daily living.

4. Discussion

This study explored sleep disturbance and factors associated with sleep disturbances in Indonesian older adults. The authors found that 30.3% of participants had sleep disturbances. After adjusting for other factors, age, female sex, disability in physical functioning, having more than one problem with IADL, high level of physical activity, depression, and loneliness were significantly associated with sleep disturbance.

The rate of sleep disturbance among Indonesian older adults reported in this study was comparable with the results found in older adults in several countries, such as the United States (46%),[25] Taiwan (41%),[26] France (30%),[27] and Spain (36.1%).[28] The overall prevalence of sleep disturbance in Indonesian older adults was similar to that in other Western countries,[25,27,28] indicating that sleep disturbance might represent a significant concern among older adults at the global level. Moreover, this study identified a noteworthy prevalence of sleep disturbance (30.3%) in Indonesia, which appears to be considerably higher than the 10% prevalence of insomnia reported in a prior study involving older adults aged 65 years and above in Indonesia.[6] In the previous study, 31,432 individuals aged 15 years or older underwent screening for insomnia and no age difference was found in the insomnia prevalence.[6] The disparities in sleep disturbance rates between our study and the previous study may be attributed to variations in study populations, the classification methods for sleep disturbance, and differences in methodologies.

In this study, the author found that age, female sex, disability in physical functioning, high level of physical activity, depression, and loneliness were significantly associated with sleep disturbance in Indonesian older adults. According to previous studies, age,[29] gender,[30] having a physical disability,[31] lack of physical activity,[32] and mental health problem[33] were related to sleep disturbance in older adults.

In this study, the authors found that age was negativley associated with sleep disturbance. Our findings align with a cross-sectional study conducted in northern Taiwan, encompassing 1358 older adults, which concluded that aging was associated with a decreased risk of insomnia.[26] The way older adults subjectively perceive sleep disturbance might be impacted by factors that extend beyond those linked to physiological aging, such as, chronic illness, depression, physical disability, perceived poor health, being widowed, and the utilization of sedatives.[34] Future longitudinal research is required to assess the relationships between age and sleep disturbance in addition to other factors in older adults.

In older adults, gender disparities in sleep disturbance cannot be ignored since the problem is more common in females.[30] Studies revealed that hormonal and psychological changes in female older adults, especially during menopause, might affect sleep disturbance.[35] In the aging phase, there is a decrease in estrogen levels, which triggers the appearance of typical symptoms of menopause, such as hot flashes, night sweats, and drastic mood swings.[36] Therefore, the effect of gender disparities may give rise to sleep disturbance.

This study also explored the significant association between physical activity and sleep disturbance. Various studies have reported that regular activity typically improves sleep quality.[37] However, regarding the effect of exercise level on sleep, there were negative results on sleep depending on the time and intensity level of the exercise. Some people experienced exercise-induced sleep disturbance if they exercised too close to bedtime, while others had no trouble sleeping immediately afterward.[38] As a result, researchers recommend avoiding strenuous activity before bed to wear off those effects.[39] Furthermore, a systematic review discovered that engaging in physical activities of excessively high frequency (six or more times a week) and intensity was associated with difficulty initiating sleep, while moderate-intensity physical activities improved sleep quality.[40] Hence, individuals who engage in physical exercise six or more times a week may experience a decline in the quality of their sleep.

According to the findings of the current study, depression, and loneliness were significant factors associated with sleep disturbance. Mental health can be susceptible to changes in aging, while good quality of sleep is seen as a pattern for sustaining mental health. As a consequence of aging, loneliness might impact the restorative qualities of sleep. Mental health problems cause worry and fear, resulting in a racing mind and becoming a major contributor to insomnia.[41]

Several limitations in this study should be noted. First, this was a cross-sectional study design, which indicated that the findings could not be considered as providing a causal relationship between associated factors and sleep disturbance. Second, using a self-report questionnaire may have led to a risk of recall and response bias. Third, secondary data were used for the analyses, and some insufficiencies in methods and data collection might have influenced the outcomes of this study. Fourth, the definition and criteria for sleep disturbance were different between studies; therefore, the comparisons of rates of sleep disturbance with other studies should be interpreted cautiously, and the findings of this study may not be generalized to other populations.

Table 4
Univariate and multivariate logistic regression analysis of factors influencing sleep disturbance.

Variable	Crude OR (95% CI)	p-value	aOR (95% CI)	p-value
Sociodemographic				
Age	0.980 (0.967–0.994)	0.005*	0.978 (0.963–0.992)	0.003*
Gender				
Male	1.0		1.0	
Female	1.148 (1.055–1.248)	0.001*	1.233 (1.023–1.487)	0.028*
Employment status				
Working	1.0			
Retired	0.961 (0.804–1.149)	0.698	-	-
Living status				
Alone	1.0		1.0	
With family	0.864 (0.730–1.023)	0.098	0.839 (0.702–1.004)	0.055
Residence				
Rural	1.0			
Urban	1.078 (0.911–1.275)	0.403	-	-
Education				
< 12 year	1.0		1.0	
≥ 12 year	1.15 (0.919–1.440)	0.245	1.229 (0.957–1.578)	0.106
Marital status				
Single	1.0			
Married	0.739 (0.267–2.045)	0.561	-	-
Separated	0.417 (0.037–4.657)	0.477	-	-
Divorced	0.748 (0.242–2.317)	0.615	-	-
Widowed	0.69 (0.248–1.920)	0.477	-	-
Income level				
Low	1.0			
High	1.11 (0.927–1.330)	0.277	-	-
Health condition				
Chronic condition				
No	1.0		1.0	
≥ 1 chronic condition	1.900 (1.602–2.252)	< 0.001*	1.323 (0.997–1.756)	0.053
Hypertension				
No	1.0		1.0	
Yes	1.439 (1.199–1.727)	< 0.001*	0.956 (0.745–1.227)	0.725
Diabetes				
No	1.0		1.0	
Yes	1.548 (1.121–2.138)	0.01*	1.440 (0.795–1.635)	0.476
Tuberculosis				
No	1.0			
Yes	1.267 (0.604–2.658)	0.666	-	-
Asthma				
No	1.0		1.0	
Yes	2.024 (1.329–3.084)	0.001*	1.482 (0.938–2.343)	0.092
Lung problems				
No	1.0		1.0	
Yes	1.571 (0.919–2.685)	0.129	1.120 (0.627–1.998)	0.702
Heart problems				
No	1.0		1.0	
Yes	1.952 (1.334–2.856)	0.001*	1.317 (0.872–1.989)	0.190
Liver problems				
No	1.0		1.0	
Yes	2.683 (1.271–5.666)	0.013*	1.714 (0.770–3.814)	0.187
Stroke				
No	1.0			
Yes	1.18 (0.709–1.963)	0.615	-	-
Cancer				
No	1.0			
Yes	1.255 (0.463–3.406)	0.855	-	-
Arthritis				
No	1.0		1.0	
Yes	1.854 (1.467–2.343)	< 0.001*	1.289 (0.978–1.699)	0.072
Cholesterol				
No	1.0		1.0	
Yes	1.701 (1.247–2.321)	0.001*	1.287 (0.912–1.815)	0.151
Prostate				
No	1.0			
Yes	1.331 (0.752–2.355)	0.405	-	-

Table 4 Continued.

Variable	Crude OR (95% CI)	p-value	aOR (95% CI)	p-value
Kidney disease				
No	1.0			
Yes	1.423 (0.59–2.667)	0.35	-	-
Digestive problems				
No	1.0		1.0	
Yes	1.820 (1.420–2.333)	< 0.001*	1.190 (0.896–1.580)	0.229
Psychiatric problem				
No	1.0			
Yes	3.03 (0.286–0.321)	0.669	-	-
Memory related problem				
No	1.0			
Yes	0.696 (0.679–0.714)	0.607	-	-
Physical functioning				
Physical functioning				
No disability	1.0		1.0	
Have disability	1.851 (1.519–2.255)	< 0.001*	1.482 (1.191–1.844)	< 0.001*
ADLs				
No problem	1.0		1.0	
≥ 1 problems	1.519 (1.203–1.918)	0.001*	1.037 (0.795–1.354)	0.788
IADLs				
No problem	1.0		1.0	
≥ 1 problems	1.390 (1.154–1.675)	0.001*	1.252 (1.012–1.549)	0.039*
Health risk behavior				
Smoking behavior				
No	1.0			
Yes	0.904 (0.764–1.069)	0.255	-	-
Physical activity				
Never	1.0		1.0	
Low	1.14 (0.876–1.483)	0.33	1.192 (0.904–1.570)	0.214
Moderate	1.15 (0.885–1.495)	0.295	1.158 (0.877–1.528)	0.301
High	1.377 (1.030–1.841)	0.031*	1.448 (1.056–1.985)	0.021*
Mental health				
Depression				
Rarely or none	1.0		1.0	
Somedays	2.936 (2.076–4.154)	< 0.001*	2.439 (1.687–3.527)	< 0.001*
Occasionally	2.814 (1.983–3.994)	< 0.001*	2.278 (1.567–3.313)	< 0.001*
Most of the time	2.386 (1.535–3.708)	< 0.001*	1.800 (1.121–2.889)	0.015*
Loneliness				
Rarely or none	1.0		1.0	
Somedays	1.363 (0.931–1.997)	0.28	0.951 (0.631–1.434)	0.811
Occasionally	1.982 (1.434–2.739)	< 0.001*	1.364 (0.957–1.943)	0.086
Most of the time	2.151 (1.534–3.016)	< 0.001*	1.739 (1.209–2.501)	0.003*

* p-value < 0.05.

5. Summary

In conclusion, the prevalence of sleep disturbance in Indonesian older adults was 30.3%, which indicates a severe burden on the healthcare system. This study has important implications for elucidating several factors related to sleep problems in older adults in Indonesia. Plans for early evaluation and detection programs should be put into place before implementing any interventions and treatments.

Declaration of any potential financial and non-financial conflicts of interest

The authors declare no potential financial and non-financial conflicts of interest.

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