Psychiatria Danubina, 2026 Vol. 38, No. 2, pp 203-211 https://doi.org/10.24869/psyd.2026.203 *Research article*
© Medicinska naklada – Zagreb, Croatia

Factors associated with sleep disturbances in nursing students at the University of Palermo

Sandro Provenzano[1], Omar Enzo Santangelo[2], Antonio Terranova[3], Giuseppina Pesco[4], Anna Sole Pizzamiglio[2], Giuseppe D'Anna[5], Luana Maria Amato[5], Simona Fanuli[5] & Alberto Firenze[6]

[1]Hospital Management, Local Health Unit of Trapani, Trapani, Italy
[2]Regional Health Care and Social Agency of Lodi, Lodi, Italy
[3]Department of Health Promotion, Maternal-Infant, Internal Medicine and Specialization of Excellence "G. D'Alessandro", University of Palermo, Palermo, Italy
[4]Integrated Medical Activities Department, University Hospital "P. Giaccone" Hospital, Palermo, Italy
[5]University of Palermo, Palermo, Italy
[6]General Directorate of the University Hospital "P. Giaccone" Hospital, Nursing Office, Palermo, Italy

received: 15 January 2026; revised: 10 April 2026; accepted: 23 April 2026

Summary

Introduction: *sleep disturbances are very common among university students and can have negative effects on physical and mental health and academic performance. There is a close correlation between sleep disturbances and psychological and behavioural problems such as anxiety, depression and alcohol abuse. The study aimed to assess the prevalence of sleep disturbances and associated factors among nursing students at the University of Palermo.*

Subjects and methods: *the study is cross-sectional and was carried out in April 2024. The study population consisted of nursing students at the University of Palermo (Italy) and supplementary year students. Socio-demographic information, lifestyle habits and psychological symptoms were collected. Data were analysed by bivariate analysis and multivariable logistic regression to identify variables associated with sleep disturbances.*

Results: *the sample consisted of 575 women and 226 men, with a mean age of 22.71 years. The statistically significant variables are: age group, BMI, year of study, living with family, smoking habit, perceived economic and health status, alcohol abuse, anxiety symptoms and depressive symptoms. Multivariable logistic regression shows the sleep disturbances to be statistically significant at: anxious symptoms with severe intensity (aOR=2.16); depressive symptoms with mild (aOR=3.90), moderate (aOR=6.93), severe (aOR=9.96), very severe (aOR=14.60) intensity.*

Conclusions: *there is a statistically significant association between sleep disturbances and the presence of anxiety and depressive symptoms, as well as with smoking habits and the risk of alcohol abuse. A careful assessment of sleep disturbances is necessary in order to implement interventions to improve the quantity and quality of sleep among nursing students.*

Keywords: *Students; Sleep; Italy; Sicily; Anxiety.*

* * * * *

INTRODUCTION

Sleep disturbances are a significant issue among university students, with negative impacts on physical and mental health, ranging from fatigue and stress to lower academic performance (Jiang et al., 2015). Although it is already known that university students have a higher prevalence of sleep disturbances than the general population, nursing students are even more exposed than other students (Belingheri et al., 2022), especially due to the night shifts of hospital internships (Belingheri et al., 2022). They are faced with numerous academic demands, new professional responsibilities and job flexibility, unfavourable conditions that are reflected in their sleep-wake rhythm (Salvi et al., 2020). In addition, inadequate sleep can also affect clinical performance, affecting patient care (Blome et al., 2021). Many studies strongly suggest that sleep frequency, as well as its quality and quantity, are correlated with students' learning abilities and academic performance, and that students are often chronically sleep deprived (Ahrberg et al., 2012). Sleep disturbances include sleep onset and sleep maintenance disorders, excessive sleepiness, sleep-wake rhythm disorders and dysfunctions associated with sleep, sleep stages or partial awakenings (Fang et al., 2019). These are often accompanied by other problems, both physical and mental. Indeed, numerous studies have shown a bidirectional relationship between sleep disturbances and psychopathological conditions such as anxiety and depression. In particular, severe anxiety symptoms are often associated with difficulty falling asleep and unrestorative sleep (Provenzano

et al., 2022). Similarly, depression is frequently accompanied by initial, central or terminal insomnia, and the degree of sleep disturbance tends to worsen as the severity of depressive symptoms increases (Gress-Smith JL et al., 2015). Not least, inappropriate alcohol use among university students shows a higher risk of developing sleep disturbances, further aggravating their emotional balance (Santangelo et al., 2019; Gardani et al., 2022). The aim of our study is to estimate the prevalence of sleep disturbances, and to assess what the associated factors are in the target population, nursing students at the University of Palermo, Italy. The purpose of the study is to estimate the prevalence of sleep disturbances and to evaluate which factors are associated in our target population, nursing students at the University of Palermo, Italy.

SUBJECTS AND METHODS

The study is cross-sectional and was carried out in April 2024.

Population

The interviewees were all the students of the three-year degree course in nursing at the University of Palermo (Italy), the students of the additional years were also interviewed, that is, those students who do not belong to the first three years of the course but who have not yet finished their studies and are required to attend the lessons. The lessons in the nursing degree course are subject to compulsory attendance and physical presence, otherwise the student cannot take the exam, the questionnaire was administered at the end of the lessons during the days of the lessons. Before filling out the questionnaire, each student was given informed consent. The only exclusion criterion was that the student was underage, but no students were found to be underage; all were over 18 years old.

Instruments

The questionnaire administered was divided into various parts, in the first part we asked the interviewees information on age, sex, weight, height, country of birth, year of study, whether he currently works, whether he still lives with his family, whether he studies in the same city where he lives or whether he is a commuter or lives in another city, whether he currently smokes, whether he is engaged or single, his perceived economic and health status, whether he does physical activity and whether in the last two weeks he has had sleep disturbances. in the second part of the survey, the Alcohol Use Disorders Identification Test-Consumption (A.U.D.I.T.-C) test was administered, the test is made up of three questions that investigate the possible risk of alcohol consumption (Dawson et al., 2005); each question has five possible answers with a score from 0 to 4.

The sum of each score gives a total score, on the basis of which the subjects are classified as "at risk" or "not at risk". A score of 5 or higher for men and 4 or higher for women indicates possible risky alcohol use. In the third part of the survey the Beck Anxiety Inventory (BAI) questionnaire was administered, a self-report tool that allows to assess the severity of anxiety symptoms in adults by administering 21 items (investigating somatic anxiety symptoms, subjective or related to phobias) with four possible answers to which are assigned a score ranging from 0 to 3. Based on the score the subjects are assigned to one of the following categories: 0-21 mild, 22-35 moderate, ≥36 severe (Leyfer et al., 2006). In the fourth part of the survey the QIDS-SR16 (Quick Inventory of Depressive Symptomatology Self-Report) questionnaire was administered, a self-report tool that allows to evaluate the severity of depressive symptomatology by administering 16 items with four possible answers to which a score ranging from 0 to 3 is attributed. Questions in the QIDS-SR16 include: sleep disturbance (initial, middle, and late insomnia or hypersomnia), sad mood, decrease/increase in appetite/weight, concentration, self-criticism, suicidal ideation, interest, energy/fatigue, psychomotor agitation/retardation. Based on the score the subjects are assigned to one of the following categories: 0-5 no depressive symptomatology, 6-10 mild, 11-15 moderate, 16-20 severe and ≥21 very severe depressive symptomatology (Rush et al., 2003). The "age" variable was subsequently dichotomized into < 23 years and ≥ 23 years as the average age of the sample was 22.71 years. The Body Mass Index (BMI) was calculated with the weight and height variables and then based on the value obtained the subjects were categorized into 4 categories: i) if BMI between 18.50 – 24.99 normal weight subject, ii) if BMI included between 25.00-29.99 overweight subject, iii) if BMI greater than or equal to 30 obese subject and iv) if BMI lower than 18.50 underweight subject (Ministry of Health, 2025), It was later renamed the Cole Index as variable. We used validated tests in Italian and administered to people 18 and older.

Statistical analysis

Absolute and relative frequencies were calculated for all qualitative variables, categorical variables were analysed using Pearson's Chi-square test. A multivariable logistic regression was performed, considering it as the dependent variable "Have you had any sleep disturbances in the last 2 weeks?" (this question is not present in any of the tests used in this study but was created specifically by the authors), in order to evaluate the role of the other variables of the questionnaire. In the final model, all the variables present in the questionnaire were inserted as independent variables, each independent variable is adjusted for all the other independent variables. The statistical significance level chosen for all analyses was 0.05. Results were analysed using STATA statistical software version 14 (StataCorp, 2015). Results are expressed as adjusted odds ratio (aOR) with 95% confidence intervals (95% CI).

RESULTS

The questionnaire was administered to all those present on the days of lessons, lessons which are mandatory in order to take the exams. Of the 806 presents, 801 agreed to answer the questionnaire (99.38%), 5 did not give consent (0.62%). The sample consisted of 575 women and 226 men, with an average age of 22.71 years, including 402 first-year students, 200 second-year students, 177 third-year students and 22 additional year students. For further details on the characteristics of the study population, see Table 1. In the bivariate analysis, the variables that were statistically significant with the occurrence of sleep disturbances in the last two weeks were: age group, BMI, year of study, living with family, smoking habit, perceived economic and health status, alcohol abuse, anxiety symptoms and depressive symptoms (see Table 2). As for Table 3, the multivariable logistic regression shows the sleep disturbances to be statistically significant at: anxious symptoms with severe intensity (aOR=2.16); depressive symptoms with mild (aOR=3.90), moderate (aOR=6.93), severe (aOR=9.96), very severe (aOR=14.60).

DISCUSSION

Our study highlighted several factors associated with the occurrence of sleep disturbances among university students. The results obtained are in line with numerous scientific studies, although some discrepancies may result from cultural, methodological or sampling differences. Sleep disturbances occur mainly in students under 23 years of age. These findings are consistent with previous studies that have found a higher prevalence of sleep disturbances among women and younger age groups. This is also the case among the students surveyed, probably due to increased academic and social pressures (Santangelo et al., 2019) . From our analysis, it appears that students with an obese BMI are more likely to experience sleep disturbances. This association is supported by previous research that has shown an inverse relationship between sleep quality and high BMI among university students. However, it is important to consider that the relationship between BMI and sleep quality may be influenced by multiple factors, including lifestyle and mental health (Wang et al., 2019).

Therefore, the results suggest that obesity is not only a physical risk factor, but also a potential indicator of psychological distress and unhealthy behaviour, which in turn may negatively influence sleep (Hu et al., 2024). Furthermore, our study shows that the smoking habit increases the likelihood of the onset of sleep disturbances. This has been documented in various studies, which have shown a relationship between smoking and lower sleep quality among university students. At the same time, a negative perception of one's health and poor economic status are associated with a higher incidence of poor sleep quality (Carone et al., 2020; Brozek et al, 2017; Leonavicius & Adomaitiene, 2014; Mishra et al, 2025). As regards the prevalence of sleep disturbances, our study does not differ much from what is present in the literature in other areas of the world, even though different tests or questions were used. For example, in a study carried out in Ethiopia, it emerged that the prevalence of poor sleep quality was found in 55.8% of participants (Lemma et al., 2012), in our study, 39.33% declared having had sleep disorders in the last two weeks. These results are comparable with the Chinese study by Hu et al. (Hu et al., 2024) (39.30%) and by Carone et al. (Carone et al., 2020) where 30% of participants declared having a low quality of sleep through a self-reported questionnaire. Another significant finding from our study concerns the correlation between the risk of alcohol abuse and the onset of sleep disturbances. Students who show a high risk of alcohol-related behaviour tend to manifest sleep problems to a greater extent, such as difficulty falling asleep, frequent nocturnal awakenings or unrestorative sleep. This aspect is also well documented in the literature: numerous studies have shown that regular or excessive alcohol intake can significantly impair sleep quality. In particular, alcohol consumption, although it may appear to have a

Table 1. Description of the sample.

Variables		**N**	**%**
Age class	< 23 years old	558	69.66
	≥ 23 years old	243	30.34
Gender	Male	226	28.21
	Female	575	71.79
Cole Index	Normal weight	554	69.16
	Overweight	144	17.98
	Obese	66	8.24
	Underweight	37	4.62
Country of birth	Italy	788	98.38
	Other	13	1.62
Year of study	First	402	50.19
	Second	200	24.97
	Third	177	22.10
	Supplementary year student	22	2.74
Do you have a job right now?	Yes	82	10.24
	No	719	89.76
Do you live with your family?	Yes	705	88.01
	No	96	11.99
Are you a student off-site or in-site?	In-site	478	59.68
	Off-site	323	40.32
Do you currently smoke?	I have never smoked	164	20.47
	No	379	47.32
	Yes	258	32.21
Are you engaged or single?	Engaged	494	61.67
	Single	307	38.33
Perceived health status	High	291	36.33
	Medium	463	57.8
	Low	47	5.87
Perceived economic status	High	103	12.86
	Medium	559	69.79
	Low	139	17.35
Do you perform regular physical activity?	Yes	259	32.33
	No	542	67.67
Have you had any sleep disturbances in the last 2 weeks?	No	486	60.67
	Yes	315	39.33
AUDIT-C	Not risk	713	89.01
	At risk	88	10.99
B.A.I.	Mild	507	63.30
	Moderate	193	24.09
	Severe	101	12.61
QIDSR-16	None	250	31.21
	Mild	270	33.71
	Moderate	156	19.48
	Severe	73	9.11
	Very severe	52	6.49
Age	22.71 (SD ± 5.12*)		
BMI score	23.27 kg/m² (SD ± 4.05*)		
AUDIT-C score	2.11 (SD ± 1.79*)		
B.A.I. score	18.64 (SD ± 13.41*)		
QIDSR-16 score	9.50 (SD ± 6.94*)		

*Standard deviation

Table 2. Correlation between the sleep disturbance and the other variables of the questionnaire.
Used Pearson's Chi-square test.

Variables		**Have you had any sleep disturbances in the last 2 weeks?**		
		No (%)	**Yes (%)**	***p-value***
Age class	< 23 years old	354 (63.44)	204 (36.56)	0.015
	≥ 23 years old	132 (54.32)	111 (45.68)	
Gender	Male	137 (60.32)	89 (39.38)	0.984
	Female	349 (60.70)	226 (39.30)	
BMI	Normal weight	349 (63.00)	205 (37.00)	0.046
	Overweight	84 (58.33)	60 (41.67)	
	Obese	30 (45.45)	36 (54.55)	
	Underweight	23 (62.16)	14 (37.84)	
Country of birth	Italy	481 (61.04)	307 (38.96)	0.098
	Other	5 (38.46)	8 (61.54)	
Year of study	First	281 (69.90)	121 (30.10)	<0.001
	Second	108 (54.00)	92 (46.00)	
	Third	85 (48.02)	92 (51.98)	
	Supplementary year student	12 (54.55)	10 (45.45)	
Do you have a job right now?	Yes	45 (54.88)	37 (45.12)	0.257
	No	441 (61.34)	278 (38.66)	
Do you live with your family?	Yes	437 (61.99)	268 (38.01)	0.039
	No	49 (51.04)	47 (48.96)	
Are you a student off-site or in-site?	In-site	291 (60.88)	187 (39.12)	0.885
	Off-site	195 (60.37)	128 (39.63)	
Do you currently smoke?	I have never smoked	108 (65.85)	56 (34.15)	<0.001
	No	256 (67.55)	123 (32.45)	
	Yes	122 (47.29)	136 (52.71)	
Are you engaged or single?	Engaged	303 (61.34)	191 (38.66)	0.627
	Single	183 (59.61)	124 (40.39)	
Perceived health status	High	219 (75.26)	72 (24.74)	<0.001
	Medium	258 (55.72)	205 (44.28)	
	Low	9 (19.15)	38 (80.85)	
Perceived economic status	High	75 (72.82)	28 (27.18)	<0.001
	Medium	356 (63.69)	203 (36.31)	
	Low	55 (39.57)	84 (60.43)	
Do you perform regular physical activity?	Yes	169 (65.25)	90 (34.75)	0.067
	No	317 (58.49)	225 (41.51)	
AUDIT-C	Not risk	447 (62.69)	266 (37.31)	0.001
	At risk	39 (44.32)	49 (55.68)	
B.A.I.	Mild	362 (71.40)	145 (28.60)	<0.001
	Moderate	100 (51.81)	93 (48.19)	
	Severe	24 (23.76)	77 (76.24)	
QIDSR-16	None	220 (88.00)	30 (12.00)	<0.001
	Mild	165 (61.11)	105 (38.89)	
	Moderate	71 (45.51)	85 (54.49)	
	Severe	22 (30.14)	51 (69.86)	
	Very severe	8 (15.38)	44 (84.62)	

Table 3. Multivariable logistic regression. Adjusted Odds Ratio are presented. Each independent variable is adjusted for all the other independent variables. Based on 801 observations.

Independent Variables		**Have you had any sleep disturbances in the last 2 weeks? Yes**		
		aOR	**95% C.I.**	***p-value***
Age	as continuous variable	1.03	0.99-1.07	0.099
Gender	Male	1		
	Female	1.07	0.72-1.61	0.729
BMI	Normal weight	1		
	Overweight	1.05	0.67-1.65	0.821
	Obese	1.25	0.65-2.41	0.506
	Underweight	0.71	0.32-1.60	0.413
Country of birth	Italy	1		
	Other	2.25	0.59-8.60	0.234
Year of study	First	1		
	Second	1.19	0.79-1.81	0.399
	Third	1.19	0.77-1.86	0.455
	Supplementary year student	0.81	0.28-2.40	0.713
Do you have a job right now?	Yes	1		
	No	0.86	0.48-1.52	0.595
Do you live with your family?	Yes	1		
	No	0.81	0.46-1.43	0.475
Are you a student off-site or in-site?	In-site	1		
	Off-site	1.02	0.71-1.46	0.913
Do you currently smoke?	I have never smoked	1		
	No	0.70	0.45-1.09	0.118
	Yes	1.32	0.82-2.13	0.259
Are you engaged or single?	Engaged	1		
	Single	1.01	0.70-1.44	0.981
Perceived health status	High	1		
	Medium	1.28	0.88-1.88	0.201
	Low	2.01	0.73-5.53	0.178
Perceived economic status	High	1		
	Medium	1.20	0.70-2.07	0.508
	Low	1.57	0.81-3.05	0.183
Do you perform regular physical activity?	Yes	1		
	No	0.93	0.64-1.35	0.694
AUDIT-C	Not risk	1		
	At risk	0.87	0.51-1.56	0.676
B.A.I.	Mild	1		
	Moderate	1.12	0.74-1.70	0.586
	Severe	2.16	1.16-4.05	0.016
QIDSR-16	None	1		
	Mild	3.90	2.41-6.30	<0.001
	Moderate	6.93	4.01-11.97	<0.001
	Severe	9.96	4.88-20.34	<0.001
	Very severe	14.60	5.35-39.84	<0.001

sedative effect at an early stage, actually alters the normal course of sleep, reducing deep sleep phases and increasing awakenings during the night. This leads to more fragmented sleep that is less effective in restoring physical and mental energy (Choueiry et al., 2016; Gianfredi et al.; 2018; Manusheva & Krkinski, 2023; Vilibić et al, 2022). Finally, the presence of severe anxiety symptoms and depressive symptoms lead to a greater onset of sleep disturbances. This association is widely supported by the literature, which has shown a significant correlation between anxiety symptoms and sleep disturbances among university students (Gress-Smith et al., 2015). The study has several limitations. First, it is monocentric, and therefore it is not possible to determine whether the results are generalizable to other settings; for this reason, future multicenter studies would be useful to improve the external validity of the findings. Another significant limitation that impacts the theoretical utility of the study is its cross-sectional design, which involves collecting data on all variables at a single point in time. While this approach is useful for identifying correlations and associations between variables, it prevents the establishment of temporal precedence, a necessary condition for inferring causality. Consequently, it is not possible to determine whether anxiety and depression are causes or consequences of sleep disturbances. Among the most relevant limitations is the reliance on self-reported data. Several key variables, including BMI, sleep disturbances, smoking habits, and alcohol consumption, were self-reported, making the findings susceptible to both recall bias and social desirability bias. Participants may have difficulty accurately remembering the frequency or details of their behaviours (recall bias) or may respond in a way they perceive as more socially acceptable rather than providing truthful answers (social desirability bias), potentially leading to misclassification or attenuation of the observed associations. In particular, in the context of sensitive topics, social desirability bias may result in an overestimation of desirable behaviours and an underestimation of undesirable ones (Firenze et al., 2017; Gianfredi et al., 2025). Moreover, BMI presents intrinsic limitations, as it does not distinguish between fat and lean mass, and its self-reported nature in this study may have further reduced measurement accuracy. Another limitation concerns the assessment of sleep disturbances, which was based on a non-validated question; the lack of a standardized and validated instrument may limit the reliability and comparability of the findings. Finally, the study did not include questions regarding pharmacological treatments that may affect sleep (e.g., anxiolytics, antidepressants, and stimulants), nor did it investigate the presence of developmental or endocrine disorders, which represents an additional limitation.

CONCLUSIONS

In conclusion, our study explored the extent of sleep disturbances among undergraduate nursing students, revealing a statistically significant association between sleep disturbances and anxiety and depressive symptoms, as well as smoking and alcohol abuse. The importance of sleep assessment in similar populations is clear, as improving sleep quantity and quality is not only crucial for health but also a protective factor for academic success and overall well-being. Nursing students are particularly vulnerable to sleep disturbances due to heavy study loads, emotional pressures, and irregular clinical shift schedules.

To address these issues, a dual approach involving both individual and organizational interventions is necessary. On an individual level, structured education on sleep hygiene could help students maintain a regular sleep schedule, manage stress through relaxation techniques such as mindfulness, and reduce stimulant use, particularly in the evening. Additionally, psychological support could be offered through peer-led support groups or online resources focused on anxiety and stress management, alongside workshops on relaxation and coping strategies.

From an organizational perspective, incorporating content on sleep physiology into the nursing curriculum would raise awareness about the importance of sleep. Clinical shift scheduling should also be optimized by reducing consecutive night shifts and ensuring adequate breaks between shifts to minimize disruption to students' sleep. Furthermore, universities should provide free**,** confidential psychological counseling for students dealing with sleep disturbances, anxiety, or depression. Finally, introducing sleep tracking programs through wearable devices or apps could encourage students to monitor their sleep habits and improve their sleep quality.

By implementing these targeted interventions, nursing schools can help students improve their sleep quality, thereby enhancing both their academic performance and mental health.

Acknowledgment: None
Ethical considerations: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
Funding sources: The authors received no funding from an external source.
Conflict of interest: None to declare.

Authors' contributions: Study concept and design: O.E.S and S.P.; analysis and interpretation of data: all authors, drafting of the manuscript: O.E.S, S.P., L.M.A., S.F., A.S.P., G.P, A.T. and G.D.; critical revision of the manuscript for important intellectual content: O.E.S, S.P. and A.F..; statistical analysis: O.E.S; final approval of the version to be submitted: all authors; agreement to be accountable for all aspects of the work: all authors.

References

Ahrberg, K., Dresler, M., Niedermaier, S., Steiger, A., & Genzel, L. (2012). The interaction between sleep quality and academic performance. *Journal of psychiatric research, 46*(12), 1618–1622. https://doi.org/10.1016/j.jpsychires.2012.09.008

Belingheri, M., Luciani, M., Ausili, D., Paladino, M. E., Di Mauro, S., De Vito, G., & Riva, M. A. (2022). Sleep disorders and night-shift work in nursing students: a cross-sectional study. *La Medicina del lavoro, 113*(1), e2022003. https://doi.org/10.23749/mdl.v113i1.12150

Blome, M. J., Johnson, M. L., Jones, M. A., Moore, M. S., & Beck, M. F. (2021). Sleep Quality and Daytime Sleepiness in Prelicensure Baccalaureate Nursing Students. *The Journal of nursing education, 60*(4), 196–202. https://doi.org/10.3928/01484834-20210322-03

Brozek, P., Brachmanska, M., Rabiczko, K., Bulska, W., Ciulkowicz, M., & Krzystanek, E. (2017). Depression, sleep disturbances and anxiety in patients with relapsing-remitting multiple sclerosis: a longitudinal cohort observation. *Psychiatria Danubina, 29*(Suppl 3), 464–468.

Carone, C. M. M., Silva, B. D. P. D., Rodrigues, L. T., Tavares, P. S., Carpena, M. X., & Santos, I. S. (2020). Fatores associados a distúrbios do sono em estudantes universitários [Factors associated with sleep disorders in university students]. *Cadernos de saude publica, 36*(3), e00074919. https://doi.org/10.1590/0102-311X00074919

Choueiry, N., Salamoun, T., Jabbour, H., El Osta, N., Hajj, A., & Rabbaa Khabbaz, L. (2016). Insomnia and Relationship with Anxiety in University Students: A Cross-Sectional Designed Study. *PloS one, 11*(2), e0149643. https://doi.org/10.1371/journal.pone.0149643

Dawson, D. A., Grant, B. F., Stinson, F. S., & Zhou, Y. (2005). Effectiveness of the derived Alcohol Use Disorders Identification Test (AUDIT-C) in screening for alcohol use disorders and risk drinking in the US general population. *Alcoholism, clinical and experimental research, 29*(5), 844–854. https://doi.org/10.1097/01.alc.0000164374.32229.a2

Dobrowolska, B., Zec, A., Tosoratti, J., Machul, M., Pokorná, A., Nascimento, C., Ferrão, S., Ziakova, K., Solgajova, A., Rybarova, L., Achil, I., & Palese, A. (2020). Night shifts as a learning experience among nursing students across Europe: Findings from a cross-sectional survey. *Nurse education today, 90*, 104441. https://doi.org/10.1016/j.nedt.2020.104441

Fang, H., Tu, S., Sheng, J., & Shao, A. (2019). Depression in sleep disturbance: A review on a bidirectional relationship, mechanisms and treatment. *Journal of cellular and molecular medicine, 23*(4), 2324–2332. https://doi.org/10.1111/jcmm.14170

Firenze, A., Provenzano, S., Santangelo, O. E., Alagna, E., Piazza, D., & Torregrossa, M. V. (2017). Hackathon Public Health. *La Clinica terapeutica, 168*(6), e421–e427. https://doi.org/10.7417/T.2017.2045

Gardani, M., Bradford, D. R. R., Russell, K., Allan, S., Beattie, L., Ellis, J. G., & Akram, U. (2022). A systematic review and meta-analysis of poor sleep, insomnia symptoms and stress in undergraduate students. *Sleep medicine reviews, 61*, 101565. https://doi.org/10.1016/j.smrv.2021.101565

Gianfredi, V., Barbati, C., Sgueglia, A. C., Bertuccio, P., Traverso, L., & Odone, A. (2025). Digital interventions in tobacco prevention for school-aged children: results of systematic review. *Public health, 245*, 105799. https://doi.org/10.1016/j.puhe.2025.105799

Gianfredi, V., Nucci, D., Tonzani, A., Amodeo, R., Benvenuti, A. L., Villarini, M., & Moretti, M. (2018). Sleep disorder, Mediterranean Diet and learning performance among nursing students: inSOMNIA, a cross-sectional study. *Annali di igiene : medicina preventiva e di comunita, 30*(6), 470–481. https://doi.org/10.7416/ai.2018.2247

Gress-Smith, J. L., Roubinov, D. S., Andreotti, C., Compas, B. E., & Luecken, L. J. (2015). Prevalence, severity and risk factors for depressive symptoms and insomnia in college undergraduates. *Stress and health: journal of the International Society for the Investigation of Stress, 31*(1), 63–70. https://doi.org/10.1002/smi.2509

Hu, B., Wu, Q., Wang, Y., Zhou, H., & Yin, D. (2024). Factors associated with sleep disorders among university students in Jiangsu Province: a cross-sectional study. *Frontiers in psychiatry, 15*, 1288498. https://doi.org/10.3389/fpsyt.2024.1288498

Jiang, X. L., Zheng, X. Y., Yang, J., Ye, C. P., Chen, Y. Y., Zhang, Z. G., & Xiao, Z. J. (2015). A systematic review of studies on the prevalence of insomnia in university students. *Public health, 129*(12), 1579–1584. https://doi.org/10.1016/j.puhe.2015.07.030

Leyfer, O. T., Ruberg, J. L., & Woodruff-Borden, J. (2006). Examination of the utility of the Beck Anxiety Inventory and its factors as a screener for anxiety disorders. *Journal of anxiety disorders, 20*(4), 444–458. https://doi.org/10.1016/j.janxdis.2005.05.004

Leonavicius, R., & Adomaitiene, V. (2014). Features of sleep disturbances in multiple sclerosis patients. *Psychiatria Danubina, 26*(3), 249–255.

Lemma, S., Gelaye, B., Berhane, Y., Worku, A., & Williams, M. A. (2012). Sleep quality and its psychologi-

cal correlates among university students in Ethiopia: a cross-sectional study. *BMC psychiatry, 12*, 237. https://doi.org/10.1186/1471-244X-12-237

Manusheva, N., & Krkinski, D. (2023). Fatigue and Sleepiness in Patients with Depression – a Sign to Look for Obstructive Sleep Apnea. *Psychiatria Danubina, 35*(1), 123–125. https://doi.org/10.24869/psyd.2023.123

Ministry of Health, Italy. (2025) Available online: https://www.salute.gov.it/portale/nutrizione/dettaglioIMCNutrizione.jsp?lingua=italiano&id=5479&area=nutrizione&menu=vuoto (Last access 12th October 2025)

Mishra, A., Maiti, R., Jena, M., & Srinivasan, A. (2025). Evaluating machine learning algorithms for prediction of treatment response for sleep disturbances in patients with schizophrenia: A post-hoc analysis from a randomized controlled trial. *Psychiatria Danubina, 37*(1), 46–54. https://doi.org/10.24869/psyd.2025.46

Provenzano, S., Santangelo, O.E., & Firenze, A. (2018) Factors associated with the anxious symptomatology in a sample of university students. *Minerva Psichiatry, 58*, 165-70. https://doi.org/10.23736/S0391-1772.18.01975-1

Rush, A. J., Trivedi, M. H., Ibrahim, H. M., Carmody, T. J., Arnow, B., Klein, D. N., Markowitz, J. C., Ninan, P. T., Kornstein, S., Manber, R., Thase, M. E., Kocsis, J. H., & Keller, M. B. (2003). The 16-Item Quick Inventory of Depressive Symptomatology (QIDS), clinician rating (QIDS-C), and self-report (QIDS-SR): a psychometric evaluation in patients with chronic major depression. *Biological psychiatry, 54*(5), 573–583. https://doi.org/10.1016/s0006-3223(02)01866-8

Salvi, C. P. P., Mendes, S. S., & Martino, M. M. F. (2020). Profile of nursing students: quality of life, sleep and eating habits. *Revista brasileira de enfermagem, 73* Suppl 1, e20190365. https://doi.org/10.1590/0034-7167-2019-0365

Santangelo, O.E., Provenzano, S., Armetta, F., Giordano, D., Alagna, E., & Firenze A. (2019) Is there a link between BMI and depressive symptomatology, risky consumption of alcohol and anxious symptomatology? *Minerva Psichiatry. 60*, 69–74.

StataCorp. (2015). Stata Statistical Software. Release 14. College Station, TX: StataCorp

Vilibić, M., Peitl, V., Živković, M., Vlatković, S., Ljubičić Bistrović, I., Ljubičić, R., Matošić, A., & Karlović, D. (2022). Quetiapine Add-On Therapy May Improve Persistent Sleep Disturbances in Patients with PTSD on Stabile Combined SSRI and Benzodiazepine Combination: A One-Group Pretest-Posttest Study. *Psychiatria Danubina, 34*(2), 245–252. https://doi.org/10.24869/psyd.2022.245

Wang, J., Chen, Y., Jin, Y., Zhu, L., & Yao, Y. (2019). Sleep quality is inversely related to body mass index among university students. *Revista da Associacao Medica Brasileira (1992), 65*(6), 845–850. https://doi.org/10.1590/1806-9282.65.6.845

Correspondence:
Dr. Omar Enzo Santangelo, Regional Health Care and Social Agency of Lodi, ASST Lodi, 26900 Lodi, Italy.
omarenzosantangelo@hotmail.it

Published under
https://creativecommons.org/licenses/by-nc-nd/4.0/