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Assessment of sleep disorders and use of psychoactive drugs among Polish students

Patryk Piotrowski[1], Mateusz Babicki[1,2], Paulina Maślanka[3], Kamila Kotowicz[1], Dominik Marciniak[3,4], Joanna Rymaszewska[1]

[1] Wroclaw Medical University, Department and Clinic of Psychiatry
[2] Wroclaw Medical University, Department of Neurosurgery
[3] Wroclaw Medical University, Psychiatry Student Research Club
[4] Wroclaw Medical University, Department of Drugs Technology

Summary

Aim. Sleep disorders in the form of insomnia or excessive daytime sleepiness have their health and social consequences. The aim of the study was to evaluate the frequency of sleep disorders, quality of life and the pattern of psychoactive substance use among the students of Polish universities using CAVI method.

Material and method. *The Athens Insomnia Scale*, *the Epworth Sleepiness Scale*, and *the Manchester Short Assessment of Quality of Life* were used. The study was conducted using anonymous and voluntary questionnaires distributed via the Internet.

Results. Most of the respondents (N = 5,342) were women (74%). A high percentage (>51%) of sleep disorders was found in women. Daytime sleepiness occurred in 28% of respondents, which correlated with sleep disorders. The use of psychoactive drugs is very common (94%) among Polish students of both sexes and (apart from alcohol) significantly affects the quality of life (p = 0.000). In the assessment of the psychoactive substance use pattern, the students of medical universities only slightly differ from students of other majors. The quality of life of people affected by sleep disorders is much lower than of the healthy student population.

Conclusions. The great scale of the sleep disorder phenomenon and the use of psychoactive substances among Polish students require further exploration with particular emphasis on preventive and therapeutic activities.

Key words: drugs, sleep disorders, students

Introduction

Sleep disorders are a growing health problem around the world [1]. So far, the studies show that they affect up to 20–40% of the total population [2]. For epidemio-

logical reasons and due to possible health consequences, this phenomenon is no longer considered in terms of an individual's health, but it is becoming a social problem [3].

It is commonly known that lifestyle has a major impact on the quality and length of sleep. The model of social functioning often changes into a less healthy one while undertaking studies. For example, this is caused by lack of parental control, peer group pressure – willingness to be a member of a new group of friends, a symbolic introduction to 'student life'. An additional biological factor is teenage delayed sleep phase disorder, which is still seen at this age, as well as chronic sleep deprivation caused by waking up early every day [4].

The significance of proper sleep has been confirmed in many areas of life such as cognitive, emotional, social, and biological functioning. Its importance in the prevention of diseases of civilization cannot be overlooked either. It constitutes a preventive factor against diabetes mellitus, hypertension, myocardial infarction, stroke, and obesity [5].

A range of possible consequences of sleep disorders is broad and involves the spectrum from unwillingness to engage in any activity, through daytime sleepiness and apathy, to health loss, making more mistakes, and having accidents [6]. Excessive daytime sleepiness may also be developed. Its symptoms include sleepiness, worse learning outcomes, concentration issues, making mistakes, risky behavior, accidents, depression, health deterioration, neglecting responsibilities, deterioration of social relations, or less work efficiency. According to estimates, this phenomenon affects 26% of the population [7].

However, no steps are taken to solve the problem even though it is common and teachers notice daytime sleepiness among their students. Such students are said not to take any interest in classes and not to behave in compliance with social standards. Still, the consequences of the phenomenon do not involve the individual only. Its social consequences include: lower work efficiency or higher likelihood of traffic and workplace accidents, which generate additional costs from the point of view of health economics [8–10].

Aim

The aim of the study was to evaluate the frequency of sleep disorders, determination of quality of life and the analysis of pattern of use of psychoactive substances among the students of Polish universities.

Material

5,342 students from Poland, who represented universities with various profiles, participated in the study. The respondents were first-year to sixth-year students. The mean age of the study group was 22 years (min. 18, max. 45; $SD = 1.92$). By far the majority of the study group were women – 4,086 surveys were completed by women, which is 74% of all the surveys. 1,256 men completed the survey (26%). Table 1 presents the characteristics of the study group.

Table 1. **Characteristics of the study group**

Sex					
Women 74% (4,086)			Men 26% (1,256)		
University profile					
Medical 1,824			Non-medical 3,518		
Major					
Medical 1,824	Humanities 1,358	Mathematical 987	Economical 979	Biological 227	
Year of studies					
I 1,240	II 1,221	III 1,206	IV 753	V 770	VI 152
Place of residence					
City <500 000 2,628			City >500000 2,700	No answer 14	

Methods

The study, with the use of anonymous and voluntary surveys, was based on authors' own questionnaire and three standardized psychometric tools. The survey was made available online from 31.01.2016 to 11.04.2016. It was a CAWI (Computer-Assisted Web Interview) quantitative investigation in the form of a survey to fill out individually on a computer by a respondent. The target group was comprised of young people who use the portal www.facebook.com, by which the survey was made available.

The form was comprised of two parts. The first one included questions about basic sociodemographic information such as age, sex, place of residence, university profile and major, and also the pattern of psychoactive substances use. The other part included the standardized psychometric tools containing multiple choice questions where only one answer could have been chosen. The questions concerned the evaluation of the sleep disorder incidence and the determination of quality of life.

The other part used the following tools:

(1) *The Athens Insomnia Scale* (AIS) – used to assess insomnia on the basis of eight questions about symptoms that occur at least 3 times within the last week. The tool comes from the United States where 6 points were initially used as the cut-off point for diagnosing sleep disorders. The scale was adapted to the Polish population in 2011, and 8 points were considered a cut-off value [11].

(2) *The Epworth Sleepiness Scale* (ESS) – used to evaluate daytime sleepiness on the basis of the total points scored by a subjective evaluation of probability

of falling asleep in eight everyday situations (watching TV, sitting in a public place, lying down to rest in the afternoon etc.). The results are interpreted in the following way: 0–10 points – no daytime sleepiness, 11–14 – sleepiness, 15 points or above – pathological sleepiness and medical advice should be sought [12].

(3) *The Manchester Short Assessment of Quality of Life* (MANSA) – consists of 16 questions about the subjective evaluation of the satisfaction with one's own life and its individual areas. The MANSA scale, suggested by Priebe, was developed on the basis of *the Lancashire Quality of Life Profile* (LQLP), which, in its developed form, allows us to evaluate quality of life comprehensively [13]. The MANSA is a more condensed and slightly modified alternative that maintains the psychometric parameters of its precursor [14]. The questionnaire is designed for the general population, without references to any specific disorder symptoms or syndromes. The Polish version of the tool was prepared in the Department and Clinic of Psychiatry, Wroclaw Medical University, in 2000. The analysis of the results may be carried out on the basis of single questions or the average number of points scored on the entire scale.

Statistical methods

All statistical analyses were performed with the use of Statistica 12 by StatSoft. The analyzed variables were qualitative (including dichotomous), ordinal and interval in character.

The chi-squared test was used to determine the relations between the compared ordinal variables. Depending on the contingency in two-way tables, the chi-squared test with the Yates' correction and Fisher's exact test were also used. While determining the relations between the variables in contingency tables, correspondence analysis was used as well.

For those variables the results of which were based on statistical interval scales, basic descriptive statistics were determined. The normality of distribution for the variables was evaluated by means of three different statistical tests: the Kolmogorov–Smirnov test, Lilliefors test, and Shapiro–Wilk W test with the significance level of $p = 0.05$. The homogeneity of variance was assessed with the Levene's test and Brown–Forsythe test, and the significance level was assumed to be $\alpha = 0.05$. The statistical significance of the differences between two mean values in the results, which features interval variables, was assessed using the parametric t-test for independent samples – if tests for distribution normality were not significant – or the parametric Cochran–Cox test for unequal variances. In the case of variables that did not meet the distribution normality criterion, the difference between two mean values was evaluated with the use of the nonparametric Mann–Whitney U test. The significance level of $\alpha = 0.05$ was assumed in all tests that evaluated the statistical significance of the differences between mean values.

Results

General image of sleep disorders and satisfaction with different aspects of one's own life in the study group

51.07% of the students in the study group were diagnosed with sleep disorders on the basis of *the Athens Insomnia Scale*. The difference between sexes was statistically significant ($p = 0.000$) and indicated that women were more frequently affected by sleep disorders (53.35%) than men (43.63%). Among the respondents, 39.65% described their falling asleep after going to bed and switching off the lights as delayed, and 11.23% of the respondents suffered from falling asleep very late or insomnia throughout the night. 81.1% of the respondents reported waking up at night, 25.59% of which claimed it was common or very common or it was the reason for insomnia throughout the night.

Only 23.17% of the students regarded their sleep duration as satisfactory; on the other hand, as many as 67.37% of the respondents were dissatisfied with their sleep quality to a varying extent irrespective of their sleep duration. 54.14% of the students noticed lower mental and physical capacity on the next day, while 58.78% of them claimed they were in a worse mood. There was no correlation between the size of the city in which the students studied ($p = 0.068$), or their age ($p = 0.37$) and suffering from insomnia. No correlation in the latter may have resulted from a small age range (mean age was 22 years; min. 18, max. 45; $SD = 1.92$).

According to *the Epworth Sleepiness Scale*, 28.08% of the students were found to be sleepy during the day. 24.56% of the respondents said that they would probably fall asleep while sitting and/or reading; on the other hand, 13.25% of the students claimed they would almost certainly fall asleep. 21.65% of the respondents found they would almost certainly fall asleep while being a passenger is a car, on a bus or train for an hour, whereas 3.37% of the students believed they would fall asleep while sitting in a public place. However, as many as 75.41% of the respondents claimed they would probably fall asleep while lying down to rest, including 48.12% who were certain they would do so. 0.85% believed that they might fall asleep driving a car while being stopped for a few minutes in the traffic.

There is a correlation between the assessment of the sleep duration and quality, including waking up at night, and a positive score of daytime sleepiness in the Epworth scale ($p = 0.000$). Among the respondents who did not wake up at night, 23.37% did not have a positive daytime sleepiness score; on the other hand, this percentage among the respondents who woke up at night very frequently or suffered from insomnia was 35.8% ($p = 0.000$). 16.64% of the respondents whose overall sleep duration was satisfactory suffered from daytime sleepiness; on the other hand, 41.18% of the students whose sleep duration was completely unsatisfactory or who suffered from insomnia throughout the night experienced daytime sleepiness ($p = 0.000$). Among those respondents who were satisfied with their sleep quality, 21.29% were sleepy during the day; on the other hand, this percentage increased to 40.83% among those students whose sleep quality was completely unsatisfactory ($p = 0.000$).

63.98% of the respondents were satisfied with their lives to a varying degree; 14.96% were dissatisfied to a varying degree; 21.06% were not able to give a clear

answer. 55.33% of the students were satisfied with their current professional/university career; 19.67% were dissatisfied, and 24.69% were not able to provide a direct answer. Table 2 contains the detailed percentage distribution of the answers to the questions about other aspects of life such as financial situation, number and quality of friendships, family relations, or mental and physical health.

Table 2. **Percentage distribution of the answers concerning quality of life (MANSA)**

Issue	Answers: "strongly agree"/"agree"/"rather agree"	Answers: "I neither agree nor disagree"	Answers: "strongly disagree"/"disagree"/ "rather disagree"
General life satisfaction	63.99%	21.05%	14.96 %
Satisfaction with work or other professional activities	55.63%	24.69%	19.67%
Satisfaction with your financial situation	44.46%	20.78%	34.76%
Having a close friend	YES = 79.90% NO = 20.10%		
Meeting a friend last week	YES = 66.47% NO = 33.53%		
Satisfaction with the number of friends and quality of these relationships	61.68%	16.89%	21.43%
Satisfaction with your extra activities (hobby)	50.11%	19.39%	30.49%
Satisfaction with your housing situation	60.67%	17.07%	22.26%
Accusation of breaking the law within the past year	YES = 14.26% NO = 85.74%		
Falling victim to violence within the past year	YES = 14.3% NO = 85.7%		
Sufficient level of safety	76.32%	12.35%	11.33%
Satisfaction with your relations with roommates or Satisfaction with living on your own (for those who live on their own)	68.87%	15.07%	16.06%
Satisfaction with your sex life	51.37%	17.65%	30.98%
Satisfaction with your family relations	70.35%	15.56%	14.1%
Satisfaction with your physical health	49.17%	22.5%	26.68%
Satisfaction with your mental health	53.76%	19.3%	26.94%

Table 3. **Statistical information in relation to sociodemographic data**

Variable		AIS				Epworth				Quality of life (MANSA)		
		Mean	SD	Positive results	p	Mean	SD	Positive results	p	Mean	SD	p
Sex	Female (N = 4,086)	8.25	4.11	53.35 %	p = 0.000	8.30	4.19	30.23%	p = 0.000	61.69	10.89	p = 0.03
	Male (N = 1,256)	7.22	4.02	43.63 %		7.25	3.92	21.10%		62.35	11.065	
Place of residence	< 500 thousand (N = 2,628)	7.91	4.09	48.11%	p = 0.068	8.04	4.15	28.01%	p = 0.9	61.86	10.92	p = 0.57
	> 500 thousand (N = 2,714)	8.10	4.13	51.89%		8.05	4.16	28.11%		61.85	10.95	

AIS – Athens Insomnia Scale; Epwort – Epworth Sleepiness Scale; MANSA – Manchester Short Assessment of Quality of Life

Studies and sleep disorders

A relationship between the occurrence of sleep disorders and type of studies ($p = 0.0043$) indicates that these issues were especially common among art students (65.22%), then among biology and humanities students (around 54%); on the other hand, economics students had a good night's sleep more often – 46.88% of them were affected by sleep disorders. 50.27% of the medical students were diagnosed with sleep disorders, and future midwives and paramedics had the highest percentage among all medical students (63.64% and 60.47% respectively); on the other hand, the smallest percentage was found among pharmaceutical students (44.05%).

The study also shows that fifth-year students slept the best, while sixth-year students slept the worst ($p = 0.0049$) (57.24% of students from medicine departments suffer from sleep disorders). However, when considering five-year studies only, the lowest quality of sleep was found in second-year students (53.24% of students suffering from these disorders). Nevertheless, it was sixth-year students who evaluated their quality of life the highest, followed by fifth-year students, among which there was the smallest number of students with a positive daytime sleepiness score on the Epworth scale (24.81%). In these respects, in the study group, the worst results were achieved by the first-year students – the percentage of students with a positive score among them was as high as 30.40%, and it is first-year students that evaluated their quality of life the lowest ($p = 0.051$). However, no upward or downward trend was found over the course of studies – each year of studies was individual in character.

The sleepiness score of 15 or above on the Epworth scale indicates pathological sleepiness and medical advice should be sought. This score was found among 3.92%

of the respondents. These respondents included 144 medical students who accounted for 24.5% of the students with a positive sleepiness score in this group. As far as non-medical students are concerned, 190 respondents were found to suffer from pathological sleepiness who accounted for 15% of all non-medical students with a positive sleepiness score ($p = 0.0002$).

Table 4. **Studies, sleep disorders and quality of life**

Variable		AIS				Epworth				Quality of life (MANSA)		
		Mean	SD	Positive results	p	Mean	SD	Positive results	p	Mean	SD	p
University profile	Medical (N = 1,824)	7.88	4.17	50.27%	p = 0.4	8.42	4.28	32.02%	p = 0.000	63.36	10.75	p = 0.000
	Non-medical (N = 3,518)	8.07	4.09	51.48%		7.85	4.08	26.04%		61.09	10.95	
Year of study	I (N = 1,240)	8.10	4.06	51.94%	p = 0.007	8.25	3.99	30.40%	p = 0.03	61.41	10.97	p = 0.02
	II (N = 1,221)	8.21	4.04	53.24%		7.96	4.03	26.78%		61.79	10.67	
	III (N = 1,206)	8.00	4.05	51.49%		8.18	4.33	29.60%		61.64	10.48	
	IV (N = 753)	7.96	4.26	57.27%		7.91	4.21	28.95%		61.86	11.42	
	V (N = 770)	7.49	4.17	50.46%		7.87	4.24	27.09%		62.70	11.32	
	VI (N = 152)	8.48	4.37	44.94%		7.56	4.30	24.81%		63.19	12.04	

AIS – Athens Insomnia Scale; Epwort – Epworth Sleepiness Scale; MANSA – Manchester Short Assessment of Quality of Life

Stimulants and sleep disorders

Among the respondents, 94% claimed they had used at least one stimulant within the last quarter before the study. 92.27% of the respondents claimed that they had consumed alcohol, including 66.89% of those who said they had drunk it frequently. The most commonly consumed alcohol was beer (72.11% of all respondents drank it, including 78.15% of those who declared alcohol consumption); on the other hand, drinks and spirits were least frequently consumed (46.42% and 57.79% of all respondents within the above-mentioned period, respectively). It is an unreliable result, however. It is affected by a considerably large group of women participating in the study because 80.4% of the male respondents claimed they had consumed spirits.

91.8% of the female respondents consumed alcohol, of which 30.4% of those who drank it at least once a week. A similar percentage of men claimed to have drunk alcohol within the last quarter ($p > 0.05$), but there is male prevalence in its consump-

tion ($p = 0.000$). 46.2% of the male respondents claimed to have drunk it at least once a week. The study also demonstrates that the most alcohol is consumed by fifth-year students (94.3%), while fourth-year students consumed it the least. Mathematics students consumed alcohol the most, but there was no statistically significant difference between individual majors ($p = 0.294$).

There was a statistically significant impact of drink consumption on sleep disorders (53.06% of the students who consumed alcohol showed symptoms of sleep disorders as compared to 49.3% of individuals with sleep disorders among non-drinking students) ($p = 0.0065$). Those respondents who consumed drinks were sleepier during the day (29.9% of them had a positive score on the Epworth scale as compared to 26.5% of the non-drinking respondents). Consuming beer, wine and spirits does not have a statistically significant effect on sleep disorders and daytime sleepiness. This relationship may result from a relatively higher alcohol consumption (expressed by a gram of pure ethanol) in those students who consumed drinks as compared to those students who consumed spirits ($p = 0.23$; $p = 0.50$; $p = 0.65$)

14.06% of the respondents claimed to have consumed cannabinoids (11.75% of women and 21.58% of men). As far as the consumption rate among individual years of studies is concerned, fifth-year students consumed them most frequently (15.84%) and sixth-year and fourth-year students consumed them least frequently (11.2% and 12.75% respectively). There was no statistical relationship ($p = 0.13$) between the study year and the frequency of cannabinoids use.

2.8% of the respondents (2.06% of women and 5.25% of men) consumed psychostimulants. Second-year students were prevalent in their consumption. However, neither the consumption of cannabinoids nor psychostimulants had a statistically significant effect on sleep quality ($p = 0.55$; $p = 0.22$).

10.93% of the respondents consumed sedatives or sleep-inducing drugs. Women are predominant here ($p = 0.000$), 11.91% of them took such drugs. On the other hand, 7.73% of men consumed such drugs. Sixth-year students took them most frequently (16.45% of them claimed to have taken them), while fifth-year students took them least frequently (9.87%). These drugs were taken the most frequently by medical students (11.4%) than other students (10.7%) ($p = 0.41$). There was a relationship between taking drugs and sleep issues among this group of students. 78.6% of the drug-consuming students suffered from sleep disorders ($p = 0.000$) as compared to 47.7% of the students who did not take such drugs. On the other hand, 32.36% of the drug-consuming students experienced daytime sleepiness as compared to 27.55% of the students who did not take such drugs ($p = 0.001$).

There is no significant difference between the substance use pattern of medical students and non-medical students. However, it may be noticed that non-medical students consumed cannabinoids more often (15% of them claimed to have consumed them within the last quarter) than medical students (12%) ($p = 0.01$).

Table 5. **Statistical data for stimulants**

Stimulant		AIS				Epworth				Quality of life (MANSA)		
		Mean	SD	Positive results	p	Mean	SD	Positive results	p	Mean	SD	p
Alcohol	Yes (N = 4,929)	7.96	4.09	50.76%	p = 0.12	8.08	4.15	28.06%	p = 0.9	61.9	10.82	p = 0.01
	No (N = 413)	8.51	4.32	54.72%		7.70	4.24	28.33%		60.33	12.09	
Cannabinoids	Yes (N = 751)	7.95	4.14	50.07%	p = 0.55	8.35	4.19	29.69%	p = 0.28	60.30	11.55	p = 0.001
	No (N = 4,591)	8.02	4.11	51.23%		8.00	4.15	27.82%		62.10	10.81	
Psychostimulants	Yes (N = 150)	8.57	4.34	56%	p = 0.22	8.59	4.17	33.33%	p = 0.14	57.56	12.22	p = 0.000
	No (N = 5,192)	7.99	4.11	50.92%		8.03	4.15	27.93%		61.97	10.87	
Sedative drugs	Yes (N = 584)	11.02	4.20	78.60%	p = 0.000	8.28	4.38	32.36%	p = 0.01	55.58	11.78	p = 0.000
	No (N = 4,758)	7.64	3.95	47.69%		8.02	4.13	27.55%		62.68	10.57	

AIS – Athens Insomnia Scale; Epwort – Epworth Sleepiness Scale; MANSA – Manchester Short Assessment of Quality of Life

Relationship between sleep disorders and the evaluation of quality of life

There is a strong relationship between the occurrence of sleep disorders and the evaluation of one's own quality of life ($p = 0.000$). The following trend can be noticed: the higher quality of life was evaluated, the fewer sleep disorders were developed in the study group. On the other hand, those who evaluated their quality of life lower reported more sleep issues. Sleep disorders were present in 19.75% of the students who scored 76 points in the MANSA questionnaire; on the other hand, sleep disorders occurred in 86.97% of the students who scored 39 points. A similar trend was observed in both cases in terms of daytime sleepiness determined by the Epworth scale ($p = 0.000$). These relationships are presented in Figure 1 and 2.

81.45% of the respondents who described their mental health as "could not be worse" suffered from sleep disorders ($p = 0.000$), while 34.55% of them experienced daytime sleepiness ($p = 0.000$). 26.38% of the respondents describing their mental health as "could not be better" achieved a positive score on the AIS, while 18.03% of them experienced daytime sleepiness. 78.52% of the students who were least satisfied with their job (the "could not be worse" answer) experienced sleep disorders

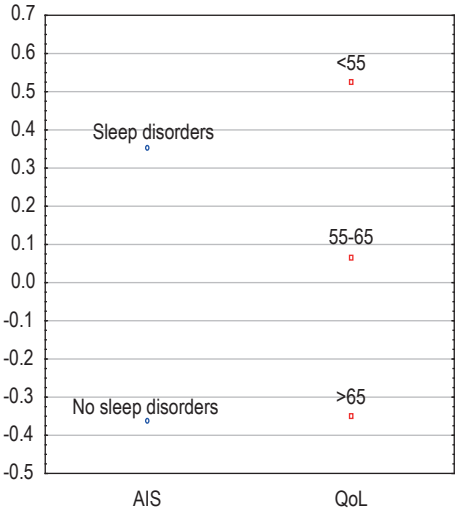

Figure 1. **Quality of life and sleep disorders**

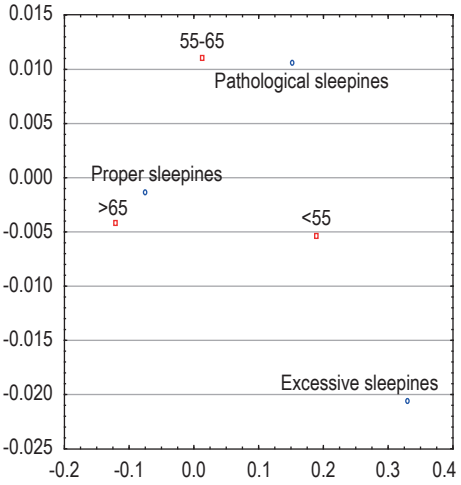

Figure 2. **Quality of life and daytime sleepiness**

(p = 0.000), while 37.04% of them suffered from daytime sleepiness according to the ESS (p = 0.000) as compared to 33.33% and 27% of the most satisfied students, respectively. Similar relationships can be determined in relation to the satisfaction with respondents' family relations (p = 0.000), physical health (p = 0.000), own hobby (p = 0.000), and sex life (p = 0.000).

Relationship between stimulant consumption and the evaluation of quality of life

There was a relationship between stimulant consumption and the evaluation of quality of life among the respondents. In the case of consuming cannabinoids, psychostimulants and sedatives/sleep-inducing drugs, the students who admitted having taken them evaluated their quality of life poorer than the students who did not take them (p = 0.000). The greatest discrepancy was observed for sedatives and sleep-inducing drugs (those who took them evaluated their quality of life at 55.6 points on average, while those who did not take them at 62.7 points).

The only stimulant that did not follow the above-mentioned scheme was alcohol. In the case of alcohol, the respondents who consumed it within the last quarter tended to evaluate their life better than the non-consumer students. In addition, the respondents who admitted having consumed alcohol frequently in the last quarter were more satisfied with their lives (Figure 3 and 4).

As mentioned above, midwifery students had the greatest difficulties in falling asleep among medical students. They evaluated their quality of life at 62.24 points; 90.91% of them claimed to have consumed alcohol, and 14.55% took sedatives or sleep-inducing drugs. 89.29% of the medical students (from pharmaceutical depart-

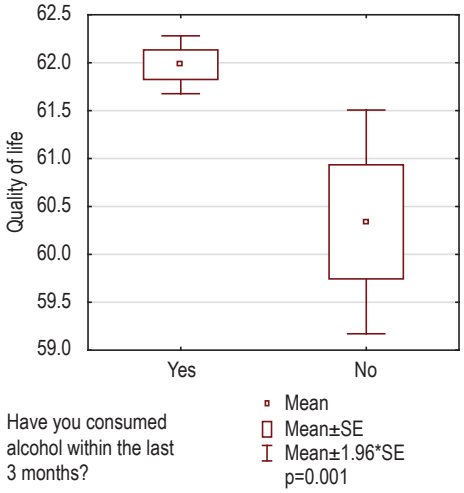

Figure 3. **Quality of life and alcohol**

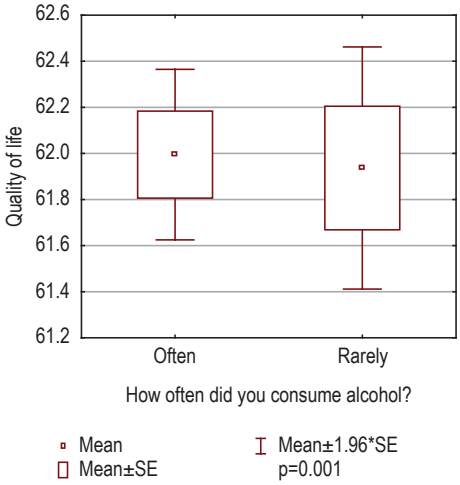

Figure 4. **Quality of life and alcohol consumption consumption frequency**

ments) who were found to sleep the best, with a quality of life score of 64.6 points, claimed to have consumed alcohol, and 12.5% of them admitted having consumed sedatives or sleep-inducing drugs.

Discussion

While conducting the study on sleep disorders, an objective and reliable assessment of parameters such as, for example, sleep quality was a significant challenge. Self-assessment questionnaires are a cost-effective tool to do so. In these questionnaires respondents answer a number of questions concerning sleep itself (waking up at night, sleep length, latency), as well as questions about functioning during waking hours (sleepiness, falling asleep involuntarily, difficulties in daily activities). These methods have repeatedly been compared to instrumental methods such as polysomnography, which are more expensive and more difficult to obtain access to. A relatively good reproducibility of results was demonstrated with the use of both types of methods [15, 16].

The AIS questionnaire used in the study was validated; the change of the cut-off point from 6 to 8 points indicates some cultural differences as far as the answers provided in the AIS are concerned [11]. A higher percentage of female respondents in the study also requires comment. Based on the report *Higher Education in Poland*, which was published by the Ministry of Science and Higher Education, on the number of women and men admitted to studies in the years 2007 and 2011, it seems that apart from IT, engineering and technical, production and processing, architecture and construction studies (which gather 16.4% of all the respondents in the study and were combined into one 'technical' group), all other researched majors saw a predominance of women – from 78% (medicine studies) to 58% (economical and mathematical stud-

ies) [17]. Therefore, the division of sexes among the respondents reflects an average cross-section of the academic society.

The results, as well as a review of Polish and world literature, indicate a persistent upward trend in the incidence of sleep disorders among young people. The study carried out in Poland by the Centre for Public Opinion Research (OBOP) indicated that 25% of young people aged 15–19 suffer from sleep disorders. A 1999 study, which was confirmed in 2004, yielded the same results for the entire age range of the Polish population. These results correspond to the world data to a large extent [18]. The study carried out in the United States indicate insomnia in 33% of young people aged 25 or below [19].

Women are more frequently affected by sleep disorders than men. This holds true irrespective of the age, race or climate zone [18, 20, 21]. Having analyzed the causes of sleep disorders in women, hormonal causes are prevalent. Even in the menstrual cycle changes in sleep quality are noticeable in the late luteal phase. Excessive daytime sleepiness is listed as one of the symptoms of premenstrual syndrome; on the other hand, poorer sleep quality and hypersomnia tend to occur during menstruation. Still, the study did not involve asking women about the cycle phases.

Pregnant women in the first trimester complain about tiredness, sleepiness, poorer sleep quality and increased daytime sleepiness, while 97% of pregnant women in the third trimester suffer from difficulties in falling asleep. The reason for this are physiological changes such as an increased abdominal circumference, difficult venous return, frequent urination, tiredness, increased body temperature, and breathing difficulties. Once pregnancy is over, 15–20% of them also suffers from restless legs syndrome [22]. It is women who take sedatives or sleep-inducing drugs more frequently [18].

Midwifery students had the greatest difficulties in falling asleep among all medical students. Given the number of midwifery male and female students, women are prevalent. This may be the reason behind the distribution of the results. From 85% (the Netherlands) to approx. 97% (Denmark and Russia) midwives are women in Europe and in the world [23].

There is a number of factors that may influence sleep quality. They can be divided into 3 main groups:

(1) Predisposing factors: genetic factors, excessive cognitive and emotional stimulation, dysfunctional strategies for coping with stress, susceptibility to worry, impulsivity, personality factors, age;
(2) Precipitating factors: stress related to life events, health, family and educational problems, physical and mental illnesses, abusing psychoactive substances, shift work, poor sleep hygiene;
(3) Maintaining factors: dysfunctional perceptions about sleep and insomnia, as well as dysfunctional behavioral strategies for managing insomnia (too much time in bed, going to bed earlier, limiting daytime activities, naps during the day, poor sleep hygiene, and worrying) [24, 25].

It can be seen that part of these factors coincides with the questions contained in the questionnaire on quality of life. The results of this questionnaire demonstrate that the

people affected by sleep disorders evaluate various aspects of their life lower. This also concerns those factors that are primarily listed as the reasons for – rather than effects of – possible sleep difficulties. Therefore, this poses the question: do unsatisfactory sex life or difficult relations with respondent's family have a negative impact on their sleep, or rather the other way around – are tiredness or lack of sleep the reason why the respondent cannot develop relations with their partner, family or friends?

The studies that have been conducted so far clearly indicate a relationship between sleep disorders and a family situation. It is the family situation that constitutes a source of 20% of sporadic and 25% of chronic sleep disorders [26]. On the other hand, researchers from the University of California report that inadequate sleep length or quality may lead to the deterioration of civil unions [27]. It is commonly known that depressive disorders (where insomnia is a common symptom) may affect the evaluation of quality of life. It has also been increasingly indicated that the analysis of sleep disorders is becoming an effective risk assessment indicator of developing depression and having relapses after remission [28]. New therapeutic strategies for treating depressive episodes aim at the correction of circadian rhythms through the interaction with melanocyte-stimulating hormone receptors and secondary modification of dopaminergic and noradrenergic transmissions [29]. On this basis, it can be deduced that there is an interdependence between sleep disorders and satisfaction with various aspects of one's own life. In this case it is an example of positive feedback.

The results of the study also indicate that first-year students suffer from sleep disorders to a much greater extent and evaluate their quality of life poorer than fifth-year students. This relationship may result from higher levels of stress during first year of studies than during fifth year of studies. The latter also indicates the end of education and lower levels of stress associated with end-of-term examinations. By analyzing the syllabuses of individual majors, it can be additionally concluded that non-medical students are preoccupied with their Master's thesis during the last term; therefore, they attend fewer classes and have relatively more free time. Those students who have just been admitted to studies face new situations, adapt to a new environment, find their feet among new peers, and try to develop their own learning system. Thus, it is the stressful period that is characterized by the necessity to confront the requirements of the environment, which activates reactions from the neuronal and neurohormonal systems. Indeed, chronic stress is considered the most harmful to mental health [30].

According to a 2015 report of the Centre for Public Opinion Research on alcohol and drug consumption among school-age youth, 92.7% of secondary school students consumed alcohol within the last year, and women consumed it more frequently than men by 0.5%. The most commonly used drugs were hashish and marijuana (31.5%); on the other hand, 17% of the respondents admitted having taken sleep-inducing drugs [31]. Surveys among adults indicate that alcohol is consumed by 76% of adult Poles; 65% of them claim to consume it sporadically and 11% of them – to consume it frequently [32]. This corresponds to the results obtained in the study and demonstrates that alcohol consumption issues begin earlier (in middle school or secondary school). Alcohol consumption decreases considerably after graduating from university, but still alcohol consumption in the Polish society is relatively high.

There is a vast amount of data in the available literature on the negative effect alcohol, cannabinoids and psychostimulants have on sleep length and quality. The effect of alcohol in the initial phase is body stimulation. However, it has a soporific effect some time after consumption. Many people affected by insomnia make use of this fact. However, it should be remembered that when alcohol is consumed an hour before going to bed, it disrupts the other half of sleep [29]. Sleep becomes restless and interrupted with wake-ups. It is difficult to fall asleep again after waking up [33].

In the study concerning the students who take psychostimulants, it was observed that those students who take psychostimulants more frequently suffer from sleep disorders and report poorer sleep quality as compared to the students who do not take them [34]. As for cannabinoids, the situation is more complex. Early studies concerning their effect on sleep show that their use may affect the nature and quality of sleep. It has also been indicated that even though cannabinoids clearly disrupted individual sleep cycles, the total sleep duration was proper. Unfortunately, it is currently difficult to conduct research on this subject due to lack of control over confounding factors. On the other hand, the studies that have already been carried out are very diverse in terms of their results. However, it should be noted that 'medical' marijuana is sometimes prescribed as a remedy for sleeping problems [35]. Despite the data obtained from those studies, the results of this study show no relationship between sleep disorders and the consumption of the above-mentioned stimulants.

Study limitations

The authors are aware of the study limitations. These limitations included the form of the self-evaluation of the studied variables and the form of data collection. The latter was performed with the use of the Internet rather than direct interview. However, it should be emphasized that Internet research is an acknowledged research method, especially among young people, which allows us to reach a wide range of respondents from around Poland, provides complete anonymity and a sense of security. As a result, given answers are sincere. One should be aware of selection bias, however, research has suggested that younger population is more comfortable using the Internet [36]. Results from *the First Australian Young and Well National Survey* showed there was a higher proportion of young people reporting psychological distress online (online self-assessment questionnaires) compared with CATI (Computer-Assisted Telephone Interviewing) [37, 38]. The self-evaluation scales yield subjective results, which in further studies require objective evaluation by means of psychiatric study. The interpretation of the results is limited by lack of data concerning physical illnesses, medication taken and mental disorders that the respondents may possibly suffer from, as well as a number of social factors affecting the variables under evaluation. Nevertheless, it should be emphasized that recognized and proven research methods were used in the study, and the number of respondents was high, which translates into the reliability of the results.

Conclusions

1. Sleep disorders are a common dysfunction among young people. They occur in both women and men, but it is women who are more susceptible to sleep difficulties.
2. Substance use is very common among Polish students of both sexes.
3. Abusive substances have a significant impact on the evaluation of quality of life.
4. In the assessment of the stimulant use pattern, the students of medical universities slightly differ from students of other majors.
5. Quality of life of the respondents affected by sleep disorders is evaluated lower than that of the respondents who are free from sleep disorders.
6. The high prevalence of sleep disorders and common use of psychoactive drugs among Polish students require further exploration with particular emphasis on preventive and therapeutic activities. The study develops powerful arguments in favor of taking action against this disturbing phenomenon.

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Address: Mateusz Babicki
Wroclaw Medical University
Department of Family Medicine
51-141 Wrocław, Syrokomli Street 1
e-mail: ma.babicki@gmail.com