UNIWERSYTET MEDYCZNY
IM. PIASTÓW ŚLĄSKICH WE WROCŁAWIU

ROZPRAWA DOKTORSKA

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Ocena zaburzeń rytmów okołodobowych wśród studentów w wybranych krajach świata, określenie wzorca stosowania substancji psychoaktywnych i jego wpływu na jakość snu.

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Spis treści

1. Wykaz publikacji stanowiących rozprawę doktorską

1. Piotrowski, P.; **Babicki, M.;** Maślanka, P.; Kotowicz, K.; Marciniak, D.; Rymaszewska, J. Assessment of Sleep Disorders and Use of Psychoactive Drugs among Polish Students. Psychiatr. Pol. 2020, 54, 1007–1024.

   IF= 1.657; Pkt. MNiSW/KBN: 100.00

2. **Babicki, M.;** Piotrowski, P.; Mastalerz-Migas, A. Assessment of Insomnia Symptoms, Quality of Life, Daytime Sleepiness, and Psychoactive Substance Use among Polish Students: A Cross-Sectional Online Survey for Years 2016-2021 before and during COVID-19 Pandemic. J. Clin. Med. 2022, 11, 2106, doi:10.3390/jcm11082106.

   IF= 4.964; Pkt. MNiSW/KBN: 140.00

3. **Babicki, M.** Use of Alcohol, Cannabinoids, Psychostimulants, and Sedatives before and during the COVID-19 Pandemic among Students in 40 European Countries. Int. J. Environ. Res. Public Health 2022, 19, doi:10.3390/ijerph192214879.

   IF= 4.614; Pkt. MNiSW/KBN: 140.00

4. **Babicki, M.**; Piotrowski, P.; Mastalerz-Migas, A. Insomnia, Daytime Sleepiness, and Quality of Life among 20,139 College Students in 60 Countries around the World - A 2016-2021 Study. J. Clin. Med. 2023, 12, 692, doi:10.3390/jcm12020692.

   IF= 4.964; Pkt. MNiSW/KBN: 140.00

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Oświadczenia współautorów określający ich wkład w powstanie poszczególnych prac stanowi załącznik 3 niniejszej rozprawy doktorskiej.

2. Wykaz stosowanych skrótów

AIS – (Athens Insomnia Scale) Ateńska Skala Bezsenności

CAWI – Computer-Assisted Web Interview

DSPS – (Delayed Sleep-Phase Syndrome) – Zespół fazy opóźnionego snu

ESS – (Eppworth Sleepines Scale) Skala Senności Epworth

GDP per capita – (Gross domestic product per capita) – Produkt krajowy brutto na mieszkańca

HDI – (Human Development Index) - Wskaźnik rozwoju społecznego

LQLP – Lancashire Quality of Life Profile

OUN – Ośrodkowy układ nerwowy

THC – Tetrahydrokannabinol

MANSA – Manchesterska Krótka Ocena Jakości Życia

UNDP – (United Nations Development Programme) - Program Narodów Zjednoczonych do spraw Rozwoju

WHO – (World Health Organization) – Światowa Organizacja Zdrowia

3. Streszczenie w języku polskim

Wstęp i cele: Zaburzenia snu są zróżnicowanym problemem zdrowotnym, który coraz częściej dotyka osoby młode, zwłaszcza studentów. Najczęstsze trudności ze snem, w tej grupie wiekowej, obejmują dyssomnie, parasomnie, bezsenność czy też nadmierną senność. Wynikać to może z gwałtownych zmian życiowych związanych ze studiami oraz możliwości funkcjonowania w ramach zespołu opóźnionej fazy snu. Co więcej, grupa ta wykazuje predyspozycje do nadużywania używek takich jak papierosy, alkohol, kannabinoidy czy też psychostymulanty oraz leki nasenne, które również wywierają wpływ na architekturę snu. Wiadomo również, że zdrowy sen jest istotnym czynnikiem wpływającym na dobrostan zdrowotny oraz jakość życia. Epidemiologia zaburzeń snu jest bardzo zróżnicowana i trudna do jednoznacznego określenia. Trudność ta wynika z wielu przyczyn m.in. różnic w metodologii przeprowadzanych badań, zastosowanych kryteriów diagnostycznych, badanej populacji oraz braku synchronicznych badań na dużych grupach społecznych. W związku z powyższym, celem niniejszego badania jest ocena rozpowszechnienia zaburzeń snu tj. bezsenności oraz senności w ciągu dnia, a także ocena jakości życia wśród studentów poszczególnych krajów świata. Kolejnym celem jest analiza wzorca stosowania substancji psychoaktywnych oraz zależności pomiędzy snem, jakością życia a używkami, a także ocena wpływu pandemii COVID-19 na wzorce snu, ocenę jakości życia oraz stosowanie używek przez studentów, z analizą porównawczą pomiędzy krajami o różnym stopniu rozwoju i zamożności.

Metodologia: Niniejsze badanie zostało przeprowadzone w oparciu o autorski kwestionariusz, stworzony na potrzeby tego projektu, który dystrybuowany był w sieci internetowej, w okresie od 31 stycznia 2016 do 30 kwietnia 2021 roku. Prośba o wypełnienie kwestionariusza została skierowana do studentów z całego świata, a informację o ankiecie rozpowszechniano jedynie w mediach społecznościowych, w zamkniętych grupach zrzeszających studentów. Ankieta obejmowała pytania oceniające status socjoekonomiczny, w tym wiek, płeć, miejsce zamieszkania, profil uczelni oraz rok studiów. Ponadto zapytano o stosowanie określonych używek: alkoholu, kannabinoidów, psychostymulantów oraz leków nasennych. Ostatni etap ankiety obejmował trzy narzędzia psychometryczne Ateńską Skalę Bezsenności (AIS), Skalę Senności Epworth (ESS) oraz Manchesterską Krótką Ocenę Jakości Życia (MANSA). Kwestionariusz dostępny był w dwóch wersjach językowych – polskim oraz angielskim.

Wyniki: W wieloetapowym badaniu wzięło udział 20 432 studentów z 60 krajów świata, z czego 20 139 wyraziło zgodę na udział w badaniu. Zdecydowaną większość badanych stanowiły kobiety (78.2%) oraz studenci kierunków niemedycznych (77.6%). Rozpowszechnienie bezsenności w analizowanej grupie studentów wyniosło 57.6%, a nadmiernej senności w ciągu dnia 27%. Wykazano, że istnieje korelacja pomiędzy bezsennością, a nadmierną sennością w ciągu dnia ($r= 0.153$; $p<0.001$). Wśród wybranych używek, studenci najczęściej sięgali po alkohol (82.0%) oraz leki nasenne/uspokajające (22.6%). Stosowanie psychostymulantów, leków nasennych, kannabinoidów istotnie wpływało zarówno na sen studentów, jak i ich ocenę jakości życia. Zaobserwowano również ścisłą korelację pomiędzy bezsennością, nadmierną sennością, a oceną jakości życia ($rAIS = -0.355$; $p < 0.001$; $rESS = -0.155$; $p < 0.001$). Trwająca pandemia COVID-19 zwiększyła ryzyko rozwoju bezsenności.

Wnioski: Bezsenność oraz nadmierna senność w ciągu dnia są powszechnymi schorzeniami występującymi wśród studentów i pozostają ściśle ze sobą powiązane. Stosowanie używek jest częstym zjawiskiem wśród studentów, przy czym rodzaj preferowanej używki uzależniony jest od uwarunkowań geograficznych oraz kulturowych. Wykazano, że istnieje zależność pomiędzy snem, a stosowanymi używkami, przy czym związek ten może mieć charakter dwukierunkowy. Zarówno zaburzenia snu, jak i stosowanie używek wpływają na ocenę jakości życia przez studentów. Pandemia COVID-19 przyczyniła się do zmiany we wzorcach snu oraz stosowanych używek wśród studentów. Z uwagi na częstość występowania zaburzeń snu oraz ich wpływ na zdrowie, zasadnym wydaje się prowadzenie dalszych badań w tym kierunku, w szczególności uwzględniających negatywne konsekwencje zdrowotne.

4. Streszczenie w języku angielskim

Introduction and objectives: Sleep disorders are a diverse health problem that increasingly affects young individuals, students especially. The most common sleep problems in this age group include dysomnia, parasomnia, insomnia, or excessive sleepiness. They can result from rapid life changes associated with studies and the possibility of functioning within a delayed sleep phase syndrome. Moreover, this group shows a predisposition to the stimulants use disorder, including cigarettes, alcohol, cannabinoids or psychostimulants and sleep medication, which also affect the sleep architecture. It is also known that healthy sleep guarantees well-being and influences the quality of life assessment. The epidemiology of sleep disorders varies significantly and is difficult to define clearly. This is challenging due to numerous reasons, including differences in the methodology of the conducted studies, the diagnostic criteria used, the population studied, and the lack of synchronous studies on large population groups. Therefore, the aim of this study is to assess the prevalence of sleep disorders, i.e. insomnia and daytime sleepiness, and to assess quality of life among students originating from different countries. A further aim is to determine the pattern of psychoactive substances used, and to analyze the relationships between sleep, quality of life, and stimulants. And finally, the impact of the COVID-19 pandemic on sleep patterns, quality of life assessment, and stimulant use among students as well as, comparison between countries with different levels of development and wealth will be evaluated.

Methodology: The present study was based on an author's questionnaire created for this project, which was distributed online between 31 January 2016 and 30 April 2021. The survey was targeted at international students, and information about the survey was distributed to students' associations groups only. The survey included questions assessing socioeconomic status, including age, gender, place of residence, university profile, and year of study. In addition, the use of specific stimulants was evaluated: alcohol, cannabinoids, psychostimulants, and sleep medication. The final stage of the questionnaire included three psychometric tools: the Athens Insomnia Scale (AIS), the Epworth Sleepiness Scale (ESS), and the Manchester Brief Assessment of Quality of Life (MANSA). The questionnaire was available in two language versions, Polish and English.

Results: A total of 20,432 students from 60 countries participated in the multi-stage study, with 20,139 consenting. The majority of participants were women (78.2%) and non-medical students (77.6%). The prevalence of insomnia among the students was 57.6%, while the prevalence of excessive daytime sleepiness was 27.0%. It was found that there was

a correlation between insomnia and excessive sleepiness (r= 0.153; p<0.001). Among the selected stimulants, alcohol was the most commonly used (82.0%), followed by sleeping/sedative drugs (22.6%). The use of psychostimulants, sleeping medications, and cannabinoids significantly affected students' sleep and quality of life scores. There was also a close correlation observed between insomnia, excessive sleepiness, and quality of life scores (rAIS = -0.355; p < 0.001; rESS = -0.155; p < 0.001). The ongoing COVID-19 pandemic increased the risk of developing insomnia.

Conclusions: Insomnia and excessive daytime sleepiness are closely related, common conditions among students. Substance use disorder is also common among students, with the type of stimulant prevalent varying in regard to geographical and cultural backgrounds. There is a bidirectional relationship between sleep disturbance and stimulant use, which affects students' quality of life assessment. The COVID-19 pandemic contributed to changes in sleep patterns and stimulant use among students. Given the impact of sleep disorders on health, it seems reasonable to carry out further observations in this area, in particular taking into account the negative health consequences and educational attainment.

5. Wstęp

Zaburzenia snu są zróżnicowanym problemem zdrowotnym, który dotyka milionów ludzi na całym świecie. Co więcej, każdego roku obserwuje się wzrost odsetka osób cierpiących z tego powodu. W przeszłości problemy ze snem dotyczyły głównie osób starszych, ale na przestrzeni ostatnich lat stały się one również jednym z wiodących problemów zdrowotnych wśród osób młodych, zwłaszcza studentów [1,2]. Przyczyn tego zjawiska może być wiele. Po pierwsze, okres studiów często wiąże się ze znacznymi zmianami życiowymi m.in. zmianą miejsca zamieszkania, większą samodzielnością, zmianą grupy rówieśniczej, czy pojawieniem się nowych obowiązków [3,4]. Z drugiej strony młodzi dorośli mogą funkcjonować w zespole opóźnionej fazy snu (DSPD). Stan ten charakteryzuje się opóźnieniem głównego epizodu snu. W wyniku czego osoba pozostaje aktywna do późnych godzin nocnych, śpi do godzin popołudniowych, co w rezultacie nie wpływa na sumaryczny czas snu [5]. Jednakże dla studentów taki model często jest niemożliwy do zrealizowania z uwagi na konieczność wypełniania swoich obowiązków. Przekłada się to na skrócenie czasu snu i rozwój nadmiernej senności w ciągu dnia. Nie bez znaczenia pozostaje również styl życia. W dotychczasowych obserwacjach wykazano, że studenci zdecydowanie rzadziej przestrzegają podstawowych zasad higieny snu, często sięgają po używki, takie jak alkohol, psychostymulanty, dopalacze, co niewątpliwie przyczynia się do obniżenia jakości snu [6,7]. Ponadto należy również zwrócić uwagę na znaczący wpływ pandemii COVID-19 na rozpowszechnienie zaburzeń snu. W badaniu subiektywnego wpływu pandemii na sen, aż 94.9% studentów stwierdziło, że pandemia wpłynęła na ich sen, a 74% deklarowało jego pogorszenie [8]. Dodatkowo z dotychczasowych badań wiemy, że w okresie lockdownu, nauczania zdalnego i znacznie ograniczonych spotkań towarzyskich, wzorce snu studentów uległy zmianie. W zdecydowanej większości studenci kładli się późno spać, spali do późnych godzin popołudniowych oraz zwiększyła się liczba drzemek w ciągu dnia [9]. Wszystko to doprowadziło do zmian rytmów okołodobowych, pogorszenia jakości snu, pomimo zwiększenia czasu jego trwania. Potencjalnym czynnikiem sprawczym może być również znaczne zwiększenie rozpowszechnienia lęku oraz depresji, które mogą pozostać w ścisłej zależności z zaburzeniami snu [10].

Epidemiologia zaburzeń snu jest bardzo zróżnicowana i trudna do jednoznacznego określenia. Trudność ta wynika z wielu przyczyn, m.in. różnic w metodologii przeprowadzanych badań, zastosowanych kryteriów diagnostycznych oraz badanej populacji. W większości do oceny rozpowszechnienia zaburzeń snu wykorzystuje się zwalidowane

kwestionariusze samooceny, których wyniki były wielokrotnie porównywane z wynikami metod instrumentalnych (np. polisomnografii) i wykazywały satysfakcjonującą powtarzalnością wyników [11]. Zdecydowana większość piśmiennictwa opiera się na ocenie rozpowszechnienia zaburzeń snu w określonym miejscu i czasie, co może mieć znaczące przełożenie na końcowe wyniki, co zostało już wcześniej zaobserwowane przez Ohayona [12]. W związku z powyższym kluczowe znacznie w lepszym poznaniu zaburzeń snu ma przeprowadzenie długofalowych badań, które pozwolą na zrozumienie tego zjawiska oraz analizy czynników ryzyka.

Do najczęściej występujących zaburzeń snu zaliczamy dyssomnie, bezsenność, parasomnie, halucynacje przysenne oraz nadmierną senność w ciągu dnia [13]. Osoby cierpiące na zaburzenia snu można podzielić na trzy grupy z uwagi na dominujący problem. Pierwsza grupa obejmuje ludzi, którzy mają trudność z zaśnięciem. Druga to osoby, które mają zaburzone zachowania w trakcie snu oraz trudność w jego utrzymaniu, trzecią grupę stanowią osoby, które wykazują nadmierną senność w ciągu dnia.

Za najczęstszy problem ze snem uznaje się bezsenność, która definiowana jest jako trudność w zaśnięciu lub prawidłowym utrzymaniu snu [14]. Według szacunków, rozpowszechnienie tego zjawiska może wynosić nawet 30-40% populacji osób dorosłych, przy czym 20% doświadcza przejściowych trudności ze snem [15]. W badaniach przeprowadzonych przed wybuchem pandemii COVID-19 rozpowszechnienie bezsenności w grupie studentów wynosiło od 7.7% do nawet 82.5% i przewyższało średnie wartości dla populacji ogólnej [16,17]. W przeglądzie przeprowadzonym przez A. Chowdhury i wsp. na podstawie 7 badań wśród studentów Azji południowo-wschodniej oszacowano rozpowszechnienie bezsenności na poziomie 52.1% [16]. W analogicznym okresie rozpowszechnienie bezsenności wśród studentów w Europie tj. Norwegii, Polsce oraz Niemczech wynosiło odpowiednio 30.5%, 19.7% oraz 7.7% [18–20]. W badaniach przeprowadzonych w trakcie pandemii COVID-19 zgłaszalność problemów ze snem była wysoka [21]. W badaniu przeprowadzonym na 1649 polskich studentach w okresie lockdownu bezsenność występowała u 42.03% uczestników [22]. W metaanalizie przeprowadzonej na 493 475 uczestnikach z 49 krajów bezsenność występowała u 36.73% studentów [32.32; 41.38%] [23].

Obok bezsenności, nadmierna senność w ciągu dnia stanowi jeden z najczęstszych problemów związanych ze snem i czuwaniem wśród studentów. Jej rozpowszechnienie nie jest tak częste jak bezsenność, jednak szacuje się, że około 10-15% populacji dorosłych może cierpieć z tego powodu. W badaniach z wykorzystaniem Skali Senności Epworth (ESS)

nadmierną senność stwierdzono u 12.2% mieszkańców Niemiec oraz 10.2% mieszkańców Korei Południowej [24,25]. Natomiast w badaniach przeprowadzonych wśród marokańskich studentów rozpowszechnienie nadmiernej senności wynosiło 8.9%. Dane płynące z obserwacji w Arabii Saudyjskiej (36.6%) czy też Malezji (35.5%) wskazują na znaczne rozpowszechnienie zjawiska [9,26]. Co więcej, bezsenność i senność w ciągu dnia pozostają w ścisłej zależności.

Rola prawidłowego snu jest kluczowa w zachowaniu dobrostanu zdrowotnego [27]. W dotychczasowych badaniach wykazano, że osoby cierpiące na zaburzenia snu zdecydowanie częściej chorują na schorzenia przewlekłe, takie jak nadciśnienie tętnicze, cukrzyca czy otyłość. Ponadto zaburzenia snu zwiększają ryzyko zgonu w ich przebiegu [28]. Zdrowy sen jest również niezbędny do utrzymania prawidłowej kondycji psychicznej. Z jednej strony występowanie zaburzeń snu może przyczyniać się do rozwoju lęku, depresji, zaburzeń osobowości, predysponować do zachowań ryzykownych oraz pogarszać relacje społeczne, z drugiej strony zaburzenia snu często bywają manifestacją kliniczną rozwijającej się choroby psychicznej lub jej zaostrzenia [8]. Ponadto wykazano, że zaburzenia snu wywierają wpływ na codzienne funkcjonowanie. Osoby z zaburzeniami snu uzyskują gorsze wyniki w pracy oraz w szkole, mają trudności z pamięcią i koncentracją [29–31].

Na kondycję zdrowotną ludzi znaczący wpływ mają używki, które zwłaszcza przez studentów, bywają nadużywane. Wykazano również, że mają one znaczny wpływ na sen. Jedną z najczęściej stosowanych przez studentów używek jest alkohol, którego spożycie jest różne w zależności od wieku, płci, oraz kultury. W badaniu przeprowadzonym wśród 5390 studentów z 8 krajów europejskich (Francja, Niemcy, Włochy, Hiszpania, Szwajcaria, Wielka Brytania, Irlandia i Polska) wykazano spożycie alkoholu na poziomie 81.7% w ciągu ostatnich 12 miesięcy, a 65.7% w ostatnim miesiącu przed badaniem [32]. W badaniu L. Ranker i S.Lipson, przeprowadzonym w ramach narodowego programu Healthy Minds Study, w którym wzięło udział 186 719 studentów z 120 amerykańskich uczelni w 2019 roku wykazano, że 60.1% studentów spożywało alkohol w ciągu ostatniego miesiąca, a 13.9% studentów zgłaszało ciągłe spożywanie alkoholu w ciągu ostatniego roku [33].

Niewątpliwie pandemia COVID-19 wpłynęła na wzorzec spożywania alkoholu, ale dane z piśmiennictwa nie są jednoznaczne w ocenie kierunku zmian. W części badań wykazano spadek odsetka osób spożywających alkohol. Dla przykładu, w badaniu Steffen et al. 44% niemieckich studentów zgłosiło zmniejszenie spożycia alkoholu w okresie pandemii [34]. Podobnych obserwacji dokonał zespół Mangot-Sala i wsp. wśród Holendrów [35]. Przyczyn tego zjawiska upatruje się w ogólnokrajowych restrykcjach prowadzących do zamknięcia

barów, lokali, restauracji, uczelni wyższych co znacząco ograniczyły spotkania towarzyskie. Zaobserwowano natomiast tendencję do zmian nawyków picia, osoby dorosłe spożywały mniejsze ilości alkoholu, ale częściej, np. z rodziną.

Inny obraz pokazuje badanie przeprowadzone wśród amerykańskich studentów, gdzie zamknięcie kampusów przyczyniło się do wzrostu częstości spożywanego alkoholu [36]. Zatem dane z piśmiennictwa nie są rozstrzygające, a różnice mogą wynikać z innego okresu zbierania danych, różnego stopnia restrykcji rządowych i różnego poziomu stresu wśród respondentów, zwłaszcza, że wykazano, iż sięganie po alkohol jest jednym z najczęstszych sposobów radzenia sobie z nim.

W badaniach wykazano, że nawet niewielka ilość przewlekle spożywanego alkoholu przyczynia się do pogorszenia jakości snu [37]. Długotrwałe stosowanie alkoholu przyczynia się do zakłócenia snu, wydłuża czas latencji, skraca czas snu i prowadzi do częstych wybudzeń, tym samym znacznie obniżając jego jakość [38,39]. Z drugiej strony, u części respondentów wykazano, że spożyty alkohol przyczynia się do subiektywnej poprawy jakości snu zwłaszcza w początkowym etapie jego działania [39].

Zbieżnych obserwacji dokonano w przypadku kannabinoidów, wskazując, że ich niewielkie dawki ułatwiają zaśnięcie [39]. Potwierdzono to w badaniach z użyciem polisomnografii, gdzie niewielkie dawki THC doprowadzały do skrócenia czasu zaśnięcia, krótszej latencji snu, jak i czasu wybudzania. Jednakże, jak w przypadku alkoholu, przewlekłe ich stosowanie, przyczynia się do pogorszenia jakości snu, zwiększa ryzyko rozwoju bezsenności oraz pojawienia się dziwacznych snów [40,41]. Częstość stosowania kannabinoidów jest znacząco niższa niż alkoholu. W metaanalizie obejmującej 19 932 studentów kierunków medycznych spożycie kannabinoidów wynosiło 31.4% przynajmniej raz w życiu, 17.2% w ciągu ostatniego roku, a 8.8% w ciągu ostatniego miesiąca [42]. Niebezpiecznym zjawiskiem są osobnicze predyspozycje do łączenia rożnych używek, m.in. alkoholu, kannabinoidów oraz psychostymulantów [43].

W badaniach zaobserwowano, że to właśnie stosowanie psychostymulantów (np. kokaina, amfetaminy, ectasy) zdecydowanie obniża jakość snu oraz pogarsza pamięć dnia następnego [37]. Przyczyn tego zjawiska upatruje się w aktywizującym wpływie na OUN poprzez wzrost poziomu neuroprzekaźników (dopamina, noradrenalina) w mózgu, co może prowadzić do pobudzenia, trudności w zasypianiu i zmniejszenia ilości snu REM (fazy snu charakteryzującej się intensywną aktywnością mózgu). Wpływ psychostymulantów na strukturę snu został

również potwierdzony na modelach zwierzęcych [44]. Należy jednak pamiętać, że zależność pomiędzy snem a stosowanymi używkami wydaje się być dwukierunkowa. Z jednej strony, występowanie zaburzeń snu wpływa na zwiększone ryzyko stosowania substancji psychoaktywnych, z drugiej strony ich stosowanie może doprowadzić do pogorszenia snu. Co więcej, udowodniono, że występowanie zaburzeń snu po odstawieniu psychostymulantów może być niezależnym czynnikiem predysponującym do powrotu do nałogu.

Spośród powszechnie stosowanych używek przez młodych dorosłych należy wymienić również leki nasenne/uspokajające, których zużycie w dobie trwającej pandemii COVID-19 znacząco wzrosło [45,46]. Za przyczynę wzrostu ich stosowania uważa się obciążenie psychiczne wynikające z pandemii, wzrost zaburzeń snu, które nierzadko leczone są przy pomocy powyższych leków [46]. Leki nasenne wpływają na organizm poprzez modyfikację funkcjonowania układu nerwowego. Działają na ośrodkowy układ nerwowy, wpływając na procesy hamowania, relaksacji i indukowania snu. Ich zadaniem jest łagodzenie objawów bezsenności, poprawa jakości snu oraz zwiększenie czasu trwania snu. Jednak przewlekłe stosowanie leków nasennych może wpływać negatywnie na sen. Może powodować uzależnienie psychiczne, zwiększać ryzyko wystąpienia efektu ubocznego w postaci tzw. "efektu następnego dnia", który charakteryzuje się osłabieniem koncentracji i trudnościami z pamięcią. W skrajnych przypadkach przewlekłe stosowanie leków nasennych może prowadzić do zwiększenia liczby epizodów bezdechu sennego, a także do zaburzeń oddechowych w czasie snu [47].

W ostatnich latach olbrzymią uwagę zwraca się na jakość życia. Definicję jakości życia wprowadzono w latach siedemdziesiątych XX wieku, a na przestrzeni lat ulegała ona modyfikacjom. Obecnie jakość życia definiujemy jako subiektywną ocenę ogólnego dobrostanu i satysfakcji z życia. Jest to koncepcja wielowymiarowa, która uwzględnia wiele aspektów życia, takich jak zdrowie fizyczne i psychiczne, poziom zamożności, relacje interpersonalne, osiągnięcia i cele życiowe, aktywność społeczną i kulturalną, wolny czas i hobby, a także warunki życia i otoczenie [48]. W związku z powyższym jej pomiar jest utrudniony. Istnieją różne narzędzia pomiaru jakości życia, takie jak kwestionariusze, skale oceny i profile zdrowia. Te narzędzia są projektowane tak, aby zbierać informacje na temat różnych aspektów życia pacjenta i pozwalają na ocenę, jak choroba lub zaburzenie wpływa na życie pacjenta. W badaniach wykazano, że jakość życia ma olbrzymie znaczenie dla pacjentów, także w podejmowaniu decyzji terapeutycznych oraz stosowaniu się do zaleceń lekarskich. Pacjenci są skłonni zrezygnować ze skutecznej terapii, gdy obniża ona ich jakość

życia [49,50]. Z uwagi na olbrzymie znaczenie snu w utrzymaniu dobrostanu, zaczęto wiązać prawidłowy sen z jakością życia, co zostało potwierdzone w obserwacjach zarówno wśród studentów, jak i populacji ogólnej [51].

Reasumując, mimo tego, że epidemiologia zaburzeń snu nie jest w pełni poznana, to dotychczasowe dane jasno wskazują, że zaburzenia snu stanowią istotny problem zdrowotny na całym świecie, a w ostatnich latach obserwuje się znaczny wzrost zaburzeń snu wśród studentów. Grupa ta charakteryzuje się również większymi predyspozycjami do stosowania używek takich jak alkohol, kannabinoidy, psychostymulanty czy też leki nasenne, które w znaczący sposób przyczyniają się do pogorszenia jakości snu. Zarówno sen, jak i stosowane używki niewątpliwie wpływają na ocenę jakości życia, która obecnie stanowi jeden z kluczowych tematów dyskusji w medycynie. Istnieje konieczność dalszego monitorowania zjawiska bezsenności oraz senności w ciągu dnia wśród studentów, zwłaszcza w obserwacjach wieloletnich, co pozwoli na lepsze zrozumienie zjawiska oraz ustalenie czynników ryzyka. Ponadto wskazane jest prowadzenie badań wieloośrodkowych wśród studentów z różnych kręgów kulturowych, co umożliwi rzetelne porównanie rozpowszechnienia zjawiska pomiędzy określonymi grupami.

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6. Założenia i cele pracy

Główne cele pracy to:

1. Ocena rozpowszechnienia zaburzeń snu tj. bezsenności oraz senności w ciągu dnia oraz ocena jakości życia wśród studentów poszczególnych krajów świata.
2. Analiza wzorca stosowania substancji psychoaktywnych przez studentów.
3. Ocena zależności pomiędzy snem, jakością życia, a stosowanymi używkami.

Dodatkowe cele badawcze to:

1. Ocena wpływu pandemii COVID-19 na sen, jakość życia oraz częstość stosowania wybranych używek przez studentów.
2. Porównanie występowania zaburzeń snu, oceny jakości życia oraz wzorców stosowania używek pomiędzy studentami krajów o różnym stopniu rozwoju i zamożności.
3. Ocena wpływu zmiennych socjodemograficznych na bezsenność, senność w ciągu dnia, jakość życia oraz stosowanie używek przez studentów poszczególnych krajów świata.

7. Materiał i metody pracy

7.1. Metodologia

Dane zostały zebrane przy pomocy autorskiego kwestionariusza dystrybuowanego drogą internetową, z wykorzystaniem portalu społecznościowego Facebook.com. Jest to badanie typu CAWI (Computer-Assisted Web Interview), które obecnie stanowi jedną z najszybciej rozwijających się metod badawczych na całym świecie. Ponadto technika ta umożliwia dostęp do szerokiej grupy odbiorców, a udział w badaniu możliwy jest w dogodnym dla nich terminie. Dotychczasowe badania wykazały, że anonimowość daje uczestnikom poczucie bezpieczeństwa, co przekłada się na szczerość udzielanych odpowiedzi [1].

Grupę docelową stanowili studenci z całego świata. W związku z powyższym informację o badaniu rozpowszechniano jedynie w obrębie grup zrzeszających studentów. Udział w badaniu był w pełni anonimowy oraz dobrowolny. Na wstępie respondentom przedstawiono informacje dotyczące celów oraz metodologii badania. Po zapoznaniu się z informacjami wyrażali dobrowolną, świadomą zgodę na udział w badaniu oraz potwierdzali status studenta. W przypadku braku spełniania obu kryteriów badanie było automatycznie zakańczane. Na każdym etapie trwania ankiety respondenci mieli możliwość rezygnacji z dalszego udziału w badaniu, bez podania przyczyny. Okres dystrybucji ankiety obejmował okres od 31 stycznia 2016 roku do 30 kwietnia 2021 roku.

Badanie uzyskało akceptację Komisji Bioetycznej Uniwersytetu Medycznego we Wrocławiu i zostało przeprowadzone zgodnie z Deklaracją Helsińską.

7.2. Kwestionariusz

Autorski kwestionariusz składał się z dwóch części: metryczki wraz z pytaniami oceniającymi stosowanie wybranych używek oraz wystandaryzowanych narzędzi psychometrycznych. Ankieta została przygotowana w dwóch wersjach językowych – polskiej – skierowanej do studentów polskojęzycznych oraz angielskiej - do pozostałych.

7.2.1. Dane socjodemograficzne oraz ocena wzorca stosowanych używek

Pytania oceniające status socjodemograficzny obejmowały analizę wieku, płci oraz miejsca zamieszkania. Dodatkowo analizie poddano również etap studiowania z uwzględnieniem roku studiów i profilu uczelni - profil medyczny lub niemedyczny. Kolejno analizie poddano stosowanie używek takich jak alkohol, kannabinoidy (np. marihuana, haszysz), psychostymulanty (np. amfetamina, metamfetamina, ecstasy) oraz leki nasenne/uspokajające (zolpidem, zopiklon, lorafen, alprazolam). Analizie poddano także częstość ich stosowania na przestrzeni ostatnich 3 miesięcy przed udziałem w badaniu.

7.2.2. Narzędzia psychometryczne

Ostatni etap kwestionariusza obejmował trzy wystandaryzowane narzędzia psychometryczne:

a) Ateńską Skalę Bezsenności (AIS)
b) Skalę Senności Epworth (ESS)
c) Manchesterską Krótką Ocenę Jakości Życia (MANSA).

7.2.2.1. Ateńska Skala Bezsenności (AIS)

Jest jednym z najczęściej stosowanych narzędzi do oceny bezsenności. Pytania wchodzące w jej skład opierają się na kryteriach ICD-10 bezsenności, a możliwe odpowiedzi przedstawione są na czterostopniowej skali Likerta, w przedziale od 0 do 3 punktów. Pytania zawarte w skali oceniają trudności w zaśnięciu, budzenie się w nocy oraz o poranku, a także ocenę jakości i czasu snu. Skala ocenia również samopoczucie, senność oraz sprawność psychiczną i fizyczną dnia następnego. Analiza wyników opiera się na sumarycznej wartości punktowej, gdzie maksymalny wynik punktowy wynosi 24. W oryginalnej wersji za punkt odcięcia przyjęto 6 punktów, natomiast w polskiej walidacji z 2011 roku wartość ta została zmieniona na 8 punktów dla populacji polskiej. Wynik równy lub wyższy świadczy o występowaniu bezsenności. W dotychczasowych badaniach wykazano wysoką czułość (93%) oraz swoistość (85%) narzędzia [2,3].

7.2.2.2. Skala Senności Epworth (ESS)

ESS Jest narzędziem służącym do oceny senności w ciągu dnia. Skala składa się z ośmiu pytań jednokrotnej odpowiedzi, w której oceniane jest prawdopodobieństwo zaśnięcia w 8 sytuacjach dnia codziennego: siedząc i czytając, oglądając telewizję, biernie siedząc w miejscu publicznym (np. teatrze), jadąc jako pasażer, leżąc i odpoczywając po południu, siedząc i rozmawiając, odpoczywając (siedzenie) po obiedzie i bez alkoholu oraz w trakcie jazdy samochodem podczas kilkuminutowego postoju w korku lub na czerwonym świetle. W każdym pytaniu respondent ma możliwość zaznaczenia odpowiedzi w przedziale od 0 – brak prawdopodobieństwa zaśnięcia do 3 - duże prawdopodobieństwo zaśnięcia. Maksymalna możliwa liczba punktów do zdobycia wynosi 24, a poszczególne punkty odcięcia obejmują: 0–10 punktów oznacza brak senności w ciągu dnia, 11–14 – senność, natomiast 15 punktów i powyżej – senność patologiczną, która wymaga konsultacji z lekarzem [4,5].

7.2.2.3. Manchesterska Krótka Ocena Jakości Życia (MANSA)

MANSA jest narzędziem składającym się z 16 pytań służących do subiektywnej oceny satysfakcji z własnego życia oraz jego poszczególnych sfer. Skala ta została zaproponowana w oparciu o istniejące narzędzie - Lancashire Quality of Life Profile (LQLP), która umożliwia wszechstronną ocenę swojego życia, zachowując jej parametry psychometryczne. Pytania zawarte w skali MANSA skupiają się na ocenie poziomu m.in. zadowolenia z życia jako całości, relacji z rodziną, przyjaciółmi, sposobu spędzania wolnego czasu, sytuacji finansowej, poczuciu bezpieczeństwa oraz ocenie swojego stanu psychicznego oraz fizycznego. Analiza skali opiera się na sumarycznej wartości punktowej, przy czym im wyższy wynik, tym wyższa ocena jakości życia. Maksymalna możliwa liczba punktów do zdobycia wynosi 92. Ponadto możliwa jest analiza na poziomie pojedynczych pytań. Narzędzie skierowane jest do ogółu populacji, bez odniesienia do poszczególnych schorzeń fizycznych lub psychicznych. Polska wersja językowa skali MANSA została przygotowana w Katedrze i Klinice Psychiatrii Uniwersytetu Medycznego im. Piastów Śląskich we Wrocławiu w 2000 roku [6,7].

7.3. Analiza statystyczna

Do ostatecznej analizy włączono w pełni uzupełnione kwestionariusze, w których wypełniający wyrazili świadomą zgodę na udział w badaniu oraz potwierdzili swój status studenta.

W pierwszej publikacji dane miały charakter jakościowy, ilościowy oraz przedziałowy. Do określenia zależności między porównywanymi zmiennymi porządkowymi wykorzystano test chi-kwadrat. Dla zmiennych, których wyniki były oparte na statystycznych skalach przedziałowych, wyznaczono podstawowe statystyki opisowe. Normalność rozkładów dla tych zmiennych oceniono testem W Shapiro–Wilka. Jednorodność wariancji oceniano testem Levene'a. Istotność statystyczną różnic między dwiema średnimi wartościami określono nieparametrycznym testem U Manna-Whitneya dla zmiennych niespełniających kryterium normalności rozkładu. W wypadku braku istotności testów na normalność rozkładu różnice pomiędzy zmiennymi oceniono: parametrycznym testem t dla prób niezależnych bądź parametrycznym testem Cochrana–Coxa dla nierównych wariancji. We wszystkich testach oceniających istotność statystyczną przyjęto $p< 0.05$.

W pracy Babicki, M.; Piotrowski, P.; Mastalerz-Migas, A. Assessment of Insomnia Symptoms, Quality of Life, Daytime Sleepiness, and Psychoactive Substance Use among Polish Students: A Cross-Sectional Online Survey for Years 2016-2021 before and during COVID-19 Pandemic. J. Clin. Med. 2022, 11, 2106, doi:10.3390/jcm11082106. respondenci zostali podzieleni na dwie grupy, uwzględniając okres wypełniania ankiety: przed wybuchem pandemii oraz w trakcie trwania pandemii. Datę graniczną ustalono na 11 marca 2020 roku, zgodnie z decyzją WHO o ogłoszeniu ogólnoświatowej pandemii [8]. Do porównania demograficznego grup, przed oraz w trakcie trwania pandemii, wykorzystano test chi-kwadrat dla zmiennych jakościowych oraz test t dla zmiennych ilościowych. Ocenę wpływu zmiennych socjodemograficznych oraz stosowanych psychostymulantów na wyniki Ateńskiej Skali Bezsenności, Skali Senności Epworth oraz Manchesterskiej Krótkiej Oceny Jakości Życia przeprowadzono przy wykorzystaniu modeli regresji liniowej. Zbudowane modele regresji liniowej obejmowały dwa predyktory, z uwzględnieniem ich interakcji. W każdym przypadku pierwszym predyktorem był okres pandemii, z dwoma poziomami „przed pandemią" oraz „w trakcie pandemii", a drugi stanowiły następujące zmienne: płeć, profil uczelni, rok studiów oraz spożycie poszczególnych używek: alkoholu, kannabinoidów, psychostymulantów lub leków nasennych/uspokajających. Do oceny wpływu pandemii, stosowanych używek oraz zmiennych socjodemograficznych na jakość życia wykorzystano wielomianową regresję

logistyczną. Korelację pomiędzy poszczególnymi skalami oceniono poprzez współczynnik korelacji Pearsona. We wszystkich testach oceniających istotność statystyczną przyjęto $p< 0.05$. Analizy zostały przeprowadzone przy pomocy programu Statistica 13.3.

W pracy Babicki, M. Use of Alcohol, Cannabinoids, Psychostimulants, and Sedatives before and during the COVID-19 Pandemic among Students in 40 European Countries. Int. J. Environ. Res. Public Health 2022, 19, doi:10.3390/ijerph192214879 europejskich studentów, w oparciu o dane EuroVoc, podzielono na cztery grupy uwzględniając region Europy, w którym zamieszkiwali – wschodnią, zachodnią, północną oraz południową [9]. Z zastosowaniem testu Shapiro-Wilka oceniono normalność rozkładu. Dla zmiennych ilościowych zastosowano podstawową statystykę opisową, a istotność statystyczną pomiędzy dwiema średnimi oceniono za pomocą nieparametrycznego testu U Manna-Whitneya. Ocena związku pomiędzy zmiennymi jakościowymi przeprowadzono za pomocą testu chi-kwadrat. Ocenę czynników ryzyka stosowania poszczególnych używek przeprowadzono za pomocą złożonych modeli regresji logistycznej z analizą krokową wsteczną. Zbudowano cztery modele, w których zmienne zależne obejmowały kolejno stosowanie alkoholu, kannabinoidów, psychostymulantów oraz środków nasennych/uspokajających. Zmienne niezależne stanowiły wiek, płeć, okres pandemii, rok studiów oraz region Europy. We wszystkich testach oceniających istotność statystyczną przyjęto $p< 0.05$. Analizy zostały przeprowadzone przy pomocy programu Statistica 13.3.

W ostatniej pracy z cyklu będącego podstawą rozprawy doktorskiej, do celów analizy statystycznej studentów podzielono na kilka grup. Analogicznie do wcześniejszych publikacji uwzględniono okres wypełniania ankiety wyróżniając studentów biorących udział w badaniu przed oraz w trakcie trwania pandemii COVID-19 [8]. Dodatkowo w oparciu dane dotyczące kraju studiowania dokonano podziału uwzględniając współczynnik HDI oraz PKB per capita na podstawie Programu Narodów Zjednoczonych ds. Rozwoju (UNDP) oraz danych Banku Światowego. Dla podziału względem współczynnika HDI wyodrębniono studentów mieszkających w krajach o bardzo wysokim, wysokim, średnim i niskim stopniu rozwoju. Natomiast uwzględniając wskaźnik PKB per capita wyodrębniono grupy krajów o wysokim, średnio-wysokim, średnio-niskim i niskim wskaźniku PKB per capita [10,11]. Analizowane zmienne miały charakter jakościowy, ilościowy oraz przedziałowy. Do porównania różnic istotnych statystycznie w ocenie socjodemograficznej w odniesieniu do etapu pandemii COVID-19 wykorzystano test chi-kwadrat dla zmiennych jakościowych oraz test-t dla zmiennych ilościowych. Ocenę wpływu zmiennych socjodemograficznych, stosowanych

używek, wpływu pandemii COVID-19, wskaźnika HDI oraz współczynnika PKB per capita na zaburzenia snu (końcowe wyniki skali AIS oraz ESS) przeprowadzono poprzez zbudowanie złożonych modeli regresji logistycznej z analizą krokową wsteczną. Dla każdego modelu zmienne niezależne obejmowały wiek, płeć, profil studiów, rok studiów, pandemia COVID-19, współczynnik HDI, wskaźnik PKB per capita oraz stosowanie określonych używek (alkohol, kannabinoidy, psychostymulanty oraz leki nasenne/uspokajające). Zmienną zależną stanowiły wynik interpretacji AIS oraz ESS. W kolejny etapie zbudowano złożony model regresji logistycznej z analizą krokową wsteczną celem ustalenia wpływu zmiennych socjodemograficznych, stosowanych używek oraz zaburzeń snu na ocenę jakości życia mierzonej poprzez skalę MANSA. Ponadto wykorzystano korelację tau-Kendalla celem oceny poziomu korelacji pomiędzy poszczególnymi pytaniami skal, a ich końcowymi wynikami. W każdym przypadku $p < 0.05$ uznano za istotne statystycznie, a obliczenia przeprowadzono za pomocą programu Statistica 13.3.

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8. Wyniki

I. Pierwsze badanie zostało przeprowadzone na grupie 5342 polskich studentów w okresie od 31.01.2016 do 11.04.2016 roku. Spośród badanych studentów zdecydowaną większość stanowiły kobiety (74%) oraz studenci kierunków niemedycznych (65.8%). 51.07% z nich uzyskało wynik w Ateńskiej Skali Bezsenności (AIS), wskazujący na występowanie bezsenności. W analizie wpływu czynników socjodemograficznych wykazano, że kobiety zdecydowanie częściej cierpiały z powodu bezsenności ($p<0.001$). Wykazano również różnice pomiędzy rokiem studiów - najczęściej z powodu bezsenności cierpieli studenci pierwszych lat.

W analizie poszczególnych pytań wchodzących w skład AIS wykazano, że aż 81.1% studentów zgłaszało budzenie się w nocy, z czego u 1 na 4 występowało to często, bardzo często lub było powodem bezsenności przez całą noc. 67.37% ankietowanych studentów zgłaszało brak zadowolenia z jakości swojego snu, a jedynie 23.17% określiło czas swojego snu jako satysfakcjonujący. W ocenie kondycji psychicznej dnia następnego aż 58.78% oceniło jako złą, podobnie jak 54.14% respondentów źle oceniło swoją kondycję fizyczną.

W analizie Skali Senności Epworth wykazano, że u 28.08% studentów występują cechy nadmiernej senności, a wynik powyżej 15 punktów, wskazujący na senność patologiczną, stwierdzono u 3.92% studentów. Wśród najczęstszych sytuacji, w których studenci deklarowali możliwość zaśnięcia było leżenie i odpoczywanie po południu – 75.41% oraz 37.81% w trakcie siedzenia i czytania. Co ciekawe, ok. 1 % ankietowanych stwierdził, że jest skłonny zasnąć w trakcie postoju na czerwonym świetle. Wykazano również ścisłą zależność pomiędzy oceną jakości snu ($p<0.001$), czasem snu ($p<0.001$), a sumaryczną wartością punktową Skali Senności Epworth. Podobnie jak w przypadku bezsenności znamiennie częściej z powodu nadmiernej senności cierpiały kobiety ($p<0.001$).

W ocenie jakości życia 63.98% studentów wyrażało zadowolenie ze swojego życia, podczas gdy zaledwie 49.17% wykazywało zadowolenie z kondycji psychicznej, a 53.76% z kondycji fizycznej. Mężczyźni uzyskiwali średnio wynik wyższy o 0.66 punktu wyższy niż kobiety ($p=0.03$).

Spośród wszystkich respondentów aż 94% potwierdziło stosowanie co najmniej 1 z wymienionych używek w ciągu ostatnich 3 miesięcy, z czego 92.27% deklarowało spożycie alkoholu, 14.06% kannabinoidów, 2.8% psychostymulantów oraz 10.93% anksjolityków. Wykazano, że stosowanie leków nasennych/uspokajających wiązało się ze zdecydowanie częstszą bezsennością (78.6% vs 47.7%; $p<0.001$) oraz sennością w ciągu dnia

(32.36 % vs 27.55%; p=0.01). Nie wykazano wpływu spożywania alkoholu, kannabinoidów oraz psychostymulantów na średnie wartości punktowe uzyskiwane w AIS oraz ESS. Spośród analizowanych używek spożywanie kannabinoidów (p<0.001), psychostymulantów (p<0.001) oraz leków nasennych (p<0.001) wiązało się z niższą oceną jakości życia. Natomiast osoby spożywające alkohol w okresie 3 miesięcy przed badaniem uzyskiwały średnio wynik wyższy o 1.6 punktu w Manchesterskiej Krótkiej Ocenie Jakości życia (p=0.01).

II. Kolejna praca powstała w oparciu o dodatkowe dane zebrane wśród polskich studentów i zakończeniu dystrybucji ankiety 1.01.2021 roku, a więc po ogłoszeniu pandemii COVID-19. W badaniu wzięło udział łącznie 14 844 respondentów, z czego 7735 (52.1%) pochodziło z okresu przed jej wybuchem. Analogicznie do badania pierwszego, zdecydowaną większość stanowiły kobiety, 11 985 (80.7%), a średni wiek wyniósł 21.82 ± 2.8 lat. W analizie AIS wynik co najmniej 8 punktów uzyskało 8041 (54.1%) studentów, uzyskując średnio 8.4 ± 4.35 punktu.

W analizie pytań AIS wykazano, że 3644 (24.5%) respondentów stwierdziło, że ich czas snu był zadowalający, a 4120 (27.7%) miało zadowalającą jakość snu. Natomiast w ESS średni uzyskany wynik wyniósł 7.77 ± 4.19. 26.1% studentów spełniło kryteria rozpoznania senności, z czego 892 (6.1%) senności patologicznej. Analiza poszczególnych pozycji AIS wykazała, że największy wpływ na jej końcowy wynik miała ocena dobrego samopoczucia dnia następnego ($r = 0.702$, $p < 0.001$) oraz subiektywna ocena jakości snu ($r = 0.663$, $p < 0.001$). Podobnie wyższe wyniki ESS korelowały z prawdopodobieństwem zaśnięcia podczas czytania ($r = 0.585$, $p < 0.001$) oraz podczas odpoczynku po obiedzie ($r = 0.579$, $p < 0.001$). Wykazano słabą dodatnią korelację AIS oraz ESS ($r = 0.223$, $t = 27.983$, $p < 0.001$).

W analizie regresji liniowej nie wykazano wpływu pandemii na bezsenność (B= -0.085, 95 Cl [-0.174, 0.003], T= -1.879, p=0.061). Natomiast zależność tę zaobserwowano w ocenie nadmiernej senności (B= 0.326, 95 Cl [0.241, 0.412], T= 7.493, p<0.001), gdzie odsetek osób z sennością w dobie pandemii wyniósł 28.33% vs 23.62% przed jej ogłoszeniem. Ponadto wykazano, że zarówno w przypadku analizy AIS jaki i ESS kobiety uzyskiwały znamiennie wyższe wyniki niż mężczyźni (p<0.001).

Spośród analizowanych używek najczęściej studenci spożywali alkohol (87.8%) następnie kannabinoidy (13.3%), psychostymulanty (2.9%) oraz leki nasenne/uspokajające (13.0%). W odniesieniu do trwającej pandemii COVID-19 zaobserwowano wzrost spożycia leków uspokajających z 11.7% na 14.5%, (p<0.001), spadek spożycia alkoholu z 91.3% na 84.0%

(p<0.001) oraz kannabinoidów z 14.0% na 12.6%, (p=0.016). W ocenie zależności pomiędzy snem a stosowanymi używkami wykazano, że stosowanie anksjolityków (p<0.001), psychostymulantów (p<0.001) wiązało się z częstszym występowaniem bezsenności. W przypadku nadmiernej senności oprócz wcześniej wymienionych anksjolityków (p<0.001) oraz psychostymulantów (p<0.015) wykazano zależność z kannabinoidami (p=0.003). W ocenie wpływu płci na spożycie używek zaobserwowano, że mężczyźni częściej sięgali po alkohol (OR 1.45, p<0.001), psychostymulanty (OR 2.1, <0.001) oraz kannabinoidy (OR 2.1, p<0.001) oraz rzadziej niż kobiety po leki anksjolityczne (OR 0.66, p<0.001).

W analizie skali jakości życia (MANSA) średni wynik uzyskany przez studentów wynosił 60.95 ± 11.25 punktów, z czego kobiety oceniały jakość życia znamiennie niżej niż mężczyźni (p=0.043). Stosowanie psychostymulantów (p<0.001) oraz leków nasennych (p<0.001) znamiennie obniża subiektywną ocenę jakości życia. Ponadto wykazano, że zarówno osoby cierpiące na bezsenność (p<0.001) oraz nadmierną senność w ciągu dnia (p<0.001) uzyskiwały zdecydowanie niższe wyniki w skali MANSA niż ich rówieśnicy z prawidłowym snem. Zaobserwowano również odwrotną korelację między oceną snu, a jakością życia w ocenie AIS ($r = -0.477$, $t = -66.204$, $p < 0.001$) oraz ESS ($r = -0.129$, $t = -15.923$, $p < 0.001$). W ocenie wpływu pandemii na ocenę jakości życia wśród polskich studentów wykazano, że w okresie przed jej ogłoszeniem studenci oceniali wyżej swoją jakość życia (p<0.001). Z analizy poszczególnych pytań skali MANSA uwidoczniono, że przed wybuchem pandemii studenci zdecydowanie wyżej oceniali swoje zdrowie psychiczne (OR 1.49, p<0.001), relacje z rodziną (OR 1.14, p<0.001) oraz całościowe zadowolenie z życia (OR 1.30, p<0.001).

III. Trzecia praca włączona do cyklu rozprawy doktorskiej powstała w oparciu o nowe dane zebrane po dystrybucji anglojęzycznej ankiety dystrybuowanej wśród studentów krajów europejskich. Łącznie w badaniu wzięło udział 17 594 studentów. Zdecydowana większość to kobiety (80.4%) oraz, mieszkańcy krajów Europy Wschodniej (86.1%) i studenci kierunków innych niż medyczne (77.2%).

W niniejszej pracy poddano ocenie wzorzec stosowania używek przez studentów krajów europejskich z uwzględnieniem trwającej pandemii COVID-19. Analogicznie do poprzednich dwóch prac, to właśnie alkohol stanowił najczęściej stosowaną używkę (89.6%), przy czym studenci najczęściej spożywali piwo (62.8%) oraz wino (58.8%). 34.7% studentów spożywało alkohol co najmniej raz w tygodniu, a 23.5% częściej niż kilka razy w miesiącu.

Kannabinoidy stosowało 2538 (14.1%) studentów, przy czym 43.8% z nich tylko raz w ostatnim kwartale. Stosowanie psychostymulantów deklarowało 3.6% ankietowanych studentów i 44.6% z nich również tylko raz w ostatnim kwartale, natomiast stosowanie leków nasennych deklarowało 2252 (12.5%) studentów, a najczęściej spożywali oni leki co najmniej raz w tygodniu (36.4%).

W wieloczynnikowej regresji logistycznej wykazano, że pandemia COVID-19 przyczyniła się do spadku spożycia alkoholu (90.3% vs 83.4%, OR 0.55, p<0.001) oraz psychostymulantów (4.2% vs 3.0%, OR 0.72, p<0.001). Natomiast spożycie leków nasennych było znacząco wyższe (11.5% vs 13.6%, OR 1.17, p<0.001).

Wykazano również, że region studiowana odgrywa rolę we wzorcach stosowania używek. Studenci krajów Europy Wschodniej znamiennie częściej sięgali po alkohol (OR 1.82, p<0.001) oraz leki nasenne (OR 1.5, p<0.001), podczas gdy rzadziej stosowali kannabinoidy (OR 0.54, p<0.001) oraz tzw. twarde narkotyki (OR 0.30, p<0.001).

IV. Ostatnia praca włączona do cyklu obejmuje analizę danych z kwestionariuszy 20 432 studentów, z czego na udział w badaniu wyraziło zgodę 20 139 studentów z 60 krajów świata. Dane zostały zebrane w okresie od 31 stycznia 2016 do 30 kwietnia 2021.

W analizowanej grupie średnia wartość punktowa Ateńskiej Skali Bezsenności wynosiła 8.26 ± 4.35, przy czym wartość powyżej punktu odcięcia uzyskało 11 597 (57.6%) studentów. W przypadku skali ESS średnia wartość punktowa wynosiła 7.90 ± 4.23, a 5442 (27.0%) studentów uzyskało wynik powyżej punktu odcięcia. Spośród pytań wchodzących w skład AIS, aż 73.6% respondentów określiło czas swojego snu jako niewystarczający, podczas gdy 71.2% oceniała jego jakość jako niewystarczającą. Jednakże to właśnie jakość snu (r=0.486, p<0.001), a nie czas snu (r=0.417, p<0.001) była najsilniej skorelowana z końcowym wynikiem AIS.

Powyższe badanie potwierdziło również, że to właśnie kobiety (OR 1.25, p<0.001) oraz studenci pierwszych lat studiów są bardziej narażeni na rozwój bezsenności oraz nadmiernej senności w ciągu dnia (OR 1.44, p<0.001). Wykazano również, że studenci kierunków medycznych (OR 0.90, p<0.001) są mniej narażeni na rozwój bezsenności, lecz z drugiej strony - częściej cierpią z powodu nadmiernej senności w ciągu dnia (OR 1.20, p<0.001). W złożonych modelach regresji logistycznej nie wykazano różnic pomiędzy bezsennością oraz sennością w ciągu dnia w odniesieniu do podziału uwzględniającego HDI. Natomiast wykazano, że studenci krajów o wysokim wskaźniku PKB per capita zdecydowanie mniej są narażeni na rozwój bezsenności (OR 0.41, p<0.001) oraz senności w ciągu dnia (OR 0.74, p<0.001)

w porównaniu ze studentami najbiedniejszych krajów. Model ten również potwierdził, że spożycie kannabinoidów (OR 1.10, p=0.034), psychostymulantów (OR 1.51, p<0.001) oraz anksjolityków (OR 2.60, p<0.001) przyczyniało się do zwiększonego ryzyka rozwoju bezsenności. Natomiast nadmierna senność znamiennie częściej wiązała się ze spożyciem psychostymulantów (OR 1.14, p=0.003) oraz leków nasennych (OR 1.27, p<0.001). Udowodniono również wpływ pandemii COVID-19 na sen, gdzie studenci w trakcie pierwszych etapów pandemii mieli mniejsze ryzyko rozwoju senności w ciągu dnia (OR 0.78, p<0.001), jednakże zdecydowanie nasiliło się ryzyko rozwoju bezsenności (OR 2.17, p<0.001).

W ocenie jakości życia, mierzonej Manchesterską Krótką Oceną Jakości Życia, studenci średnio uzyskali 60.9 ± 11.46 punktów. Złożony model regresji liniowej z analizą krokową wsteczną wykazał, że zarówno bezsenność (B= -3.142, SE= 0.079, t= -39.41, p<0.001) jak i nadmierna senność w ciągu dnia (B= -1.331, SE= 0.086, t= -15.56, p<0.001) obniżają jakość życia studentów. Co więcej, okres pandemii również przyczynił się do gorszej oceny jakości życia (B= -0.406, SE=0.078, t= -5.18, p<0.001). Natomiast w ocenie wpływu używek potwierdzono wcześniejsze obserwacje, że osoby spożywające psychostymulanty (p<0.002) oraz leki nasenne (p<0.001) uzyskiwali niższe wartości w ocenie jakości życia.

9. Wnioski

1. Bezsenność oraz senność w ciągu dnia stanowią powszechny problem zdrowotny wśród studentów na całym świecie.
2. Stosowanie używek w tej grupie wiekowej jest powszechne, a studenci najczęściej sięgają po alkohol (82.0%), kannabinoidy (13.6%) oraz leki uspokajające/nasenne (12.6%).
3. Stosowanie psychostymulantów oraz leków nasennych wiąże się z częstszym rozpowszechnieniem bezsenności oraz senności w ciągu dnia wśród studentów.
4. Zarówno bezsenność, jak i senność w ciągu dnia obniża jakość życia studentów, podobnie jak spożywanie psychostymulantów, kannabinoidów oraz leków nasennych/uspokajających.
5. Pandemia COVID-19 przyczyniła się do zmian wzorca stosowania używek. Studenci w czasie pandemii częściej sięgali po leki nasenne/uspokajające (11.6% vs 13.4%), a rzadziej po alkohol (86.8% vs 77.1%).
6. Pandemia COVID-19 wpłynęła również na zmianę wzorców snu, gdzie w początkowym jej etapie studenci częściej cierpieli z powodu bezsenności, natomiast rzadziej na nadmierną senność w ciągu dnia. Przyczyniła się ona również do obniżenia jakości ich życia.
7. Kobiety, studenci pierwszych lat oraz kierunków niemedycznych znamiennie częściej cierpią z powodu bezsenności.
8. Studenci krajów o wysokim PKB per capita zdecydowanie rzadziej cierpią z powodu bezsenności niż w krajach o najniższym PKB per capita.
9. Z powodów epidemiologicznych oraz możliwych konsekwencji zdrowotnych zaburzenia snu nie mogą być rozpatrywane jedynie w kontekście zdrowia jednostki, ale jako problem społeczny, dlatego wymagane są dalsze badania, w szczególności długofalowe, wieloośrodkowe uwzględniające różnice kulturowe, społeczne oraz geograficzne, mające znaczący wpływ na prawidłowy sen.

10. Cykl publikacji stanowiących rozprawę doktorską.

1. **Assessment of sleep disorders and use of psychoactive drugs among Polish students.**

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

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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

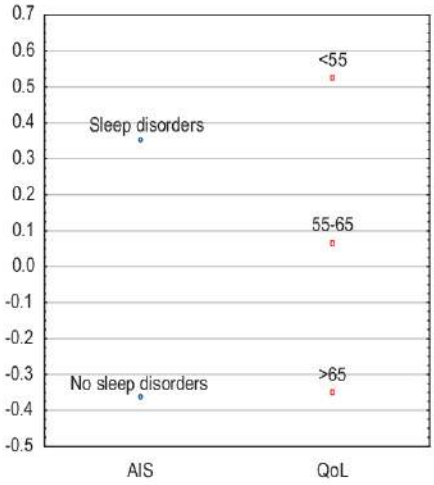

Figure 1. **Quality of life and sleep disorders**

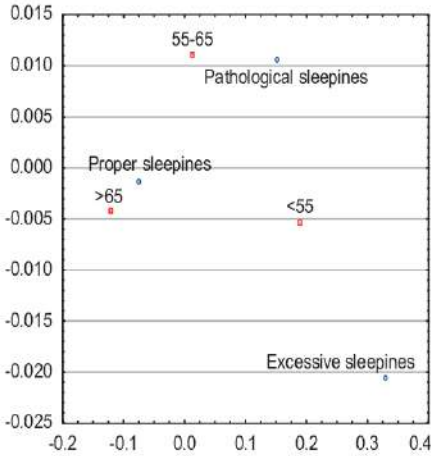

Figure 2. **Quality of life and daytime sleepiness**

(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-

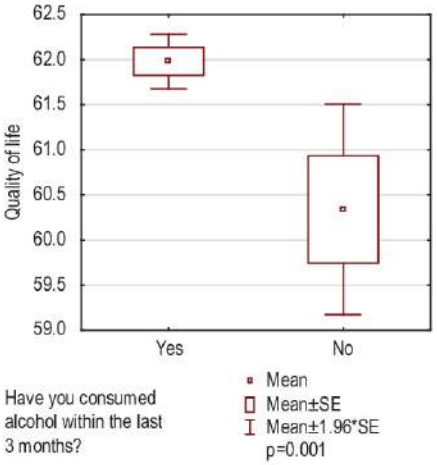

Figure 3. **Quality of life and alcohol**

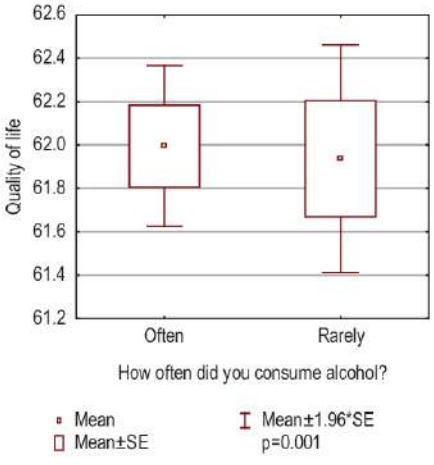

Figure 4. **Quality of life and alcohol consumption consumption frequency**

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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2. **Assessment of insomnia symptoms, quality of life, daytime sleepiness, and psychoactive substance use among Polish students: a cross-sectional online survey for years 2016-2021 before and during COVID-19.**

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Assessment of Insomnia Symptoms, Quality of Life, Daytime Sleepiness, and Psychoactive Substance Use among Polish Students: A Cross-Sectional Online Survey for Years 2016–2021 before and during COVID-19 Pandemic

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Abstract: Sleep disorders are a serious health problem worldwide, and insomnia is their most common manifestation. An increasing number of people have insomnia every year, young adults, especially. Due to the importance that sleep has in almost every aspect of our lives, the need to monitor disturbances in circadian rhythms has arisen. Therefore, this study aimed to assess the prevalence of sleep disorders among Polish students, including their quality of life (QOL) and drug use patterns. The study also investigated associations between sleep, QoL, and drug use. The study was conducted in 2016–2021 based on the self-made sociodemographic questionnaire, as well as standardized psychometric tools: Athens Insomnia Scale (AIS), Epworth Sleepiness Scale (ESS), and Manchester Short Assessment of quality of life (MANSA). A total of 14,844 students participated in the study. The majority were women (80.7%), of which 3425 (23.1%) were medical students, with the most numerous representing medical and dental faculties, 1884 (57.2%). Before the COVID-19 pandemic, 52.1% of the surveys were collected; 54.1% of respondents had insomnia as indicated by the AIS scores, and 26.1% displayed sleepiness during the day. Female students, the first-year college students, more often suffered from sleep disorders. Drug use was widespread among Polish students, correlating with sleep assessment results and QoL. In conclusion, sleep disorders are a significant clinical problem among Polish students. Female and junior students' years are more prone to sleep deprivation. Insufficient sleep can be associated with a lower QoL score and psychoactive substance use. The effects of the COVID-19 pandemic on sleep are not conclusive, because there was decreasing quality for longer sleep durations. In order to analyze these associations, there is a need for further in-depth study.

Keywords: sleep disorders; insomnia; quality of life; students; young adults; COVID-19

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1. Introduction

Sleep disorders are a significant health problem worldwide, and insomnia is the most common disease that affects increasingly more people every year [1,2]. Young adults, often students, are more prone to sleep deprivation [3]. Several reports have estimated that even 40–60% of young adults have sleep deficits [4–8]. Biological and social factors and incorrect behavior patterns are primary reasons for such phenomena. Because of their age, the functioning of most students can follow symptoms of the so-called "youthful" delayed sleep-wake phase disorder. Namely, their evening and night periods become preferential to increased activity, while the day, especially in the morning, is a period of sleep and rest. Getting up early, necessary to fulfill new adult social roles, is very difficult, and the amount

pandemic.

of sleep becomes insufficient [9]. Undoubtedly, the changes in social life functioning have a significant impact. A period of education at the university level is associated with many new life experiences such as changing the place of residence, increased independence, changing peer groups, and new duties related to educational learning [10]. In addition, the population of students rarely follows proper sleep hygiene and frequently overuse psychoactive substances affecting sleep physiology [11–13].

Sleep is fundamental to life functions. Healthy sleep is necessary to maintain mental and physical well-being and proper emotional and social functioning, while its disturbances may have many adverse outcomes [14,15]. First, sleep deficit may lead to excessive daytime sleepiness [10]. Second, individuals suffering from sleep disorders exhibit problems with attention, memory, and concentration, which result in poor performance in study and work [16–19]. The university student population is also predisposed to chronic diseases such as diabetes, hypertension, obesity, or myocardial infarction with an increased risk of death [20,21]. These people have a lowered quality of life (QoL) and an increased risk of developing psychiatric diseases, and a tendency to risk behaviors and poor social relations [22]. Because sleep deterioration enormously affects mental health, physical health, and everyday functioning, there is a need of close monitoring of the COVID-19 pandemic deteriorating almost every aspect of human life, as shown by recent studies [22]. Moreover, the very recent studies have indicated that the adverse psychological outcomes of the COVID-19 pandemic such as anxiety, depression, sleep disorders, and post-traumatic stress disorder more often affect younger adults, including university students [23]. There is also evidence of changes in the psychoactive drug use patterns in the COVID-19 pandemic, depending on the data collection period, sample population, and the initial level of drug use [24,25].

At the beginning of the 1970s, the definition of quality of life (QOL) was introduced to medicine. Since then, there has been growing interest in applying QoL into medical practice. According to the WHO definition, QoL is a subjective assessment of an individual's life situation concerning the individual's culture, value system, goals, expectations, and interests [26]. Therefore, measuring a patient's QOL provides an essential possibility for assessing a patient's perspective concerning an individual life situation. As shown, patients' subjective feelings influence, to a large extent, their behavior. Several studies have shown that patients with decreased QoL due to a specific therapeutic therapy are more likely to give it up despite clinical effectiveness. Nonetheless, the nature of QOL measurement is challenging. Current research usually uses a questionnaire technique, covering many aspects of life and being interpreted by having a total score value. An exemplary survey measurement is the Manchester Short Assessment of quality of life (MANSA) [27–29].

To sum up, studies so far have shown that there is a close correlation between insomnia and daytime sleepiness, with people suffering from insomnia having a higher level of daytime sleepiness. Additionally, both of these parameters significantly lower the assessment of the quality of life of students. Moreover, it has been proven that both women, students of younger years and students of medical faculties show greater problems with sleep than others [2,6,10,14,15]. The negative impact of the ongoing COVID-19 pandemic on sleep quality and the assessment of quality of life has also been proven. During the ongoing pandemic, an increase in sleep problems was observed both in the general population and among students [22–25]. Moreover, the period of the pandemic also contributed to changes in the scope of stimulants used, with the impact varying depending on the period of data collection and the study group. Due to the connections between sleepiness, insomnia, quality of life, and the drugs used, and the impact of the COVID-19 pandemic on them, we decided to conduct a study that combines individual aspects [24,25].

This study aimed to assess disorders of circadian rhythms among Polish students, including their QoL and psychoactive drug use patterns. In addition, is there a relationship between insomnia, daytime sleepiness, and quality of life? Does the use of psychoactive substances affect the level of insomnia, daytime sleepiness, and the assessment of the quality of life, and is there a difference in their assessment in terms of gender, field of study,

and year of study? Finally, has the COVID-19 pandemic contributed to the deterioration in the quality of sleep and life of Polish students? Based on previous reports [1,2,4,20–25], the authors formulated the following research hypotheses: (1) Sleep disorders are common among Polish students. (2) Sleep disorders would be higher among female university students. (3) There would be an association between sleep disturbance and QoL. (4) The COVID-19 pandemic would exacerbate sleep disorders and reduce QOL among students. (5) Male university students would be more prone to risk behaviors, including the use of psychoactive substances.

2. Materials and Methods

2.1. Methodology

The study used a survey questionnaire design using standardized questionnaires distributed online via the Facebook social network in groups associating students. The students' status in most cases was confirmed via their membership. The survey was administered to students living and studying in Poland, and participation in the survey was anonymous and voluntary. The survey data collection covered the period from 31 January 2016 to 1 January 2021.

At each stage of the study, the respondents had the opportunity to terminate their participation without giving any reason. After being familiarized with objectives and the research methodology, the respondents were asked to give informed consent to participate in the study. Consented participants were then requested to continue the study procedure. The survey questionnaire consisted of two sections. The first one assessed socio-demographic status of the respondents, including age, sex, place of residence, field of study, and year of study. Then, the survey assessed frequencies of using psychoactive substances (alcohol, cannabinoids, psychostimulants) and hypnotics. The second part involved three standardized psychometric tools: Athens Insomnia Scale (AIS), Epworth Sleepiness Scale (ESS), and Manchester Short Assessment of quality of life (MANSA).

2.1.1. Athens Insomnia Scale (AIS)

The AIS scale is an 8-item tool for quantitative evaluation of insomnia symptoms based on the ICD-10 criteria. It uses a four-point Likert scale (0—no difficulty, 3—severe difficulty) assessing difficulty in falling asleep, waking up at night, waking up in the morning, total sleep time, sleep quality, well-being the next day, mental and physical fitness the next day, and sleepiness during the day, occurring at least 3 times in the last 14 days. The maximum score that can be earned is 24. The Polish adaptation of AIS was used in which the cut-off point for diagnosing insomnia was set at 8 scores. The measurement characterizes high sensitivity (93%) and specificity (85%). Moreover, a high reliability of the Cronbach's alpha was shown, yielding a value of 0.832 [30–32].

2.1.2. Epworth Sleepiness Scale (ESS)

The ESS scale measures excessive sleepiness and is one of the most common in making the diagnosis of sleepiness. The ESS consists of 8 questions about the likelihood of falling asleep in 8 typical everyday situations (e.g., watching TV, sitting in a public place, lying down and relaxing in the afternoon, etc.). The maximum ESS score is 24. The following point criteria were adopted in the present study: 0–10 points means no daytime sleepiness, 11–14 points—sleepiness, and 15 points and above—pathological sleepiness, which requires consultation with a doctor. The reliability of the scale measured with Cronbach's alpha coefficient was 0.755 [33–35].

2.1.3. Manchester Short Assessment (MANSA)

The MANSA measures the subjective assessment of several aspects of an individual's life satisfaction. MANSA consists of 16 questions covering individual spheres of life. In 12 questions, the respondents give answers on a Likert scale from 1 (it could not be worse) to 7 (it could not be better). The remaining 4 items include affirmative (2 points) or

negative (1 point) answers. The maximum MANSA score is 92, and the QoL interpretation involves the total scored obtained by respondent, where the higher the value, the better the assessed QoL. Some reports may also use individual questions to evaluate life satisfaction. Cronbach's alpha was 0.810 [36,37].

2.2. Statistical Analysis

The analysis employed numerical and rank-based values. The chi-square test was used to assess significant differences in the demographics of the university student population before and during the pandemic and the frequency of drug use in both periods of time. The age differences between groups before and during the pandemic was tested using the *t*-test. Linear regression examined the effects of sociodemographic variables and stimulants on the AIS, ESS, and MANSA scores. The linear regression models included two predictors, including their interaction: the first predictor was "Pandemic" (with two levels: "Before" vs. "During" Pandemic). Separate models included gender (female vs. male), year of study (I–VI), major (medicine, engineering, humanities, economics, biology), type of faculty (medical studies), alcohol consumption (yes/no), consumption of cannabinoids (yes/no), psychostimulants (yes/no), and use of hypnotics (yes/no). The effects of the period of the study ("before" and "during" a pandemic) and demographics on MANSA life satisfaction were analyzed using the ordinate polynomial logistic regression. It included dependent variables such as the subsequent MANSA items with rank values and the predictors of the study period and demographic variables in separate models. The relationships between drug use and the pandemic and demographic variables were investigated similarly. The correlation between the scales was performed using Pearson's correlation coefficient. The Statistica program (13.3.) was used to compute *t*-test and chi-square statistics and general linear models. The ordinate polynomial logistic regression models were built with the MASS package in the R 4.0.4 environment.

3. Results

3.1. Characteristics of the Respondents

Detailed characteristics of the population are presented in Table 1. A total of 14,844 university students in Poland with an average age of 21.82 ± 2.8 participated in the study. A total of 7735 (52.1%) surveys were collected in the period before the declaration of the COVID-19 pandemic. The majority were women, 11,985 (80.7%), and 5,352 humanities students (36.1%). Similar frequencies were observed both before and during the pandemic. The study included a group of 3425 medical students (23.1%), in which the most numerous group were students from the medical and medical-dental faculty, 1884 (57.2%). The study was conducted according to the Helsinki Declaration and was approved by the Bioethics Committee at the Wroclaw Medical University.

3.2. Sleep Disturbance

Detailed results of sleep disturbance are presented in Table 2. Polish students obtained a mean AIS score of 8.40 ± 4.35, and as many as 8041 (54.1%) students scored at least 8 points, showing insomnia [32]. A total of 3644 (24.5%) respondents said their sleep time was satisfactory, while 4120 (27.7%) had satisfactory sleep quality. Only 955 (6.4%) did not report daytime sleepiness. Specific single AIS measures for the entire study group and the COVID-19 pandemic are presented in Table S1.

For the ESS's somnolence subscale, the mean score was 7.77 ± 4.19. Somnolence was diagnosed in 3872 (26.1%) students, of which 892 (6.1%) declared suffering from pathological somnolence. The most common predisposition of sleep is lying down and resting after lunch (91.1%). Nearly 5.8% of students admitted that there are situations when they could fall asleep while driving a car for a few minutes to stop in a traffic jam. The list of ESS items is presented in Table S2, which is part of the Supplementary Materials.

The analysis of sociodemographic variables indicated that women had significantly higher mean AIS and ESS scores. Moreover, higher AIS and ESS scores were observed

among first-year students. Interestingly, medical students with the lowest AIS values had at the same time the highest ESS measure. There was a correlation between the stimulants and ESS measures of sleep. Higher ESS scores were associated with psychostimulants, cannabinoids, and hypnotics use. On the other hand, both psychostimulants and hypnotics affected the AIS measures for students having on average higher values in both scales. There was an inverse correlation for the effects of alcohol on sleep because individuals who consumed alcohol obtained lower results on average on both scales.

Table 1. Characteristics of the study group.

Variable		Overall Study Group N (%)	Before Pandemic N (%)	During Pandemic N (%)	Chi²	*p*
Sex	Female	11,985 (80.7)	6129 (79.2)	5859 (82.4)	25.38	<0.001
	Male	2859 (19.3)	1612 (20.8)	1248 (17.6)		
Age M ± SD		21.82 ± 2.8	21.97 ± 2.42	21.71 ± 4.74	-	<0.001
Study year	I	4842 (32.7)	1866 (24.1)	2977 (41.9)	573.05	<0.001
	II	2767 (18.6)	1717 (22.2)	1050 (14.8)		
	III	2781 (18.7)	1690 (21.8)	1093 (15.4)		
	IV	2080 (14.0)	1131 (14.6)	949 (13.4)		
	V	1984 (13.4)	1129 (14.6)	855 (12.0)		
	VI	390 (2.6)	208 (2.7)	183 (2.6)		
University profile	Medical	3425 (23.1)	2082 (26.9)	1344 (18.9)	133.09	<0.001
	Non-Medical	11,419 (76.9)	5659 (73.1)	5763 (81.1)		
Study course	Medical	3425 (23.1)	2082 (26.9)	1344 (18.9)	159.41	<0.001
	Technical	2676 (18.0)	1348 (17.5)	1329 (18.7)		
	Humanistic	5352 (36.1)	2524 (32.6)	2829 (39.8)		
	Biological	915 (6.1)	480 (6.2)	436 (6.1)		
	Economic	2472 (16.7)	1303 (16.8)	1169 (16.5)		
Faculty in the medical course	Medical/Dental	1884 (57.2)	1119 (56.0)	765 (58.9)	31.57	<0.001
	Pharmacy	354 (10.7)	263 (13.2)	91 (7.0)		
	Faculty of Health Sciences	1058 (32.1)	616 (30.8)	443 (34.1)		
COVID-19 pandemic status announcement	Before pandemic	7735 (52.1)	-	-	-	-
	During pandemic	7105 (47.9)	-	-		
Use of stimulants in the last 3 months						
Alcohol	Yes	13,039 (87.8)	7069 (91.3)	5973 (84.0)	183.55	<0.001
	No	1805 (12.2)	672 (8.7)	1134 (16.0)		
Cannabinoids	Yes	1978 (13.3)	1082 (14)	898 (12.6)	5.77	0.016
	No	12,866 (86.7)	6659 (86.0)	6209 (87.4)		
Psychostimulants	Yes	417 (2.9)	218 (2.8)	200 (2.8)	0.005	0.993
	No	14,427 (97.1)	7532 (97.2)	6907 (97.2)		
Sedatives	Yes	1933 (13.0)	904 (11.7)	1029 (14.5)	25.66	<0.001
	No	12,911 (87.0)	6837 (88.3)	6078 (85.5)		

There was no significant difference in the AIS measures between the period before and during the pandemic, $p = 0.061$. The analysis of separate items showed a significant decrease in sleep qualities for both stages as sleep was rated as satisfactory by 30.09% of students before the pandemic as compared to a percentage of 25.20% after the declaration

of the pandemic ($p < 0.001$). However, after the pandemic had started, the percentage of students with adequate sleep time increased (20.97% vs. 28.44%, $p < 0.001$). A detailed list is presented in Tables S1 and S2.

Table 2. Linear regression model of the influence of sociodemographics and stimulants on AIS and ESS scales.

Explanatory Variable		Percentage of Positive Results	B	95%CI	t	p
Athens Insomnia Scale						
COVID-19 pandemic status announcement	Before pandemic	54.83%	−0.085	[−0.174, 0.003]	−1.879	0.061
	During pandemic	54.51%	Ref.	Ref.	Ref.	Ref.
Sex	Female	55.90%	0.467	[0.378, 0.557]	10.283	**<0.001**
	Male	44.10%	Ref.	Ref.	Ref.	Ref.
Study year	I	55.48%	0.151	[0.004, 0.009]	2.100	**0.035**
	II	56.02%	0.182	[0.003, 0.015]	2.143	**0.015**
	III	53.90%	−0.042	[−0.208, 0.122]	−0.508	0.611
	IV	52.50%	−0.225	[−0.405, −0.043]	−2.434	**0.014**
	V	50.25%	−0.259	[−0.444, −0.075]	−2.759	**0.005**
	VI	54.99%	Ref.	Ref.	Ref.	Ref.
Study course	Medical	50.88%	−0.404	[−0.546, −0.263]	−5.586	**<0.001**
	Technical	52.90%	−0.194	[−0.345, −0.041]	−2.499	**0.012**
	Humanistic	57.91%	0.378	[0.253, 0.498]	6.022	**<0.001**
	Biological	60.15%	0.601	[0.358, 0.834]	5.052	**<0.001**
	Economic	49.80%	Ref.	Ref.	Ref.	Ref.
Faculty in the medical course	Medical/Dental	48.99%	−0.282	[−0.512, −0.052]	−2.401	**0.016**
	Pharmacy	47.74%	−0.137	[−0.491, 0.217]	−0.759	0.447
	Faculty of Health Sciences	54.86%	Ref.	Ref.	Ref.	Ref.
Alcohol	Yes	53.94%	−0.204	[−0.315, −0.094]	−3.63	**<0.001**
	No	55.70%	Ref.	Ref.	Ref.	Ref.
Cannabinoids	Yes	53.48%	Ref.	Ref.	Ref.	Ref.
	No	54.26%	−0.031	[−0.134, 0.072]	−0.591	0.553
Psychostimulants	Yes	58.85%	Ref.	Ref.	Ref.	Ref.
	No	54.02%	−0.356	[−0.568, −0.144]	−3.291	**<0.001**
Sedatives	Yes	78.43%	Ref.	Ref.	Ref.	Ref.
	No	50.52%	−1.700	[−1.800, −1.599]	−33.115	**<0.001**
Epworth Sleepiness Scale						
COVID-19 pandemic status announcement	Before pandemic	28.33%	0.326	[0.241, 0.412]	7.493	**<0.001**
	During pandemic	23.62%	Ref.	Ref.	Ref.	Ref.
Sex	Female	27.48%	0.477	[0.390, 0.562]	10.915	**<0.001**
	Male	20.21%	Ref.	Ref.	Ref.	Ref.
Study year	I	26.68%	0.201	[0.066, 0.336]	2.923	**0.003**
	II	27.25%	0.223	[0.063, 0.383]	2.732	**0.006**
	III	26.70%	0.055	[−0.103, 0.215]	0.685	**0.049**
	IV	23.89%	−0.151	[−0.324, 0.022]	−1.701	0.088
	V	24.19%	−0.167	[−0.344, 0.010]	−1.847	0.065
	VI	27.11%	Ref.	Ref.	Ref.	Ref.

Table 2. *Cont.*

Explanatory Variable		Percentage of Positive Results	B	95%CI	t	p
Study course	Medical	30.24%	0.409	[0.272, 0.545]	5.867	**<0.001**
	Technical	24.80%	−0.086	[−0.232, 0.060]	−1.154	0.249
	Humanistic	25.11%	−0.033	[−0.151, 0.085]	−0.5514	0.581
	Biological	27.18%	−0.044	[−0.268, 0.180]	−0.384	0.701
	Economic	23.42%	Ref.	Ref.	Ref.	Ref.
Faculty in the medical course	Medical/Dental	28.82%	−0.268	[−0.500, −0.035]	−2.261	**0.023**
	Pharmacy	31.92%	0.081	[−0.2767, 0.439]	0.446	0.655
	Faculty of Health Sciences	32.20%	Ref.	Ref.	Ref.	Ref.
Alcohol	Yes	26.32%	0.196	[0.090, 0.302]	3.626	**<0.001**
	No	24.31%	Ref.	Ref.	Ref.	Ref.
Cannabinoids	Yes	28.89%	Ref.	Ref.	Ref.	Ref.
	No	25.65%	−0.147	[0.048, 0.247]	−2.916	**0.003**
Psychostimulants	Yes	32.30%	Ref.	Ref.	Ref.	Ref.
	No	25.90%	−0.242	[−0.455, −0.048]	−2.427	**0.015**
Sedatives	Yes	30.26%	Ref.	Ref.	Ref.	Ref.
	No	25.45%	−0.143	[−0.243, −0.043]	−2.809	**<0.001**

Notes: Statistically significant values are in bold with the significance level set at $p < 0.05$. Abbreviations: B—coefficient value of a given variable, 95% CI—confidence interval of B coefficient, *t*—test value, *p*—statistical significance. M—mean, SD—standard deviation.

The analysis of separate items showed that the factors of the well-being of the next day (r = 0.702, $p < 0.001$) and the subjective assessment of sleep quality (r = 0.663, $p < 0.001$) impacted the final AIS score most.

Similarly, the higher ESS scores correlated with the probability of falling asleep while reading (r = 0.585, $p < 0.001$) and during rest after lunch (r = 0.579, $p < 0.001$).

3.3. Quality of Life Assessment

Detailed MANSA results are presented in Table 3. The study found that the mean QoL was 60.95 ± 11.25. Women assessed their QOL significantly lower than men ($p = 0.043$). Among the stimulants used, both alcohol and cannabinoids were associated with a higher QOL score, unlike with hypnotics and psychostimulants. The period of the COVID-19 pandemic significantly lowered the QoL among Polish students ($p < 0.001$). Moreover, people suffering from insomnia and daytime sleepiness showed a much lower subjective assessment of the quality of life ($p < 0.001$).

The analysis of separate MANSA scores showed that Polish students gave the highest ratings for their satisfaction with the sense of security and relationships with their roommates. Because of the ongoing pandemic, there was a significant decrease in the subjective assessment of mental health (OR 1.49, $p < 0.001$), as well as the general feeling of satisfaction with life (OR 1.3, $p < 0.001$). During the pandemic, Polish students gave higher ratings for satisfaction with the housing situation (OR 0.81, $p < 0.001$) and relations with roommates (OR 0.88, $p < 0.001$). A detailed list of the MANSA items and their relationship with the COVID-19 pandemic is presented in Table 4.

3.4. Correlations between Individual Scales

There were significant correlations between the AIS, ESS, and QoL measurements used in the study. It was shown that the increase in AIS values was positively associated with the mean ESS score (r = 0.223, $t = 27.983$, $p < 0.001$). However, there was an inverse correlation between the assessment of sleep and QOL, because higher AIS (r = −0.477,

$t = -66.204$, $p < 0.001$) and ESS (r = −0.129, $t = -15.923$, $p < 0.001$) scores correlated with a lower subjective QOL assessment (MANSA).

Table 3. Influence of sociodemographic variables, pandemic, stage of studies, insomnia, and daytime sleepiness on subjective QOL assessment in a linear regression model.

Explanatory Variable		B	95%CI	*t*	*p*
MANSA Scale					
COVID-19 pandemic status announcement	Before pandemic	0.430	[0.199, −0.661]	3.653	**<0.001**
	During pandemic	Ref.	Ref.	Ref.	Ref.
Sex	Female	−0.237	[−0.468, −0.006]	−2.015	**0.043**
	Male	Ref.	Ref.	Ref.	Ref.
Study year	I	−0.866	[−1.223, −0.504]	−4.682	**<0.001**
	II	−0.545	[−0.975, −0.115]	−2.489	**0.001**
	III	−0.644	[−1.072, −0.216]	−2.953	**0.003**
	IV	0.385	[−0.08, 0.851]	1.616	**0.105**
	V	0.704	[0.227, 1.181]	2.896	**0.003**
	VI	Ref.	Ref.	Ref.	Ref.
Study course	Medical	2.238	[1.873, 2.602]	12.024	**<0.001**
	Technical	0.049	[−0.341, 0.439]	0.248	**0.804**
	Humanistic	−1.503	[−1.817, −1.188]	−9.360	**<0.001**
	Biological	−0.891	[−1.491, −0.291]	−2.912	**0.003**
	Economic	Ref.	Ref.	Ref.	Ref.
Faculty in the medical course	Medical/Dental	1.401	[0.821, 1.982]	4.731	**<0.001**
	Pharmacy	−0.326	[−1.221, 0.569]	−0.713	0.476
	Faculty of Health Sciences	Ref.	Ref.	Ref.	Ref.
Insomnia (AIS)	Yes	−8.923	[−9.255, −8.589]	−52.465	**<0.001**
	No	Ref.	Ref.	Ref.	Ref.
Daytime sleepiness (ESS)	Yes	−3.297	[−3.706, −2.888]	−15.801	**<0.001**
	No	Ref.	Ref.	Ref.	Ref.
Alcohol	Yes	0.552	[0.267, 0.834]	3.793	**<0.001**
	No	Ref.	Ref.	Ref.	Ref.
Cannabinoids	Yes	Ref.	Ref.	Ref.	Ref.
	No	−0.587	[−.0853, −0.320]	−4.301	**<0.001**
Psychostimulants	Yes	Ref.	Ref.	Ref.	Ref.
	No	2.056	[1.501, 2.603]	7.372	**<0.001**
Sedatives	Yes	Ref.	Ref.	Ref.	Ref.
	No	3.198	[2.934, 3.465]	23.719	**<0.001**

Notes: Statistically significant values are in bold with the significance level set at $p < 0.05$. Abbreviations: B—coefficient value of a given variable, 95%CI—confidence interval of B coefficient, *t*—test value, *p*—statistical significance.

3.5. The Pattern of Stimulants/Alcohol and Drug Use among Polish Students

The drug use related to stimulants is presented in Table 1. Detailed effects of sociodemographics and the pandemic on drug use are shown in Table 5. The most common stimulants were alcohol, consumed by 87.7% of respondents, but after the COVID-19 pandemic burst, alcohol use had decreased from 91.3% to 84%. Hypnotics were used by 13% of the respondents, and psychostimulants were used by 2.9% of the university/undergraduate

student population. There was a significant influence of gender on the type of stimulants. Women used sedatives/sleeping pills more often, whereas men consumed alcohol, and used cannabinoids and psychostimulants more often. With alcohol consumption, we observed a distinct pattern that a higher year of study was associated with increased alcohol use. It was also shown that after the COVID-19 pandemic burst, the frequency of using hypnotics/sedatives by Polish students increased significantly (OR 0.76, $p < 0.001$). However, as the pandemic continued, alcohol consumption decreased (OR 1.35, $p < 0.001$).

Table 4. Polynomial logistic regression analysis of the relationship between separate MANSA subscales and the COVID-19 pandemic in the ordinance.

Question	Mean Score for Both Phases of the Study	Before the Pandemic Announcement	
	M (SD)	OR (95%CI)	*p*
How satisfied are you with your life as a whole today?	4.592 (1.34)	1.30 (1.22–1.38)	**<0.001**
How satisfied are you with your job (or sheltered employment, or training/education as your main occupation)?	4.441 (1.34)	0.915 (0.86–0.97)	**<0.001**
How satisfied are you with your financial situation?	4.106 (1.53)	1.11 (1.04–1.18)	**0.001**
How satisfied are you with the number and quality of your friendships?	4.667 (1.72)	1.09 (1.02–1.16)	**0.006**
How satisfied are you with your leisure activities (hobby)?	4.223 (1.66)	1.04 (0.97–1.11)	0.201
How satisfied are you with your accommodation?	4.764 (1.60)	0.81 (0.77–0.87)	**<0.001**
How satisfied are you with your personal safety?	5.165 (1.42)	1.12 (1.06–1.20)	**<0.001**
How satisfied are you with the people that you live with?	5.049 (1.55)	0.88 (0.83–0.94)	**<0.001**
How satisfied are you with your sexual life?	4.268 (1.93)	1.09 (1.03–1.17)	**0.002**
How satisfied are you with your relationship with your family?	4.962 (1.44)	1.14 (1.07–1.22)	**<0.001**
How satisfied are you with your physical health?	4.301 (1.48)	1.04 (0.98–1.10)	0.216
How satisfied are you with your mental health?	4.128 (1.68)	1.49 (1.40–1.58)	**<0.001**

Notes: Statistically significant values are in bold with the significance level set at $p < 0.05$. OR—odds ratio.

Table 5. Polynomial logistic regression analysis of sociodemographics and pandemic effects on the frequency of stimulants/alcohol and drug use.

Variables		Alcohol		Cannabinoids		Psychostimulants		Sedatives	
		OR (CI 95%)	*p*	OR (CI 95%)	*p*	OR (CI 95%)	*p*	OR (CI 95%)	*p*
Sex (Female—Ref.)	Male	1.45 (1.30–1.63)	**<0.001**	2.10 (1.79–2.46)	**<0.001**	2.10 (1.55–2.87)	**<0.001**	0.66 (0.54–0.81)	**<0.001**
Study year (I year—Ref.)	II	0.83 (0.73–0.94)	**0.002**	0.85 (0.68–1.05)	0.147	0.81 (0.52–1.27)	0.362	1.04 (0.85–1.27)	0.674
	III	1.02 (0.90–1.16)	0.701	1.04 (0.85–1.26)	0.733	0.99 (0.66–1.49)	0.976	1.02 (0.84–1.24)	0.811
	IV	1.05 (0.92–1.21)	0.401	0.87 (0.70–1.09)	0.238	093 (0.60–1.45)	0.760	0.83 (0.67–1.03)	0.096

Table 5. *Cont.*

Variables		Alcohol		Cannabinoids		Psychostimulants		Sedatives	
		OR (CI 95%)	*p*	OR (CI 95%)	*p*	OR (CI 95%)	*p*	OR (CI 95%)	*p*
	V	1.13 (0.99–1.30)	0.071	0.69 (0.54–0.89)	**<0.001**	0.61 (0.36–1.04)	0.720	0.84 (0.67–1.06)	0.139
	VI	1.36 (1.04–1.80)	**0.027**	0.61 (0.36–1.03)	**0.050**	0.90 (0.36–2.25)	0.826	1.04 (0.68–1.58)	0.855
Study course (Biological—Ref.)	Economic	1.00 (0.82–1.22)	0.981	0.88 (0.61–1.28)	0.156	0.79 (0.39–1.59)	0.527	1.01 (0.73–1.40)	0.913
	Humanistic	0.83 (0.69–1.00)	**0.050**	0.79 (0.58–1.09)	0.148	1.06 (0.58–1.97)	0.835	1.40 (1.04–1.87)	**0.029**
	Medical	0.88 (0.73–1.08)	0.226	0.74 (0.54–1.01)	0.059	0.94 (0.48–1.83)	0.861	0.94 (0.68–1.29)	0.710
	Technical	1.18 (0.97–1.45)	0.085	0.96 (0.70–1.30)	0.799	1.12 (0.58–2.15)	0.732	0.64 (0.46–0.88)	**<0.001**
Faculty in the medical course (Pharmaceutical—Ref.)	Medical and dental	1.57 (1.06–2.32)	**0.025**	1.65 (0.78–3.52)	0.187	3.05 (0.41–22.79)	0.276	0.78 (0.43–1.43)	0.430
	Health sciences	1.44 (0.96–2.17)	0.074	0.85 (0.38–1.90)	0.700	1.24 (0.14–10.47)	0.839	0.788 (0.42–1.49)	0.463
COVID-19 pandemic status announcement (During pandemic—Ref.)	Before pandemic	1.35 (1.27–1.44)	**<0.001**	1.10 (0.98–1.23)	0.083	0.93 (0.73–1.18)	0.571	0.76 (0.69–0.85)	**<0.001**

Notes: Statistically significant values are in bold with the significance level set at $p < 0.05$.

4. Discussion

Sleep disorders are a significant health problem, not only among the elderly but now also among young adults. Therefore, the central aim of this study was to assess the prevalence of sleep disorders among university students, including their QoL and patterns of psychoactive substance use. In addition, the study determined how the COVID-19 pandemic affected students' quality of life. The study proved a considerable health problem of Polish students because it showed that 54.1% of the population sample had symptoms of insomnia as indicated on the AIS scale [31]. To the best of the authors' knowledge, this has been the first report on such a large group of Polish students, and it includes observations both before and during the COVID-19 pandemic, which makes the study strong and innovative.

The ESS results showed the occurrence of daytime sleepiness in 26.1% of students, of which as much as 6.1% should suspect pathological sleepiness. The present results are consistent with other reports indicating a significant increase in sleep problems among young adults. For instance, in a study conducted in Morocco, the prevalence of insomnia was found in 54% of the students' population, and 9.4% of them suffered from daytime sleepiness. In another study on Hungarian students, 23% of the population had insomnia [38,39]. However, as previously observed by Ohayon [40], the prevalence of sleep disorders varies depending on the data collection period, population sample, and research methods. For example, a Polish study on the assessment of sleep disorders among 2413 young Poles indicated that 50.5% of them declared difficulties with sleep [41]. Another study by Kałduńska et al. [42] in 2019 based on standardized psychometric tools found sleep disorders in 28.3% of respondents, among whom there was a large number of students from universities in Krakow—19.7% [42,43]. However, in a Polish study on 1,649 students during the lockdown in Poland, insomnia was diagnosed in 42.03% of the population sample [44]. Interestingly, in a large population study by Kiejna et al. [2], the occurrence of sleep disorders among Poles over 15 years of age was estimated at 27.3%. As mentioned earlier, these discrepancies

more likely depended on the different periods of data collection, various research methods, and the selection of the population sample.

In this study and many previous reports, it was observed that women much more often suffer from sleep disorders [2,6,39,41,45]. This report found that women scored higher in both AIS and ESS scales. These findings are not clear. Undoubtedly, women show a higher level of emotional excitability and therefore are more at risk of developing psychiatric diseases, including anxiety and depression, which are associated with sleep problems. It is believed that this results from sex steroid hormones whose levels are different between genders after puberty [46]. The concentration of hormones in women is related to the menstrual cycle, affecting assessments of the quality and duration of sleep [47,48]. Some studies have shown that high estradiol and progesterone levels were associated with prolonged arousal and wakefulness [49]. There was also a unidirectional growing intensification of both insomnia and daytime sleepiness in the first-year students, obtaining higher AIS and ESS scores. These effects may be explained by appearances of life changes associated with the university enrolment, including change of place of residence, new social roles, and new life obligations. These changes can induce anxiety and fear, correlated with the risk of developing sleep disorders, as confirmed in earlier reports [50,51].

Contrary to the previous observations, in this study, medical students showed significantly lower AIS scores than students from other studies. In ESS, these values were highest, and the percentage of people with a positive result was 30.24%. In a survey among medical university students, daytime sleepiness occurred in 35% of Malaysian students, 30.6% of Indian students, and 46.5% of Brazilian medical adepts [15,52,53]. It is believed that high sleepiness among medical students is associated with many hours of classes, study, clinical practice, often including night duty, and significant stress and mental strain [54].

The comparison of separate AIS items showed a moderate correlation between the result and the question about sleep quality ($r = 0.663$, $p < 0.001$). This effect seems to be consistent with the reports worldwide indicating that the quality, but not the time, of sleep is most important ($r = 0.578$, $p < 0.001$). This may also be the result of no AIS differences between periods before and during the COVID-19 pandemic. During the lockdown, universities were closed, and students switched to remote learning. Their scope of decreased duties could contribute to changing their sleep pattern. For instance, Gupta et al. [55] observed that students went to sleep late more often during the lockdown, got up later, and had a greater number of naps during the day, which reduced the quality of sleep.

Another explanation could be that students had longer sleep during the day because of life changes. Here, we observed that the percentage of students with normal sleep time increased from 20.97% to 28.44%, $p < 0.001$, while sleep satisfaction decreased from 30.09% to 25.20%, $p < 0.001$. It is clear that delayed falling asleep can reduce the amount of slow-wave sleep, significantly deteriorating its quality and exacerbating sleep problems [53,54]. Similar findings were also observed among Spanish students as there was an increase in sleep time in the initial period of the pandemic [25]. In contrast, in a study conducted in Jordan, 94.9% of students declared that the pandemic had affected their sleep habits, and 74% of them reported a subjective deterioration in sleep quality. Additionally, 71.3% of students showed symptoms of depression [22]. The COVID-19 pandemic is an unusual situation, having a considerable impact on people's health and psychological condition. Recent reports have shown an increased risk of depression, anxiety, sleep disorders, and PTSD in almost every age group [23]. In addition, the present results of the subjective assessment of mental condition showed a decreasing tendency when comparing periods during and before the pandemic (OR 1.49, $p < 0.001$) and the QOL (OR 1.30, $p < 0.001$). Thus, the impact of the COVID-19 pandemic on mental health seems to be complex, demanding constant monitoring, especially given successive waves of the disease. We should note that, despite the social distancing, socialization was rated by Polish university students as being more satisfied with the housing situation (OR 0.81, $p < 0.001$) and relations with roommates (OR 0.88, $p < 0.001$).

Psychoactive substances influencing sleep include alcohol, cannabinoids, cocaine, or morphine [11–13,56,57]. The study confirmed the relationship between sleep and substance use. We showed that psychostimulants and sedatives-hypnotics were associated with AIS scores, while alcohol consumption was associated with lower AIS scores. However, the EPSS measurement showed that alcohol, cannabinoids, psychostimulants, and hypnotics affected daytime sleepiness. The finding of the effect of stimulants on sleep is not clear. For example, alcohol consumption in the initial stage may lead to a subjective improvement in sleep [58]. However, its only long-term use that can disturb sleep by extending its latency time, shortening the duration of sleep, and leading to frequent awakenings, thus significantly diminishing its quality [58,59]. The cannabinoids have a similar effect on sleep, but in the short-term manner, subjectively improving sleep quality [58]. In the study investigating the subjective evaluation of cannabis' effect on sleep, the respondents indicated the ease of falling asleep as the main advantage of drug use [60]. Similar findings were confirmed in polysomnography studies of small THC doses, leading to shorter falling-asleep times, shorter sleep latencies, and shorter awakening times [61]. However, for chronic alcoholic use, even at low doses, there is a negative effect on sleep [62]. The most common subjective feelings are bizarre dreams, decreased sleep quality, and insomnia [63,64]. On the other hand, there is substantial evidence that substance use reduces the quality of sleep and adverse next-day effects on memory [65], as indicated in this study in a higher percentage of people with positive ESS and AIS scores. It is worth noting that the relationships between sleep and substance use seem to be bidirectional: the incidence of sleep disorders affects the increased risk of using psychoactive substances, and vice versa, their use leads to sleep deterioration. There is also evidence that the sleep disorders after discontinuation of psychostimulants may be an independent factor predisposed to relapse [62]. However, that requires in-depth analysis that goes beyond this study. The study showed that at the initial stage of the COVID-19 pandemic, there was a significant decrease in alcohol use among students in Poland. Similar findings were observed among students from the USA, Portugal, or Germany [66–68]. This effect was probably due to the prevailing restrictions, e.g., the closure of bars, restaurants, pubs, and universities, and the introduction of distance learning. This resulted in the deprivation of in-person social interactions often associated with alcohol consumption. This was also confirmed by the change in drinking habits, for instance, smaller amounts were consumed more often with the family [66–68]. The study among Spanish students showed a decline in alcohol and tobacco consumption as well as pro-health habits, such as increasing physical activity and consumption of fruit and vegetables. Some researchers hypothesized that the COVID-19 pandemic intensified some health-promoting habits due to the fear of the virus and death [25]. On the other hand, another study in the US assessing alcohol consumption before and after university closure showed an increased alcohol consumption and excessive searching for drinking opportunities among students [24]. Therefore, the patterns of substance use in the COVID-19 pandemic seem to vary given the study site, and its period and individual predispositions, consequently, it should be subjected to further monitoring. Interestingly, there was an inverse pattern in hypnotics/sedatives as their consumption increased during the COVID-19 pandemic. Undoubtedly, this effect may be explained by an increase in anxiety and depression, and sleep disorders [69]. Moreover, the period of the COVID-19 pandemic is also reflected in the assessment of our sleep. While the study results did not show any differences between the stages in the mean AIS values, these observations are visible in individual questions. The quality of sleep decreased significantly while its length increased.

The authors are aware of limitations of this study. The first limitation of the study was data collection. This resulted in difficulties in precise estimation of the number of participants who received the information and participants who replied. Additionally, it was not possible to determine the number of questionnaires that were initially finished and then not completed at each stage. Moreover, the anonymity of the study prevented the authors from providing information about the results and information about the potential

need for specialist consultations. Another limitation was the limited representativeness of the Polish university students, such as most women, students of humanities, and first-year students. The measurements used also had some limitations. The self-reported scales were based on subjective feelings, but in-depth psychiatric research requires objectification, such as a psychiatric examination or standardized instruments. However, the scales used were comparable to the tools of, e.g., polysomnography, where satisfactory results were obtained [70,71]. The findings were also limited as no data on somatic diseases, medications, and mental disorders among the respondents and their family members were provided, as well as many other important sociodemographic factors. However, it should be emphasized that the study used reliable research methods and a large sample size. Limitations included the lack of measurements of the level of addiction to the substances used, as well as the assessment of day/night activity among respondents, which, according to the literature, have an impact on sleep quality [72].

To sum up, this study provides important findings on the epidemiology of sleep disorders, including somnolence and insomnia, and the subjective assessment of QOL among young adults studying in Poland. It indicated the specific psychoactive substance use patterns in Polish university students. It turned out that insomnia may be a common phenomenon as 54% of the surveyed students were prone to its symptoms. In addition, the study showed that the COVID-19 pandemic increased daytime sleepiness, worsening the quality of sleep without increasing the phenomenon of general insomnia. Compared to other reports, there was a significant increase in sleep problems among adults in Poland before the pandemic. However, the heterogeneity of the study groups, different periods of data collection, and different research methods prevented conclusive results from being obtained. Therefore, further research on sleep disorders requires an in-depth analysis based on a standardized methodology to objectify the final conclusions. Therefore, the authors have made an effort, and research is currently underway to disseminate the questionnaire in many countries around the world. The publication of the results is planned shortly.

5. Conclusions

Sleep disorders are a significant health problem for young adults living in Poland. The impact of the COVID-19 pandemic on sleep is not fully clear. As the pandemic has progressed, the quality of students' sleep has decreased, and the phenomenon of daytime sleepiness may have also increased. There were no differences in severity of insomnia before and during the COVID-19 pandemic among Polish students. Ultimately, we found that substance use is widespread in young adults, affecting either sleep or their quality of life. Our findings also suggested the increased use of sedatives/hypnotics and decreased alcohol consumption during the COVID-19 pandemic.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/jcm11082106/s1. Table S1. A detailed list of the individual questions included in the Athens Insomnia Scale, divided into the period before and during the COVID-19 pandemic. Table S2. A detailed list of questions included in the Epworth Sleepiness Scale, divided into the period before and during the COVID-19 pandemic.

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3. Use of alcohol, cannabinoids, psychostimulants, and sedatives before and during the COVID-19 pandemic among students in 40 european countries.

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Article

Use of Alcohol, Cannabinoids, Psychostimulants, and Sedatives before and during the COVID-19 Pandemic among Students in 40 European Countries

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Abstract: In March 2020, the WHO announced the COVID-19 pandemic, which has been ongoing for over 2 years. To stop the spread of the virus, the governments of many countries decided to introduce reasonable social restrictions that were suitable for pandemic waves. This led to radical changes in people's lives, especially among students, who are very active in society. Before COVID-19, being of student age was associated with the highest frequency of stimulants use. It is important to note that drugs are taken disparately in various areas. Therefore, using the Computer-Assisted Web Interview type of study, the impact of the pandemic on the use of alcohol, cannabinoids, psychostimulants (e.g., amphetamine, methamphetamine, ecstasy) and sedatives (e.g., zolpidem, zopiclone, alprazolam, lorazepam, etc.) was assessed among students from European countries. The questionnaire included single- and multiple-answer questions. The first part concerned sociodemographic questions, while the second included questions about the use of stimulants in the last 3 months prior to participation in the study. Distribution of the survey covered the period from 31 January 2016 to 30 April 2021. A total of 17,594 European students participated in the study. The vast majority of participants were women (80.4%) and students of non-medical universities (77.2%) living in Eastern European countries (86.1%). Of all students, 15,613 (89.6%) reported alcohol drinking, 2538 (14.1%) the use of cannabinoids, 650 (3.6%) psychostimulants, and 2252 (12.5%) sedatives in the past three months. It has been shown that women are far less likely to use alcohol (OR 0.81), psychostimulants (OR 0.44) and cannabinoids (OR 0.49), while they are more likely to use sedatives (OR 1.41). During the COVID-19 pandemic, the consumption of alcohol (OR 0.55) and psychostimulants (OR 0.72) decreased and that of sleep medications increased (OR 1.17). To conclude, the COVID-19 pandemic influenced the pattern of stimulants used by students in European countries. The restriction of social interactions contributed to the decrease in the consumption of alcohol and psychostimulants but increased the use of sedatives and the frequency of their use. Women were found to use sedatives more often, while men preferred to drink alcohol and use cannabinoids or psychostimulants. It has also been shown that students of Central and Eastern Europe more often use alcohol and sedatives, while in Southern European countries psychostimulants and cannabinoids are preferred.

Keywords: COVID-19; restrictions; students; lifestyle; Europe; sedatives; stimulants; alcohol; drugs

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1. Introduction

Due to the rapid spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the World Health Organization (WHO) announced the coronavirus disease 2019 (COVID-19) pandemic in March 2020, which has been ongoing for over 2 years [1]. In its early stages, the governments of many countries decided to introduce reasonable social restrictions in order to stop the spread of the virus; the level of restrictions varied in each pandemic wave [2–4]. Restrictions included, but were not limited to, the closure of offices, shopping malls, hotels, bars and clubs. In addition, the closure of kindergartens, schools and universities forced the introduction of remote education, which, until then, had not been a popular method of education [5,6]. However, these restrictions were not identical in

every European country, and as the pandemic continued, national governments pursued their own policies to counter COVID-19 [7]. This led to radical changes in people's lives, especially among students, who are social butterflies. Previous studies have shown that in the early pandemic stages, the number of social meetings decreased sharply [8]. In addition, it has been shown that before the COVID-19 outbreak, being of student age was associated with the highest frequency of stimulants use [9,10]. Moreover, the use of, for example, sedatives—such as antidepressants, anxiolytics and hypnotic-sedatives—has increased due to pandemic-related mental distress [11]. Interestingly, the consumption aspect needs to be considered bearing in mind that sedatives are taken disparately in various areas, which generally reflects the problem with the usage of drugs overall [12,13]. The same diversity is known to be present in groups of different ages [14]. Therefore, the aim of this study was to assess the impact of the COVID-19 pandemic on the use of alcohol, cannabinoids, psychostimulants and sedatives among students from European countries. To the best of the author's knowledge, this study is one of the few studies on such a large sample group, which covers 40 European countries and compares periods before and during the COVID-19 pandemic, which is its strong point.

2. Materials and Methods

This was a Computer-Assisted Web Interview (CAWI) type of study on the basis of an original proprietary questionnaire. The survey was distributed via a social network among the groups of students who were the study recipients. The participation was fully voluntary and anonymous. At each stage of the study, the respondents had the opportunity to withdraw from participation without giving a reason.

Before completing the questionnaire, the participants were informed about its goals and methodology; they then gave their informed consent to participate in the survey. Afterwards, the respondents confirmed their student status. The lack of consent and/or lack of student status confirmation resulted in the immediate termination of the study. However, if both criteria were met, the respondent continued to the appropriate part of the questionnaire. Distribution of the survey covered the period from 31/01/2016 to 30/04/2021.

The questionnaire included single-answer and multiple-answer questions. The first part concerned sociodemographic questions including age, gender, college profile (medical/non-medical) and both the year and country of study. The next part of the survey included questions about the use of alcohol, cannabinoids, psychostimulants (e.g., amphetamine, methamphetamine, ecstasy) and sedatives (e.g., zolpidem, zopiclone, alprazolam, lorazepam, etc.) in the last 3 months prior to participation in the study. Additionally, if the answer was affirmative, they were asked to specify the frequency of using stimulants: at least once a week; several times a month; not more than once a month; or once a quarter. Among students consuming alcohol, a question was also asked about the type of drink consumed (multiple-answer question). Based on the date of completing the survey, the respondents were divided into people before and during the COVID-19 pandemic. The cut-off date was 11/03/2021, i.e., the date when the pandemic was announced by the WHO. Based on EuroVoc data, the respondents were divided according to the European region of study; the following were distinguished: Western, Northern, Southern and Central-Eastern [15].

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Bioethics Committee of the Wroclaw Medical University, Poland.

Statistical Analysis

Statistica 13.0 (Hamburg, Germany) by StatSoft was used for the statistical analysis. The Shapiro–Wilk test was used to estimate the normal distribution. Basic descriptive statistics were employed for quantitative variables. Statistical significance between the two means was assessed using the non-parametric Mann–Whitney U test. The Chi-square (Chi^2) test was used to determine the relationship between the compared ordinal variables.

In order to assess the risk factors for the use of individual stimulants, four complex logistic regression models were built with a backward stepwise analysis. In each case, the independent variables included age, gender, pandemic period, European region, profile and year of study. The dependent variables included the use of alcohol, cannabinoids, psychostimulants and sedatives.

3. Results

3.1. Study Group Characteristics

A total of 17,594 European students participated in the study. The vast majority of participants were women (80.4%) and students of non-medical universities (77.2%) living in Eastern European countries (86.1%). Before the outbreak of the COVID-19 pandemic, 9372 (52.2%) students completed the survey. A detailed comparison of the entire study group and the comparison with regard to the COVID-19 pandemic is presented in Table 1.

Table 1. Characteristics of the study group and the comparison regarding the COVID-19 pandemic.

Variable		Whole Group N (%)	Before Pandemic N (%)	During Pandemic N (%)	Chi^2	p
Age M ± SD		22.13 ± 2.97	22.18 ± 2.58	22.06 ± 3.34	—	0.938
Sex	Female	14,441 (80.4)	7404 (79.0)	7037 (82.0)	25.54	**<0.001**
	Male	3513 (19.6)	1968 (21.0)	1545 (18.0)		
University profile	Medical	4089 (22.8)	2404 (36.7)	1685 (19.6)	92.21	**<0.001**
	Non-medical	13,865 (77.2)	6968 (73.3)	6897 (80.4)		
Study year	I	5170 (28.8)	2046 (21.8)	3124 (36.4)	532.64	**<0.001**
	II	3220 (18.0)	1978 (21.1)	1242 (14.5)		
	III	3401 (18.9)	2037 (21.7)	1364 (15.9)		
	IV	2705 (15.1)	1468 (15.7)	1237 (14.3)		
	V	2609 (14.5)	1420 (15.2)	1189 (13.9)		
	VI	849 (4.7)	423 (4.5)	426 (5.0)		
COVID-19 pandemic status announcement	Before pandemic	9372 (52.2)	—	—	—	—
	During pandemic	8582 (47.8)	—	—		
Part of Europe	Central and Eastern Europe	15,453 (86.1)	8061 (86.0)	7392 (86.1)	23.94	**0.003**
	Western Europe	969 (5.4)	457 (4.9)	512 (6.0)		
	Northern Europe	541 (3.0)	278 (3.0)	263 (3.1)		
	Southern Europe	881 (5.5)	576 (6.1)	415 (4.8)		

Statistically significant values are in bold.

3.2. The Usage of Alcohol, Cannabinoids, Psychostimulants and Sedatives

Of all students, 15,613 (89.6%) reported alcohol drinking, 2538 (14.1%) the use of cannabinoids, 650 (3.6%) psychostimulants (e.g., amphetamine, methamphetamine, ecstasy), and 2252 (12.5%) sedatives (e.g., zolpidem, zopiclone, alprazolam, lorazepam, etc.) in the past three months. The most consumed drink was beer (62.8%). In response to the ongoing COVID-19 pandemic, a reduction in the percentage of people consuming alcohol was observed (90.3% vs. 83.4%; $p < 0.001$). On the other hand, the number of people drinking at least once a week increased (16.1% vs. 56.8%, $p < 0.001$). A decrease in use during the COVID-19 pandemic was also observed for the cannabinoids (14.7% vs. 14.1%; $p < 0.05$) and psychostimulants (4.2% vs. 3.0%; $p < 0.001$). However, in both cases, no statistically significant difference was observed in the frequency of use. The COVID-19

pandemic contributed to an increase in the use of sedatives (e.g., zolpidem, zopiclone, alprazolam, lorazepam, etc.) among students from 11.5% to 13.6% ($p < 0.001$). The number of students using them more than once a week also increased. A detailed summary of the use of stimulants, the frequency of their use for the entire group, and a comparison of the period before and during the COVID-19 pandemic are presented in Table 2.

Table 2. Percentage comparison of students using alcohol, psychostimulants, cannabinoids and sedatives in relation to the COVID-19 pandemic.

Variable		Whole Group N (%)	Before Pandemic N (%)	During Pandemic N (%)	Size Effect	p
Alcohol		15,613 (89.6)	8459 (90.3)	7154 (83.4)	188.66 #	**<0.001**
Beer		11,267 (62.8)	6325 (67.5)	4942 (57.6)	187.95 #	**<0.001**
Wine		10,545 (58.8)	5811 (62.0)	4734 (55.2)	86.52 #	**<0.001**
Spirits		8611 (47.9)	4947 (52.8)	3664 (42.7)	182.77 #	**<0.001**
Cocktails		7571 (42.2)	4205 (44.9)	3366 (39.2)	58.56 #	**<0.001**
Frequency of use (N = 15,613)	At least once a week	5422 (34.7)	1361 (16.1)	4061 (56.8)	0.685 *	**<0.001**
	A few times a month	3676 (23.5)	2183 (25.8)	1493 (20.9)		
	Not more often than once a month	4747 (30.4)	4747 (56.1)	0 (0.0)		
	Once in the last 3 months	1768 (11.3)	168 (2.0)	1600 (22.4)		
Cannabinoids		2538 (14.1)	1376 (14.7)	1162 (14.1)	4.82 #	**0.029**
Frequency of use (N = 2538)	At least once a week	453 (17.8)	237 (17.2)	216 (18.6)	0.047 *	0.127
	A few times a month	325 (12.8)	170 (12.3)	155 (13.3)		
	Not more often than once a month	649 (25.6)	337 (24.6)	312 (26.9)		
	Once in the 3 months	1111 (43.8)	632 (45.9)	479 (41.2)		
Psychostimulants		650 (3.6)	393 (4.2)	257 (3.0)	18.44 #	**<0.001**
Frequency of use (N = 650)	At least once a week	102 (15.7)	63 (16.0)	39 (15.2)	0.034 *	0.862
	A few times a month	166 (25.5)	103 (26.2)	63 (24.5)		
	Not more often than once a month	92 (14.2)	57 (14.5)	35 (13.6)		
	Once in the 3 months	290 (44.6)	170 (43.3)	120 (46.7)		
Sedatives		2252 (12.5)	1080 (11.5)	1168 (13.6)	17.81 #	**<0.001**
Frequency of use (N = 2252)	At least once a week	820 (36.4)	372 (34.3)	448 (38.4)	0.062 *	**0.034**
	A few times a month	419 (18.6)	215 (19.8)	204 (17.4)		
	Not more often than once a month	528 (23.4)	243 (22.4)	285 (24.4)		
	Once in the 3 months	485 (21.6)	254 (23.5)	231 (19.8)		

Chi^2. * Cramér's V. Statistically significant values are in bold.

3.3. Risk Factors for the Use of Alcohol, Cannabinoids, Psychostimulants and Sedatives

In a complex logistic regression model, it was shown that women consume much less alcohol (OR 0.81), cannabinoids (OR 0.49) and psychostimulants (OR 0.44). On the other hand, they are more likely to take sedatives than men (OR 1.41). It has been shown that the inhabitants of Eastern Europe drink alcohol (OR 1.82) and consume sedatives (OR 1.5) much more often in relation to students from Southern Europe. However, they use

psychostimulants (OR 0.30) and cannabinoids (OR 0.54) much less frequently. A detailed list of factors influencing the use of stimulants is presented in Table 3.

Table 3. Complex logistic regression model showing the impact of age, gender, university profile, studying year and area, and the impact of COVID-19 pandemic on the consumption of alcohol, cannabinoids, psychostimulants and sedatives.

Variable		Alcohol		Cannabinoids		Psychostimulants		Sedatives	
		OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*
Age M ± SD		0.96 (0.94, 0.97)	**<0.001**	0.96 (0.94, 0.97)	**<0.001**	0.95 (0.92, 0.97)	**0.001**	1.04 (1.02, 1.05)	**<0.001**
Sex	Female	0.81 (0.72, 0.91)	**<0.001**	0.49 (0,45, 0.55)	**<0.001**	0.44 (0.37, 0.52)	**<0.001**	1.41 (1.24, 1.59)	**<0.001**
University profile	Medical	—	—	—	—	—	—	—	—
Study year	II	1.04 (0.91, 1.19)	0.498	—	—	—	—	0.85 (0.74, 0.97)	**0.004**
	III	1.23 (1.08, 1.42)	**0.002**	—	—	—	—	0.82 (0.72, 0.94)	**0.019**
	IV	1.31 (1.14, 1.52)	**<0.001**	—	—	—	—	0.77 (0.69, 0.89)	**<0.001**
	V	1.55 (1.32, 1.82)	**<0.001**	—	—	—	—	0.71 (0.61, 0.84)	**<0.001**
	VI	1.42 (1.13, 1.78)	**0.003**	—	—	—	—	0.98 (0.78, 1.23)	0.854
COVID-19 pandemic status announcement	During pandemic	0.55 (0.50, 0.60)	**<0.001**	—	—	0.72 (0.61, 0.84)	**<0.001**	1.17 (1.06, 1.28)	**<0.001**
Part of Europe	Central and Eastern Europe	1.82 (1.53, 2.17)	**<0.001**	0.54 (0.46, 0.64)	**<0.001**	0.30 (0.24, 0.39)	**<0.001**	1.50 (1.97, 1.88)	**<0.001**
	Western Europe	1.27 (0.99, 1.60)	0.050	0.84 (0.66, 1.04)	0.119	0.82 (0.59, 1.15)	0.258	1.03 (0.76, 1,40)	0.86
	Northern Europe	1.12 (0.86, 1.47)	0.404	0.72 (0.55, 0.96)	**0.026**	0.84 (0.56, 1.27)	0.421	1.05 (0.74, 1.50)	0.783

OR—odds ratio; 95% CI—95% confidence interval; statistically significant values are in bold.

4. Discussion

The aim of this study was to assess the impact of the COVID-19 pandemic on the use and frequency of alcohol, psychostimulants, cannabinoids and sedatives among students from European countries. The results of the study indicate that, of the substances analyzed, students were most likely to consume alcohol both before and during the pandemic; however, they consumed alcohol much less frequently during the initial phase of the pandemic. This may have been caused by the lockdown, which restricted social meetings. The data in the literature seem to certify this: Steffen et al. indicated that 44% of young adults reported drinking less; at the same time, only 7% of adults reported the same. On the other hand, an increase in alcohol consumption was reported by 14% of young adults and 17% of mature adults [16]. Similar observations were noted by Mangot-Sala et al., that alcohol consumption was generally lower during the pandemic than in previous years [17]. The change in drinking habits when, for example, smaller amounts were consumed more frequently with the family is in line with the observation from this research, where many

students drank less but more frequently [16,18,19]. Undoubtedly, the consumption pattern depends on the age group and many other predictors, as has already been summarized [20]. The above findings also certify the observation of our study that alcohol consumption increases among students in their final years of study—these people are gradually changing from young adults to mature adults. In contrast, a study by A. Zysset et al. found that in the early stages of the pandemic, one in four students surveyed developed riskier alcohol-related behaviors [21]. Similar observations were made among American students, where alcohol consumption increased significantly after the campus shutdown [22]. Thus, the data from the literature are not conclusive, and the differences are probably due to the different period of data collection. It could also have been related to varying degrees of government restrictions and increased stress. In earlier studies, increased alcohol consumption was shown to be a common way of coping with stress [23].

Although no significant differences were noted for frequency, a decrease in the use of cannabinoids and psychostimulants was visible during the pandemic. This may be related to alcohol consumption, which is known to be a predictor of other drugs usage (for example nicotine). A reduced number of occasions to drink alcohol (during lockdown) could entail a small decrease in psychostimulants or cannabinoids [24]. It can also be suggested that in the early days of the pandemic, the supply chains of psychoactive drugs may have been disrupted and their availability reduced. As investigated by Gunn et al., cannabis and alcohol are co-used [25]. However, the percentage of cannabinoids use decreased only moderately, and the differences are imperceptible when comparing the whole group (not only a group before COVID-19) to those from the pandemic period. Since the study limitation is definitely the lack of addiction level measurements, it cannot be precluded that a moderate to no decrease in cannabinoids use is due to addiction [26].

In contrast to the reduction in alcohol, cannabinoids and psychostimulants usage during the pandemic, the consumption of sedatives increased. There are studies confirming that since the beginning of the COVID-19 outbreak, mental distress/disorders have evidently increased, explaining the elevated intake that was observed in this study [27,28]. Another possible explanation could be a change in sleep patterns during the pandemic. Previous research has shown that during a lockdown, students went to bed late, stayed up late and had numerous naps during the day. All of this leads to changes in sleep architecture, worsens the quality of sleep and may contribute to a more frequent consumption of sedatives [29].

Gender differences revealed that, compared to men, women consume more sedatives but less alcohol, cannabinoids and psychostimulants. This suits the available data reporting that men are more likely than women to use almost all types of illicit drugs and that substance usage is significantly lower for females than for males [30,31]. On the other hand, when considering prescription drugs, women are more likely to seek treatment for a misuse of central nervous system depressants (which include sedatives); therefore, being at risk for greater anxiety could entail more antidepressants prescriptions, which increases the risk of misuse and overdose [32–34].

Finally, the results presented that, compared to Southern Europe, the students from Eastern Europe are more likely to consume alcohol and sedatives but use fewer psychostimulants and cannabinoids, the latter also being applicable for European students from the North. Regarding alcohol consumption, it has been confirmed that the highest lifetime prevalence rates (for beer, wine and breezers) were found among Eastern European countries such as Estonia, Hungary, the Czech Republic and Lithuania [35]. When it comes to sedative medication, the Statista report presenting data from 2020 indicated that, out of 19 countries in which the defined daily dosage (DDD) per 1000 inhabitants per day was evaluated, there were six countries from Central/Eastern Europe, five countries from Northern Europe and five from Western Europe, as well as four countries from Southern Europe [36]. Although the highest DDDs were observed for European countries of the North (Sweden, Iceland, Norway) and the lowest mainly in those of the West (Netherlands, Austria, Germany), the prevalence of Central/Eastern European countries was visible

in those located halfway up the list (Estonia, Czechia, Slovakia), compared to only one country of the South, i.e., Spain. As for cannabinoids, a study by Gabri et al. efficiently summarizes cannabis use among adolescents and young adults [37]. The authors recapitulated the country-specific prevalence of self-reported cannabis use, within which three countries from Southern Europe (Spain, Italy, Portugal) and two from Central/Eastern Europe (Czechia, Slovakia) were included. When comparing the percentages of cannabis consumption that refer to the period when the current study also collected data (Gabri et al. provided results up to the year 2018), the mean percentage for Southern Europe is twice as large as in Central/Eastern Europe. Although this conforms to the observations presented herein, it should be certified in the future, taking into account more lenient and stringent legislations in specific countries.

The author is aware of the limitations of this work, which undoubtedly include the methodology of data collection. Since it was disseminated via the Internet, the author cannot verify the identity of the respondents. The number of people who received information about the study and the response rate is also unknown. On the other hand, this method of collecting data made it possible to reach respondents from many European countries. In addition, young respondents in particular are more willing to participate in this type of research and show greater truthfulness [38]. In a face-to-face questionnaire, more socially acceptable answers are often observed [39]. Another limitation is the vast majority of women and inhabitants of Central and Eastern Europe, which could have had an impact on the final results. The significant predominance of women may be due to the fact that women make up the majority of students from European countries [40]. In addition, past research shows that women are more likely to participate in online surveys [41]. In contrast, the preponderance of students from East-Central European countries may be because the author of the survey is a resident of that region. This may have affected the students' level of confidence in participating in the survey. On the other hand, it could also be due to the lower visibility of the survey information in international student groups. However, it should be noted that this study covers the period before and during the pandemic and includes nearly 17,500 students, which undoubtedly proves its strength and innovation. It is also important to mention the lack of differentiation in the type of cannabinoid intake, which may show different efficacy.

Taken together, this study provides evidence that the COVID-19 pandemic significantly influenced the pattern of alcohol, cannabinoids, psychostimulants and sedatives used by students in European countries. The restriction of social interactions contributed to the decrease in the consumption of alcohol and psychostimulants. On the other hand, the COVID-19 pandemic has contributed to a significant increase in the use of sedatives and the frequency of their use. The logistic regression analysis showed that women use sedatives more often, while men prefer to drink alcohol and use cannabinoids or psychostimulants. It has also been shown that students of Central and Eastern Europe use alcohol and sedatives more often, while in Southern European countries psychostimulants and cannabinoids are preferred.

Undoubtedly, the results of this study show that the use of psychoactive substances is a serious problem among students. The ongoing COVID-19 pandemic has affected their use in different ways. It is necessary to continue monitoring the phenomenon and take appropriate steps to reduce the use of stimulants, the excessive use of which can lead to addiction and serious health consequences.

5. Conclusions

The COVID-19 pandemic has significantly changed the patterns of psychoactive substance use by students: alcohol consumption has decreased, and the use of sedatives has increased. Women evidently use more sedatives but consume less alcohol. Among the students of Central and Eastern European countries, the most frequently used stimulant is alcohol.

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4. Insomnia, daytime sleepiness, and quality of life among 20,139 college students in 60 countries around the world - a 2016-2021 study.

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Insomnia, Daytime Sleepiness, and Quality of Life among 20,139 College Students in 60 Countries around the World—A 2016–2021 Study

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Abstract: Background: Sleep disorders are a widespread phenomenon, and the number of individuals suffering from them is increasing every year, especially among young adults. Currently, the literature lacks studies that cover both countries with different levels of development and a period before the announcement of the ongoing COVID-19 pandemic. Therefore, this study aims to globally assess the prevalence of insomnia and daytime sleepiness among students and assess their quality of life. Methods: For this purpose, our own questionnaire was distributed online via Facebook.com. In addition to the questions that assessed socioeconomic status, the survey included psychometric tools, such as the Athens insomnia scale (AIS), the Epworth sleepiness scale (ESS), and the Manchester short assessment of the quality of life (MANSA). The survey distribution period covered 31 January 2016 to 30 April 2021. Results: The survey involved 20,139 students from 60 countries around the world. The vast majority of the students were women (78.2%) and also those residing in countries with very high levels of development and/or high GDP (gross domestic product) per capita at 90.4% and 87.9%, respectively. More than half (50.6%) of the respondents (10,187) took the survey before the COVID-19 pandemic was announced. In the group analyzed, 11,597 (57.6%) students obtained a score indicative of insomnia and 5442 (27.0%) a score indicative of daytime sleepiness. Women, low-income residents, and nonmedical students were significantly more likely to have scores indicating the presence of insomnia. Individuals experiencing both sleepiness ($B = -3.142$; $p < 0.001$) and daytime sleepiness ($B = -1.331$; $p < 0.001$) rated their quality of life significantly lower. Conclusions: Insomnia and excessive daytime sleepiness are common conditions among students worldwide and are closely related. The COVID-19 pandemic significantly altered students' diurnal rhythms, which contributed to an increase in insomnia. Students in countries with a high GDP per capita index are significantly less likely to develop insomnia compared to the residents of countries with a low GDP per capita index. Sleep disorders definitely reduce the quality of life of students.

Keywords: insomnia; daytime sleepiness; human development index; gross domestic product per capita; quality of life

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1. Introduction

The spectrum of sleep disorders is very broad and can include but is not limited to dyssomnias, insomnia, pathological sleepiness, narcolepsy, parasomnias, or sleep (hypnagogic and hypnopompic) hallucinations. Some of the most common conditions in the general population include, among other things, insomnia and daytime sleepiness [1]. Insomnia is a medical condition in which a person has difficulty falling asleep or staying asleep [2]. On the other hand, daytime sleepiness is defined as difficulty in maintaining appropriate levels of wakefulness [3]. The two conditions have a close relationship, and it was proved that those suffering from insomnia show higher levels of daytime sleepiness [3,4]. According

to global reports, every year, there are more and more individuals suffering from sleep disorders, especially young people [5,6]. A specific group is young adult students who, due to a series of life changes that are associated with studying (change of residence, greater independence, as well as increased consumption of stimulants, such as alcohol, cannabinoids, or psychostimulants), are far more likely to develop sleep disorders [7,8]. Young people rarely follow basic sleep hygiene rules, which have a huge effect on sleep quality [9]. Low knowledge of sleep hygiene among college students was also demonstrated. Furthermore, they adhered to the basic principles of sleep hygiene to a low degree [10,11]. Moreover, it is believed that young adults may still function properly within the late sleep phase and, for this reason, they stay awake longer, go to bed late, and have to get out of bed early due to their daily responsibilities. This leads to a situation where the amount of sleep becomes insufficient [12]. These changes were particularly observed among college students [13]. Furthermore, reference should also be made to the ongoing COVID-19 pandemic and its direct impact on mental health, including sleep. Numerous studies indicate that this situation has resulted in an increase in insomnia, especially among young people [14,15]. It was also observed that the ongoing COVID-19 pandemic significantly altered the previous sleep patterns among college students, who went to bed late, got out of bed late, and had numerous naps during the day. All this leads to a deterioration of sleep quality, which is the most important guarantor of its efficiency. The reasons are found in the introduction of lockdowns, remote working and learning, and significant restrictions on social interaction [16].

The role of sleep is invaluable, and it is believed that it is one of the fundamental needs of humans. Sleep ensures the maintenance of both mental and physical health [17]. It is known that those suffering from sleep disorders are far more likely to suffer from chronic diseases, such as hypertension, diabetes, obesity, and death [18]. Sleep disorders were found to increase the risk of developing mental disorders, including depression, anxiety, and personality disorders. On the other hand, sleep disorders can also be a symptom of a developing mental health condition or its exacerbation [19]. Moreover, poor sleep has a direct impact on daily life. It is associated with lower performance at school and work and with concentration and memory difficulties [2,20,21]. A correlation between psychoactive substance use and sleep was also proven. The dependency mechanism is complex and works in two directions. Users of alcohol, cannabinoids, or psychostimulants have problems with their sleep physiology; on the other hand, those with poor sleep quality are far more likely to turn to stimulants in the hope of improving it [22–24].

Adequate sleep was also found to have a huge effect on the assessment of quality of life (AQoL) index, which has become increasingly important in recent years. AQoL, in addition to a biological health assessment, is an essential part of a comprehensive patient assessment [25]. The AQoL is made up of many factors, such as mental health, physical health, social relationships, economic status, etc., and thus its measurement is not straightforward. To this end, several standardized psychometric tools have been developed. Their questions address various aspects of life, thus enabling it to be reliably assessed [26]. Several studies revealed that both organic and mental health conditions contribute significantly to a reduced QoL, which can also be used for identifying a range of health problems. These problems can have an impact on patients, and their modification will improve patients' life [27,28].

There can be considerable difficulty in terms of the diagnostic evaluation of sleep disorders such as insomnia and sleepiness, which are very complex. The most accurate tools are instrumental methods, especially polysomnography. Due to the methodologies of this study, however, it was not feasible to use polysomnography as a screening tool. Therefore, appropriate questionnaires with a high level of sensitivity and reproducibility, when compared to instrumental methods, were developed, and they can also be used in population studies [29,30].

Currently, the literature is rich in studies on sleep disorders; however, they focus on a specific time and place. There is no single study that covers the different regions of the

world with different cultural backgrounds, economic statuses, and levels of development. Socioeconomic status has long been proven to have a direct effect on health by affecting living conditions and behavioral patterns, especially health ones. Despite this, their effects on sleep are still poorly understood, and the data are not consistent and need to be standardized [31,32].

Therefore, this study aims to globally assess the prevalence of insomnia and daytime sleepiness among college students and assess their QoL. This study explored the relationships between sleep, QoL, and stimulants, such as alcohol, cannabinoids, psychostimulants, or anxiolytics. Furthermore, it explored the differences in terms of AQoL, the prevalence of insomnia, and daytime sleepiness according to socioeconomic status, as measured by GDP (gross domestic product) per capita and the human development index (HDI).

2. Materials and Methods

2.1. Participants

Table 1 shows the characteristics of the study group. The survey was completed by 20,431 respondents. A total of 292 people did not agree to participate in the survey and/or were not students. Finally, 20,139 respondents from 60 countries around the world with a mean age of 22.6 ± 3.6 years were included in the study. The vast majority of respondents were women (78.2%), nonmedical students (77.6%), and first-year university students (27.3%). Furthermore, students residing in countries with very high levels of development and/or high GDP per capita accounted for 90.4% and 87.9%, respectively. More than half (50.6%) of respondents (10,187) took the survey before the COVID-19 pandemic was announced. The most commonly used stimulant among students was alcohol. A total of 82% of students consumed alcohol at least once within the 3 months prior to the survey. Fewer than 25 percent (22.6%) of students admitted to using sedatives/hypnotic drugs, with an upward trend observed following the announcement of the COVID-19 pandemic.

2.2. Assessment

The CAWI (computer-assisted web interview) survey was designed based on our own questionnaire that was distributed online via a social networking site. A convenient sampling method was used in the selection of the study sample. The questionnaire was distributed to student groups around the world. The survey was fully anonymous, and voluntary, and its participants were free to opt-out at any stage of the survey without giving any reason. Prior to participating in the survey, respondents were informed of the aims and methodology of the study. Subsequently, they gave their informed consent to participate in the study. Additionally, respondents had to confirm their student status. In the case of both positive answers, the respondents proceeded to the relevant part of the questionnaire. If there was any negative answer, the survey was automatically terminated. The survey distribution period was from 31 January 2016 to 30 April 2021.

Inclusion criteria included being a college student and giving informed consent. In contrast, the exclusion criteria included: lack of college student status, lack of consent to participate in the study, and age of <18 years old.

The study was approved by the Bioethics Committee of the Wroclaw Medical University and was conducted in accordance with the Declaration of Helsinki.

The authors' own questionnaire consisted of two parts. The first part involved sociodemographic data, including age, sex, country of residence, and study data: year of study and university profile (medical/non-medical). Moreover, the consumption of stimulants, such as alcohol, cannabinoids, psychostimulants, and sedatives/hypnotic drugs, was assessed within the last three months prior to participation in the survey. The second part of the survey consisted of standardized psychometric tools, such as AIS, ESS, and MANSA.

Table 1. Characteristics of the study group for the total population and by the COVID-19 pandemic.

Variable		Entire Study Group N (%)	Before the Pandemic N (%)	During the Pandemic N (%)	Size Effect	p ^
Sex	Female	15,743 (78.2)	7887 (77.4)	7856 (78.9)	6.69 *	**0.010**
	Male	4396 (21.8)	2300 (22.6)	2096 (21.1)		
Age M ± SD		22.6 ± 3.6	22.4 ± 3.0	22.7 ± 4.1	0.083 #	**<0.001**
Year of study	I	5504 (27.3)	2180 (21.4)	3324 (33.4)	458.52 *	**<0.001**
	II	3600 (17.9)	2106 (20.7)	1494 (15.0)		
	III	3761 (18.7)	2173 (21.4)	1588 (16.0)		
	IV	3119 (15.5)	1624 (15.9)	1495 (15.0)		
	V	2885 (14.3)	1530 (15.0)	1355 (13.6)		
	VI	1270 (6.3)	574 (5.6)	696 (7.0)		
University profile	Medical	4518 (22.4)	2578 (25.3)	1940 (19.5)	97.73 *	**<0.001**
	Non-medical	15,621 (77.6)	7609 (74.7)	8012 (80.5)		
HDI	Very high	18,206 (90.4)	9432 (92.6)	8774 (88.2)	146.77 *	**<0.001**
	High	785 (3.9)	364 (3.6)	421 (4.2)		
	Medium	1000 (5.0)	329 (3.2)	671 (6.7)		
	Low	148 (0.7)	62 (0.6)	86 (0.9)		
GDP per capita	High	17,716 (87.9)	9252 (90.8)	8464 (85.0)	175.27 *	**<0.001**
	Upper-middle	1059 (5.3)	455 (4.5)	604 (6.1)		
	Lower-middle	973 (4.9)	348 (3.4)	625 (6.3)		
	Low	391 (1.9)	259 (2.6)	132 (1.3)		
COVID-19 pandemic announcement	Before the pandemic	10,187 (50.6)	—	—	—	—
	During the pandemic	9952 (49.4)	—	—		
Place of study	Europe	17,954 (89.1)	9372 (92.1)	8582 (86.2)	220.82 *	**<0.001**
	North America	147 (0.7)	65 (0.6)	82 (0.8)		
	South America	173 (0.9)	65 (0.6)	108 (1.1)		
	Asia	1425 (7.1)	474 (4.7)	951 (9.6)		
	Africa	390 (1.9)	167 (1.6)	223 (2.2)		
	Australia	50 (0.3)	35 (0.3)	15 (0.2)		
Alcohol	Yes	16,517 (82.0)	8833 (86.8)	7684 (77.1)	317.47 *	**<0.001**
	No	3622 (18.0)	1345 (13.2)	2277 (22.9)		
Cannabinoids	Yes	2731 (13.6)	1449 (14.2)	1282 (12.9)	8.01 *	**0.004**
	No	17,408 (86.4)	8729 (12.9)	8679 (87.1)		
Psychostimulants	Yes	729 (3.6)	432 (4.2)	297 (3.0)	23.01 *	**<0.001**
	No	19,410 (96.4)	9746 (95.8)	9664 (97.0)		
Sedatives	Yes	2522 (22.6)	1183 (11.6)	1339 (13.4)	15.21 *	**<0.001**
	No	17,617 (87.4)	8995 (88.4)	8622 (86.6)		

M—mean; SD—standard deviation; HDI—Human Development Index; GDP—Gross domestic product; * Chi^2; # Cohen's d; ^ comparison of distribution in relation to the COVID-19 pandemic. Statistically significant values are in bold with the significance level set at $p < 0.05$.

AIS (Athens insomnia scale) is an 8-item tool for assessing insomnia. AIS questions are based on the ICD-10 criteria for insomnia and a 4-point Likert scale (0—no difficulty sleeping; 3—severe difficulty). The tool assesses difficulty falling asleep, waking up at night, waking up in the morning, total sleep duration, sleep quality, mood the following day, mental and physical health the following day, and sleepiness during the day. The analysis of the tool is based on a summary score, and the cut-off point is 6. This tool has high sensitivity (93%) and specificity (85%). A high internal consistency for Cronbach's alpha was found −0.827 [33,34];

ESS (Epworth sleepiness scale) is a tool for assessing daytime sleepiness based on 8 questions that assess the likelihood of falling asleep in specific situations. The maximum number of points is 24, and the cut-off point is 11. Furthermore, for values above 15, pathological sleepiness may be suspected. The reliability of the tool, as measured by Cronbach's alpha coefficient, was 0.742 [35–37];

MANSA (Manchester short assessment of quality of life) is a 16-item tool for the subjective AQoL. This tool assesses satisfaction with, among other things, mental health, physical health, leisure activities, and relationships with family and friends. A maximum of 92 points can be scored using this tool; however, the higher the score, the better the AQoL. The internal consistency of the tool was 0.764 [38,39].

Then, based on the survey completion period, respondents were divided into the period before the announcement of the COVID-19 pandemic (until 11 March 2020) and the period during the pandemic—from 11 March 2020 onwards, according to the date of its announcement by the WHO [40]. Moreover, based on the country of residence, respondents were distributed by GDP per capita and HDI based on data from the World Bank and the United Nations Development Programme (UNDP). The assessment of HDI identified groups with very high, high, medium, and low development rates. In assessing the GDP per capita index, the following groups were distinguished: high, upper-middle, lower-middle, and low income [41,42].

2.3. Statistical Analysis

The analysis pertained to qualitative, quantitative, and dichotomous variables. Basic descriptive statistics methods were used for the quantitative variables. The chi-squared test was used to assess significant differences in terms of demographics and the psychoactive substances used among students regarding the COVID-19 pandemic. The age difference between the pandemic stages was assessed using the t-test. Kendall's tau correlations were used for assessing the level of correlation between individual scale questions and the final scale score. A complex backward stepwise logistic regression model was constructed to determine the influence of factors on the risk of developing insomnia, where the dependent variable was the analysis of the AIS scores (insomnia/no insomnia) and the endogenous variables were sociodemographic data (age, sex), year of study, university profile, COVID-19 pandemic, HDI distribution, GDP per capita distribution, and psychoactive substance use (alcohol, cannabinoids, psychostimulants, hypnotic drugs). An analogous model was built to assess daytime sleepiness. In this case, the dependent variable was the ESS (sleepiness/no sleepiness) analysis. Subsequently, a complex backward stepwise linear regression model was constructed to assess the effects of sociodemographic variables, year of study, university profile, COVID-19 pandemic, HDI distribution, GDP per capita distribution, psychoactive substance use, insomnia, and daytime sleepiness on AQoL.

Statistica 13.3 software was used for the calculations.

In each case, $p < 0.05$ was considered statistically significant.

3. Results

3.1. Sleep Disorders and Risk Factors

In the group analyzed, the mean AIS score was 8.26 ± 4.35, within which 11,597 (57.6%) students had a score indicating the presence of insomnia. An analysis of the individual questions included in the scale revealed that 73.6% of students describe their

sleep duration as insufficient, and 71.2% rate their sleep quality as unsatisfactory. More than one-third (78.5%) of students reported waking up during the night, and 78.9% had difficulty falling asleep. In terms of the questions analyzed, it was sleep quality that was most strongly associated with the final AIS score ($r = -0.486$, $p < 0.001$) rather than sleep duration ($r = 0.417$, $p < 0.001$). Regarding potential risk factors, women were found to have a higher risk of developing insomnia (OR 1.25; 95%Cl 1.67, 1.35; $p < 0.001$). Furthermore, it was shown that the risk of developing insomnia decreases with subsequent years of study. Medical students had a lower risk of developing insomnia (OR 0.90; 95%Cl 0.84, 0.97; $p = 0.004$) compared to nonmedical students. There were no statistically significant differences between the students according to the development levels of the country they were in. In contrast, a negative correlation was shown between GDP per capita and insomnia. The pandemic showed a more than two-fold increase in the risk of students developing insomnia.

For the Epworth scale (ESS), the mean score obtained by the students was 7.90 ± 4.23, and 5442 (27.0%) students obtained a score indicating the presence of daytime sleepiness. The most common situations in which respondents indicated the likelihood of falling asleep included afternoon rest (90.4%), riding the bus (73.4%), and watching TV (72.5%). Moreover, 10.4% of students indicated, with varying degrees of likelihood, falling asleep while driving a car. A risk factor analysis found that the risk of daytime sleepiness decreased after the pandemic outbreak. The use of hypnotic drugs was found to have a definite negative impact on both the risk of developing insomnia and daytime sleepiness. Psychostimulants significantly increase the risk of both insomnia (OR 1.51; 95%Cl 0.64, 1.89; $p < 0.001$) and excessive daytime sleepiness (OR 1.14; 95%Cl 1.04, 1.26; $p < 0.001$).

A detailed comparison of the risk factor analysis for the development of insomnia and daytime sleepiness is shown in Table 2.

3.2. The Assessment of Quality of Life (AQoL)

The mean score obtained in the analysis of MANSA was 60.9 ± 11.46. The linear regression analysis revealed that the subjective AQoL scores were higher during the COVID-19 pandemic than before it was announced ($p < 0.001$). The assessment of the HDI showed that the residents of countries with a very high HDI score rated their QoL at the highest level ($B = 2.001$; $p = 0.002$), while no differences were shown in terms of the GDP per capita distribution. There was a negative correlation between the use of hypnotic drugs, psychostimulants, and quality of life. The QoL of those individuals experiencing both sleepiness ($B = -3.142$; $p < 0.001$) and daytime sleepiness ($B = -1.331$; $p < 0.001$) was rated significantly lower.

A detailed comparison of the MANSA scores is shown in Table 3.

The analysis of individual MANSA questions revealed that students suffering from insomnia and daytime sleepiness in each question scored lower on average than their peers with normal sleep. In terms of the subjective assessment of life satisfaction, students suffering from insomnia scored, on average, 0.77 points lower ($p < 0.001$). The students also rated their mental and physical health significantly lower in the presence of insomnia and daytime sleepiness ($p < 0.001$). A detailed comparison is shown in Table S1.

3.3. Correlation between Individual Scales

The correlation analysis between the individual scales showed that the higher the mean scores for both AIS and ESS, the lower the AQoL scores ($rAIS = -0.355$; $p < 0.001$; $rESS = -0.155$; $p < 0.001$). Moreover, the two scales have a close relationship, and the higher the AIS score, the higher the ESS score ($r = 0.153$; $p < 0.001$).

Table 2. The backward stepwise logistic regression model assessment of the effects of sociodemographic variables, university profile, pandemic, place of residence, and psychoactive substance use on insomnia and daytime sleepiness.

Variable		AIS				ESS			
		OR	95%CI	*p*	NG	OR	95%CI	*p*	NG
Age M ± SD		1.06	[1.05, 1.07]	**<0.001**		1.01	[1.00, 1.02]	**<0.001**	
During the pandemic		2.17	[2.05, 2.31]	**<0.001**		0.78	[0.74, 0.84]	**<0.001**	
Sex	F	1.25	[1.67, 1.35]	**<0.001**		1.44	[1.33, 1.56]	**<0.001**	
Year of study	VI	0.87	[0.75, 1.01]	**0.073**		0.82	[0.70, 0.95]	**0.007**	
	V	0.82	[0.73, 0.91]	**<0.001**		0.77	[0.68, 0.87]	**<0.001**	
	IV	0.88	[0.73, 0.97]	**0.012**		0.82	[0.74, 0.91]	**<0.001**	
	III	0.97	[0.89, 1.07]	0.661	0.113	0.89	[0.81, 0.98]	**0.017**	0.017
	II	1.14	[1.04, 1.25]	**0.003**		0.95	[0.87, 1.05]	0.362	
University profile	Medical	0.90	[0.84, 0.97]	**0.004**		1.20	[1.12, 1.29]	**<0.001**	
HDI	Very high	1.41	[0.74, 2.67]	0.297		—	—	—	
	High	1.14	[0.64, 2.06]	0.647		—	—	—	
	Medium	1.70	[1.04, 2.76]	**0.033**		—	—	—	
GDP per capita	High	0.41	[0.24, 0.69]	**<0.001**		0.74	[0.59, 0.93]	**0.008**	
	Upper-middle	0.76	[0.47, 1.25]	0.287		1.02	[0.79, 1.32]	0.875	
	Lower-middle	0.98	[0.68, 1.42]	0.928		1.06	[0.82, 1.37]	0.644	
Alcohol	Yes	—	—	—		—	—	—	
Cannabinoids	Yes	1.10	[1.00, 1.20]	**0.034**		—	—	—	
Psychostimulants	Yes	1.51	[0.63, 1.89]	**<0.001**		1.14	[1.04, 1.26]	**0.003**	
Sedatives	Yes	2.60	[2.36, 2.87]	**<0.001**		1.27	[1.16, 1.39]	**<0.001**	

HDI—human development index; GDP—gross domestic product; AIS—Athens insomnia scale; ESS—Epworth sleepiness scale; NG—Nagelkerke pseudo-R^2; OR—odds ratio; 95%CI—confidence interval of OR; *p*—statistical significance; statistically significant values are in bold with the significance level set at $p < 0.05$.

Table 3. The effects of sociodemographic variables, pandemic, university profile, year of study, insomnia, and daytime sleepiness on the subjective AQoL in a complex backward stepwise linear regression model.

Variable		MANSA					
		B	β	SE	t	*p*	NG
During the pandemic		−0.406	−0.035	0.078	−5.18	**<0.001**	
University profile	Medical	1.124	0.081	0.091	12.30	**<0.001**	
HDI	Very high	2.001	0.058	0.656	3.04	**0.002**	
	High	0.105	0.002	0.490	0.21	0.829	
	Medium	−1.795	−0.040	0.486	−3.70	**<0.001**	
GDP per capita	High	−0.874	−0.031	0.565	−1.54	0.122	
	Upper-middle	0.767	0.017	0.443	1.73	0.083	0.110
	Lower-middle	−0.091	−0.002	0.453	−0.20	0.840	

Table 3. *Cont.*

Variable		MANSA					
		B	β	SE	t	*p*	NG
Year of study	VI	0.711	0.033	0.263	2.69	**0.007**	
	V	0.386	0.021	0.182	2.12	**0.033**	
	IV	0.126	0.007	0.176	0.72	0.474	
	III	−0.273	−0.016	0.165	−1.65	0.097	
	II	−0.121	−0.007	0.167	−0.72	0.469	
Alcohol	Yes	0.563	0.038	0.107	5.24	**<0.001**	
Cannabinoids	Yes	−0.260	−0.015	0.116	−2.25	**0.024**	
Psychostimulants	Yes	−0.629	−0.021	0.210	−2.298	**0.002**	
Sedatives	Yes	−2.357	−0.137	0.114	−20.54	**<0.001**	
AIS	Insomnia	−3.142	−0.271	0.079	−39.41	**<0.001**	
ESS	Daytime sleepiness	−1.331	−0.103	0.086	−15.56	**<0.001**	

HDI—human development index; AIS—Athens insomnia scale; ESS—Epworth sleepiness scale; NG—Nagelkerke pseudo-R^2; B—coefficient value of a given variable; SE—standard error; t—test value, *p*—statistical significance; statistically significant values are in bold with the significance level set at $p < 0.05$.

4. Discussion

Sleep disorders are a common phenomenon that occurs all over the world, and every year the number of individuals suffering from these disorders increases. Despite the huge number of studies regarding sleep, few studies are conducted on a long-term basis and cover countries with different cultural and socioeconomic backgrounds. Therefore, this study primarily aims to assess the prevalence of insomnia and daytime sleepiness according to countries with different levels of development and wealth. Also, the purpose of this study is to assess their impact on students' QoL and search for potential risk factors for the development of sleep disorders, including the ongoing COVID-19 pandemic. To the best of the authors' knowledge, this study is one of the first in the world with this kind of scope and study group size, covering a period both before and during the COVID-19 pandemic.

The results of this study clearly indicate that sleep disorders are a serious health problem among students. According to the analysis of the AIS, 11,597 (57.6%) respondents obtained a score indicating insomnia, and 5442 (27.0%) respondents scored 11 points or more on the ESS, which indicates excessive daytime sleepiness. Insomnia is identified in many research reports as the most common sleep dysfunction among students, and its prevalence varies according to the population surveyed, the period of data collection, and the tools used [43]. For example, in the period from 2015–2018, the average prevalence of insomnia among students in South Asia (India, Pakistan, Nepal, and Bangladesh) was 52.1%, with a range from 35.4% to 70% [44]. During the same period, in a study by Haile et al., the prevalence of insomnia among Ethiopian students was 61.6% [45]. In contrast, in a study among Sudanese students, the percentage of students with sleep problems was as high as 82.5% [46]. During the same period, the insomnia severity among students from affluent countries was 37.2, 30.5, 19.7, and 7.7% for Chinese, Norwegian, Polish, and German students, respectively [47–50]. These data imply that the place of residence, including socioeconomic status, can have a tremendous impact on sleep. This is also supported by studies using instrumental tools (actigraphy and polysomnography) and selfassessment questionnaires, where students with lower socioeconomic status were found to have a higher risk of developing sleep disorders, including insomnia [51]. Furthermore, a study conducted among 159,000 US respondents found that poor socioeconomic situations and a lower level of education increase the risk of developing sleep disorders [52]. In the case of Korean adolescents, it was found that the lower the average household income, the worse the sleep quality was [53]. These data are consistent with the results of this study, in

which students in the richest countries, according to the GDP per capita index, showed a significantly lower risk of developing insomnia (OR 0.45; $p < 0.001$) and excessive daytime sleepiness (OR 0.74; $p = 0.008$). Determining the causes of this phenomenon is not simple, and the available data are not conclusive. According to the authors of this study, this may be due to lifestyle. Those with a higher level of education and a higher income often pay more attention to health-promoting behaviors, including sleep hygiene [31,32,52]. Another reason may be student housing conditions. Poor housing and neighborhood conditions were found to contribute to poorer sleep quality and duration [54]. It was also found that those from lower-income countries are more likely to suffer from mental disorders such as anxiety and depression, which have a huge impact on sleep quality. Furthermore, it is important to bear in mind that health services, diagnostic evaluation, and the treatment of chronic conditions are of lower quality in lower-income countries, and this undoubtedly affects sleep quality.

When analyzing the results, it is also important to bear in mind the ongoing COVID-19 pandemic and its enormous impact on sleep. For example, in a study regarding the subjective assessment of the impact of the COVID-19 pandemic on sleep, as many as 94.9% of students clearly indicated that the pandemic had affected their sleep [55]. So far, it has been proven that the pandemic led to changes in sleep habits among students: going to bed later, getting out of bed later, having more naps during the day, and increased sleep duration [16,56]. Such behavior results in changes to the diurnal rhythm and worsening sleep quality despite a relative increase in its duration. This phenomenon may explain the results of this study, in which the pandemic period increased the risk of developing insomnia by 2.17 times with a decrease in the risk of excessive daytime sleepiness (OR 0.78; $p < 0.001$). It should also be kept in mind that human mental health has deteriorated due to the ongoing pandemic, which is in close correlation with sleep quality [57].

This study revealed that nonmedical students had a higher risk of developing insomnia, while medical students were more likely to suffer from excessive daytime sleepiness. These findings appear to contradict previous reports, in which it was future medics who were more likely to report sleep problems in all forms. A Lithuanian study found that medical students were significantly more likely to have sleep problems compared to law students or economics students [58]. Similar observations were made by comparing law students with medical students in India [59]. According to a study by Sharma et al., medical students scored on average 1.27 points higher on the PSQI (Pittsburgh sleep quality index) scale than other students, and 60% reported insufficient sleep duration [60]. On the other hand, the significantly higher risk of excessive daytime sleepiness among medical students may be due to the heavy burden of study, vocational training practice, including night duty, and high mental workload, and this was proved in observations among students in, among others, Malaysia, Brazil or Jordan [16,17,55].

In contrast, the results of this study appear to be consistent with previous reports, in which it was found that first-year university students have a higher risk of developing sleep disorders, and this may be due to both sudden life changes, such as the start of university and relocation, or new social relationships. Increased evening activity and the more frequent consumption of stimulants may be other potential causes of sleep disorders [61–63]. However, it is important to bear in mind that the effects of stimulants on sleep are very complex, and studies to date do not provide a definitive answer. Although this study did not prove that the use of alcohol within the last three months increased the risk of insomnia or daytime sleepiness, its long-term use may contribute to prolonged sleep latency and frequent awakenings, which significantly reduces sleep quality [64]. In the case of the use of psychostimulants, the results of this study clearly show their negative effects on sleep, contributing to an increased risk of both insomnia and daytime sleepiness. A study conducted among US students found that psychostimulant users reported significantly lower sleep quality [65]. In contrast, a study in animal models confirmed that the use of psychostimulants alters sleep architecture [66]. It must also be kept in mind that the relationship between sleep and stimulants is a two-way relationship. On the one hand, the

use of stimulants may lead to changes in sleep patterns and deterioration of sleep quality. On the other hand, the presence of sleep disorders significantly increases the risk of using stimulants [7].

Another parameter that was measured in this study was quality of life (QoL), which is not the easiest to measure. Due to its multifaceted nature, the objective assessment of QoL (AQoL) requires the use of appropriately designed psychometric tools. According to the authors, the questionnaire used in this study addresses many aspects of life that affect the sense of QoL, with high sensitivity and specificity [38,39]. This study revealed that students scored, on average, 60.9 ± 11.46 points in the MANSA questionnaire. The presence of sleep disorders, both in the form of insomnia and daytime sleepiness, was found to significantly impair students' QoL. These reports are consistent with worldwide observations in which abnormal sleep significantly reduced the QoL of students in Iran, Portugal, and Rome [67–69]. The effect of sleep on QoL is also relevant in population-based assessments. S. Lee's study, which was conducted among 225,541 Koreans, revealed that poor sleep quality significantly reduces QoL, particularly when anxiety or depressive disorders are also present [70]. In contrast, the analysis of the individual questions of the scale revealed that inadequate sleep significantly reduced the satisfaction of students' mental and physical health, which is also consistent with Korean observations, according to which those with poor sleep quality had problems with regular physical activity [70]. In addition to sleep quality, there was also a correlation between the HDI of students' place of residence and the MANSA total score, according to which students in countries with a very high HDI obtained the highest MANSA scores. This is also consistent with previous data, i.e., the higher a country's development status, the higher the level of social prosperity, which improves the QoL of its inhabitants [71].

The authors are aware of the limitations of this study, which undoubtedly include the methodology for data collection using an anonymous online questionnaire. The use of such a method, however, makes it possible to reach a very large audience from all over the world and increases the chance of participation in the survey. Previous studies found that anonymous online surveys strongly reduce feelings of anxiety among respondents and increase the likelihood of participation [72]. On the other hand, the authors of anonymous online surveys have no possibility of verifying the veracity of the data left and determining the response rate. Moreover, the used psychometric tools are based on the subjective assessment of respondents and need to be objectified through psychiatric examination. It should also be mentioned that the software used prevented the detection of bots. The interpretation of this study's findings is also limited by the fact that the authors did not collect data regarding chronic conditions, the chronic medications used, and the mental health conditions that may potentially be present in the surveyed population. Another limitation of this study is the great disparity between the respondents in terms of HDI, GDP per capita, and sex, with a marked predominance of women. It should be noted, however, that the used psychometric tools are distinguished research methods. Furthermore, the significant size of the study group from 60 countries around the world and the observation period covering both the COVID-19 pandemic period and the period before its outbreak contribute to the strength and innovation of this study.

In conclusion, the results of this study clearly indicate that sleep disorders are a serious health problem among young adults, which has been further exacerbated by the ongoing COVID-19 pandemic. However, further observations on representative groups of students in countries with different levels of development and wealth are necessary to better understand the phenomenon of insomnia in relation to socioeconomic status. In addition, it could be useful to prepare relevant meta-analyses using existing data.

Solutions to this problem should also be sought, which could be represented by the implementation of appropriate social campaigns on proper sleep hygiene and the importance of sleep for health, as well as appropriate education on the use of stimulants and their impact on health and sleep. For this purpose, it would be possible to use the

mass media, with enormous potential. In addition, it would be possible to implement appropriate classes on healthy lifestyles as one of the possible subjects during education.

5. Conclusions

Insomnia and excessive daytime sleepiness are common conditions among students worldwide and are closely related. The COVID-19 pandemic significantly altered students' diurnal rhythms, which has contributed to an increase in insomnia. Students in countries with a high GDP per capita index are significantly less likely to develop insomnia compared to the residents of countries with a low GDP per capita index. Sleep disorders definitely reduce the QoL of students.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/jcm12020692/s1, Table S1: Comparison of the mean scores of the individual MANSA questions according to insomnia and excessive daytime sleepiness.

Author Contributions: Conceptualization, M.B. and P.P.; Methodology, M.B., P.P. and A.M.-M.; Data curation, M.B.; Writing—original draft, M.B.; Writing—review & editing, P.P. and A.M.-M.; Supervision, P.P. and A.M.-M. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Bioethics Committee of the Wroclaw Medical University, Poland. (approval number: KB-234/2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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11. Złączniki

11.1. Zgoda komisji bioetycznej na realizację projektu

KOMISJA BIOETYCZNA
przy
Uniwersytecie Medycznym
we Wrocławiu
ul. Pasteura 1; 50-367 WROCŁAW

OPINIA KOMISJI BIOETYCZNEJ Nr KB – 234/2021

Komisja Bioetyczna przy Uniwersytecie Medycznym we Wrocławiu, powołana zarządzeniem Rektora Uniwersytetu Medycznego we Wrocławiu nr 278/XVI R/2020 z dnia 21 grudnia 2020 r. oraz działająca w trybie przewidzianym rozporządzeniem Ministra Zdrowia i Opieki Społecznej z dnia 11 maja 1999 r. (Dz.U. nr 47, poz. 480) na podstawie ustawy o zawodzie lekarza z dnia 5 grudnia 1996 r. (Dz.U. nr 514 z 2020 r.) w składzie:

dr Joanna Birecka (psychiatria)
dr Beata Freier (onkologia)
dr hab. Tomasz Fuchs (ginekologia, położnictwo)
prof. dr hab. Dariusz Janczak (chirurgia naczyniowa, transplantologia)
dr hab. Krzysztof Kaliszewski (chirurgia endokrynologiczna)
dr prawa Andrzej Malicki (prawo)
dr hab. Marcin Mączyński (farmacja)
Urszula Olechowska (pielęgniarstwo)
prof. dr hab. Leszek Szenborn (pediatria, choroby zakaźne)
prof. dr hab. Andrzej Szuba (choroby wewnętrzne, angiologia
ks. prof. Andrzej Tomko (duchowny)
prof. dr hab. Mieszko Więckiewicz (stomatologia)
dr hab. Andrzej Wojnar, prof. nadzw. (histopatologia, dermatologia) przedstawiciel Dolnośląskiej Izby Lekarskiej)
dr hab. Jacek Zieliński (filozofia)

pod przewodnictwem
prof. dr hab. Jerzego Rudnickiego (chirurgia, proktologia)

Przestrzegając w działalności zasad Good Clinical Practice oraz zasad Deklaracji Helsińskiej, po zapoznaniu się z projektem badawczym pt.

„Opieka nad pacjentem w medycynie rodzinnej w dobie pandemii COVID-19. Ocena zaburzeń rytmów okołodobowych wśród studentów w wybranych krajach, określenie wzorca stosowania substancji psychoaktywnych i jego wpływu na jakość snu"

Zgłoszonym przez **dr hab. Agnieszkę Mastalerz-Migas** zatrudnioną w Katedrze i Zakładzie Medycyny Rodzinnej Uniwersytetu Medycznego we Wrocławiu oraz złożonymi wraz z wnioskiem dokumentami, w tajnym głosowaniu postanowiła **wyrazić zgodę** na przeprowadzenie badania internetowego typu CAWI **pod warunkiem zachowania anonimowości zgromadzonych danych.**

Uwaga: Badanie to zostało objęte ubezpieczeniem odpowiedzialności cywilnej Uniwersytetu Medycznego we Wrocławiu z tytułu prowadzonej działalności.

Pouczenie: W ciągu 14 dni od otrzymania decyzji wnioskodawcy przysługuje prawo odwołania do Komisji Odwoławczej za pośrednictwem Komisji Bioetycznej UM we Wrocławiu.

Opinia powyższa dotyczy projektu badawczego realizowanego z działalności statutowej.

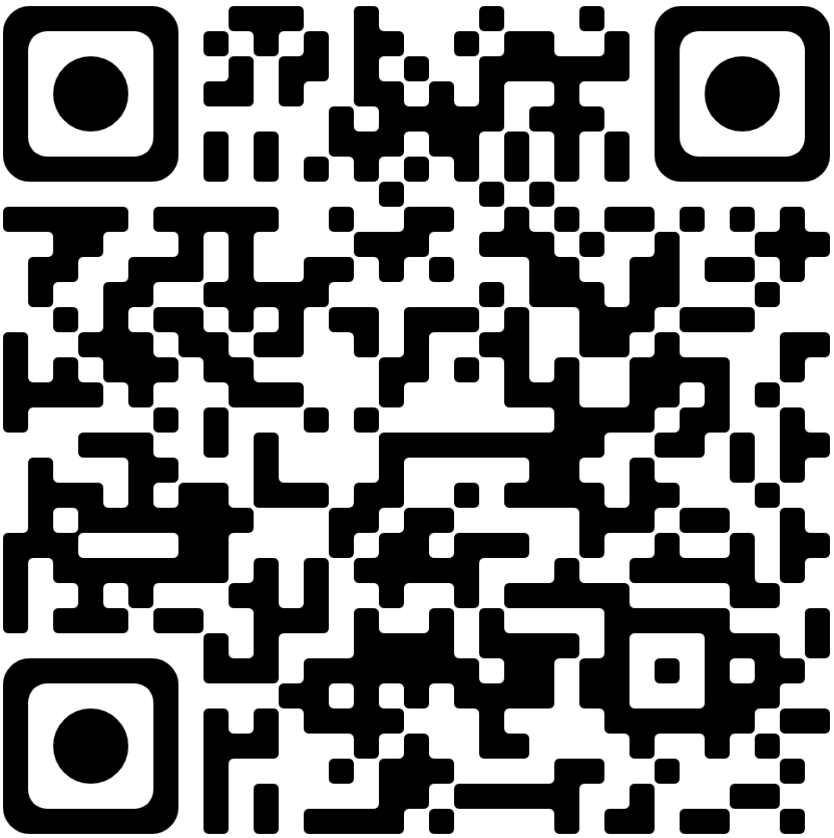
Przewodniczący Komisji Bioetycznej
przy Uniwersytecie Medycznym

prof. dr hab. Jerzy Rudnicki

Wrocław, dnia 18 marca 2021 r.

11.2. Formularz wykorzystany w badaniu

Formularze - polskojęzyczny oraz anglojęzyczny - dostępne są po zeskanowaniu kodu QR. Po zeskanowaniu kodu pojawi się folder w domenie „Dysk Google”, gdzie znajdują się oba formularze.



10.3. Oświadczenia współautorów

Lek. Mateusz Babicki
Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu
Katedra i Zakład Medycyny Rodzinnej

Wrocław, 28.02.2023 r.

Oświadczenie

Oświadczam, że w pracy Piotrowski Patryk, Babicki Mateusz, Maślanka Paulina, Kotowicz Kamila, Marciniak Dominik, Rymaszewska Joanna "Assessment of sleep disorders and use of psychoactive drugs among Polish students". Psychiatria Polska 54 no. 5 (2020): 1007-1024. doi:10.12740/PP/111751. mój udział polegał na opracowaniu metodologii badania, zbieraniu danych ich analizie oraz interpretacji, przygotowaniu tekstu manuskryptu, jego korekcie, a także ostatecznej akceptacji.

Oświadczam, że w pracy Babicki Mateusz, Piotrowski Patryk, Mastalerz-Migas Agnieszka „Assessment of Insomnia Symptoms, Quality of Life, Daytime Sleepiness, and Psychoactive Substance Use among Polish Students: A Cross-Sectional Online Survey for Years 2016–2021 before and during COVID-19 Pandemic." Journal of Clinical Medicine. 2022; 11(8):2106. https://doi.org/10.3390/jcm11082106 mój udział polegał na opracowaniu metodologii badania, zbieraniu danych ich analizie oraz interpretacji, przygotowaniu tekstu manuskryptu, jego korekcie, a także ostatecznej akceptacji.

Oświadczam, że w pracy Babicki Mateusz „Use of Alcohol, Cannabinoids, Psychostimulants, and Sedatives before and during the COVID-19 Pandemic among Students in 40 European Countries." Int. J. Environ. Res. Public Health 2022, 19, 14879. https://doi.org/10.3390/ijerph192214879 mój udział polegał na opracowaniu metodologii badania, zbieraniu danych ich analizie oraz interpretacji, przygotowaniu tekstu manuskryptu, jego korekcie, a także ostatecznej akceptacji.

Oświadczam, że w pracy Babicki Mateusz, Piotrowski Patryk, Mastalerz-Migas Agnieszka. Insomnia, Daytime Sleepiness, and Quality of Life among 20,139 College Students in 60 Countries around the World—A 2016–2021 Study. Journal of Clinical Medicine. 2023; 12(2):692. https://doi.org/10.3390/jcm12020692 mój udział polegał na opracowaniu metodologii badania, zbieraniu danych ich analizie oraz interpretacji, przygotowaniu tekstu manuskryptu, jego korekcie, a także ostatecznej akceptacji.

dr hab. n. med.
Agnieszka Mastalerz-Migas
specjalista medycyny rodzinnej
PWZ 6360905

Dr hab. n. med. Agnieszka Mastalerz-Migas prof. UMW

Wrocław, 28.02.2023 r.

Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu,
Katedra i Zakład Medycyny Rodzinnej

OŚWIADCZENIE

Oświadczam, że w pracy Babicki Mateusz, Piotrowski Patryk, Mastalerz-Migas Agnieszka „Assessment of Insomnia Symptoms, Quality of Life, Daytime Sleepiness, and Psychoactive Substance Use among Polish Students: A Cross-Sectional Online Survey for Years 2016–2021 before and during COVID-19 Pandemic." Journal of Clinical Medicine. 2022; 11(8):2106. https://doi.org/10.3390/jcm11082106 mój udział polegał na współpracy przy tworzeniu metodologii, analizie oraz krytycznej ocenie projektu, przygotowaniu tekstu manuskryptu, a także jego korekcie i ostatecznej akceptacji.

Podpis

Oświadczam, że w pracy Babicki Mateusz, Piotrowski Patryk, Mastalerz-Migas Agnieszka. Insomnia, Daytime Sleepiness, and Quality of Life among 20,139 College Students in 60 Countries around the World—A 2016–2021 Study. Journal of Clinical Medicine. 2023; 12(2):692. https://doi.org/10.3390/jcm12020692 mój udział polegał na współpracy przy tworzeniu metodologii, analizie oraz krytycznej ocenie projektu, przygotowaniu tekstu manuskryptu, a także jego korekcie i ostatecznej akceptacji.

Podpis

Paulina Anczykowska (nazwisko panieńskie Maślanka) Wrocław, 28.02.2023 r.

Praktyka lekarza rodzinnego Urszula Puskarz, Główna 163, 58-312 Stare Bogaczowice

OŚWIADCZENIE

Oświadczam, że w pracy Piotrowski Patryk, Babicki Mateusz, Maślanka Paulina, Kotowicz Kamila, Marciniak Dominik, Rymaszewska Joanna "Assessment of sleep disorders and use of psychoactive drugs among Polish students". Psychiatria Polska 54 no. 5 (2020): 1007-1024. doi:10.12740/PP/111751. mój udział polegał na przygotowaniu tekstu manuskryptu.

Podpis

Paulina Anczykowska
lekarz
3501413

dr hab. n. med.
Agnieszka Mastalerz-Migas
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PWZ 6560905

Wrocław, 28.02.2023 r.

Dr n. med. Kamila Al Noaimy prof. AUIB
(nazwisko panieńskie Kotowicz)

College of Arts and Sciences
American University of Iraq - Baghdad

OŚWIADCZENIE

Oświadczam, że w pracy Piotrowski Patryk, Babicki Mateusz, Maślanka Paulina, Kotowicz Kamila, Marciniak Dominik, Rymaszewska Joanna "*Assessment of sleep disorders and use of psychoactive drugs among Polish students*", Psychiatria Polska 54 no. 5 (2020): 1007-1024. doi:10.12740/PP/111751. mój udział polegał na pracy przy opracowaniu metodologii oraz tworzeniu manuskryptu.

Podpis

Kamila Al Noaimy

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PWZ 6500955

Dr Dominik M. Marciniak

Wrocław, 28.02.2023 r.

Uniwersytet Medyczny we Wrocławiu, Wydział Farmaceutyczny, Katedra i Zakład Technologii Postaci Leku

OŚWIADCZENIE

Oświadczam, że w pracy Piotrowski Patryk, Babicki Mateusz, Maślanka Paulina, Kotowicz Kamila, Marciniak Dominik, Rymaszewska Joanna "Assessment of sleep disorders and use of psychoactive drugs among Polish students". Psychiatria Polska 54 no. 5 (2020): 1007-1024. doi:10.12740/PP/111751. mój udział polegał na wsparciu w obliczeniach statystycznych.

Podpis

Dominik M. Marciniak

dr hab. n. med.
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Dr hab. n. med. Patryk Piotrowski

Wrocław, 28.02.2023 r.

Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu,
Katedra Psychiatrii, Zakład Psychiatrii Konsultacyjnej i Badań Neurobiologicznych

OŚWIADCZENIE

Oświadczam, że w pracy Piotrowski Patryk, Babicki Mateusz, Maślanka Paulina, Kotowicz Kamila, Marciniak Dominik, Rymaszewska Joanna "Assessment of sleep disorders and use of psychoactive drugs among Polish students". Psychiatria Polska 54 no. 5 (2020): 1007-1024. doi:10.12740/PP/111751. mój udział polegał na współpracy przy tworzeniu metodologii, analizie oraz krytycznej ocenie projektu, przygotowaniu tekstu manuskryptu, a także jego korekcie i ostatecznej akceptacji.

dr hab. n. med. Patryk Piotrowski
SPECJALISTA PSYCHIATRA
1844056
Podpis

Oświadczam, że w pracy Babicki Mateusz, Piotrowski Patryk, Mastalerz-Migas Agnieszka „Assessment of Insomnia Symptoms, Quality of Life, Daytime Sleepiness, and Psychoactive Substance Use among Polish Students: A Cross-Sectional Online Survey for Years 2016–2021 before and during COVID-19 Pandemic." Journal of Clinical Medicine. 2022; 11(8):2106. https://doi.org/10.3390/jcm11082106 mój udział polegał na współpracy przy tworzeniu metodologii, analizie oraz krytycznej ocenie projektu, przygotowaniu tekstu manuskryptu, a także jego korekcie i ostatecznej akceptacji.

dr hab. n. med. Patryk Piotrowski
SPECJALISTA PSYCHIATRA
1844056
Podpis

Oświadczam, że w pracy Babicki Mateusz, Piotrowski Patryk, Mastalerz-Migas Agnieszka. Insomnia, Daytime Sleepiness, and Quality of Life among 20,139 College Students in 60 Countries around the World—A 2016–2021 Study. Journal of Clinical Medicine. 2023; 12(2):692. https://doi.org/10.3390/jcm12020692 mój udział polegał na współpracy przy tworzeniu metodologii, analizie oraz krytycznej ocenie projektu, przygotowaniu tekstu manuskryptu, a także jego korekcie i ostatecznej akceptacji.

dr hab. n. med.
Agnieszka Mastalerz-Migas
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PWZ 6560905

dr hab. n. med. Patryk Piotrowski
SPECJALISTA PSYCHIATRA
1844056
Podpis

Prof. dr hab. n. med. Joanna Rymaszewska

Wrocław, 28.02.2023 r.

Katedra i Klinika Psychiatrii
Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu

OŚWIADCZENIE

Oświadczam, że w pracy Piotrowski Patryk, Babicki Mateusz, Maślanka Paulina, Kotowicz Kamila, Marciniak Dominik, Rymaszewska Joanna "*Assessment of sleep disorders and use of psychoactive drugs among Polish students*". Psychiatria Polska 54 no. 5 (2020): 1007-1024. doi:10.12740/PP/111751. mój udział polegał na przygotowaniu tekstu manuskryptu, jego korekcie oraz ostatecznej akceptacji.

Podpis

dr hab. n. med.
Agnieszka Mastalerz-Migas
specjalista medycyny rodzinnej
PWZ 6500905

11. Nota biograficzna autora

Mateusz Babicki urodził się 2 czerwca 1992 roku w Paczkowie. W 2017 ukończył kierunek lekarski na Uniwersytecie Medycznym im. Piastów Śląskich we Wrocławiu. Od stycznia 2020 roku realizuje szkolenie specjalizacyjne z medycyny rodzinnej w trybie rezydentury w Centrum Medycznym AD-Med. przy ul. Syrokomli 1 we Wrocławiu. Od października 2019 roku jest studentem Szkoły Doktorskiej Uniwersytetu Medycznego im. Piastów Śląskich we Wrocławiu. Jest członkiem Polskiego Towarzystwa Medycyny Rodzinnej, pełniąc funkcję przewodniczącego dwóch sekcji tematycznych Towarzystwa: Naukowej oraz COVID-19. Aktywnie działa na rzecz rozwoju i edukacji środowiska lekarzy rodzinnych. Jest autorem lub współautorem 44 publikacji naukowych i 5 doniesień zjazdowych polskich oraz międzynarodowych.

12. Wykaz dotychczasowych osiągnięć autora

Publikacje

- Autor **44** publikacji, w tym **31** w indeksowanych czasopismach z IF. Sumaryczne wartości IF= **136.458**; MNiSW/KBN = **3455**. Cytowania (bez autocytowań) według bazy Web of Science= **184**; H-index = **9**

  Spośród publikacji z IF w **27/31** jestem autorem pierwszym lub ostatnim i/lub korespondencyjnym.

- Autorstwo/współautorstwo **5** doniesień zjazdowych na konferencjach polskich oraz zagranicznych.

Projekty badawcze

- 2021 r - Kierownik wieloośrodkowego projektu finansowanego w ramach subwencji konkursowej Uniwersytetu Medycznego im. Piastów Śląskich we Wrocławiu: Retrospektywna ocena stanu zdrowia osób po przechorowaniu COVID-19, badanie podłużne.
- 2015 - 2017 r. - badacz w międzynarodowym projekcie badawczo-implementacyjnym o akronimie Meetingdem pt.: Wdrożenie i walidacja pozytywnie ocenianego Programu Wsparcia - Centrum Spotkań dla osób z otępieniem oraz ich opiekunów w Europie.

Funkcje w czasopismach naukowych

- 2022 – obecnie - Guest Editor w międzynarodowym czasopiśmie Vaccines (IF – 4.961; 140 MNiSW/KBN)

Nagrody i wyróżnienia

- 2023 - Nagroda czasopisma „Lekarz POZ” za najczęściej czytany artykuł w Open Acces, pt.: „ Jak skutecznie i bezpiecznie leczyć infekcje bakteryjne dróg oddechowych u dzieci?”.
- 2022 – Laureat VI edycji plebiscytu Dolnośląskiego Klubu Kapitału, Młode Talenty 2022, w kategorii „Sukces naukowy”
- 2021 – Nagroda czasopisma „Lekarz POZ” za najczęściej czytany artykuł w Open Acces, pt.: „Racjonalna antybiotykoterapia infekcji górnych dróg oddechowych w dobie COVID-19”.

Działalność w towarzystwach naukowych

- 10.2022 – obecnie – przewodniczący sekcji Naukowej Polskiego Towarzystwa Medycyny Rodzinnej
- 01.2021 – obecnie - przewodniczący sekcji COVID-19 Polskiego Towarzystwa Medycyny Rodzinnej

Działalność edukacyjna i inne

- Wiceprzewodniczący Komitetu Organizacyjnego XII Kongresu Polskiego Towarzystwa Medycyny Rodzinnej, Wrocław, 2023 r.
- Członek Komitetu Organizacyjnego XI Kongresu Polskiego Towarzystwa Medycyny Rodzinnej, Wrocław, 2022 r.
- Koordynator Ogólnopolskiego Projektu naukowo-edukacyjnego dotyczącego przewlekłej choroby nerek realizowanego przez Polskie Towarzystwo Medycyny Rodzinnej we współpracy z Polskim Towarzystwem Nefrologicznym
- Stypendysta Programu „Dolnośląscy Liderzy Medycyny" w latach 2021 – 2022 r.
- Członek zespołu Programu STOP COVID realizowanego przez Fundację Cardica
- Członek Telemedycznego Okrągłego Stołu w grupie POZ powstałego z inicjatywy Ministra Zdrowia

Wykaz publikacji

2023

a) Czasopisma posiadające współczynnik wpływu Impact Factor (IF)

1. **Babicki Mateusz**, Piotrowski Patryk, Mastalerz-Migas Agnieszka: Insomnia, daytime sleepiness, and quality of life among 20,139 college students in 60 countries around the world - a 2016-2021 study, Journal of Clinical Medicine, 2023, vol. 12, nr 2, art.692 [14 s.]. DOI:10.3390 /jcm12020692
2. Kapusta Joanna, Chudzik Michał, Kałuzińska-Kołat Żaneta, Damian Kołat, Monika Burzyńska, Piotr Jankowski, **Mateusz Babicki**: Do selected lifestyle parameters affect the severity and symptoms of COVID-19 among elderly patients? The retrospective evaluation of individuals from the STOP-COVID registry of the PoLoCOV study, Journal of Infection and Public Health, 2023, vol. 16, nr 1, s.143-153. DOI:10.1016/j.jiph. 2022.12.008

2022

a) Czasopisma posiadające współczynnik wpływu Impact Factor (IF)

1. **Babicki Mateusz**, Kowalski Krzysztof, Bogudzińska Bogna [i in.]: Alterations in mental health and quality of life among healthcare workers in times of COVID-19: Four-stage cross-sectional study during first four pandemic waves in Poland, Frontiers in Psychiatry, 2022, vol. 13, art. 1027734 [13 s.]. DOI:10.3389/fpsyt.2022.1027734
2. **Babicki Mateusz**, Malchrzak Wojciech, Mastalerz-Migas Agnieszka: Assessment of attitudes, main concerns and sources of knowledge regarding COVID-19 vaccination in Poland in the unvaccinated individuals - a nationwide survey, Vaccines, 2022, vol. 10, nr 3, art.381 [17 s.]. DOI:10.3390/vaccines10030381
3. **Babicki Mateusz**, Piotrowski Patryk, Mastalerz-Migas Agnieszka: Assessment of insomnia symptoms, quality of life, daytime sleepiness, and psychoactive substance use among Polish students: a cross-sectional online survey for years 2016-2021 before and during COVID-19 pandemic, Journal of Clinical Medicine, 2022, vol. 11, nr 8, art.2106 [16 s.]. DOI:10.3390 /jcm11082106
4. **Babicki Mateusz**, Mastalerz-Migas Agnieszka: Attitudes of Poles towards the COVID-19 vaccine booster dose: an online survey in Poland, Vaccines, 2022, vol. 10, nr 1, art.68 [11 s.]. DOI:10.3390/vaccines10010068
5. **Babicki Mateusz**, Bogudzińska Bogna, Kowalski Krzysztof [i in.] : Depression, anxiety and quality of life among online responders in Poland: a cross-sectional study covering four waves of the COVID-19 pandemic, International Journal of Environmental Research and Public Health, 2022, vol. 19, nr 16, art.9934 [16 s.]. DOI:10.3390/ijerph19169934
6. **Babicki Mateusz**: Use of alcohol, cannabinoids, psychostimulants, and sedatives before and during the COVID-19 pandemic among students in 40 european countries, International Journal of Environmental Research and Public Health, 2022, vol. 19, nr 22, art.14879 [9 s.]. DOI:10.3390 /ijerph192214879
7. **Babicki Mateusz**: Will bivalent vaccination against COVID-19 increase the desire for COVID-19 vaccination among Poles?, Vaccines, 2022, vol. 10, nr 10, art.1658 [9 s.]. DOI:10.3390 /vaccines10101658
8. Chudzik Michał, **Babicki Mateusz**, Kapusta Joanna [i in.] : Do the successive waves of SARSCoV-2, vaccination status and place of infection influence the clinical picture and COVID-19 severity among patients with persistent clinical symptoms? The retrospective

study of patients from the STOP-COVID registry of the PoLoCOV-Study, Journal of Personalized Medicine, 2022, vol. 12, nr 5, art.706 [15 s.]. DOI:10.3390/jpm12050706

9. Chudzik Michał, **Babicki Mateusz**, Kapusta Joanna [i in.] : Long-COVID clinical features and risk factors: a retrospective analysis of patients from the STOP-COVID registry of the PoLoCOV study, Viruses-Basel, 2022, vol. 14, nr 8, art.1755 [13 s.]. DOI:10.3390/v14081755
10. Chudzik Michał, **Babicki Mateusz**, Mastalerz-Migas Agnieszka [i in.] : Persisting smell and taste disorders in patients who recovered from SARS-CoV-2 virus infection - data from the Polish PoLoCOV-CVD study, Viruses-Basel, 2022, vol. 14, nr 8, art.1763 [15 s.]. DOI:10.3390 /v14081763
11. Jazienicka-Kiełb Alicja, **Babicki Mateusz**, Krajewska Magdalena [i in.] : Assessment of primary care physicians' knowledge of chronic kidney disease in Poland, Frontiers in Public Health, 2022, vol. 10, art.1032240 [10 s.]. DOI:10.3389/fpubh.2022.1032240
12. Malchrzak Wojciech, **Babicki Mateusz**, Pokorna-Kałwak Dagmara [i in.] : COVID-19 vaccination and Ukrainian refugees in Poland during Russian-Ukrainian war - narrative review, Vaccines, 2022, vol. 10, nr 6, art.955 [7 s.]. DOI:10.3390/vaccines10060955
13. Pływaczewska-Jakubowska Magdalena, Chudzik Michał, **Babicki Mateusz** [i in.] : Lifestyle, course of COVID-19, and risk of Long-COVID in non-hospitalized patients, Frontiers in Medicine, 2022, vol. 9, art.1036556 [10 s.]. DOI:10.3389/fmed.2022.1036556
14. Kardas Przemysław, **Babicki Mateusz**, Krawczyk Jarosław [i in.] : War in Ukraine and the challenges it brings to the Polish healthcare system, The Lancet Regional Health - Europe, 2022, vol. 15, art.100365 [2 s.]. DOI:10.1016/j.lanepe.2022.100365
15. **Babicki Mateusz**, Mastalerz-Migas Agnieszka: Providing care for those fleeing war: challenges and solutions for Polish doctors looking after refugees from Ukraine, BMJ-British Medical Journal, 2022, vol. 377, art.o1440 [2 s.]. DOI:10.1136/bmj.o1440

b) **Czasopisma nieposiadające współczynnika wpływu Impact Factor (IF)**

1. **Babicki Mateusz**, Pokorna-Kałwak Dagmara: Antybiotykooporność - poszukiwanie nowych rozwiązań w leczeniu infekcji dróg oddechowych, Lekarz POZ, 2022, vol. 8, nr 1, s.73-77
2. **Babicki Mateusz**: Antybiotykooporność - problem XXI wieku. Wybrane sposoby jej przeciwdziałania w ramach podstawowej opieki zdrowotnej, Forum Zakażeń, 2022, vol. 13, nr 4, s.129-133

3. **Babicki Mateusz**, Pokorna-Kałwak Dagmara: Jak skutecznie i bezpiecznie leczyć infekcje bakteryjne dróg oddechowych u dzieci?, Lekarz POZ, 2022, vol. 8, nr 5, s.326-329
4. **Babicki Mateusz**, Tomasiewicz Krzysztof, Woroń Jarosław [i in.] : Paxlovid - pierwszy doustny lek do ambulatoryjnego leczenia COVID-19, Lekarz POZ, 2022, vol. 8, nr 1, s.18-23
5. **Babicki Mateusz**: Racjonalna antybiotykoterapia w przebiegu infekcji górnych dróg oddechowych - zalecenia a perspektywa pacjenta. Analiza wyników badania IPSOS 2022, Lekarz POZ, 2022, vol. 8, nr 6, s.439-443
6. Jazienicka-Kiełb Alicja, **Babicki Mateusz**, Krajewska Magdalena [i in.] : Program Przewlekłej Choroby Nerek. Projekt edukacyjno-badawczy realizowany przez Polskie Towarzystwo Medycyny Rodzinnej, Lekarz POZ, 2022, vol. 8, nr 2, s.112-115
7. Jazienicka-Kiełb Alicja, **Babicki Mateusz**, Krajewska Magdalena [i in.] : Przewlekła choroba nerek w praktyce lekarza POZ - diagnostyka, obraz kliniczny, postępowanie, Lekarz POZ, 2022, vol. 8, nr 2, s.105-111
8. Resler Katarzyna, Masalski Marcin, **Babicki Mateusz**, Mastalerz-Migas Agnieszka, Frączek Marcin. SELF-ASSESSMENT OF HEARING USING A MOBILE APP AMONG COVID-19 PATIENTS. Journal of Hearing Science. 2022;12(4):19-25. doi:10.17430/JHS.2022.12.4.2.

2021

a) Czasopisma posiadające współczynnik wpływu Impact Factor (IF)

1. **Babicki Mateusz**, Bogudzińska Bogna, Kowalski Krzysztof [i in.] : Anxiety and depressive disorders and quality of life assessment of poles - a study covering two waves of the COVID-19 pandemic, Frontiers in Psychiatry, 2021, vol. 11, art.704248 [11 s.]. DOI:10.3389/fpsyt. 2021.704248
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