

# The lifestyle of international students in Poland during the COVID-19 pandemic

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## Abstract

**Purpose** – This study aimed to evaluate the lifestyle of international students residing in Poland during the COVID-19 pandemic. Focusing on students from universities in Warsaw, the research explored behavioral patterns and lifestyle adjustments made in response to the pandemic.

**Design/methodology/approach** – The study was conducted between June and September 2020, employing the Computer-Assisted Web Interview (CAWI) method. It surveyed over 3,000 students, achieving 719 responses collected via Google Forms and MS Teams. The Healthy Lifestyle and Personal Control Questionnaire (HLPCQ) was used to measure lifestyle factors and personal control behaviors among participants.

**Findings** – The results indicated that young people from various cultural backgrounds demonstrated similar lifestyle behaviors throughout the pandemic. This homogeneity suggests common adaptations made by international students in response to the challenges posed by the global health crisis.

**Originality/value** – The study provides valuable insights into how the COVID-19 pandemic impacted the lifestyles of international students in Poland. It offers information beneficial to researchers and public health professionals focused on improving the well-being of international students during future global crises.

**Keywords** Lifestyle, COVID-19, HLPCQ, Well-being, Cross-cultural behavior

**Paper type** Research paper

## Introduction

Health awareness has recently grown among young people, including students (Nobre, Oliveira, Monteiro, Sequeira, & Ferré-Grau, 2021). An increasing number of young people are trying to lead a healthier lifestyle, which includes a balanced diet rich in vegetables, fruits, and plant proteins and avoiding highly processed foods. Several key trends are driving changes in young adults' eating habits. First of all, increased health awareness and the availability of nutrition information make young people more likely to pay attention to their diet's quality.

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*Ethical statement:* Approval for this study was obtained from the Ethics Committee of the University of Social Sciences (Warsaw, Poland)—resolution No. 01/2020 on the date 23 March 2020. All of the participants provided their informed consent before participating in the research.



The popularity of plant-based diets is growing, and the consumption of fresh fruit and vegetables is increasing (Abe-Inge, Aidoo, Moncada de la Fuente, & Kwofie, 2024). However, the fast-paced life and the intensity of professional and educational responsibilities often lead to the consumption of fast food and ready-made meals, negatively affecting diet quality. Lifestyle changes are equally complex. On the one hand, more and more young adults are engaging in regular physical activity and practicing various forms of exercise. Social media is rich in trends related to an active lifestyle and taking care of one's physical condition, contributing to their popularization (Jane, Hagger, Foster, Ho, & Pal, 2018). On the other hand, technological development and the digitization of everyday life lead to increased time spent in front of screens, which we may associate with a sedentary lifestyle and negative health consequences.

The COVID-19 pandemic also forced people to limit physical activity (Cheikh *et al.*, 2022). However, after the restrictions ended, many people started looking for alternative forms of exercise, such as outdoor running, yoga at home, or online training. While the immediate effects of COVID-19 may have passed for many people, lifestyle changes may have long-lasting consequences (Tamaki, Nozawa, & Kitsuki, 2024). For example, the increased popularity of remote work or online learning has influenced how young people organize their time and living space. Noteworthy, the pandemic has increased interest in mental health. Stress related to work, education, and social pressure, combined with inappropriate eating habits and lack of physical activity, can lead to problems such as depression and sleep disorders. Eating habits may change as a result of the epidemic situation and contribute to the obesity problem and its consequences for health (Skotnicka, Karwowska, Kłobukowski, Wasilewska, & Małgorzewicz, 2021). In a 2023 cross-sectional study among adults from Saudi Arabia, scholars found that for a few respondents, the diet quality slightly improved during the pandemic and immediately after it, especially in the context of highly processed food. However, most respondents indicated an increase in body weight and height and consumption of products from the unhealthy food category. This study reported a disturbingly high percentage of indications related to an increase in unhealthy food consumption, weight gain, and deterioration of general well-being (Al-Tannir *et al.*, 2023). In turn, according to official data from the USA, during the pandemic, there was an increase in food insecurity, which, thanks to the government's actions, reduced in the post-pandemic period (USDA, 2023).

Currently, it is important to abandon negative habits acquired during the pandemic isolation. Another important task is to consolidate positive behaviors related primarily to nutrition that developed during the period of self-isolation, in particular regarding the preparation method, quality, and frequency of meals.

We aimed to assess the lifestyles of international students living in Poland during the COVID-19 pandemic. The article consists of five parts. The first part will present the research problem's theoretical framework. The second part will describe the research tool used in the study, which was the Healthy Lifestyle and Personal Control Questionnaire (HLPCQ). We will also provide a detailed description of the study sample and the statistical analyses performed. The third part will provide a detailed results analysis. The fourth part of the article will present the main conclusions. The last part of the article will discuss the limitations, potential sources of errors and inaccuracies in the data, and methodological limitations that may affect the generalization of the results. We will also suggest directions for future research that could help better understand the impact of the pandemic on the lives of international students.

## Literature review

### *Impact of the COVID-19 pandemic on people's behavior*

The coronavirus disease pandemic, commonly known as COVID-19, has significantly impacted humanity's lifestyle (Williams, 1995; Tarazona, Kirouchena, Clerc, Pinsard-Laventure, & Bourrion, 2022). The conducted systematic literature reviews and bibliometric analyses indicate the impact of the pandemic on consumer behavior and

lifestyle as well as work and social interactions (Cruz-Cárdenas, Zabelina, Guadalupe-Lanas, Palacio-Fierro, & Ramos-Galarza, 2021; Herjanto, Amin, & Mahfooz, 2022; Hosseinzadeh, Zareipour, Baljani, & Moradali, 2022). Since the early months of 2020, information outlets have continuously inundated consumers with information about the progression of COVID-19, the mutations of the Sars-Cov-2 virus, and the resulting risks to their lives and health, with the media constantly reporting on case numbers, deaths, imposed restrictions, and the pandemic's impact on the economy, social and cultural situation, and psychological well-being (Młynkowiak-Stawarz, Bęben, & Kraus, 2024). With the spread of COVID-19 in 2020, authorities introduced quarantine to prevent the virus' further spread. It was a temporary solution in the fight against the pandemic. Quarantine has contributed to the occurrence of a number of side effects in individuals, such as emotional exhaustion, irritability, phobias, increased anxiety, depressive symptoms, and post-traumatic stress disorder, as well as uncertainty about the future, deterioration of the financial situation and lack of physical activity (Mattioli, Sciomer, Cocchi, Maffei, & Gallina, 2020; Cirillo *et al.*, 2021; Sidor & Rzymiski, 2020). Moreover, the long quarantine period resulted in other unfavorable phenomena such as social isolation, a sedentary lifestyle, reduced sleep quality, increased food intake, and an overall deterioration of eating habits (Ingram, Maciejewski, & Hand, 2020; Muscogiuri, Barrea, Savastano, & Colao, 2020). The literature on the subject presents research results showing that changes to the life cycle that occurred during the COVID-19 pandemic may have had a negative impact on human health, resulting in the development of chronic diseases and life risk factors (Cheval *et al.*, 2021; Robinson *et al.*, 2021). Motives are important factors that guide consumers when making food choices (Shen, Long, Shih, & Ludy, 2020). They include social, political, cultural, and aesthetic factors, as well as food's nutritional value. When choosing food, common and recognized motivating factors include convenience, health, price, sensory attractiveness, familiarity, mood, natural content, the desire to control body weight as well as ethical considerations (Konttinen, Sarlio-Lähteenkorva, Silventoinen, Männistö, & Haukkala, 2013; Rankin *et al.*, 2018; Simopoulos, 2022). The COVID-19 pandemic has changed people's diet and physical activity. However, sports habits in various countries have seen an upward or downward trend (Gür, 2022). In Australia, consumers increased their physical activity and reduced overeating habits during quarantine (Owen, Tran, Hammarberg, Kirkman, & Fisher, 2021). In Italy, consumers also increased their levels of physical activity (Di Renzo *et al.*, 2020). In turn, in Spain, scholars observed an increase in body weight in people who did not engage in physical activity (López-Moreno, López, Miguel, & Garcés-Rimón, 2020). Since the quarantine period interrupts the working-day routine, it may result in general weariness and boredom. Moreover, scholars associate boredom with increased energy consumption and, consequently, the consumption of larger amounts of fats, carbohydrates, and protein, physical activity, and an increase in body weight (Moynihan *et al.*, 2015). Research from Poland has shown that during a nationwide quarantine, a significant percentage of people may modify their eating habits, manifesting themselves in more frequent meals, snacking, and changes in body weight. However, overweight and obese people are most susceptible to such modifications. The tendency to lose weight in underweight people may also be disturbing. The study emphasizes the importance of understanding the relationship between quarantine and the long-term strengthening of unfavorable eating habits and related health problems (Sidor & Rzymiski, 2020). During quarantine, various information that reaches consumers, especially regarding the epidemic, may cause anxiety and stress.

#### *Health habits and stress management in higher education*

Health promotion and healthy habits, including stress management, aim to help individuals control their lives. Studies show that poor diet and lack of physical activity increase the risk of cardiovascular disease, type 2 diabetes, cancer, and depression (Plotnikoff *et al.*, 2015).

Skillful management of everyday choices can improve health and quality of life (Darviri *et al.*, 2014). Health-related behaviors are not one-dimensional but rather a multidimensional phenomenon. The myriad factors that influence personal lifestyle choices continue to be a topic of heated debate. For example, it is not easy to precisely estimate the contribution of conscious, autonomous decisions, or socio-economic conditions (Califf, 2021). Mixed patterns are the norm, and extreme behaviors such as completely “healthy” or completely “unhealthy” are sporadic (Williams, 1995). Darviri *et al.* (2014) noted that an internal locus of control over internal health and high levels of self-efficacy positively correlate with successful behavior change. The guidelines for managing lifestyle diseases list the psychological factors that underlie the behavior change process (Piepoli *et al.*, 2016).

Research indicates that as individuals transition to higher education, they often face a myriad of new responsibilities and stress, which can be overwhelming (Deliens, Deforche, De Bourdeaudhuij, & Clarys, 2015). As a result, they may adopt unhealthy eating habits. Moreover, various factors, such as hectic schedules, distance from family, erratic eating habits, reliance on fast food, dietary choices, and physical activity levels, can significantly impact their lifestyle (Amiri, Chaman, & Khosravi, 2019). Some scholars suggest that while students may know about a balanced diet, they struggle to put it into practice (Strong, Parks, Anderson, Winett, & Davy, 2008). Furthermore, exposure to harmful stress can also contribute to incorrect eating behaviors (Kim & Kim, 2009), such as increased snacking, skipping breakfast, and consuming more significant portions (Vella-Zarb & Elgar, 2010). Moreover, working at night leads to poor eating habits (Almajwal, 2016). Student life can be challenging at times due to social life (Spadaro & Hunker, 2016), academic assignments and assessments (Siraj *et al.*, 2014), mood disorders (Ross, Cleland, & Macleod, 2006), or adapting to university life and environment (Norafifah *et al.*, 2016). Another research revealed that the demanding college environment and inadequate university life acclimatization can affect self-assurance and sleep routines (Klassen & Durksen, 2014). Attending college marks a phase when students begin to take greater control over their lifestyle choices and health habits (El Ansari *et al.*, 2011). As students transition into university life, they undergo a significant shift towards independence, leave home, and embark on a journey filled with new challenges.

Various recommendations concerning the management of lifestyle-related ailments highlight the psychological elements that form the foundation of the behavior modification process. However, there’s a dearth of tools available to effectively implement this understanding into practical application (Piepoli *et al.*, 2016).

The presented theoretical framework and literature review allowed us to describe the research goals. First, we aimed to compare the lifestyles of international students from different cultural backgrounds during the pandemic and identify significant differences or similarities. Second, we wanted to provide recommendations for university administrations to support international students during future global crises.

To achieve the research objectives, we hypothesized:

*H1.* There are significant differences in the lifestyles of students from various countries during the COVID-19 pandemic.

*H2.* International students with stable financial situations were more inclined to maintain healthier habits during the COVID-19 pandemic than those facing financial difficulties.

## Materials and methods

### *Ethical approval*

We obtained approval for this study from the Ethics Committee of the University of Social Sciences (Warsaw, Poland); resolution No. 01/2020 on March 23, 2020. All the participants provided their informed consent before participating in the research.

*Questionnaire design*

The questionnaire consisted of 26 items concerned with the selected aspects related to eating behavior. The research used the measurement tool Healthy Lifestyle and Personal Control Questionnaire (HLPCQ) by Darviri *et al.* (2014). It aims to assess the concept reinforced by items resulting from functions. We used a 4-point rating scale, in which 4 = always, 3 = often, 2 = sometimes, and 1 = never. The second part contained questions about age, gender, working shifts, financial situation, and region.

The presented results are the third part of our research. We presented other results in two articles, i.e., “How Has the COVID-19 Pandemic Influenced the Tourism Behaviour of International Students in Poland?” (Szlachciuk, Kulykovets, Dębski, Krawczyk, & Górską-Warsewicz, 2022a) and “The Shopping Behavior of International Students in Poland during COVID-19 Pandemic” (Szlachciuk, Kulykovets, Dębski, Krawczyk, & Górską-Warsewicz, 2022b).

*Study design and sample*

We recruited participants from universities located in Warsaw, Poland. The criteria for participation in the study were being an international student and studying at a Polish university for at least one year. We conducted a survey from June to September 2020. We decided to use the CAWI method. We posted the questionnaire on the Internet using Google Forms. We distributed the questionnaire to the students via MS Teams. All students used this program.

We reached out to over 3,000 students and received 807 responses. We eliminated 87 questionnaires due to missing responses. We obtained a research sample of 719 respondents. Table 1 presents the study sample characteristics.

**Table 1.** Characteristics of the studied group, considering selected socio-demographic characteristics

Variables	Total N = 719	(%)
<i>Gender</i>		
Female	331	46.0
Male	388	54.0
<i>Age</i>		
18–26	393	54.7
27–34	106	14.7
35 and above	220	30.6
<i>Working shifts</i>		
No	264	36.7
Yes	455	63.3
<i>Financial situation</i>		
I have enough money for everything without special savings	248	34.5
I live sparingly and have enough money for my basic needs	333	46.3
I live very sparingly to put aside money for my secondary needs	107	14.9
I do not have enough money for my basic needs (such as food and clothes)	31	4.3
<i>(For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article)</i>		
Europe	286	39.8
Asia	369	51.3
Other	64	8.9

**Source(s):** Own elaboration

Most respondents were 18–26 years old (54.7%). Numerous empirical studies have already investigated consumer preferences and eating habits of young consumers (Brown, McIlveen, & Strugnell, 2000; Livingstone, Lamb, Abbott, Worsley, & McNaughton, 2020; Wierzbiński, Surmacz, Kuźniar, & Witek, 2021). This is due to the formation of preferences at a young age and the interaction of home, school, and social environments. In this aspect, there is an interaction between young consumers' food preferences and their food awareness behavior (Brown *et al.*, 2000). Moreover, ecological awareness and the influence of reference groups are important for young people (Wierzbiński *et al.*, 2021). Research shows the importance of young consumers in making purchasing decisions for green products (Abdulalem Mohammed & Alaswadi, 2020; Roseira, Teixeira, Barbosa, & Macedo, 2022). Researchers also note that we know little about the relative importance of influences on healthy eating in the context of decision-making. Food preferences vary across demographics, suggesting that tailoring dietary interventions to specific groups of young adults may provide benefits (Livingstone *et al.*, 2020). Analyzing the eating habits of young people is also important, as bad eating habits acquired during adolescence may lead to negative long-term health consequences. Therefore, examining the many factors that positively or negatively influence young consumers' attitudes toward food consumption is crucial for understanding and addressing these habits (Gilmour, Gill, & Loudon, 2020).

Women accounted for 46.0% of the study population. A total of 63.3% declared that they combined work and study. Most of the respondents (46.3%) assessed their financial situation as "I live sparingly and have enough money for my basic needs." Only 4.3% responded "I do not have enough money for my basic needs (such as food and clothes)." Over half of the respondents (51.3%) were from Asian countries, and more than one-third were from European countries.

#### *Data analysis*

Using a descriptive analysis, we calculated the means, standard deviations (SD), and frequencies (%). We assessed the scales' reliability using Cronbach's alpha coefficient. In general, a value greater than 0.7 indicated satisfactory reliability. We checked the distributions of the analyzed variables using the Shapiro-Wilk test (0.942;  $p = 0.568$ ).

First, we used an exploratory factor analysis (EFA) with varimax rotation to define the nature of the relationship between the factors. We determined the number of factors based on the following criteria: components with an eigenvalue of 1, a scree plot test, and the factors' interpretability. We considered information sources with factor loadings of at least 0.50. We confirmed data factorability with the Kaiser–Meyer–Olkin (KMO) (cut-off value of 0.60) measure of sampling adequacy and Bartlett's sphericity test ( $p \leq 0.05$ ).

We performed cluster analysis using the k-means method. This algorithm groups similar objects into groups called clusters. Each cluster is different from every other cluster, and the objects in each cluster are similar to each other (Ali & Sheng-Chang, 2020).

#### **Results and discussion**

Table 2 presents a summary of the responses on 26 items. Most of the respondents said that they liked cooking (mean 3.26). Only 5.3% of respondents said that they never liked cooking. Over 30% of respondents always and over 36% often check the food labels before buying a product. Research findings confirm the link between reading food labels and dietary habits (Amuta-Jimenez, Lo, Talwar, Khan, & Barry, 2019). Using food labels increases the likelihood of healthy eating (Bryła, 2020). Meanwhile, 7.1% of respondents never check information on the packaging of a food product. Over 40% of respondents are interested in how much food they put on their plates. Almost one-third of them never calculate the calories of their meals. Only 17.8% always do this. The analysis of the answers to the question about restrictions on fat consumption showed that almost the same number of respondents answered that they always

**Table 2.** Summary of the responses to the survey (in %;  $N = 719$ )\*

Items	Mean; SD	(1)	(2)	(3)	(4)
Do you like cooking?	3.26 ± 0.894	5.3	14.3	29.2	51.2
Are you careful about how much food you put on your plate?	3.07 ± 0.851	7.5	20.4	29.5	42.6
Do you concentrate on positive thoughts during difficulties?	3.16 ± 0.963	4.3	16.7	38.1	40.9
Do you balance your time between work, personal life, and leisure?	3.08 ± 0.994	7.0	16.8	37.4	38.8
Do you eat a good breakfast?	3.06 ± 0.910	7.5	21.0	29.5	42.0
Do you care about meeting and discussing with your family on a daily basis?	2.99 ± 0.971	8.2	19.8	30.1	41.9
Do you check the food labels before buying a product?	2.91 ± 0.915	7.1	25.5	36.9	30.6
Do you eat whole-wheat products?	2.87 ± 0.972	7.0	27.1	37.6	28.4
Do you empty your brain of thoughts or the next day's program during bedtime?	2.84 ± 0.925	7.4	29.6	34.2	28.8
Do you share your personal problems or worries with others?	2.83 ± 0.909	11.0	23.9	35.9	29.2
Do you eat organic foods?	2.71 ± 0.932	8.4	33.5	32.5	25.7
Do you eat dinner at the same time each day?	2.69 ± 0.893	15.7	27.7	28.5	28.1
Are you careful about not missing a meal each day?	2.68 ± 1.045	14.6	30.5	27.1	27.8
Do you avoid soft drinks?	2.68 ± 0.952	12.2	34.1	27.3	26.4
Do you avoid eating packaged- or fast-food?	2.67 ± 1.024	10.2	34.4	33.4	22.1
Do you follow a scheduled program for your daily activities?	2.65 ± 1.034	14.6	29.9	31.7	23.8
Do you sleep at the same time each day?	2.63 ± 1.014	18.4	26.6	28.4	26.7
Do you eat lunch at the same time each day?	2.63 ± 1.065	16.6	29.2	29.1	25.2
Do you eat breakfast at the same time each day?	2.62 ± 1.033	18.9	27.1	27.1	26.8
Do you eat your meals at the same time each day?	2.57 ± 1.070	19.3	24.9	34.9	20.9
Do you practice aerobic exercise for 20 or more minutes at least 3 times per week?	2.55 ± 1.038	19.5	27.5	31.0	22.0
Do you limit fat in your meals?	2.54 ± 1.049	21.1	25.0	32.4	21.4
Do you avoid eating when stressed or disappointed?	2.50 ± 1.074	22.1	28.5	26.8	22.5
Do you exercise in an organized manner?	2.48 ± 1.083	18.5	32.7	31.4	17.4
Do you avoid binge eating when you are out with friends?	2.44 ± 0.984	23.6	28.1	28.9	19.3
Do you calculate the calories of your meals?	2.27 ± 1.052	31.0	29.2	22.0	17.8

**Note(s):** \*We used a 4-point rating scale, in which 4 = always, 3 = often, 2 = sometimes, and 1 = never

**Source(s):** Own elaboration

(21.4%) or never (21.1%) limit fat in their meals. Over 37% of respondents declared frequent consumption of whole-wheat products. Only 7.0% of respondents never do it. Some respondents declared avoiding eating packaged- or fast food (mean 2.67). Over 20% of respondents always behave in this manner. However, 23.6% of respondents never avoid binge eating during meetings with friends. Moreover, 26.4% of respondents always avoid soft drinks. Over one-third sometimes do it.

Over 27% of respondents are always careful about not missing a meal each day. Only 14.6% declared that they never behaved like that. The average mean of responses on four questions regarding the maintenance of a routine regarding the time of eating meals was close – “Do you eat dinner at the same time each day” (mean 2.69), “Do you eat lunch at the same time each day” (mean 2.63), “Do you eat breakfast at the same time each day” (mean 2.62), and “Do you eat your meals at the same time each day” (mean 2.57). However, when we looked at how the individual responses broke down, we saw that 34.9% of respondents often ate meals at the same time each day. Over one-fifth always and 19.3% never do it. Almost 19% never eat breakfast, 16.6% never eat lunch, and 15.7% never eat dinner at the same time each day. Considering the individual answers, we observed that the most significant number of respondents declared eating, particularly dinner, at the same time (28.1%). Maintaining regular eating habits is crucial for proper circadian rhythm since food consumption partially influences the circadian system. Mobile apps designed to track individuals' eating patterns

have revealed that many people have irregular eating schedules, such as consuming meals and sleeping at varying times during the week and on weekends (or days off) (Manoogian, Chaix, & Panda, 2019).

Interestingly, almost 40% of the respondents declared that they can balance work, personal life, and leisure. In turn, 7% of the respondents cannot find such a balance. Almost 30% always share their problems or worries with others, and almost the same amount of respondents declared that they always empty their brains of thoughts or the next day's program during bedtime. Over 40% of respondents always concentrate on positive thoughts during difficulties. Respondents had a problem responding to the question, "Do you avoid eating when stressed or disappointed?" A similar number of respondents indicated "always" (22.5%) and "never" (22.1%) answered. Over 17% of respondents always exercise in an organized manner. Almost one-third often practice aerobic exercise for 20 or more minutes at least three times per week. Less than one-fifth declare that they never do it (Table 2).

The importance of adopting healthy lifestyles is becoming increasingly evident due to the growing number of associated health benefits. Numerous studies emphasize the significance of improving various aspects of our lives to enhance overall well-being (García-Hermoso, Hormazábal-Aguayo, Fernández-Vergara, Olivares, & Oriol-Granado, 2020; Noto, Takahashi, Kimura, Moriwaki, & Masuda, 2020). It is essential to incorporate lifestyle interventions as part of the response to COVID-19 and to prevent future pandemics (Czapla et al., 2021).

#### *Exploratory factor analysis (EFA)*

Table 1 presents the primary variables. The respondents referred to them on a five-point scale. To examine the relationship between the observed variables with the use of a smaller number of unobserved variables, we performed an exploratory factor analysis. The Kaiser–Meyer–Olkin value was 0.92. Bartlett's test of sphericity  $\chi^2 = 5490.28$ ,  $p \leq 0.01$ . We conducted the EFA using maximum likelihood extraction with varimax rotation. The results of the EFA of the 26 items with varimax rotation made it possible to extract six factors. They explained 60.96% of the total variance. We arbitrarily assumed that the components of the factor were those variables that, after rounding, obtained absolute values equal to 0.5 or greater.

We interpreted the factors as follows: *daily routine*, *daily healthy choices*, *mental balance*, *dietary avoidance*, *social and diet balance*, and *physical and social routine*. The Cronbach's alpha coefficient of the total questionnaire (0.921) was within the recommended values (Table 3).

#### *Cluster analysis*

Using cluster analysis, we identified three clusters (Table 4). For better understanding, we titled each cluster: Cluster 1 – "Mindful moderators," Cluster 2 – "Intentional balancers," and Cluster 3 – "Relaxed planners." The first cluster included 31.4% of the study population. The second cluster included 40.3% of the population, and the third cluster included 28.2%. The average value ranged for the entire study population from 2.27 for the statement "Do you calculate the calories of your meals?" to 3.26 for the statement "Do you like cooking?" (3.26). In cluster 1, mean values ranged from 3.00 for the statement "Do you avoid binge eating when you are out with friends?" to 3.48 for the two statements "Are you careful about how much food you put on your plate?" and "Do you like cooking?" For cluster 2, the mean values ranged from 1.96 for the statement "Do you calculate the calories of your meals?" to 3.41 for the statement "Do you eat a good breakfast?" Meanwhile, for cluster three, the mean values ranged from 1.61 for the statement "Do you calculate the calories of your meals?" to 2.89 for the statement "Do you like cooking?" This means that in all clusters, the lowest mean values characterized the statement "Do you calculate the calories of your meals?," while the highest value for clusters one and three was for the statement "Do you like cooking?"

**Table 3.** The results of first EFA

Items	Daily routine	Daily healthy choices	Social and diet balance	Dietary avoidance	Physical and social routine	Mental balance	Total Cronbach's alpha
Do you eat lunch at the same time each day?	0.837						0.92
Do you eat dinner at the same time each day?	0.804						
Do you eat breakfast at the same time each day?	0.787						
Do you eat your meals at the same time each day?	0.774						
Do you sleep at the same time each day?	0.726						
Are you careful about not missing a meal each day?	0.629						
Do you follow a scheduled program for your daily activities?	0.540						
Do you calculate the calories of your meals?		0.702					
Do you check the food labels before buying a product?		0.586					
Do you limit fat in your meals?		0.578					
Are you careful about how much food you put on your plate?		0.576					
Do you avoid binge eating when you are out with friends?		0.516					
Do you eat organic foods?		0.509					
Do you balance your time between work, personal life and leisure?			0.701				
Do you eat a good breakfast?			0.653				
Do you like cooking?			0.564				
Do you care about meeting and discussing with your family on a daily basis?			0.501				
Do you avoid soft drinks?				0.663			
Do you avoid eating packaged- or fast-food?				0.652			
Do you eat whole-wheat products?				0.552			
Do you avoid eating when stressed or disappointed?				0.513			
Do you practice aerobic exercise for 20 or more minutes at least 3 times per week?					0.726		
Do you exercise in an organized manner?					0.663		
Do you share your personal problems or worries with others?					0.554		
Do you concentrate on positive thoughts during difficulties?						0.780	
Do you empty your brain of thoughts or the next day's program during bedtime?						0.749	
Variance explained (%)	33.85%	8.70%	6.10%	4.42%	4.00%	3.88%	
Total variance explained (%)	60.96%						

**Source(s):** Own elaboration

**Table 4.** Mean values for the entire population and for individual clusters

Specification	Whole population	Cluster 1 Mindful moderators	Cluster 2 Intentional balancers	Cluster 3 Relaxed planners	Significance
Number of people	719	226	290	203	
Percentage	100%	31.4%	40.3%	28.2%	
<i>Gender</i>					
Female	46.0%	45.6%	47.6%	44.3%	
Male	54.0%	54.4%	52.4%	55.7%	
<i>Age</i>					
18–26	54.7%	57.5%	49.3%	59.1%	
27–34	14.7%	15.9%	16.2%	11.3%	
35+	30.6%	26.5%	34.5%	29.6%	
<i>Nationality</i>					
European students	34.6%	21.7%	43.1%	36.9%	
Asian students	56.5%	67.3%	52.1%	50.7%	
Others	8.9%	11.1%	4.8%	12.3%	
<i>Financial situation assessment</i>					
I do not have enough money for my basic needs (like food and clothes)	4.3%	7.1%	0.3%	6.9%	
I have enough money for everything without special savings	34.5%	45.6%	26.9%	33.0%	
I live sparingly and have enough money for my basic needs	46.3%	38.9%	50.7%	48.3%	
I live very sparingly to put aside money for my secondary needs	14.9%	8.4%	22.1%	11.8%	
<i>Items</i>					
Are you careful about how much food you put on your plate?	3.07	3.48	3.20	2.36	$p < 0.001$
Do you check the food labels before buying a product?	2.91	3.25	3.01	2.33	$p < 0.001$
Do you calculate the calories of your meals?	2.27	3.01	1.96	1.61	$p < 0.001$
Do you limit fat in your meals?	2.54	3.17	2.42	1.83	$p < 0.001$
Do you like cooking?	3.26	3.48	3.33	2.89	$p < 0.001$
Do you eat organic foods?	2.71	3.14	2.67	2.17	$p < 0.001$
Do you eat whole-wheat products?	2.87	3.20	2.91	2.39	$p < 0.001$
Do you avoid eating packaged- or fast-food?	2.67	3.07	2.85	1.94	$p < 0.001$
Do you avoid soft drinks?	2.68	3.19	2.67	2.00	$p < 0.001$
Do you avoid eating when stressed or disappointed?	2.50	3.08	2.40	1.82	$p < 0.001$
Do you avoid binge eating when you are out with friends?	2.44	3.00	2.19	1.97	$p < 0.001$
Do you eat your meals at the same time each day?	2.57	3.16	2.56	1.78	$p < 0.001$
Are you careful about not missing a meal each day?	2.68	3.25	2.65	1.94	$p < 0.001$
Do you eat a good breakfast?	3.06	3.41	3.41	2.16	$p < 0.001$
Do you sleep at the same time each day?	2.63	3.24	2.77	1.66	$p < 0.001$
Do you follow a scheduled program for your daily activities?	2.65	3.29	2.61	1.81	$p < 0.001$

(continued)

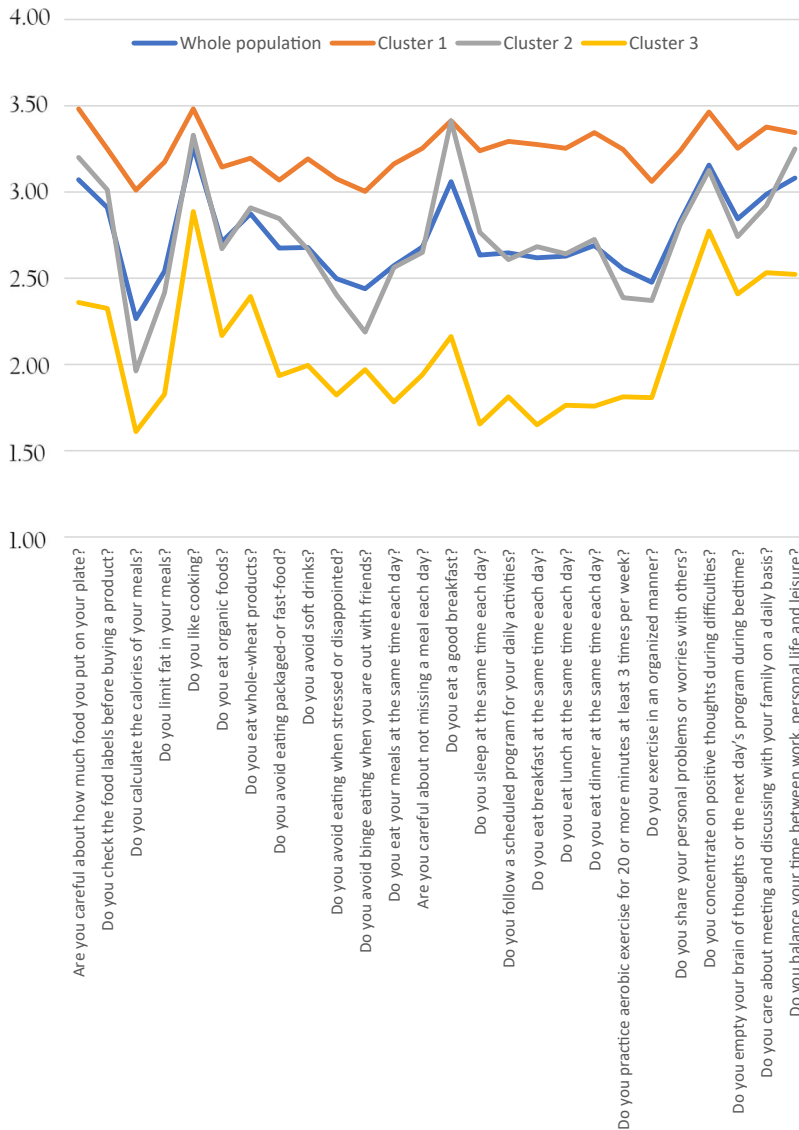
Table 4. Continued

Specification	Whole population	Cluster 1 Mindful moderators	Cluster 2 Intentional balancers	Cluster 3 Relaxed planners	Significance
Do you eat breakfast at the same time each day?	2.62	3.28	2.68	1.65	$p < 0.001$
Do you eat lunch at the same time each day?	2.63	3.25	2.64	1.76	$p < 0.001$
Do you eat dinner at the same time each day?	2.69	3.34	2.73	1.76	$p < 0.001$
Do you practice aerobic exercise for 20 or more minutes at least 3 times per week?	2.55	3.25	2.39	1.81	$p < 0.001$
Do you exercise in an organized manner?	2.48	3.06	2.37	1.81	$p < 0.001$
Do you share your personal problems or worries with others?	2.83	3.24	2.81	2.31	$p < 0.001$
Do you concentrate on positive thoughts during difficulties?	3.16	3.46	3.13	2.77	$p < 0.001$
Do you empty your brain of thoughts or the next day's program during bedtime?	2.84	3.25	2.74	2.41	$p < 0.001$
Do you care about meeting and discussing with your family on a daily basis?	2.99	3.38	2.92	2.53	$p < 0.001$
Do you balance your time between work, personal life and leisure?	3.08	3.34	3.25	2.52	$p < 0.001$

Source(s): Own elaboration

Furthermore, cluster analysis showed differences in the lifestyles of international students (Figure 1). For students from cluster one, we obtained the highest average values for all studied statements. In contrast, for students from cluster three, the average values reached the lowest values. We obtained the largest difference for the third and first clusters for the statements “Do you eat breakfast at the same time each day?” (1.63), “Do you eat dinner at the same time each day?” (1.59), and “Do you sleep at the same time each day?” (1.58). We recorded the smallest difference for the statements “Do you like cooking?” (0.60), “Do you concentrate on positive thoughts during difficulties?” (0.69), and “Do you eat whole-wheat products?” (0,80). In cluster two, we obtained intermediate values with the smallest difference between the mean values for cluster one and cluster two recorded for three clusters: “Do you eat a good breakfast?,” “Do you like cooking?,” and “Do you balance your time between work, personal life, and leisure?” In contrast, the smallest difference between the mean values for cluster two and cluster three occurred for the statements: “Do you avoid binge eating when you are out with friends?,” “Do you empty your brain of thoughts or the next day's program during bedtime?,” “Do you concentrate on positive thoughts during difficulties?,” and “Do you calculate the calories of your meals?”

The structure of the clusters varied in terms of nationality. The share of European students ranged from 21.7% in the first cluster to 43.1% in the second cluster. In turn, the share of Asian students ranged from 50.7% in the third cluster and 52.1% in the second cluster to 67.3% in the first cluster. There are studies available in the literature on the diverse lifestyles of European and Asian consumers (Baenas *et al.*, 2022). These results fit in with other research findings. For example, in the systematic review of 52 articles, authors indicate that there are five groups of consumers according to the way they behave in the context of COVID-19. The authors defined these groups as follows: health-related behaviors, consumption behaviors, ethical



**Figure 1.** Cluster analysis.  
**Source(s):** Own elaboration

behaviors, behavioral intentions, and other related behaviors, as well as social connectedness behaviors (Herjanto *et al.*, 2022). In the descriptive and bibliometric analysis of 70 studies related to COVID-19, consumer behavior, technology, and society, scholars indicated three thematic areas, including consumer behavior and technology use, purchase and handling of essential hygiene and protective products, and external and internal factors influencing the consumer behavior (Cruz-Cárdenas *et al.*, 2021). Similarly, a systematic literature review of 43 publications from databases such as Web Of Science, Scopus, PubMed, Embase, Google Scholar, and Magiran indicates that rapid changes in lifestyle, work and social interactions, and social distance affected relationships (Hosseinzadeh *et al.*, 2022).

## Conclusions

Cluster analysis allowed us to identify three statistically different clusters: mindful moderators (cluster 1), intentional balancers (cluster 2), and relaxed planners (cluster 3). In the structure of these clusters, the highest percentage of Asian students was in the first cluster and European students in the second. At the same time, the first cluster displayed the highest means for the statements studied. Students in better financial situations were more likely to demonstrate healthy habits, such as eating whole grain products, avoiding binge eating when out with friends, or practicing aerobic exercise for 20 or more minutes at least three times per week. The second cluster displayed means that were closest to the means for the entire population. This may mean that the lifestyles of students of different nationalities studying in Poland were unified, which will lead to the unification of lifestyles that consider cultural differences. This could have impacted the COVID-19 pandemic and the restrictions in force in Poland.

Analyzing the obtained results allowed us to formulate theoretical and practical implications. The study on the lifestyle of international students in Poland during the COVID-19 pandemic provides significant insights into the behaviors of young adults in the context of a global crisis. The research shows that students from different cultures exhibited similar behaviors during the pandemic, emphasizing the global nature of COVID-19's impact on lifestyle. These results can contribute to a better understanding of how global crises affect young adults, particularly their dietary habits, physical activity, and stress management. The COVID-19 pandemic forced people to adapt to new conditions, which involved limiting physical activity, changes in diet, and an increase in stress and anxiety levels. Understanding how these changes affect young adults is crucial for developing strategies to support their health and well-being. This research can also help identify the long-term effects of the pandemic on the mental and physical health of this demographic group, which is essential for future research and health policy. The practical implications of our study concern the universities' activities. They should aim to increase the availability of psychological support services, including individual and group therapy, to help students cope with anxiety, stress, and other mental health issues caused by the pandemic. Implementing preventive programs, such as stress management workshops, can help students better handle emotional challenges. Higher education institutions should also offer courses and workshops on healthy eating to help students make informed dietary choices. Access to dietary counseling, including individual consultations with nutritionists, can help students maintain a healthy diet even under challenging conditions. Investments in sports infrastructure, such as gyms and sports fields, and the organization of sports events can promote a healthy lifestyle among this group. The research results can help create more resilient educational environments by implementing mental health support programs. Ensuring access to professional psychological help and prioritizing mental health can increase students' resilience to stress and difficulties.

In summary, the study provides valuable insights that can help develop strategies to support the health and well-being of international students, as well as build more resilient and supportive educational environments.

## Limitations

The study possesses certain noteworthy limitations that warrant consideration. Future research should be conducted with a larger and more diverse group of participants to enhance the validity and generalizability of the findings. Moreover, the sole use of online exams may exclude certain groups, such as people without internet access. Using self-report questionnaires such as the H LPCQ may have introduced subjective bias because participants may not always report their behavior in detail. Students may have underestimated or overestimated their level of physical activity and reported eating habits that differed from their actual ones. The COVID-19 pandemic was dynamic, and we conducted the study at a time that may not have had any impact on changes in students' lifestyles. Compliance with studies over an extended duration may provide valuable information about long-term side effects.

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