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Knowledge, attitudes, and self-reported health behaviors related to reproductive health among university students in Poland: A cross-sectional study[1]

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Abstract: *Introduction:* Reproductive health is a significant area of public health, and the level of knowledge and health behaviors in young adults may be important for their future health and reproductive decisions. The level of health education in students may influence informed decision making regarding health and reproductive plans. *Aim of the study:* The study aimed to assess the knowledge, opinions, and declared health behaviors of university students in Poland regarding reproductive health. *Material and methods:* A cross-sectional online survey (CAWI) was conducted in a group of 182 students from Polish universities. Non-random convenience sampling was used. Two standardized tools developed by Juczyński were utilized – the List of Health Criteria (LHC) and the Health Behavior Inventory (HBI) – along with an original, 26-item knowledge test on reproductive health. The analysis included descriptive statistics, a rank analysis of responses in the LHC and HBI, and the evaluation of the percentage of correct answers in the original knowledge test in relation to current medical guidelines. *Results:* In the LHC, the highest-rated criteria referred to subjective well-being and somatic fitness, including "feeling well" and "having all body parts functioning properly." In the HBI, selected preventive behaviors were declared relatively more frequently, while behaviors related to rest, limiting work overload, and coping with tension and stress were reported less often. 48.9% of the respondents declared that they rarely or almost never avoided work overload. A significant proportion of the respondents rarely declared taking actions aimed at reducing intense stress and tension. A high percentage of incorrect answers was recorded in the section of the test concerning nutrition during pregnancy. *Conclusions:* The surveyed students' knowledge regarding reproductive health was diverse and showed significant gaps in certain areas, particularly regarding selected physiological issues and nutrition during pregnancy. At the group level, a discrepancy was observed between high awareness of selected risk factors and less frequent reports of certain behaviors related to rest and stress reduction. The results indicate the validity of developing health education programs for students, covering both the knowledge of reproductive health and issues related to sleep, regeneration, and stress management.
Keywords: attitudes, students, knowledge, health behaviors, reproductive health

1. Introduction

The World Health Organization (WHO) defines reproductive health as the state of physical, mental and social well-being with respect to the reproductive system, its functions and processes, and not merely the absence of disease or disorder (WHO, n.d.). This term also encompasses the ability to make informed and autonomous decisions regarding reproductive matters. Reproductive health includes sexual health, fertility and issues related to motherhood and reproductive care (Walentynowicz-Moryl and Mianowska, 2020).

1 Article in Polish language: https://stowarzyszeniefidesetratio.pl/fer/67p_Wysz.pdf

The importance of promoting reproductive health also increases in the light of the demographic changes we are observing. The reproductive health of parents largely affects the health of their children, as well as the health of subsequent generations (Ministerstwo Zdrowia,2024).

Adverse demographic changes are observed not only in Poland, but also in many European countries. They have social, economic and health consequences (Kochańczyk, 2020). In this context, health education focused not only on the transfer of knowledge, but also on supporting behaviors conducive to reproductive health is of particular importance. The scope of professional competences of midwives includes educational and health-related activities concerning family planning, maternity and paternity protection, preparation for parenthood and counseling in the field of hygiene and nutrition (Act of 15 July 2011 on the Professions of Nurse and Midwife).

Students are at a stage of their life when health behaviors are shaped and decisions that will affect their future reproductive health may be made. Designing educational interventions should be preceded by an assessment of the needs and existing knowledge deficits in the target group. Therefore, a study was conducted to assess the knowledge, attitudes and self-reported health behaviors of students regarding reproductive health. Basic knowledge about sexuality, fertility and reproductive health is a crucial element of the health competences of young adults. Due to their professional competence, midwives may be an important source of expert information in this area (Uzar, 2019). Providing reproductive health education belongs to the statutory professional competences of midwives. The competences also include the preparation and provision of educational activities addressed to various target groups. The activities may help prevent reproductive health problems and increase health competences of the target groups. Moreover, education should cover topics such as family planning methods, prevention of sexually transmitted infections and the influence of reproductive health on the overall quality of life (Witkowska-Wirstlein, 2018). The lack or an insufficient scope of health education in this area may lead to risky behaviors in young people. Learning the basics of fertility physiology constitutes an important part of sex education regardless of the general attitude towards sex education (Bączek et al., 2020). Young adults should have access to reliable information on factors affecting fertility, with age being a significant one. Reliable knowledge may support informed decisions about future family planning (Lucas et al., 2015).

So far, Polish research on the knowledge of pupils and students about fertility has primarily focused on three areas. They mainly include the knowledge of fertility physiology and menstrual cycle, methods of fertility recognition and contraception (Walentynowicz-Moryl and Mianowska, 2020). Knowledge of family planning methods should be available, reliable and well documented by scientific research. The level of this knowledge among medical students who may participate in education and health counseling in the future is of particular importance. Individual methods of contraception differ in their mechanism of action, effectiveness, contraindications and possible impact on health and daily functioning (Musik, 2024). Every person has the right to comprehensive education that contributes to a deeper understanding of moral, cultural and social values. It also helps in recognizing and understanding emerging problems (Bączek et al., 2020). Reproductive health education should also include adults, as information needs change with each stage of life. So far, the literature has primarily focused on the sex education of children and adolescents, while adult education has received relatively less attention. The authors of some research indicated that despite the declared interest in the subject of reproductive health, the level of the knowledge of students remained insufficient in selected areas. Knowledge deficits were also observed in medical students, despite the fact that the professional preparation of this group included issues related to human health (Turner et al., 2014). The growing number of online sources of information about sexuality and reproductive health may make it even more difficult to identify reliable and evidence-based material. These days, young people cite the mass media as the main source of knowledge in the field of sexual health. Although they allow

easy, fast and often free access to information, it is necessary to focus on verifying information on reproductive health (Jabłońska et al., 2018).

An additional argument in favor of the need to educate adults and promote pro-health and pro-parenting attitudes is the ongoing process of social changes related to sexuality that influence the transformation of concepts such as gender and the modification of medical and social norms. Current changes, as well as easy access to a variety of opinions on the Internet, require adults to provide support in terms of understanding the rational assessment of new reality. Reliable education in the field of reproductive health can support young adults in making informed decisions regarding health and reproductive plans (Walendzik-Ostrowska and Dec-Pietrowska, 2023).

Students' knowledge of selected aspects of reproductive health has been the subject of previous domestic and foreign research. So far, the analyses have focused largely on an isolated assessment of students' purely factual knowledge – most often concerning contraception methods, prevention of sexually transmitted infections or the physiology of fertilization. An important research gap is clearly visible in the literature concerning the subject. The level of knowledge, the way of evaluating health and self-declared health behaviors were analyzed much less frequently. This study attempts to partially fill this gap through an integrated analysis of three areas: knowledge about reproductive health, subjective evaluation of health criteria and reported health behaviors. Instead of being limited to a simple description of statements, the project integrated a proprietary clinical knowledge test based on the guidelines issued by the WHO (n.d.) and Polskie Towarzystwo Ginekologów i Położników [Polish Society of Gynecologists and Obstetricians] (PTGiP, n.d.) – with two recognized, standardized psychometric tools authored by Juczyński (2001): Lista Kryteriów Zdrowia (LKZ) [the List of Health Criteria] and Inwentarz Zachowań Zdrowotnych (IZZ) [Health Behavior Inventory]. Such an approach allows for the parallel characterization of knowledge, health criteria and reported health behaviors in the same group of respondents. Furthermore, unlike many previous papers which are uniform in nature, this project makes it possible to characterize the co-occurrence of these phenomena in the context of the specificity of the demographic crisis and contemporary nutritional myths, which may add practical value to the obtained results in terms of the design of academic public health curricula.

To date, the results of research on students' knowledge about reproductive health have not been fully consistent. Researchers such as Walentynowicz-Moryl and Mianowska (2020) and Bączek et al. (2020) suggested that the young Polish generation was characterized by a relatively satisfactory general health awareness, stimulated by mass prevention campaigns. Conversely, other authors indicated significant shortcomings in the field of detailed biological knowledge and difficulties in assessing the reliability of information obtained from the Internet (Turner et al., 2014, Jabłońska et al., 2018). The ambiguity of the results so far justifies further analysis of both the level of knowledge and its relationship with the reported health behaviors. The field of nutrition during the preconception period and pregnancy is a source of additional controversy in the literature on this subject. Classic studies (e.g., Uzar, 2019) focused on the problem of malnutrition or extreme nutritional knowledge deficiencies in young women. As regards nutrition during pregnancy, the problem of misconceptions that lead to excessive restriction of certain food groups is also of particular importance (Lucas et al., 2015). However, the sources of erroneous nutritional beliefs and their potential relationship with decisions made by young adults remain insufficiently understood. An important cognitive gap is clearly visible in the current research approach. Most authors (e.g., Musik, 2024) treat the level of students' factual knowledge in an isolated way – as a simple sum of correct answers to questions about contraception or physiology. There is a lack of holistic, complementary studies that would link this purely cognitive component with the deeper psychological and axiological structures of young adults: with their subjective evaluation of health criteria and realistically implemented habits and lifestyle hygiene.

2. Own research

2.1. Aim of the study and research questions

The study was conducted to assess the knowledge, attitudes and self-reported health behaviors of students regarding reproductive health. The study was cross-sectional and exploratory. In connection with the goal, the following research questions were formulated:

- What level of knowledge about reproductive health do the surveyed students present and in which areas do the greatest knowledge deficits occur?
- What health criteria are the highest and lowest rated by the surveyed students in the LHC?
- Which health behaviors are reported by the surveyed students the most and the least frequently?

2.2. Research hypotheses

In relation to the research questions, the following working hypotheses were formulated:

- The surveyed students will obtain a higher percentage of correct answers concerning general lifestyle and hygiene than in the area of detailed reproductive physiology and selected recommendations regarding nutrition during pregnancy.
- Within the LHC framework, the criteria related to subjective well-being and physical and functional capacity will be given the highest weight.
- A higher level of knowledge about the impact of stress, sleep and lifestyle on reproductive health will only be weakly correlated with the frequency of reported health-promoting behaviors in the corresponding areas of the HBI.

2.3. Material and methods

The adopted research model is based on the analysis of three complementary areas of the functioning of young adults: the cognitive component (represented by the level of factual knowledge), the axiological component (subjective evaluation of health criteria – LHC) and the behavioral component, understood as the self-reported frequency of health behaviors measured using the HBI. The analyses concerned the distributions of the studied variables in the analyzed sample of students.

The analysis of the empirical material (n = 182) is based on methods of descriptive statistics and structural and rank analysis. In addition, we carried out the analysis of responses at the level of individual LHC and HBI items. For individual items, the average response values were calculated. Subsequently, they were organized from the highest to the lowest value, creating a ranking of items. The scoring weight was assigned to individual response categories on the Likert scale (from 1 to 5 points), which made it possible to rank health criteria and the frequency with which individual behaviors were reported.

The study was conducted with a diagnostic survey using the CAWI (Computer-Assisted Web Interview) technique. The authors of the study provided a link to the questionnaire on online forums, social networks and discussion groups associating students of various universities. The inclusion criterion for the study was the student status in any program at a Polish university. Midwifery students were excluded from the study due to the specific scope of education directly related to the studied issue, as this could lead to systematically higher knowledge test results.

The proprietary knowledge test on reproductive health used in the project consisted of 26 single-choice closed questions. This tool was a factual questionnaire used to assess factual knowledge concerning reproductive health. Due to the heterogeneous content range of the test, the Cronbach's alpha coefficient was not adopted as the basic indicator of its reliability. The questions were designed based on current clinical standards and guidelines of the WHO (n.d.) and PTGiP (n.d.). In order to assess the relevance of the content, the set of questions was assessed by two independent experts in the field of obstetrics and public health. Before starting the actual research process, a pilot study was conducted in a group of 15 students, which made it possible to verify the comprehensibility of the wording, eliminate structural errors and optimize the time needed to complete the questionnaire (the results of the pilot study were not included in the final analysis).

3. Results

A total of 182 respondents participated in the study with women constituting 80.8% of the sample. The age of the participants ranged from 18 to 48 years; 94.5% of the respondents were aged 18–25. Most of the respondents were unmarried (95.1%), 4.4% were married, and 0.5% were divorced. The largest group of the respondents came from a city with over 500,000 residents (43.4%). The second largest group included rural residents (20.9%), and the smallest group of individuals reported living in cities with between 150,000 and 500,000 residents (8.8%).

The respondents included students of first-cycle studies, second-cycle studies, as well as single-cycle master's programs. Over half of them (57.7%) were first-cycle students. First-year students made up the largest percentage (36.3%), followed by second-year (26.9%), third-year (20.3%) and fifth-year students (12.6%). Fourt-year students were the smallest group (3.9%). The study was addressed to both medical and non-medical students. The number of respondents studying medical faculties (53.8%) slightly exceeded the number of non-medical students. The group of respondents studying medical faculties included students of medicine, nursing, dietetics, speech and language therapy, pharmacy, dental medicine, and emergency medicine. The group of respondents studying non-medical fields included students majoring in education, psychology, cognitive science, management, law, philosophy, criminology, administration, English philology, journalism, military history, national security, and production engineering.

As regards the topics covered in the knowledge test, several categories can be identified: male and female reproductive health, fertility, pregnancy, contraception, as well as the organization of reproductive health care.

The percentage of correct answers varied across different areas of knowledge. In the area of intimate hygiene, the respondents demonstrated a high level of competence (78% of correct answers). A similar trend was observed in the assessment of factors influencing the regularity of the menstrual cycle (Table 1), where nearly the entire population (97.8%) correctly identified stress as a key determinant, and high percentages of responses were also recorded for illness (96.2%) and sleep (90.1%). A lower percentage of correct answers was noted in questions regarding specific physiological parameters. This is evidenced by the fact that only 47.3% of the respondents knew the actual survival time of the ovum after ovulation, and nearly half (48.9%) could not indicate the correct length of the menstrual cycle.

As regards the structure of attitudes to the conditions of fertility (Table 2), a very high and consistent level of agreement was observed with regard to classic risk factors. The influence of stimulants, alcohol, stress, and healthy nutrition was confirmed by over 97% of the respondents. In the case of shift work, the responses were more diverse: 19.8% of the respondents indicated the answer "No opinion", and 14.2% disagreed with its impact on fertility.

Another set of questions concerned pregnancy and childbirth. In response to the question about the normal duration of pregnancy, the vast majority of the respondents (77.5%) correctly indicated that pregnancy lasted from 38 to 42 weeks. At the same time, over one-fifth of the respondents (21.4%) incorrectly believed that the normal duration of pregnancy was 32-36 weeks. The study participants demonstrated the highest level of knowledge regarding the function of the umbilical cord, with the percentage of correct answers reaching as high as 98.9%. The most difficult question, however, was one regarding the proper course of action after waters break. Correct answers were provided by 72.5% of the respondents, while 27.5% chose the wrong answer or admitted they did not know.

Significant variability in responses was also observed for questions concerning nutrition during pregnancy (Table 3). The highest percentage of responses consistent with recommendations was recorded for red wine (98.9% identified it as a prohibited product) and raw meat (71.4% identified it as a prohibited product, 27.5% as not recommended – which together amounted to 98.9% correct exclusion from the diet due to the risk of toxoplasmosis and listeriosis). Conversely, we found a high percentage of responses inconsistent with the adopted recommendations for selected products, e.g., red meat was classified as a non-recommended or prohibited

Table 1. Factors affecting the regularity of the menstrual cycle according to the respondents (N = 182)

Factor	Stress	Shift work	Illness	Travel	Sleep
Number of the respondents:	178 (97.8%)	112 (61.5%)	175 (96.2%)	128 (70.3%)	164 (90.1%)

Table 2. Respondents' attitudes to the impact of selected factors on fertility (N = 182)

Factor / Number of respondents	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Healthy nutrition	153 (84.1%)	25 (13.7%)	1 (0.5%)	3 (1.6%)	0
Practicing sports	116 (63.7%)	52 (28.6%)	7 (3.8%)	7 (3.8%)	0
Alcohol	156 (85.7%)	21 (11.5%)	1 (0.5%)	2 (1.1%)	2 (1.1%)
Shift work	66 (36.3%)	54 (29.7%)	36 (19.8%)	21 (11.5%)	5 (2.7%)
Stimulants	168 (92.3%)	12 (6.6%)	0	2 (1.1%)	0
Stressful situations	149 (81.9%)	30 (16.5%)	1 (0.5%)	2 (1.1%)	0
Self-examination	98 (53.8%)	34 (18.7%)	24 (13.2%)	14 (7.7%)	12 (6.6%)
Vitamin intake	85 (46.7%)	73 (40.1%)	13 (7.1%)	10 (5.5%)	1 (0.5%)

Table 3. Opinion of the respondents on products indicated, not recommended and prohibited during pregnancy (N = 182)

Factor / Number of respondents	Indicated	Not recommended	Prohibited
Natural yoghurt	161 (88.5%)	19 (10.4%)	2 (1.1%)
Red meat	63 (34.6%)	99 (54.4%)	20 (11%)
Seafood	19 (10.4%)	100 (54.9%)	63 (34.6%)
Eggs	143 (78.6%)	34 (18.7%)	5 (2.7%)
Red wine	0	2 (1.1%)	180 (98.9%)
Blue cheese	14 (7.7%)	93 (51.1%)	75 (41.2%)
Steak tartare	2 (1.1%)	50 (27.5%)	130 (71.4%)

product by 65.4% of the respondents. A similar level of strictness and lack of clinical knowledge applied to seafood (as many as 89.5% identified it as not recommended or prohibited) and blue cheeses (92.3% of negative recommendations, with no distinction made for cheeses prepared from pasteurized milk).

The final section of the test was designed to assess the knowledge concerning professional competences of midwives and the organization of reproductive health care. The participants of the study presented the highest level of knowledge in the question concerning the distinctive nature of the midwife and nurse professions (97.3% of correct answers). High percentages of correct answers were also recorded in questions regarding the required education of the midwife (92.3%), the independent nature of the profession (87.9%) and the possibility of providing prenatal care in the case of a physiological pregnancy by both a doctor and a midwife (85.6%). The lowest percentage of correct answers was recorded for the question regarding the competences of midwives – 57.7% of the respondents stated that midwives only dealt with pregnant women, women in labor and in the postpartum period. Only 37.4% answered that midwives cared for women at every stage of their lives. The question regarding the possible jobs for a midwife received slightly better results. The most frequently selected workplaces included the antenatal ward and the gynecological ward

Table 4. List of Health Criteria (LHC) with rank analysis (N = 182)

Criteria (LHC)	1	2	3	4	5	Weighted average	Rank
Feel good	4	11	21	30	116	4.34	1
Have all body parts functioning properly	8	8	25	27	114	4.27	2
Have healthy eyes, hair and skin	5	5	27	49	96	4.24	3
Make sure to get enough rest and sleep	6	5	27	53	91	4.20	4
Not to smoke	12	9	29	19	113	4.16	5
Being able to enjoy life	10	11	34	34	93	4.04	6
Eat adequately	6	7	32	52	85	4.03	7
Not to get sick, at most, get the flu once in a while	4	12	26	54	86	4.02	8
Maintain a healthy weight	4	11	32	48	87	4.01	9
Feel happy most of the time	9	7	32	47	87	4.01	9
Not to experience any physical issues	10	8	41	44	79	3.96	11
Be able to solve one's own problems	12	11	38	42	79	3.91	12
Be in a good mood	9	7	45	45	76	3.91	12
Drink little or no alcohol	12	14	45	37	74	3.81	14
Have good social relations	11	8	42	52	69	3.81	14
Accept oneself, know one's own abilities	10	13	35	47	77	3.76	16
Be able to work without tension and stress	12	17	34	51	68	3.71	17
Be able to adapt to changes in life	12	16	38	47	69	3.70	18
Be able to control one's own feelings	9	14	50	40	69	3.67	19
Live to old age	13	21	36	61	51	3.64	20
Be responsible	16	21	42	41	62	3.51	21
Have a job and diverse interests	16	17	44	43	62	3.51	21
Hardly ever need to make doctor's appointments	23	19	32	50	58	3.33	23
Take medication only occasionally	16	29	49	38	50	3.26	24

(89.0% each), as well as the delivery suite (87.3%). Neonatal intensive care unit was selected slightly less frequently (86.3%). The operating room received the lowest percentage of responses (47.8%).

To provide a more in-depth interpretation of the subjective definitions of health presented by students, the obtained results were categorized and ranked based on weighted averages calculated for each of the 24 LHC criteria (where the score of 1 corresponded to a weight of 1 point, and the score of 5 corresponded to a weight of 5 points). A ranking of health criteria was created based on the average response values. The criteria associated with the somatic and functional dimension and emotional well-being ranked highest in the students' conceptual network.

- Rank 1: *Feel good* (Weighted average: 4.34 points; 63.7% of the respondents gave the highest rating).
- Rank 2: *Have all body parts functioning properly* (Weighted average: 4.27 points; 62.6% of the respondents gave the highest rating).
- Rank 3: *Have healthy eyes, hair and skin* (Weighted average: 4.24 points; 62.1% of the respondents gave the highest rating).
- Rank 4: *Make sure to get enough rest and sleep* (Weighted average: 4.20 points; 51.1% of the respondents gave the highest rating).
- Rank 4: *Not to smoke* (Weighted average: 4.16 points; 50.5% of the respondents gave the highest rating).

Table 5. Health Behavior Inventory (HBI) with rank analysis (N = 182)

Criteria / Behaviors (HBI)	1	2	3	4	5	Weighted average	Rank
I limit smoking	26	12	16	15	113	4.08	1
I try to get medical information...	6	11	26	64	75	3.98	2
I have friends and a stable family life	3	9	27	74	69	3.92	3
I eat a lot of fruit and vegetables	1	7	40	77	57	3.91	4
I follow doctors' recommendations	7	12	25	85	53	3.82	5
I care about proper nutrition	5	23	60	74	20	3.45	6
I avoid catching a cold	5	14	41	76	46	3.44	7
I think positively	14	30	44	57	37	3.41	8
I take other people's advice seriously...	10	22	57	60	33	3.41	8
I control my body weight	14	18	57	60	33	3.40	10
I try to find out how others avoid illness	31	25	46	56	24	3.04	11
I get enough sleep	23	35	51	51	22	3.03	12
I avoid excessive physical exertion	14	37	53	50	28	3.01	13
I have the phone numbers for emergency services written down...	65	21	16	27	53	2.99	14
I undergo medical checkups regularly	26	39	43	38	36	2.91	15
I avoid salt	19	46	59	39	19	2.90	16
I eat whole grain bread	15	8	61	49	42	2.90	16
I avoid depressing situations	22	41	59	43	17	2.79	18
I avoid food with preservatives	26	42	51	48	15	2.73	19
I limit sugar and animal fats	16	47	73	31	15	2.73	19
I avoid feelings like anger, anxiety and depression	26	57	48	34	17	2.77	21
I get enough rest	22	59	55	35	11	2.75	22
I try to avoid extreme emotions, stress	29	51	58	32	12	2.71	23
I avoid work overload	27	62	50	34	9	2.65	24

The other end of the hierarchy (the lowest ranks) was occupied by criteria related to a negative attitude to health (defined solely as the lack of contact with medical system) and a purely institutional dimension:

- Rank 23: *Almost never have to go to the doctor* (Weighted average: 3.56 points; only 31.9% of the respondents gave the highest rating).
- Rank 24: *Take medication only occasionally* (Weighted average: 3.43 points; only 27.5% of the respondents gave the highest rating).

The rank system indicates that the respondents placed a high value on criteria related to well-being and fitness, while they rated criteria defining health in terms of a reduced need for medical care or pharmacotherapy lower.

A similar procedure for ranking weighted averages was applied to declared health behaviors (HBI), with responses being assigned scores from 1 (*almost never*) to 5 (*almost always*). This analysis allowed the identification of areas where people paid the most attention to their health and behaviors paid attention to the least frequently. The structure of behaviors occurring with the highest frequency included those concerning conservative prevention and intentional search for knowledge:

- Rank 1: *I limit smoking* (Weighted average: 4.08 points; 62.1% of "almost always" responses).
- Rank 2: *I try to get medical information and understand the causes of health and illness* (Weighted average: 3.98 pts; 41.2% of "almost always" responses).

- Rank 3: *I have friends and a stable family life* (Weighted average: 3.92 points; 37.9% of "almost always" responses).
- The lowest average values were obtained for behaviors related to rest, stress reduction and avoidance of work overload:
- Rank 22: *I get enough rest* (Weighted average: 2.75 points; as much as 48.9% of the participants responded: "rarely" or "almost never").
- Rank 23: *I try to avoid extreme emotions, stress, tension* (Weighted average: 2.71 points; 44.5% of the participants responded: "rarely" or "almost never").
- Rank 24: *I avoid overworking* (Weighted average: 2.65 points, 43.5% of the participants responded "rarely" or "almost never").

In the analyzed sample, the participants reported engaging in selected preventive and information-seeking behaviors relatively more often, while behaviors related to rest and stress reduction were reported less frequently.

4. Discussion

The fragmented nature of knowledge regarding reproductive health was also observed in previous studies conducted in students. The obtained results indicate that the surveyed students presented a relatively high level of knowledge on selected issues of reproductive health. However, significant knowledge gaps were found in some of the analyzed areas, which warrants further educational activities. According to the research by Walentynowicz-Moryl and Mianowska (2020), young women had satisfactory general knowledge about the basic issues of reproductive health, while they were much less able to cope with questions requiring a more detailed knowledge of the physiology of reproduction. The obtained results are partly consistent with those observations, indicating a greater knowledge of general issues than specific physiological parameters. The highest level of knowledge was recorded for the principles of intimate hygiene, the impact of lifestyle on fertility and basic information about pregnancy. Similarly to the cited papers (Walentynowicz-Moryl and Mianowska, 2020), the greatest difficulties identified in the present study concerned biological parameters, including the length of the menstrual cycle and the exact life span of the ovum after ovulation.

The high accuracy of responses regarding the impact of lifestyle factors (stress, stimulants, alcohol, diet) on fertility is consistent with the results of the educational program described by Bączek et al. (2020). The authors also emphasized that young people were becoming increasingly aware of behavioral risk factors affecting fertility and knew how to protect themselves against sexually transmitted infections (STIs), but their knowledge of the strictly biological mechanisms of reproduction remained highly insufficient. One possible explanation for such a pattern of results may be the students' exposure to information concerning various aspects of reproductive health. However, this hypothesis requires direct verification in further research. This view corresponds directly with the findings of Jabłońska et al. (2018), who pointed to the dominance of the mass media as the primary source of sexual knowledge.

A significant result was noted in the context of contraception: good knowledge of emergency and barrier contraception methods coupled with glaring difficulties regarding the knowledge of the Pearl Index and fertility awareness methods. Similar observations were presented by Musik (2024), indicating that students declared general knowledge of basic methods of contraception, but their expertise remained very limited. This is due to the fact that information about the most common methods is widely available on the Internet, while indicators of effectiveness and natural methods require more careful, expert knowledge acquisition.

The respondents' relatively good knowledge of the course of pregnancy and childbirth is also noteworthy, which partly aligns with the observations presented by Uzar (2019). This author showed that adolescents had basic knowledge about pregnancy. However, numerous misconceptions were noted regarding the nutrition of pregnant women and management in specific clinical situations. As regards the present study, similar discrepancies concerned such aspects as the correct classification of foods recommended during pregnancy.

It is worth noting a high percentage of overly restrictive beliefs regarding the consumption of certain products during pregnancy. Some products that, when prepared properly, may be part of a well-balanced diet during pregnancy were also classified as not recommended or prohibited. If such beliefs translate into actual eating behaviors, they may lead to the unjustified restriction of selected products. However, this relationship was not assessed in this study.

The study also showed limited knowledge about the professional competences of a midwife. Although the majority of the respondents correctly indicated the independent nature of this profession and the possibility of managing a physiological pregnancy by a midwife, over half of the respondents mistakenly believed that the midwife worked only with pregnant women and women in labor. The results indicate the urgent need to popularize the actual range of competences of midwives and their role in the promotion of women's reproductive health throughout their lives, which was strongly emphasized by Witkowska-Wirstlein (2013), who indicated midwives as key health educators. It is worth mentioning, however, that the study included adults (people studying at universities), so it can be assumed that the group represents a higher level of knowledge than a statistical citizen.

The comparison of the results of individual parts of the study revealed a discrepancy at the group level between the self-reported knowledge regarding selected health factors and the frequency of reporting engaging in the corresponding behaviors. According to the available literature on the subject (e.g., Musik, 2024), these areas were studied in isolation. A comprehensive look at the findings reveals a certain methodological and practical dissonance among the respondents.

The results of the proprietary test of knowledge and attitudes (as shown in Table 1 and Table 2) revealed that as many as 97.8% of the students declared full awareness that stress has a destructive effect on the regularity of the menstrual cycle, and 98.4% explicitly identified stressful situations as a factor directly reducing fertility. Moreover, in the axiological structure measured using the LHC questionnaire (Table 4), as many as 50.0% of the respondents considered "getting enough rest and sleep" to be the most important criterion for being healthy. This means that, at the declarative and conceptual level, the respondents demonstrated high awareness of the impact of stress on selected aspects of reproductive health.

Conversely, the direct comparison of this knowledge with actual life practices as measured by the Health Behavior Inventory (HBI, Table 5) revealed a clear difference in group distributions. Behaviors related to stress avoidance, adequate rest and avoidance of overwork were the last three items in the ranking of HBI weighted averages, with nearly half of the sample (48.9%) directly admitting to permanent work overload and lack of adequate sleep. These results suggest that the mere awareness of health recommendations does not necessarily coexist with frequent declarations of corresponding behaviors.

The observed pattern may be interpreted as a gap between knowledge and behavior. The respondents showed high awareness of some risk factors, while they were less likely to self-report selected behaviors related to stress reduction and rest. The reasons for the observed discrepancy were not the subject of this study and require further analysis taking account of factors such academic stress, burden of responsibilities, access to support and environmental conditions. These results are fully in line with the WHO health promotion guidelines (n.d.), according to which effective health education cannot be limited to the dry presentation of information, but must provide practical tools to enable lasting lifestyle changes.

This highlights the fact that reproductive health education programs in higher education institutions cannot rely solely on traditional topics of contraception or STI prevention. They must urgently emphasize stress management, elements of evidence-based nutrition, and sleep hygiene as an integral part of biological fertility protection. Information campaigns in the media alone are insufficient if they are not accompanied by specific preventive measures. Following the example of international solutions (e.g., in Slovenia), young people should be provided with free, universal access to medical tools, as exemplified by that country's program offering free HPV vaccinations to students up to age 26 (European Centre for Disease Prevention and Control, 2026).

Strengths of the study

The strengths of the study include the use of the proprietary knowledge test and two standardized tools for assessing health criteria and health behaviors in the same sample. An additional value is related to the analysis of responses at the level of individual items, enabling the identification of specific areas of knowledge and behaviors requiring further attention.

5. Limitations of the study

The interpretation of the obtained results requires taking account of several important methodological limitations. The use of convenient sampling using the CAWI Internet technique is the key one. Combined with the lack of randomness, it makes the sample unrepresentative and prevents the unconditional generalization of findings to the overall population of Polish students. In addition, the structure of the study group is characterized by strong feminization – women constituted as much as 80.8% of all respondents, which limits the possibility of formulating conclusions regarding male students. The age structure also poses an interpretative challenge. Despite the formally broad range covering individuals aged 18 to 48, as many as 94.51% of the participants belonged to the 18-25 age cohort, meaning that the findings apply primarily to the youngest generation of students. It should also be remembered that all questionnaires used are based on self-reports and subjective declarations, which may be associated with a tendency to provide answers that conform to social expectations (social desirability bias). Due to the cross-sectional nature of the study, the obtained results do not allow for conclusions regarding cause-and-effect relationships. The use of a proprietary knowledge test, the psychometric properties of which require further assessment, also constitutes a limitation. Moreover, an analysis based on aggregated group results does not, in itself, allow us to draw conclusions about discrepancies between knowledge and behavior in individual participants.

6. Practical implications and directions for further research

The obtained results justify considering the expansion of academic health promotion activities to include issues related to reproductive health, sleep, recovery, stress management and nutrition. Such activities could be supplemented by forms of psychological support and promotion of healthy habits available to students. It is also crucial to conduct information campaigns promoting the broad competences of midwives and for public health institutions to create reliable content in social media, which may facilitate access to information consistent with up-to-date medical knowledge.

In the context of further scientific steps, it is advisable to conduct longitudinal studies that would enable the assessment of the actual impact of stress on students' reproductive decisions in the long term. Future projects should also aim to increase the participation of men in the sample and include more diverse age groups and representative academic centers. A direct and in-depth comparison of health indicators between students in medical, humanities and technical programs would also be a valuable addition to the analyses.

Conclusions

- In the study group, the level of knowledge about reproductive health was diverse: a high level of knowledge about some general lifestyle factors was accompanied by gaps in knowledge regarding selected issues of reproductive physiology, nutrition in pregnancy and the scope of midwives' responsibilities.
- As regards nutrition during pregnancy, a high percentage of overly restrictive classifications of selected products was recorded, which indicates the need to strengthen education based on up-to-date recommendations.

- Within the LHC framework, the criteria related to subjective well-being and physical fitness received the highest ratings, while those defining health in terms of a limited need for medical care received lower ratings.
- At the level of group results, a discrepancy was observed between high awareness of the importance of stress and rest for health and a relatively rare declaration of behaviors related to rest, stress reduction and avoiding work overload. Despite the high awareness of selected factors affecting health, behaviors aimed at mental hygiene, physical recovery and avoidance of work overload occupy the lowest positions in the actual structure of health behaviors (HBI).
- The results justify developing educational activities addressed to students, which, in addition to providing medical knowledge, would cover practical competences regarding a healthy lifestyle, coping with stress, sleep, nutrition and the use of professional sources of information on reproductive health.

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