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The influence of socioeconomic and psychological factors on the popularity of sauna treatment among female university students

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The influence of socioeconomic and psychological factors on the popularity of sauna treatment among female university students

Abstract

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Material/Methods: The research was conducted in 2012 with 550 first-year female students, aged 19-20. The research was carried out with a diagnostic survey method using an anonymous questionnaire.

Results: Our findings revealed that the applied socioeconomic factors (permanent place of residence, parents' educational background and the students' monthly budget) as well as psychological factors (the evaluation of the sauna during bathing and the following day) significantly affected the frequency of sauna use. The research revealed a significant and positive influence of the sauna use on the students' well-being (during bathing and the following day). **Conclusions:** Sauna exerts a positive influence on students' mental well-being and should be used as a calming and relaxing method which could be implemented in the physical activity as well as health programs. Despite the statistically significant differences, the effects of the factors under investigation were analyzed only within a partial range due to a relatively low level of interest among the students in taking sauna bathing.

Keywords

sauna treatment, female students, socioeconomic status, psychological factors, popularity, influence

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The influence of socioeconomic and psychological factors on the popularity of sauna treatment among female university students

Authors' Contribution:

A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

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INTRODUCTION

People's lifestyle (work, play, rest and refreshment) is one of the main factors that determine and control human development. Exogenous environmental factors (modifiers) constitute another very important group of indicators that significantly affect human life, including socioeconomic sub-factors such as monthly earnings, parents' educational background and their culture, the organization of free time and rest, interest in physical activity, the size and nature of the socio-cultural environment as well as social customs and traditions. The character of the body response to the impact of socio-economic stimuli depends on the factor type, its intensity, duration and its structural difference.

Living and social conditions are predominant factors constituting individual's socioeconomic status [1]. Urbanization appears to be a key factor in this regard as there are apparent differences in human physical development depending on the place of living: urban, small town, or rural one [2]. Faster growing and maturation of children in urban environment results from better health care and living conditions (nutrition, hygiene, medical care) [3]. The research by Wolanski et al. [4] suggests that individuals representing metropolitan population are characterized by stronger body built, better nutrition, lower blood pressure, and better perspiration characteristic, except for a higher respiration rate caused quite probably by air pollution in industrial – urban environments. On the other hand, in the case of psychomotor traits, women residing in the country displayed greater muscle strength and shorter reaction time, which may indicate a positive health status in rural areas. This assertion is confirmed in the occurrence of fewer diseases among rural than urban populations. Undoubtedly, a significant effect of stimulating the nervous system and sensory organs (television, movies, commercials etc.) is also more discernible in the urban environment.

Family is a basic unit in the society, which, from the standpoint of human ecology, forms the basic environment for a child's development [4, 5]. Current incomes determine the approximate financial status of a family or a social or professional group [6]. The real state of affluence and consumption is determined by the amount of income attributed to each family member. A diversified overall level of incomes and expenditure entails a different way of cash management [7]. The study of the effect of family types under different cultural and economic conditions in Poland, Bulgaria, Japan, Korea, and Mexico provides evidence for civilization-related diversity of a family as the environment for child development [8]. Children of the intellectual background tend to be of a more ectomorphic build and reach a higher final body size than farmer's children, who show a more stocky body build. The highest value of somatic features and faster maturation is observed in children of parents with higher education [9]. Seemingly as a result, education in secondary schools is often undertaken by young people from upper classes of society [10].

An individual's biological status manifests itself by his/her physical, mental and social health, and in highly economically developed societies motor fitness is an important measure of a person's biological condition [11]. Possessing an appropriate level of motor fitness seems to be particularly

important these days in the light of a continuous decrease in the level of human physical activity, especially in economically developed regions [12]. The problem of human physical activity as one of the main factors determining overall human health has become important mostly in recent decades. Many observations and studies have shown the specific handicap of human biological properties, which in consequence leads to higher susceptibility to falling ill with numerous civilization diseases [13]. Therefore, we can speak of a certain reversal of the situation, in which favorable socio-economic conditions encourage sedentary lifestyle and thus indirectly lead to obesity. Several reports have indicated that there is a correlation between television viewing time and increased weight or risk of weight gain [14, 15].

The importance of saunas as a source of mental and physical well-being has been recognized by several researchers [16, 17]. Saunas began appearing along the Baltic coastline in Finland as early as in 1000 AD [17]. Throughout centuries people have taken baths in different forms and for different reasons, e.g. because of religious ceremonies, to heal illnesses, for cleaning purposes, relaxation or socializing. The Finnish sauna tradition, for instance, includes a strong social element [18].

THE INFLUENCE OF SAUNA ON THE HUMAN BODY

Literature on the subject clearly indicates that there are numerous health benefits of sauna bathing, e.g. for the cardiovascular systems and in lowering blood pressure [19]. The basic influence of sauna on human body refers to activating thermoregulatory mechanisms, which in turn trigger reactive changes in the whole system [20]. High temperatures in the sauna lead to the secretion of adrenalin [21], ACTH, cortisol and prolactin concentration after sauna bath, which might be due to the body's acclimatization to high temperature [22]. The activation of the endocrinal system is supposed to increase water retention in the body and maintain thermal equilibrium. Because of perspiration, the amount of sodium serum in the body is lowered. It was also determined that sauna bathing decreased the total amount of cholesterol (total cholesterol) and the concentration of low density lipids, simultaneously increasing the concentration of high density lipids [23]. A regular exposure to sauna alleviates pain accompanying injuries of the musculoskeletal system and enhances mobility of joints in patients suffering from rheumatism [23]. Scoon et al. demonstrated that a 3-week post-exercise sauna bathing resulted in noticeable enhancement of endurance running performance, apparently by increasing blood volume [24]. According to Pagel et al. [25], this may be accounted for by the release of blood from other organs and increased secretion of erythropoietin, which in turn enhances endurance abilities of human body by an increase in the peripheral blood and, by this, more efficient transport of blood to the operating muscles. In addition, the research conducted on scuba divers as participants showed that a single pre-dive sauna session significantly reduces circulating bubbles after a chamber dive, which may diminish the risk of decompression sickness [26]. As has been presented above, not only is sauna a popular social form of relaxation but also a way of treatment of numerous health illnesses and discomforts.

University students should be subject to specific concern, as after graduation they are typically involved in responsible public engagements, having

a significant impact on their social environment as role models. A large number of publications emphasize the role of university graduates in the economic and social development of a nation. Having a university degree more often than not increases social prestige and is one of the requirements for a prominent professional career and better life perspectives [27]. Due to their expertise and social position, individuals boasting higher education background tend to be opinion leaders, thus we can assume them to have a marked influence on shaping the social needs for a healthy lifestyle. A special concern and attention in terms of promoting a healthy lifestyle among university students should be given particularly to the students beginning university education as it is the first year of their studies that is abundant in the largest and stormiest changes in their lifestyle [28]. These changes mostly concern a noticeable reduction in physical activity and a dramatic rise in caloric intake (the main factors responsible for weight gain among college students), smoking, excessive drinking or drug taking [28, 30]. Moreover, the first year of university education is typically marked by a high amount of stress, as students newly enrolled in the university must face challenges of a new social and educational environment [31]. Being deprived of parental care and support, first-year students frequently have difficulty in coping with this pressure. Therefore, it is of great importance to raise awareness among university students of how to maintain and enhance physical and mental well-being. Educating students in these respects is highly advisable as this is the final stage of their education during which the attitudes towards a healthy lifestyle can be still modified or altered.

Pro-health habits of university students are to a large extent determined by their families' social, physical and economic environment. According to Basch [32], there is a relationship between low economic background and students' poorer academic achievements. The scope of literature on health education of students is very wide but not in every aspect. It was established that there is a general lack of information on the popularity of sauna among students, their knowledge of its influence on a human body, contraindications against its use and the degree of awareness of the benefits of sauna bathing as a function of the students' socioeconomic status.

The aim of the study was to assess the influence of socio-psychological factors, such as: the permanent place of residence, the location and the type of secondary school, parents' educational background, students' monthly budget, and the evaluation of sauna treatment during bathing and the following day on the frequency of sauna use among Polish female university students. It was also examined whether sauna use had an influence on the students' mental well-being. The following questions were formulated for this purpose:

1. Do selected socio-psychological factors such as: the permanent place of residence, the location and the type of secondary school, parents' educational background, students' monthly budget, and the evaluation of sauna treatment during bathing and the following day significantly influence the frequency of the sauna use by first-year female students enrolled at the University?
2. Is there an influence of sauna treatment on the student's mental disposition during bathing and the following day?

MATERIALS AND METHODS

ETHICS

The research was carried out in compliance with a prior consent from the Ethical Committee, and the subjects willingly volunteered to participate in the study, which they confirmed by signing a written statement.

PARTICIPANTS

The research was conducted in 2012 on 550 first-year female students attending the University. The students were randomly selected by a use of random selection tables out of 247 groups attending physical education (PE) classes. As a result, fifty-seven groups were formed. Eventually, the research involved 19-20-year-old female students who constituted over 97% of all the female students allocated in the selected groups. This number was determined on the basis of the technical opportunity of surveying the study participants within a single week. The students who were absent on the day of the study on health or other grounds were excluded from the research. The research was carried out with a diagnostic survey method using an anonymous questionnaire.

The research on the popularity of sauna bathing was developed by the director of the cross-sectional research project "Health-Conscious University" employed at the Department of Physical Education & Sport. The aim of the program was to examine the popularity of sauna bathing among young women entering university. As no other universities in this country have included sauna treatment in their physical education programs, our research involved a unique and pioneer project nationwide, in the course of which students were given an opportunity to use sauna at obligatory P.E. classes. The study group consisted entirely of first-year female students so as to complement and expand the series of cross-sectional studies conducted biannually with UWM first-year students since 2000. These studies mainly focused on the lifestyle and motor fitness of young adults beginning their university education [33]. Additionally, the present study will be continued over the course of the students' university education as a longitudinal study. The reason why only women were selected for the study is that females constitute the excessive majority of the university students (approx. 70%). The overwhelming majority of the students under our study were permanent residents of the voivodeship of this region. A detailed characteristic of the study group is presented in Table 1.

Women living permanently in small towns constitute the highest percentage of first-year students (28.91%), and a similar but lower percentage of respondents reside in the country or in big towns (24.00% and 23.27% respectively). Most of the surveyed students graduated from secondary schools located in small and big towns (36.55% and 35.09% respectively). A decided majority of respondents graduated from secondary schools (79.64%), whereas more than one fifth (20.36%) are graduates of vocational secondary schools. The largest number of students have parents with secondary school background (fathers – 49.27%, mothers – 63.27%) and the smallest number – with a university degree (fathers – 16.73%, mothers – 17.82%). About half of the surveyed students (50.56%) indicated the monthly budget up to PLN 1000 (USD 313), whereas slightly fewer (42.36%) – between PLN 1000-1500

(USD 313–469). Only 6.54% of respondents showed the budget between PLN 1500–2000 PLN (USD 469–625), and three students–more than 2000 PLN (USD 625) per month.

Table 1. Characteristics of the female students involved in the study

| Place of permanent residence - town population size | | | | | | | | | | | |
|---|-------|-----------------------|-------|-------------------|-------|------------|-------|----------|-------|-------|-----|
| Village | | Small town small S | | Big town | | Small city | | Big city | | Total | |
| N | % | N | % | N | % | N | % | N | % | N | % |
| 132 | 24.00 | 159 | 28.91 | 128 | 23.27 | 74 | 13.45 | 57 | 10.36 | 550 | 100 |
| Place of secondary school - town population size | | | | | | | | | | | |
| Village | | Small town small S | | Big town | | Small city | | Big city | | Total | |
| N | % | N | % | N | % | N | % | N | % | N | % |
| 7 | 1.27 | 193 | 35.09 | 201 | 36.55 | 86 | 15.64 | 63 | 11.45 | 550 | 100 |
| Type of the secondary school | | | | | | | | | | | |
| Secondary School | | | | Vocational school | | | | Total | | | |
| N | | % | | N | | % | | N | | % | |
| 438 | | 79.64 | | 112 | | 20.36 | | 550 | | 100 | |
| Father's educational background | | | | | | | | | | | |
| Primary | | Secondary | | Higher | | Total | | | | | |
| N | | % | | N | | % | | N | | % | |
| 187 | | 34.00 | | 271 | | 49.27 | | 92 | | 16.73 | |
| 550 | | 100 | | | | | | | | | |
| Mother's educational background | | | | | | | | | | | |
| Primary | | Secondary | | Higher | | Total | | | | | |
| N | | % | | N | | % | | N | | % | |
| 104 | | 18.91 | | 348 | | 63.27 | | 98 | | 17.82 | |
| 550 | | 100 | | | | | | | | | |
| Students' monthly budget | | | | | | | | | | | |
| <PLN 1000 | | PLN 1000 - 1500 | | PLN 1500 - 2000 | | PLN 2000 < | | Total | | | |
| N | % | N | % | N | % | N | % | N | % | | |
| 278 | 50.56 | 233 | 42.36 | 36 | 6.54 | 3 | 0.54 | 550 | 100 | | |

Explanations: N - number of respondents, % - percentage

It was also assessed whether the number of female students adopted for the research is sufficient so as to treat the test as a representative of this type of research. The following formula was used for this purpose (1):

Where:

d - maximum (acceptable) estimation error. $\mu\alpha$ - value read from the normal distribution table N(0.1) at the accepted significance level of $1 - \alpha$. For the accepted level of significance $1 - \alpha = 0.95$ ($\mu\alpha = 1.96$) it was assumed that the estimation error does not exceed 5% [34]. The necessary number of participants was established as 485, thus lower than the actual number accounted for in the studies (550). That is why the study group of female students can be considered homogenous and representative for the population of first-year university students.

SELF-ADMINISTERED QUESTIONNAIRE

An anonymous questionnaire consisted of questions related to the frequency

of sauna use among Polish female university students, and their personal feelings and impressions connected with sauna during bathing and the following day. These feelings and impressions were evaluated using a 10-point scale (evaluation rating between 1 and 5 – moderate satisfaction, evaluation between 6 and 10 – great satisfaction). The questions in the last part of the survey referred to the information on the participants' gender, age, and the following socio-psychological factors (independent variables): place of permanent residence, parents' educational background, students' monthly budget, evaluation of sauna bathing during the bathing and the following day and its influence on the frequency of sauna use.

STATISTICS

Statistical calculations were carried out using the Statistica PL v.10 computer program in the basic statistics module. Descriptive statistics as well as tests of significance for the structure indicator at a significance level of $\alpha = 0.05$ were applied in the calculations and statistically significant differences occurred when the calculated p value was lower than α ($p < \alpha$). The formula below was used in order to calculate the structure indicator (relative frequency), which explains the division of the analyzed statistical sample into groups of subjects differentiated by values of individual features (1):

$$W_i = \frac{n_i}{N} \quad (1)$$

Where:

W_i – structure indicator, n_i – the number of individual components of a given group, N – the number of the whole statistical sample [34]. For interpretation of the results, the following residential categories were established: village, small town: < 20,000 inhabitants, big town: 20,000 – 50,000 inhabitants, small city: 50,000 – 100,000 inhabitants, and big city: > 100,000 inhabitants.

RESULTS

Tables 2-7 show the influence of several socioeconomic factors such as the place of permanent residence, the type and place of secondary school, parents' educational background, students' monthly budget as well as the evaluation of sauna treatment on the popularity of sauna among female university students.

Table 2. The influence of the place of permanent residence on the frequency of using sauna

| Statistical parameters | Town population size | | | | | | | | | |
|--|----------------------|--------|------------|--------|----------|--------|------------|--------|----------|--------|
| | Village | | Small town | | Big town | | Small city | | Big city | |
| | Use of sauna | | | | | | | | | |
| | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| No of students questioned | 53 | 79 | 53 | 106 | 57 | 71 | 38 | 36 | 18 | 39 |
| Structure indicator | 0.0964 | 0.1436 | 0.0964 | 0.1927 | 0.1036 | 0.1291 | 0.0691 | 0.0655 | 0.0327 | 0.0709 |
| Probability (p) | 0.0080 | | 0.0000 | | 0.0936 | | 0.4058 | | 0.0021 | |
| Frequency of using sauna | | | | | | | | | | |
| Frequency of using sauna | Town population size | | | | | | | | | |
| | Village | | Small town | | Big town | | Small city | | Big city | |
| | N | % | N | % | N | % | N | % | N | % |
| 1 – 2 times in life | 33 | 62.26 | 27 | 50.94 | 13 | 22.81 | 15 | 39.47 | 6 | 33.33 |
| 3 – 20 times in life | 6 | 11.32 | 5 | 9.43 | 10 | 17.54 | 4 | 10.53 | 5 | 27.78 |
| 1 – 2 times a week | 3 | 5.66 | 2 | 3.77 | 2 | 3.51 | 3 | 7.89 | 0 | 0.00 |
| 1 – 3 times a month | 2 | 3.77 | 5 | 9.43 | 7 | 12.28 | 1 | 2.63 | 3 | 16.67 |
| 1 – 6 times a year | 9 | 16.98 | 14 | 26.42 | 25 | 43.86 | 15 | 39.47 | 4 | 22.22 |
| Total | 53 | 100 | 53 | 100 | 57 | 100 | 38 | 100 | 18 | 100 |
| Degree of freedom | | | | | | | | | 16 | |
| Chi-square value | | | | | | | | | 29.1078 | |
| Probability (p) of exceeding the calculated value of chi-square statistics | | | | | | | | | 0.02 | |

Explanations: if $p < \alpha = 0.05$ – statistically significant differences, N – number of respondents, % – percentage

Table 2 presents the influence of the place of permanent residence on the frequency of using sauna by female students. It was revealed that there is a significant negative relationship between the frequency of using sauna by female students living in villages ($p = 0.0080$) and small towns ($p=0.0000$). Among the women living in villages, small towns and big cities the largest number of students admitted to taking sauna bathing once or twice in their lives (village – 62.26%, small town– 50.94%, big cities – 33.33%). In big towns, the highest percentage of women used sauna 1–6 times a year (43.86%), whereas in small cities both the students who took sauna bathing once or twice in their lives and those who did so 1–6 times a year constituted the highest percentage (39.47%). None of the students living in big cities attended sauna studios 2–3 times a week (Tab. 2).

Table 3. The influence of parents' educational background on the frequency of using sauna

| Mother's educational background | | | | | | |
|--|----------------|--------|------------------|--------|------------------|--------|
| Statistical parameters | Primary school | | Secondary school | | Higher education | |
| | Yes | No | Yes | No | Yes | No |
| No of students questioned | 31 | 73 | 138 | 210 | 50 | 48 |
| Structure indicator | 0.0564 | 0.1327 | 0.2509 | 0.3818 | 0.0909 | 0.0873 |
| Probability (p) | 0.0000 | | 0.0000 | | 0.4170 | |
| Mother's educational background | | | | | | |
| Frequency of using sauna | Primary school | | Secondary school | | Higher education | |
| | N | % | N | % | N | % |
| 1 – 2 times in life | 11 | 35.48 | 56 | 40.58 | 26 | 52.00 |
| 3 – 20 times in life | 6 | 19.35 | 21 | 15.22 | 6 | 12.00 |
| 1 – 2 times a week | 2 | 6.45 | 7 | 5.07 | 1 | 2.00 |
| 1 – 3 times a month | 3 | 9.68 | 10 | 7.25 | 6 | 12.00 |
| 1 – 6 times a year | 9 | 29.03 | 44 | 32.88 | 11 | 22.00 |
| Total | 31 | 100 | 138 | 100 | 50 | 100 |
| Degree of freedom | | | | | 8 | |
| Chi-square value | | | | | 5.5903 | |
| Probability (p) of exceeding the calculated value of chi-square statistics | | | | | 0.69 | |
| Father's educational background | | | | | | |
| Statistical parameters | Primary school | | Secondary school | | Higher education | |
| | Yes | No | Yes | No | Yes | No |
| No of students questioned | 60 | 127 | 120 | 151 | 39 | 53 |
| Structure indicator | 0.1091 | 0.2309 | 0.2182 | 0.2745 | 0.0709 | 0.0964 |
| Probability (p) | 0.0000 | | 0.0151 | | 0.0633 | |
| Father's educational background | | | | | | |
| Frequency of using sauna | Primary school | | Secondary school | | Higher education | |
| | N | % | N | % | N | % |
| 1 –2 times in life | 30 | 50.00 | 46 | 38.33 | 17 | 43.59 |
| 3 – 20 times in life | 15 | 25.00 | 12 | 10.00 | 3 | 7.69 |
| 1–2 times a week | 5 | 8.33 | 4 | 3.33 | 1 | 2.56 |
| 1 – 3 times a month | 3 | 5.00 | 12 | 10.00 | 4 | 10.26 |
| 1 – 6 times a year | 7 | 11.67 | 46 | 38.33 | 14 | 35.90 |
| Total | 60 | 100 | 120 | 100 | 39 | 100 |
| Degree of freedom | | | | | 8 | |
| Chi-square value | | | | | 22.5847 | |
| Probability (p) of exceeding the calculated value of chi-square statistics | | | | | 0.004 | |

Explanations: if $p < \alpha = 0.05$ – statistically significant differences, N – number of respondents, % – percentage

Table 3 demonstrates the influence of parents' educational background on the frequency of using sauna. It was stated that there was a negative influence of merely primary ($p = 0.0000$) or secondary ($p = 0.0000$) education on the popularity of sauna. The highest percentage of students declaring sauna use once or twice in their lives had mothers with primary (35.48%), secondary (40.58%), and higher education (52.00%). A relatively high percentage of students attending sauna 1–6 times a year had mothers of all levels of educational background. In the case of fathers' educational background, a similar correlation was observed: the negative influence on the popularity of sauna use was observed in the case of the students whose fathers had primary ($p = 0.0000$) and secondary ($p = 0.0151$) education. Namely, the highest percentage of students attended sauna once or twice in their lives and those were the students whose fathers acquired either primary (50.00%), secondary (38.33%), or higher education (43.59%). Additionally, among the students

whose fathers acquired merely primary education, 25% attended sauna 3–20 times in their lives, and higher education – 1–6 times a year (38.33% and 35.90% respectively) (Tab. 3).

Table 4. The influence of the students' monthly budget on the frequency of using sauna

| Students' monthly budget | | | | | | | | |
|--|-----------|--------|-----------------|--------|-----------------|--------|------------|--------|
| Statistical parameters | <PLN 1000 | | PLN 1000 – 1500 | | PLN 1500 – 2000 | | PLN 2000 < | |
| | Yes | No | Yes | No | Yes | No | Yes | No |
| No of students questioned | 53 | 225 | 143 | 90 | 20 | 16 | 3 | 0 |
| Structure indicator | 0.0964 | 0.4091 | 0.2582 | 0.1636 | 0.0364 | 0.0291 | 0.0055 | 0.0000 |
| Probability (p) | 0.0000 | | 0.0001 | | 0.2482 | | 0.0408 | |
| Students' monthly budget | | | | | | | | |
| Frequency of using sauna | <PLN 1000 | | PLN 1000 – 1500 | | PLN 1500 – 2000 | | PLN 2000 < | |
| | N | % | N | % | N | % | N | % |
| 1–2 times in life | 28 | 52.83 | 60 | 42.25 | 3 | 15.00 | 1 | 33.33 |
| 3 – 20 times in life | 9 | 16.98 | 19 | 13.38 | 2 | 10.00 | 0 | 0.00 |
| 1–2 times a week | 4 | 7.55 | 6 | 4.23 | 0 | 0.00 | 0 | 0.00 |
| 1 – 3 times a month | 3 | 5.66 | 15 | 10.56 | 0 | 0.00 | 1 | 33.33 |
| 1 – 6 times a year | 9 | 16.98 | 42 | 29.58 | 15 | 75.00 | 1 | 33.33 |
| Total | 53 | 100 | 143 | 100 | 20 | 100 | 3 | 100 |
| Degree of freedom | | | | | | | 12 | |
| Chi-square value | | | | | | | 29.1563 | |
| Probability (p) of exceeding the calculated value of chi-square statistics | | | | | | | 0.004 | |

Explanations: if $p < \alpha = 0.05$ – statistically significant differences, N – number of respondents, % – percentage

The influence of the students' monthly budget on the frequency of using sauna is demonstrated in Table 4. The negative influence of the monthly budget was observed in the groups of students whose monthly budget was below PLN 1000 ($p = 0.0000$). In the case of women with up to PLN 1000-1500 ($p = 0.0001$) and over PLN 2000 ($p = 0.0408$) a month at their disposal, a positive influence of this budget was observed on the frequency of using sauna. In the case of women with the monthly budget below PLN 1500, the highest percentage of respondents used sauna once or twice in their lives (< PLN 1000 – 52.83%, and from PLN 1000 to PLN 1500 – 42.25%). As for the students whose monthly budget ranged from PLN 1500-2000, three fourths used sauna 1-6 times a year. In the case of women with the monthly budget over PLN 2000, the same number of respondents (33.33%) attended sauna once or twice in their lives, 1-3 times a month, and 1-6 times a year. Within the same group none of the students took sauna bathing 3-20 times in their lives and once or twice a week (Tab. 4).

Table 5 shows the influence of sauna on the students' well-being during the bathing and the following day. It was observed that in most of the cases the sauna bathing significantly improved the students' well-being during the bathing (ratings from 5 to 10) as well as the following day (rating from 6 to 10). The positive influence of the sauna bathing significantly affected the frequency of using sauna in both cases. The majority of the women under study declared their willingness to attend sauna in the future (Tab. 5).

Table 5. The evaluation of sauna and its influence on the frequency of sauna use

| Evaluation rating | Do you want to attend sauna? | The level of satisfaction during the sauna bathing | | | The level of satisfaction the following day | | |
|-------------------|------------------------------|--|---------------------|-----------------|---|---------------------|-----------------|
| | | N | Structure indicator | Probability (p) | N | Structure indicator | Probability (p) |
| 1 | Yes | 0 | 0.0000 | 0 | 0 | 0.0000 | 0 |
| | No | 0 | 0.0000 | | 0 | 0.0000 | |
| 2 | Yes | 0 | 0.0000 | 0 | 0 | 0.0000 | 0 |
| | No | 0 | 0.0000 | | 0 | 0.0000 | |
| 3 | Yes | 0 | 0.0000 | 0 | 0 | 0.0000 | 0 |
| | No | 0 | 0.0000 | | 0 | 0.0000 | |
| 4 | Yes | 0 | 0.0000 | 0 | 0 | 0.0000 | 0 |
| | No | 0 | 0.0000 | | 0 | 0.0000 | |
| 5 | Yes | 14 | 0.0291 | 0.0013 | 9 | 0.0218 | 0.1232 |
| | No | 2 | 0.0055 | | 5 | 0.0127 | |
| 6 | Yes | 20 | 0.0418 | 0.0000 | 18 | 0.0345 | 0.0043 |
| | No | 2 | 0.0055 | | 5 | 0.0109 | |
| 7 | Yes | 35 | 0.0727 | 0.0000 | 34 | 0.0691 | 0.0010 |
| | No | 4 | 0.0127 | | 9 | 0.0291 | |
| 8 | Yes | 49 | 0.1018 | 0.0000 | 51 | 0.1109 | 0.0000 |
| | No | 9 | 0.0255 | | 12 | 0.0327 | |
| 9 | Yes | 41 | 0.0818 | 0.0000 | 38 | 0.0782 | 0.0001 |
| | No | 4 | 0.0127 | | 10 | 0.0273 | |
| 10 | Yes | 31 | 0.0636 | 0.0002 | 24 | 0.0491 | 0.0001 |
| | No | 8 | 0.0200 | | 4 | 0.0109 | |

Explanations: if $p < \alpha = 0.05$ – statistically significant differences, N – number of respondents

Table 6. The influence of the place of secondary school on the frequency of using sauna

| Location of secondary school | | | | | | | | | | |
|--|----------|------------|-----------------|------------|-----------|------------|------------|------------|-----------|------------|
| Statistical parameters | Village | | Population size | | | | | | | |
| | | | Small town | | Big town | | Small city | | Big city | |
| | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| No of students questioned | 3 | 4 | 63 | 130 | 83 | 118 | 48 | 38 | 22 | 41 |
| Structure indicator | 0.005 | 0.007 | 0.114 | 0.236 | 0.1509 | 0.2145 | 0.087 | 0.0691 | 0.0745 | 0.0400 |
| Probability (p) | 0.3541 | | 0.0000 | | 0.0032 | | 0.1305 | | 0.0069 | |
| Frequency of using sauna | Village | | Small town | | Big town | | Small city | | Big city | |
| | N | % | N | % | N | % | N | % | N | % |
| 1 – 2 times in life | 2 | 66.67 | 32 | 51.61 | 29 | 34.94 | 20 | 41.67 | 9 | 40.91 |
| 3 – 20 times in life | 0 | 0.00 | 5 | 8.06 | 12 | 14.46 | 7 | 14.58 | 6 | 27.27 |
| 1 – 2 times a week | 1 | 33.33 | 1 | 1.61 | 5 | 6.02 | 3 | 6.25 | 0 | 0.00 |
| 1 – 3 times a month | 0 | 0.00 | 5 | 8.06 | 9 | 10.84 | 2 | 4.17 | 3 | 13.64 |
| 1 – 6 times a year | 0 | 0.00 | 19 | 30.65 | 28 | 33.73 | 16 | 33.33 | 4 | 18.18 |
| Total | 3 | 100 | 63 | 100 | 83 | 100 | 48 | 100 | 22 | 100 |
| Degree of freedom | 16 | | | | | | | | | |
| Chi-square value | 20.76654 | | | | | | | | | |
| Probability (p) of exceeding the calculated value of chi-square statistics | 0.19 | | | | | | | | | |

Explanations: if $p < \alpha = 0.05$ – statistically significant differences, N – number of respondents, % - percentage

As can be seen from Table 6, in big ($p = 0.0000$) and small ($p = 0.0032$) towns, and in big cities ($p=0.0069$) the number of women attending sauna was significantly lower in comparison to those who never used sauna. Of all the students attending sauna in all the places of secondary school, the highest percentage of women visited sauna once or twice in their lives. Surprisingly, among the women who graduated from secondary school in the country, more than 33% of the respondents used sauna 1-2 times in a week. A similar percentage of women who have completed secondary school in small and big towns and small cities attended sauna 1-6 times a year (30.65%, 33.73%, and 33.33% respectively). A slightly more than a quarter of women (27.27%) who graduated from secondary school in big cities visited the sauna 3-20 times in their lives (Tab. 6).

Table 7. The influence of the type of secondary school on the frequency of using sauna

| Statistical parameters | Type of secondary school | | | |
|--|------------------------------|------------|-------------------|------------|
| | State-owned secondary school | | Vocational school | |
| | Yes | No | Yes | No |
| No of students questioned | 179 | 259 | 40 | 72 |
| Structure indicator | 0.3255 | 0.4709 | 0.0727 | 0.1309 |
| Probability (p) | 0.0000 | | 0.0007 | |
| Frequency of using sauna | State-owned secondary School | | Vocational school | |
| | N | % | N | % |
| 1 – 2 times in life | 73 | 41.01 | 19 | 47.50 |
| 3 – 20 times in life | 24 | 13.48 | 6 | 15.00 |
| 1–2 times a week | 8 | 4.49 | 2 | 5.00 |
| 1 – 3 times a month | 17 | 9.55 | 2 | 5.00 |
| 1 – 6 times a year | 57 | 31.46 | 11 | 27.50 |
| Total | 179 | 100 | 40 | 100 |
| Degree of freedom | | | 4 | |
| Chi-square value | | | 1.341 | |
| Probability (p) of exceeding the calculated value of chi-square statistics | | | 0.854 | |

Explanations: if $p < \alpha = 0.05$ – statistically significant differences, N – number of respondents, % – percentage

Table 7 shows that among the students who graduated from both of the school types, a significantly higher percentage of respondents did not attend the sauna studios at all (state-owned secondary school – $p = 0.0000$, vocational school – $p = 0.0007$). The highest percentage of respondents who completed both types of schools used the sauna once or twice in their lives. About 30% of graduates from secondary and vocational schools took sauna bathing 1–6 times a year (31.46%, and 27.50% respectively) (Tab. 7).

DISCUSSION

Without doubt, our results present the practical value as they can be used to increase the popularity of sauna among students at Polish schools of higher education. In Finland the use of sauna is so customary that it is included in the national survey of time use [35] but it is not compared to this study due the different research settings. Our observations revealed that 19-20-year-old women only sporadically frequent sauna in the analyzed region. Accordingly, the applied socioeconomic-psychological factors significantly affected the popularity of sauna among Polish female university students; however, the frequency of using sauna was relatively low.

It was observed that sauna treatment was significantly less popular among the women residing in the country and in small towns under 20,000 inhabitants. Generally, those women took sauna bathing more rarely as compared to the graduates from big cities. This may be accounted for by limited access to sauna facilities in rural areas and small towns, yet this is not the only reason. Another reason may be a very low level of physical activity of Polish university students confirmed by numerous research including cross-sectional studies on UWM female students [33], students of Polish medical schools [36] and the University of Szczecin [37]. The lack of regular sauna use can result from the Polish students' unfamiliarity with the beneficial effects of sauna bathing on the human body [21, 22] as well as the lack of such a custom in the Polish society, which is particularly noticeable in rural areas and small towns. Residents of larger population centers have a much easier access to sauna studios, or in some cases the facilities are available even for free, as it is for example in the case of swimming lessons conducted at the UWM as compulsory P.E. classes. Immediately after a one-hour swimming session every student is given 30 min. for biological regeneration (sauna, jacuzzi, etc.). Students learning to swim often visit the sauna after the workout. Therefore, it might be assumed that such a way of training encouraged the students to initiate the habit of using sauna. What is more, for the students attending swimming lessons sauna bathing has become a welcome and desirable trend, the lack of which could unfavorably affect students' image. The cross-sectional studies conducted biannually among first-year university female students revealed that the vast majority of women limit their physical activity only to the obligatory PE lessons [33]. Therefore, the attractiveness of such classes would be conceivably increased by introducing additional physical activities combined with sauna use as a relaxation follow-up [20]. It may be expected that particularly those women who attend the swimming lessons will take up sauna bathing as their regular pastime, which might lead to increasing their overall level of physical activity.

It was also noted that women whose parents have primary and secondary education used sauna significantly fewer times than females raised by parents of higher education background. Pro-health attitudes are more common in families raised by parents with a university degree [5], and therefore the use of sauna is more popular in the families of the intelligentsia.

Another significant factor influencing the frequency of using sauna is the students' monthly budget. The students who had less than 1000 PLN per month at their disposal took sauna bathing significantly fewer times compared with those whose monthly budget ranged from PLN 1000-1500 and more than PLN 2000 a month. Our results, therefore, confirmed the views of the scientists claiming that financial situation of the family is one of the most important factors affecting human behavior in relation to physical health [6, 11]. Low socioeconomic status appears to be related to adolescents' food consumption habits [38], physical inactivity practices and subsequent obesity rates [39].

The factors that did not differentiate the frequency of using sauna were the type of secondary school and the location of secondary school. It was observed that sauna treatment was significantly less popular in both types of schools, i.e. state-owned secondary and vocational schools, as well as among the women who completed secondary schools in small and big towns and big

cities. Polish secondary schools regardless of the type and profile are rarely equipped with facilities such as sauna parlors. The only instances of schools with such facilities are sports profile secondary schools, which is why it can be stated that the use of sauna in ordinary secondary schools is incidental.

Interesting are the results of the influence of psychological factors on the use of sauna by young women. Those students who felt refreshed and relaxed during bathing as well as the following day (high ratings in the 10-point scale) visited the sauna much more frequently than those whose impressions were less favorite (lower ratings awarded). Some women who gave lower ratings for their well-being the following day were nonetheless still interested in taking sauna bathing in future, which could be due to their curiosity, eagerness to follow the trend, or their intention of taking care of their health. The marked majority of the respondents stated that sauna bathing affected them highly positively as they felt refreshed and calm. For this reason sauna treatment can contribute significantly to improving their mental health, which is of great importance for young people during the university time. The studies conducted among the female students at the UWM have shown that a marginal percentage (0.53%) of the participants took sauna bathing in order to lower the amount of stress [31]. Studying is a period of concentrated stress, which is particularly intensified during exam sessions. In many cases it causes a significant increase in depression and other forms of psycho-pathology among students [40].

Our findings showed a relatively significant influence of the analyzed socioeconomic and psychological factors on the use of sauna. They also constitute an interesting reference material for the observation of a similar design conducted among the students studying in other countries. As it has been stated before, there are no studies on the effect of environmental factors on the popularity of sauna by students in other countries and thus different in terms of socio-cultural behaviors in relation to their own health. A significant influence of environmental factors is discernible in health differences occurring among the university students [41]. In the case of Polish universities there is a distinct lack of health programs implemented in order to reduce the gap determined by the socioeconomic status. Disseminations of one of the components of such a program can consequently enhance its attractiveness and effectiveness.

LIMITATION

Sadly, the results of our research cannot be compared to any studies by other Polish and/or foreign authors, since no such studies concerning the popularity of sauna in relation to socioeconomic and psychological factors have been published yet. Another limitation resulted from the fact that our research was pioneering in examining the popularity of sauna among university students participating in obligatory P.E. classes as none of the Polish universities include sauna bathing in their university programs. Furthermore, another limitation of expanding this research into international and overseas university center stems directly from the fact in the vast majority of countries within and outside the European Union, obligatory P.E. classes at universities are no longer a common practice. For the reason that Polish higher education still includes obligatory P.E. classes in their curriculum, Polish P.E. teachers at universities

have a unique chance of shaping students' pro-health attitudes promoting physical activity.

CONCLUSION

The studies showed a significant influence of socioeconomic and psychological factors on the popularity of sauna treatment among female university students aged 19-20. Despite the statistically significant differences, the effects of the factors under investigation were analyzed only within a partial range due to the students relatively low level of interest in taking sauna bathing. Sauna exerts a positive influence on students' mental well-being and should be used as a calming and relaxing method which could be implemented in the physical activity as well as health programs. Research on the relationships between environmental factors and the popularity of sauna among the university students should be confirmed extending its range of additional factors such as sex and age. Additional attempts should be made to continue the research by expanding it into other education institutions in Poland and abroad, so as to determine the potential use of sauna during obligatory as well as voluntary physical activity programs at universities.

REFERENCES

- [1] Tanner JM. Growth as a mirror of the society: secular trend and class distinction. In: Demirjian A, Brault-Dubuc M. editors. *Human Growth: A multidisciplinary review*. London & Philadelphia: Taylor and Francis; 1986, 3-34.
- [2] Eveleth PB, Tanner JM. *World wide variation in human growth*. Cambridge: Cambridge University Press; 1990.
- [3] Eiben OG, Mascie-Taylor CDN. Children's growth and socio-economic status in Hungary. *Econ Hum Biol*. 2004;2:295-320.
- [4] Wolanski N, Tomonari K, Januszko L, Liocheva V, Chung S, Tsushima S. Comparative study on socio-economic and biological properties of families from Bulgaria, Japan, South Korea and Poland. *Stud Hum Ecol*. 1991;9:151-166.
- [5] Bogin B. *Patterns of Human Growth*, Second Ed. Cambridge: Cambridge University Press; 1999.
- [6] Roche AF, Sun SS. *Human Growth: Assessment and Interpretation*. Cambridge: Cambridge University Press; 2003.
- [7] Tanner JM. *Growth at Adolescence*, Second Ed. Oxford: Blackwell; 1962
- [8] Wolański N, Chung S, Czarzasta T, et al. Family characteristics and offspring growth in various countries I. Frequency of various family types in Bulgaria, Japan, Korea, Mexico and Poland. *Stud Hum Ecol*. 1994;11:5-11.
- [9] Eiben OG, Panto E. Some data to growth of Hungarian youth in function of socio-economic factors. *Anthropologie*. 1988;26:9-23.
- [10] Podstawski R, Gornik K, Kolankowska E. First year female students lifestyles and attitudes towards health risk and preventive measures. In: Harris PB, editor. *Health behavior new re-search. Public health in the 21st century*. New York: Nova Science Publishers; 2013, 29-57.
- [11] Tanner JM. Introduction: growth in height as a mirror of the standard of living. In: Komlos J, editor. *Stature living standards and economic development*. Chicago-London: The University of Chicago Press; 1994, 1-6.
- [12] Francis KT. Status of the year 2000 health goals for physical activity and fitness. *Physical Therapy*. 1999;79:405-414.
- [13] Church TS, Earnest CP, Skinner JS, Blair SN. Effects of different doses of physical activity on cardiorespiratory fitness among sedentary, overweight or obese postmenopausal women with elevated blood pressure. *JAMA*. 2007; 297: 2081-2091.
- [14] Dietz WH, Grotmaker SL. Do we fatten our children at the television? *Pediatrics*. 1985;75:807-812.
- [15] Tucker LA. The relationship of television viewing to physical fitness and obesity. *Adolescence*. 1986;21:797-806.
- [16] Cohen M, Bodeker G. *Understanding the global spa industry: Spa management*. Oxford: Butterworth-Heinemann; 2008.
- [17] Smith M, Puczek L. *Health and wellness tourism*. Oxford: Butterworth-Heinemann; 2008.
- [18] Hjalager A-M, Konu H, Huijbens EH, et al. *Innovating and re-branding Nordic wellbeing tourism*. Final report from a joint NICe research project. NICe Press; 2011.
- [19] Hannuksela ML, Ellahham S. Benefits and risks of sauna bathing. *Am J Med*. 2001;110:118-126.

- [20] Podstawski R, Honkanen A, Tuohino A, Kolankowska E. Recreational-health use of saunas by 19-20-year-old Polish university students. *J Asian Sci Res.* 2013;3(9):910-923.
- [21] Kukkonen-Harjula K, Kauppinen K. How the sauna affects the endocrine system. *Ann Clin Res.* 1988;20(4):262-266.
- [22] Kauppinen K. Sauna, shower, and ice water immersion. Physiological response to brief exposures to heat, cool, and cold. Part I. Body fluid balance. *Arc Med Res.* 1989;48(2):55-63.
- [23] Pilch W, Szygula Z, Klimek A, et al. Changes in the lipid profile of blood serum in women taking sauna baths of various duration. *Int J Occup Med Environ Health.* 2010;23(2):167-174.
- [24] Kukkonen-Harjula K, Kauppinen K. Health effects and risk of sauna bathing. *Int J Circ Health.* 2006;65(3):195-205.
- [25] Scoon GSM, Hopkins WG, Mayhew S, Cotter JD. Effect of post-exercise sauna bathing on the endurance performance of competitive male runners. *J Sci Med Sport.* 2007;10(4):259-262.
- [26] Pagel H, Jelkmann W, Weis C. Comparison of the effects of renal artery constriction and anemia on the production of erythropoietin. *Eur J Appl Physiol.* 1988;413(1):62-66.
- [27] Blatteau JE, Gempp E, Balestra C, Mets T, Germonpre P. Pre-dive sauna and venous gas bubbles upon decompression from 400 kpa. *Avia Space Environ Med.* 2008;79(12):1100-1105.
- [28] Ansari WE, Stock C, John J, et al. Health promoting behaviours and lifestyle characteristics of students at seven universities in the UK. *Cent Eur J Pub Health.* 2011;19(4):197-204.
- [29] Huang TK, Harris KJ, Lee RE, Nazir N, Born W, Kaur H. Assessing overweight, obesity, diet, and physical activity in college students. *J Am Coll Health.* 2003;52:83-86.
- [30] Bray SR, Born HA. Transition to university and vigorous physical activity: implications for health and psychological well-being. *J Am Coll Health.* 2004;52:181-188.
- [31] Podstawski R, Gornik K, Kolankowska E, Boraczynski M, Boraczynska S. Health attitudes of the female students from Olsztyn, Poland – the physical activity, addictions and the knowledge about health behaviors. *Pedagogics, Psychology, Medical-biological Problems of Physical Training and Sports.* 2013;4:73-82.
- [32] Basch ChE. Healthier students are better learners: A missing link in school reforms to close the achievement gap. *J School Health.* 2011;81(10):593-598.
- [33] Podstawski R. Sprawność fizyczna i opinie na temat profilaktyki zagrożeń zdrowia studentów pierwszego roku Uniwersytetu Warmińsko-Mazurskiego w Olsztynie w roku akademickim 1999/2000 [Physical ability and opinions on health prevention among the first-year students at the University of Warmia & Mazury in Olsztyn in the academic year 1999/2000]. Olsztyn: UWM Press; 2006. Polish.
- [34] Nowak E. Zarys metod ekonometrii [Outline of econometric methods]. Warsaw: PWN Press; 2002. Polish.
- [35] Official Statistics of Finland (OSF). Time use survey [e-publication]. Helsinki: Statistics Finland, 2013, [referred: 13.8.2013].
- [36] Lisicki T. Studenci I roku akademii medycznych wobec wymogów zdrowego stylu życia [First year students of medical universities compared with health lifestyle requirements]. Gdańsk: AWFIS Press; 2006. Polish.
- [37] Umiastowska D. Zmiana modelu akademickiego wychowania fizycznego w świetle badań uczestnictwa szczecińskich studentów w kulturze fizycznej. [Change of the model of physical education at universities in the light of research on participation in physical education of students from Szczecin]. Szczecin: University of Szczecin Press; 2007. Polish.
- [38] McMurray RG, Ainsworth BE, Harrell JS, Griggs TR, Williams OD. Is physical activity or aerobic power more influential on reducing cardiovascular disease risk factors? *Med Sci Sport Exerc.* 1998;30:1521-1529.
- [39] Butler J, Fryer CS, Reed EA, Thomas SB. Utilizing the school health index to build collaboration between a university and an urban school district. *J Sch Health.* 2011;81(12):774-782.
- [40] Bayram N, Bilgel N. The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. *Soc Psychol Psychiatr Epidemiol.* 2008;43:667-672.
- [41] Basch ChE. Healthier Students Are Better Learners: High-Quality, Strategically Planned, and Effectively Coordinated School Health Programs Must Be a Fundamental Mission of Schools to Help Close the Achievement Gap. *J Sch Health.* 2011;81(10):650-662.