4 Health behaviour and its determinants

4.1 Study design

Health behaviours are some of the most essential determinants of our health. This commonly known and accepted statement does not always translate into more health-promoting lifestyles of people. Persons having jobs related to health care or health education are particularly open to being judged by the rest of the society. They include, for example, physicians, nurses and physiotherapists. We can observe a possible opportunity for using the opinion-forming potential of the aforementioned circles and their role in encouraging health behaviours more beneficial to health in patients (clients). One of the basic conditions for the effectiveness of activities taken up by health workers to bring health-promoting lifestyles into focus is their personal example in this regard as well as coherence between educational message and their own behaviour.

To date, the literature in Poland has hardly addressed the issue of preparation of health-promoting activities within medical circles at an individual professional-patient level, especially from the perspective of analysing their own health related behaviours. Until now, more focus has been on the issues of health of medical workers related to professional stress, burning out or occupational diseases.

Somehow, it is assumed that biomedical studies alone will provide future professionals with expertise required for protection and promotion of both their own health and that of their patients. Consequently, it is expected that medical staff will therefore set an example for patients in this sphere of life. This is reflected in the underestimation of the process of education of medical personnel in terms of their pedagogical preparation to provide health education or in the development of so-called soft (social) skills that are so important for good professional-patient relations.

The aim of the present study is to determine the level of implementation and co-occurrence (coherence) of selected health behaviours among present and future medical personnel and to explore differences in their subjective and social determinants. The theoretical background for the proposed subject presentation is based on a holistic health model and in particular a socio-ecological approach (Capra 1982). The proposed research model (Fig. 4.1 and 4.2) was based on the TTI model and the assumptions for the study included the use of elements of the Bandura's Social Cognitive Theory (Bandura, 1986) and Rotter's expectancy-reinforcement model (Rotter, 1966), transposed to the field of health (Laverson, 1974).

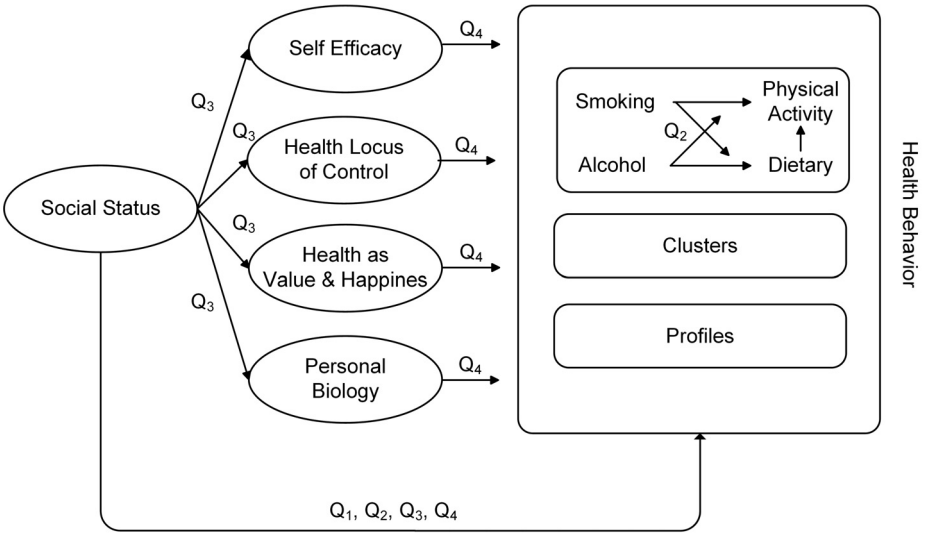

Figure 4.1 Proposed research model

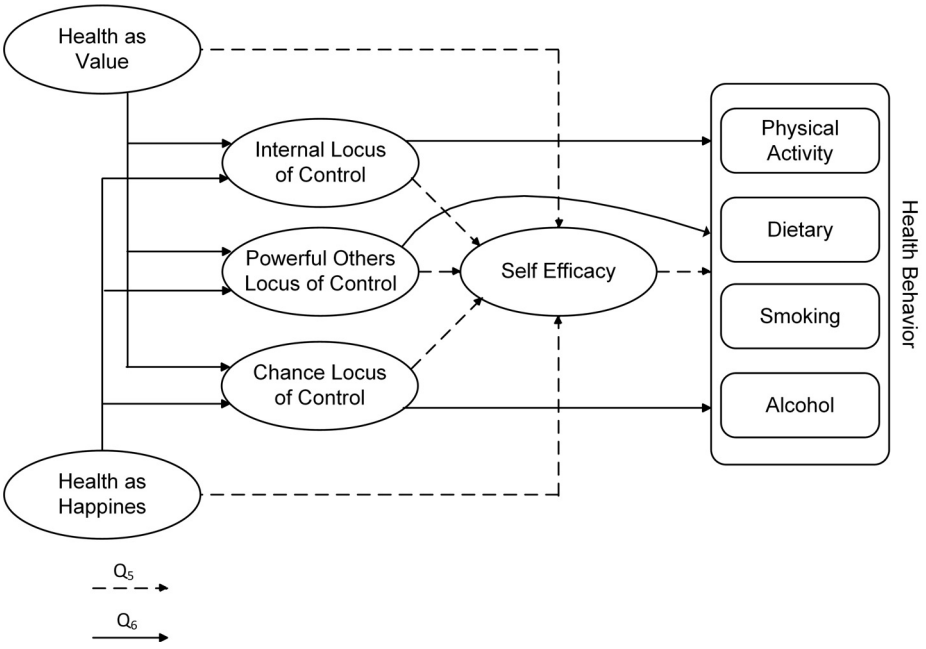

Figure 4.2 Proposed research model – mediating models (Q5, Q6)

Based on a review of the literature on the subject, the following research questions were formulated:

Q 1. What is the level of health behaviour by present and future medical personnel?

Q 2. Is there a significant co-occurrence of the examined health behaviours (both beneficial and adverse) revealed in the groups of respondents participating in the study? Is it possible to define clusters of health behaviours typical of the selected social and professional groups?

Q 3. Do the groups of present and future medical professionals significantly differ in terms of the selected subject variables (self-rated health, health valuation, perceived health locus of control, self-efficacy) in respect of the selected health behaviours and biological indices (BMI, WHR, incidence of lifestyle diseases)?

Q 4. Which variables (subject, biological, social) correlate with health behaviour, health behaviour clusters and health profiles of both present and future medical personnel?

Q 5. Does self-efficacy play a mediator role in the relationship between health valuation and health behaviour as well as between health locus of control and health behaviour?

Q 6. Does health locus of control play a mediator role in the relationship between health valuation and health behaviour?

Table 4.1 presents the variables subject to analysis in the study together with indexes for their assessment and research tools used.

Table 4.1 Variables and their operationalization

Variables	Indicators	Tools
Health Behaviour		
Physical Activity	level of PA (low, medium, high) METs	The International Physical Activity Questionnaire (IPAQ short version)
Nutrition	Nutrition Index 12 (points:12-36) Nutrition Index 3 (points:3-9) level: low, medium, high	author's questionnaire *Me and My Health*
Smoking	categories: current, ex-, never smoking	author's questionnaire *Me and My Health*
Alcohol Consumption	categories: abstinent, moderate, high, binge	author's questionnaire *Me and My Health*
Health Behaviour Profiles	categories: destructive, ambivalent, passive, average, beneficial	author's questionnaire *Me and My Health*
Self-rated Health (SRH)	categories: very good, good, moderate, bad, very bad	World Health Survey, WHO (2002)

continued **Table 4.1** Variables and their operationalization

Variables	Indicators	Tools
Health-Specific Self-Efficacy		
Physical Exercise Self-Efficacy	points (5-20) level: low, medium, high	Physical Exercise Self-Efficacy Scale (Schwarzer & Renner, 2000a)
Nutrition Self-Efficacy	points (5-20) level: low, medium, high	Nutrition Self-Efficacy Scale (Schwarzer & Renner, 2000a)
Smoking Self-Efficacy	points (9-36) level: low, medium, high	Smoking Self-Efficacy Questionnaire (Velicer et.al., 1990)
Alcohol Resistance Self-Efficacy	points (3-15) level: low, medium, high	Alcohol Resistance Self-Efficacy Scale (Schwarzer & Renner, 2000a)
Health as a personal value	range: from 0 (not chosen) to 5 (the most important)	List of Personal Value (LPV) (Juczyński, 2001)
Health as a happiness symbol	range: from 0 (not chosen) to 5 (the most important)	List of Personal Value (LPV) (Juczyński, 2001)
Health Locus of Control	Internal: points (6-36), level: low, high Powerful Others: points (6-36), level: low, high Chance: points (6-36), level: low, high	Multidimensional Health Locus of Control Scale (MHCL) (Wallston et. al., 1978; Juczyński, 2001)
Socio-demographic status	stage of education: student, professional occupation: physician, nurse, physiotherapist, medical student, physiotherapy student age (years) gender marital status (categories: single, married, divorced, widow/er) material status (categories: excellent, good, average, poor)	demographic survey
Biological Heath Indicator	BMI: value, categories Waist circumference Waist-hip Ratio chronic diseases	author's questionnaire *Me and My Health*

The following groups of independent variables were taken into consideration in the study during statistical analyses:

1. Subject variables (Self-rated Health (SRH), Health-Specific Self-Efficacy, Health as a personal value, Health as a happiness symbol, Health Locus of Control)
2. Social variables – career stage (student – major in biomedical studies, professional – graduate of biomedical studies), occupation (medical student, physiotherapy student, physician, nurse, physiotherapist)

3. Biological variables (BMI, Waist circumference, Waist-hip Ratio, chronic diseases).

Dependent variables include health behaviours of both future and current medical personnel presented in two ways: as individual behaviours (physical activity, nutrition, smoking, alcohol consumption) or as Health Behaviour Profiles the construction of which is discussed in the description of research tools.

The following section outlines the research tools used.

To assess **health-specific self-efficacy** we used free questionnaires developed by Schwarzer and Renner (2000a): **The Nutrition Self-Efficacy Scale, The Physical Exercise Self-Efficacy Scale, The Alcohol Resistance Self-Efficacy Scale,** and the **Smoking Self-Efficacy Questionnaire** developed by Velicer and others (1990). The following responses were proposed for all statements included in the questionnaires and regarding health-related self-efficacy: very uncertain (1 point), rather uncertain (2 points), rather certain (3 points) and very certain (4 points). Next, the total value for each scale was determined and the scores obtained for the surveyed population were converted to standard ten scores (stens) where the score below 5 sten scores was considered as "low level", from 5 to 6 inclusive as medium level and from 7 upwards as "high level".

The Nutrition Self-Efficacy Scale includes five statements regarding the certainty of respondents as to their ability to deal with barriers that may hinder the preparation of healthy foods. The Physical Exercise Self-Efficacy Scale includes also five statements referring to the potential obstacles to carrying out exercises by respondents. The Alcohol Resistance Self-Efficacy Scale contains three potential situations that may affect the respondents' ability to control themselves. The Smoking Self-Efficacy Questionnaire includes nine potential situations in which the confidence of respondents in their ability to refrain from smoking is verified.

In accordance with the questionnaire adaptation procedure, the self-efficacy questionnaires were translated into Polish by two independent translators (English Philology graduates) and verified by 3 competent judges (PhDs in Physical Culture Sciences, two with specialisation in Health Education). Tests verifying the questionnaire reliability were conducted among 116 adults and Cronbach's alpha for individual scales was between 0.66 and 0.78.

To assess the **health locus of control** we used the **Multidimensional Health Locus of Control Scale** (Wallston, 1978; Juczyński, 2001). The Multidimensional Health Locus of Control Scale (MHLC) consists of 18 statements for which a Likert-scale of summated ratings was used and numerical values were assigned to each of the six possible responses. For statements in which a favorable response was desired, a "strongly agree" was assigned a numerical value of 6 and a "strongly disagree" a numerical value of 1. According to the authors' proposal, it allows the classification of results using the median as a point of division between high and low results in each of the health control dimensions: **Internal** Health Locus of Control (IHLC),

Powerful Others Health Locus of Control (PHLC), and **Chance** Health Locus of Control (CHLC). The IHLC scale assesses individuals' ability to control their health. The PHLC scale tests the beliefs that powerful others, such as doctors, nurses, friends, and family, determine one's health. The CHLC construct assesses the beliefs that health or illness was determined by fate, luck, or chance. In the study the A version of the questionnaire was used for which the Polish adaptation as well as validity and reliability assessments were made by Juczyński (2001).

The **List of Personal Values (LPV)** (Juczyński, 2001) allows respondents to assess health as a value in the context of other values. The questionnaire consists of two parts. In the first one each respondent chooses 5 (out of 9) *symbols of happiness* (many friends, satisfying family life, doing favorite job, success in education, work, good health, being needed by others, good financial situation, life full of adventure, fame and popularity) and ranks (classifies) them from the most important one (5 points) to the least important one (1 point). A similar procedure is followed in the second part where the respondent chooses 5 (out of 10) *personal values* (love and friendship, good health and physical fitness, sense of humor, intelligence, wisdom, courage, joy, kindness, good looks, wealth) and then ranks them. In the designed studies the classification (ranking) made by respondents will be used for determining correlations with the demonstrated health behaviours.

Self-rated Health (SRH). In accordance with the guidelines of the World Health Organization (World Health Survey, 2002) the following question was used for the subjective health assessment: "In general, how would you rate your health today?". The respondents provided answers using a scale of five: "very good, good, moderate, bad, very bad".

The International Physical Activity Questionnaire (IPAQ short version) (Biernat & Stupnicki, 2005, Craig et al., 2003) was used to assess the respondents' physical activity. Metabolic Equivalent values (METs) per week were calculated for individuals and the respondents were divided into three categories of PA (low, moderate, high). The questionnaire includes 7 questions regarding: intensive and moderate physical efforts made in the most recent month as well as movement activity (walking) and time spent sitting.

The author's questionnaire *Me and My Health* was used to assess **nutrition, alcohol consumption** and **smoking status**. It also contains questions about **anthropometric dimensions** (weight, height, waist and hip circumference), lifestyle diseases and **socio-demographic status**.

The nutrition status was calculated as a mean of answers to 12 questions. The questions were constructed in accordance with the guidelines of the National Food and Nutrition Institute (Principles of Proper Nutrition, 2009) and recommendations included in the Golden Charter of Proper Nutrition (1997). This document constitutes a consensus reached by numerous organizations dealing with the promotion of healthy nutrition within the scope of nutritional recommendations for healthy adults. The analysis was also based on the guidelines included in the so-called Healthy Eating

Pyramid (2009), still constituting one of the socially most recognizable symbols of nutritional recommendations, despite the criticism of its assumptions.

The questionnaire contained questions regarding: frequency of meals (including in particular breakfasts) and frequency of consumption of certain products: whole grain products, vegetables, fruits, dairy, legumes, fish, white meat, red meat, vegetable oil, water (on a 5-point scale from "every day" to "never").

In order to to analyse respondents' nutrition behaviours as one component (variable) and to also take all the analysed eating habits into consideration a summary index was proposed, allowing us to determine the level of adoption of the studied nutrition behaviours by the respondents – Nutrition Index. Having given consideration to health guidelines, following consultation with nutrition specialists at the Poznań University of Life Sciences, individual behaviours were classified as adverse, moderately beneficial or beneficial to health by assigning the score of 1, 2 and 3 to them, respectively. As a result, each respondent could get the score between 12 and 26 in respect of the nutrition index, taking all 12 studied nutrition behaviours into consideration (Nutrition Index 12, NI12). Next, the scores obtained for the surveyed population were converted to standard ten scores, where the score below 5 sten scores was considered as "low level", from 5 to 6 inclusive as "medium level" and from 7 upwards as "high level". Given the fact that the consumed complex carbohydrates, vegetables and fruits are considered to be particularly important diet elements in terms of health, also Nutrition Index 3 (NI3), taking these behaviours into consideration, was proposed. The score that could be achieved in respect of NI3 ranged from 3 to 9. It was found that in order to be considered beneficial to health the NI3 index must contain maximum one of the studied behaviours at the moderate level whereas the others must be definitely beneficial. It gives a score of 8 or 9 for "high level", 7 for "medium level" and 6 or below for "low level".

Smoking status was evaluated in three categories: as currently smoking, ex-smoking or non-smoking respondents. It was also evaluated if the respondents are passive smokers.

The assessment of behaviours related to **alcohol consumption** was made on the basis of both frequency and quantity of consumed alcohol portions (so-called standard drinks). A standard drink is considered to contain 10 g of pure alcohol that can be found, for example, in 1 glass of wine (100 ml), 1 shot of vodka (25 ml) or 1 glass of beer (250 ml). 4 patterns of alcohol consumption were distinguished on that basis (Dietary Guidelines for Americans, 2010; CDC. Fact Sheets – Preventing Excessive Alcohol Use, n.d.): an abstinent is a person who declares that he/she does not drink alcohol, moderate alcohol consumption is defined as up to 1 drink per day for women and up to 2 drinks per day for men, high-risk drinking is the consumption of more than 7 drinks per week for women and more than 14 per week for men, binge drinking is the consumption of 4 or more drinks for women and 5 or more drinks for men per day.

The first version of the *Me and My Health* questionnaire was verified and used during the studies conducted in 1997, serving as a part of preparations for doctoral

dissertation of the author of the project entitled: *Determinants of pro-health activities in the workplace with the allocation of a place for physical activity.* For the purposes of the designed study it was modified and extended to include the need for classification of the behaviours subject to analysis. The questionnaire reliability was verified in a study conducted on 189 students of the University School of Physical Education in Poznań. The study was conducted using a test-retest method at an interval of 3 weeks and the correlation coefficient for individual questions ranged between 0.67 and 0.88.

Health Behaviour Profiles. The paper proposes an original approach to the comprehensive analysis of health behaviours. The behaviours subject to study were divided into two groups: (1) health-enhancing behaviours (physical activity, nutrition beneficial to health), i.e. the behaviours in which the respondents' activities prove to be beneficial to their health and (2) health-compromising behaviours (smoking, excessive consumption of alcohol), i.e. the behaviours in which the respondents' activities prove to be adverse to their health. Each of the distinguished groups included 2 health behaviours classified on a 3-point scale: adverse (low PA, low NI12, current smoker, binge or heavy alcohol consumption), moderate (moderate PA, moderate NI12, ex-smoker, moderate alcohol consumption), beneficial (high PA, high NI12, never smoker, abstinent). Next, the co-occurrence was calculated for the health-enhancing behaviours and for the health-compromising behaviours (-,+,++; see legend in Tab. 4.2), respectively, whereas the last stage included the taxonomization of co-occurrence of all the four behaviours. Based on such division of the analysed health behaviour, it is possible to distinguish various types of human activity related to one's health (Health Behaviour Profiles), as illustrated in Table 4.2.

Table 4.2 Matrix for Health Behaviour Profiles

Taxonomy of activity related to health		**Health-enhancing behaviours**		
		-	**+**	**++**
Health-compromising behaviours	++		*Ambivalent*	
	+	*Destructive*	*Average*	
	-	*Passive*	*Beneficial*	

Legend: (-) – no occurrence of behaviours, activity; (+) – moderate intensity of behaviour, activity occurrence; (++) – intensive occurrence of behaviours, activity

A *destructive* Health Behaviour Profile was found to be the one in which there are no health-enhancing behaviours or there is a moderate or intensive occurrence of health-compromising behaviours. It may involve the co-occurrence of: low physical activity, adverse diet, binge or heavy alcohol consumption and ex-smoking or smoking status. A *passive* Health Behaviour Profile was found to be the one in which there are no health-enhancing behaviours and no health-compromising behaviours. It may involve the co-occurrence of: low physical activity, adverse diet, being an abstinent and never smoking status. An *ambivalent* Health Behaviour Profile was found to be the one in

which on the one hand there are health-enhancing behaviours but on the other hand the occurrence of health-compromising behaviours is intensive. It may involve the co-occurrence of: moderate or high physical activity, beneficial diet, binge or heavy alcohol consumption and ex-smoking or smoking status. An *average* Health Behaviour Profile was found to be the one in which on the one hand there are health-enhancing behaviours but on the other hand the occurrence of health-compromising behaviours is moderately intensive. It may involve the co-occurrence of: moderate or high physical activity, beneficial diet, binge or heavy alcohol consumption and never smoking status. A *beneficial* Health Behaviour Profile was found to be the one in which on the one hand there are health-enhancing behaviours and on the other hand there are no health-compromising behaviours. It may involve the co-occurrence of: moderate or high physical activity, beneficial diet, being an abstinent and never smoking status.

Biological variables. The respondents were asked to independently assess the following parameters: weight and height, allowing calculation of the **Body Mass Index** (BMI). It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). Due to the discussion of experts on the BMI classification and the need for a revision of the cut-off point of 25 kg/m^2 defining overweight in the current WHO classification, it was decided to take also an additional cut-off point of 23 kg/m^2 into account in the analysis. BMI classification according to the WHO recommendations (1995, 2000, 2004) applied in the paper:

- underweight <18.50
- normal range I 18.50-22.99 (additional cut-off point)
- normal range II 23.00-24.99
- overweight ≥25.00
- obese ≥30.

The respondents were also asked to measure **waist and hip circumferences**. The results obtained were treated rather as a rough guide since they were not obtained from measures professionally taken by trained interviewers. However, it should be noted that the professional groups being studied are properly instructed in taking such measures and it may be assumed that a proportion of false readings would be lower than for the general population. On that basis a **Waist-Hip Ratio** was calculated whereas the waist circumference was also used for determining the risk of metabolic complications. Based on these two WHO recommendations (Waist Circumference and Waist–Hip Ratio, 2011), it was found that the increased risk occurred in the case of waist circumference >94 cm for men and >80 cm women; substantially increased risk was present in the case of individuals with waist circumferences >102 cm for men and >88 cm for women. For waist waist-hip ratio the values ≥0.90 for men and ≥0.85 for women were found resulting in the increased risk of metabolic complications. The respondents were also asked about the presence of **chronic diseases**, such as: hypertension, varicose veins, obesity, atherosclerosis, peptic ulcer disease, diabetes, allergies, asthma, depression or cardiovascular disease.

4.1.1 Survey Process and Study Participants

In the study we used the diagnostic survey employing a Snowball Sampling method (Atkinson & Flint, 2001). We used this method especially for the investigation of a group of health professionals because it is very difficult to convince them to take part in such a survey. An anonymous questionnaire survey was conducted. It took around 20-30 minutes to complete. The participation in the survey was voluntary and this strategy helped to obtain responses. The study participants included health professionals from randomly chosen hospitals, medical clinics and rehabilitation clinics in Poznań and Wielkopolska Provinces in Poland. The survey was also conducted among physiotherapy students at the University School of Physical Education in Poznań and among medical students at the Poznań University of Medical Sciences. The survey among students was conducted during educational classes (usually at the end of the lecture) and the participation was voluntary so any student unwilling to participate had an option to leave the lecture hall. The survey was conducted in 2011 and 2012.

The study gathered data from 777 individuals, including 428 medical and physiotherapy students and 349 medical professionals. The stratification of the participants is presented in Table 4.3.

Table 4.3 Description of the study samples

		All	students		professionals		
			medical	physiotherapy	physicians	nurses	physiotherapists
n (%)		777	223 (28.7)	205 (26.4)	111 (14.3)	114 (14.7)	124 (15.9)
age	M ± SD	29.4±12.0	21.4±1.7	20.6±1.2	41.1±11.3	44.4±8.3	33.8±11.2
gender n (%)	♀	580 (74.6)	165 (74.0)	146 (71.2)	83 (74.8)	105 (92.1)	81 (65.3)
	♂	197 (25.4)	58 (26.0)	59 (28.8)	28 (25.2)	9 (7.9)	43 (34.7)
marital status n (%)	single	500 (64.4)	206 (92.4)	202 (98.0)	20 (18.0)	15 (13.2)	57 (46.0)
	married	243 (31.3)	9 (4.0)	0 (0.0)	88 (79.3)	94 (82.5)	52 (42.0)
	divorced	14 (1.8)	0 (0.0)	0 (0.0)	1 (0.9)	0 (0.0)	13 (10.5)
	widow/er	6 (0.8)	0 (0.0)	0 (0.0)	2 (1.8)	3 (2.6)	1 (0.8)
material status n (%)	excellent	66 (8.5)	23 (10.3)	18 (8.8)	20 (18.0)	2 (1.8)	3 (2.4)
	good	485 (62.4)	138 (61.9)	113 (55.1)	77 (69.4)	83 (72.8)	74 (59.7)
	average	217 (28.0)	58 (26.0)	69 (33.7)	14 (12.6)	29 (25.4)	47 (37.9))
	poor	3 (0.4)	0 (0.0)	3 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)

Note: numbers may not add to total due to missing data

4.1.2 Statistical Analysis

The study was based on a correlation-regression model meaning that it is only possible to draw conclusions regarding correlations between variables rather than making cause-effect interpretations. A mediation analysis was also used in order to explicate relationships between independent and dependent variables through analysing the impact of intermediate variables. However, in this case there is no strict control over variables like in an experimental model and that's why, caution was exercised in their interpretation.

In the first stage of the analysis the respondents were characterized within the scope of the examined variables and differences were sought between them. Depending on the tool and the variable, some descriptive statistics were used, including the arithmetic mean, standard deviation, and percentages for individual categories. In order to compare the groups parametric tests were used for continuous variables while comparing two groups – Student's *t*-distribution together with Hedges's g effect size index for which the following effect size classification was adopted: 0.2 – small effect size, 0.5 – medium effect size, 0.8 – large effect size. In comparisons of more groups a one-way analysis of variance (ANOVA) was used for which next post hoc Tukey test and eta squared effect size were calculated for which the following effect size classification was adopted: 0.01 – small effect size, 0.06 – medium effect size, 0.14 – large effect size. For ranked variables non-parametric tests were used: for the comparison of two groups – the Mann-Whitney *U* test with the Glass's rank biserial correlation coefficient (r_g) for which the following effect size classification was adopted: 0.2 – small effect size, 0.5 – medium effect size, 0.8 – large effect size. In comparisons of more groups the Kruskal-Wallis test was used for which next post hoc tests for comparisons between the groups as well as Epsilon-squared effect size were calculated for which the following effect size classification was adopted: 0.1 – small effect size, 0.3 – medium effect size, 0.5 – large effect size. In comparisons of categorical variables the chi-square test was used for which next the Cramer's V effect size was calculated for which the following effect size classification was adopted: 0.1 – small effect size, 0.3 – medium effect size, 0.5 – large effect size. The two-way ANOVA was also used in order to determine relationships and interaction between the successively selected health behaviours and group/or career stage effect on the level of the other health behaviour. We set the level of significance a priori at $p < .05$ (Cohen, 1988; King & Minium, 2009).

In the next stage of the study the analysis of clusters was employed in order to determine the co-occurrence of health behaviours. It is a tool designed to reveal natural groupings (clusters) within a data set that would otherwise not be apparent. A two-step cluster analysis procedure was employed which allowed us to analyse both qualitative and quantitative variables at the same time (Norusis, 2006). The variables on the basis of which clusters were identified included four lifestyle risk factors: physical activity, nutrition, smoking and alcohol consumption. The following indicators of behaviours were chosen: two levels of physical activity: low

or moderate and high; sum of points for NI12 for nutrition; three levels for smoking: current smoking, ex-smoking, never smoking; two levels for alcohol consumption: moderate and heavy or binge drinking. In order to minimize the effect of the order of observations in the sample on the clustering results the set was sorted by randomly generated numbers. The measure of distance between clusters was based on a log-likelihood ratio whereas the Schwarz's Bayesian Information Criterion was used as a clustering criterion. The analyses were run in the SPSS 21.0 programme.

The subsequent stage of the analysis involved the search for relationships between the indicated determinants of health behaviours and the degree of adoption of given health behaviours. To accomplish that purpose, a logistic regression was employed. For that purpose, the dependent variables were classified as dichotomous variables and the conversion details were described next to the study results. The analyses were run in the Statistica 10 programme.

The last stage of the analysis involved the use of mediation analysis. The mediation analysis is one of the most popular and standard procedures employed in social sciences in order to explicate relationships between independent and dependent variables based on the search for mediators (Hayes, 2009, 2013; MacKinnon, Fairchild, & Fritz, 2007; Rucker, Preacher, Tormala, & Petty, 2011). In order to prove that a given variable is a mediating factor bringing us closer to the explanation of a relationship between the independent variable and the dependent variable it is necessary to take a few steps. In the classic approach it involves (Baron & Kenny, 1986): (1) demonstrating a correlation between the independent and dependent variables – path "c" (Fig. 4.3); (2) demonstrating that the independent variable correlates with the intervening variable – path "a" (Fig. 4.3) and (3) demonstrating that the intervening variable correlates with the dependent variable, even taking the independent variable in the model into consideration – path "b" (Fig. 4.3). It is expected that the original relationship between the independent variable and the dependent one (path coefficient "c" – total effect) will decrease to an insignificant value at the adopted level of significance (coefficient "c'" – direct effect). In the classic mediation approach such decrease proves the complete mediation. However, in practice a partial decrease of the contribution of the independent variable to the dependent one is often observed, proving the partial mediation which allows the assumption that there are other mechanisms regulating the relationship between the variables.

Currently, most scientific research methodologists find it of key importance for mediation to demonstrate a relationship between the independent variable and the dependent variable – path coefficient "a" and a relationship between the intervening variable and the dependent variable – path coefficient "b" (Fig. 4.1). An analysis of statistical significance and indirect effect size – "a" x "b" (Fig. 4.1) is conducted without placing any emphasis on demonstrating a statistically significant relationship between the independent variable and the dependent variable (Hayes, 2009; Rucker et al., 2011; Zhao, Lynch, & Chen, 2010). Consequently, it is believed that the mediation hypothesis should be considered confirmed when a statistically

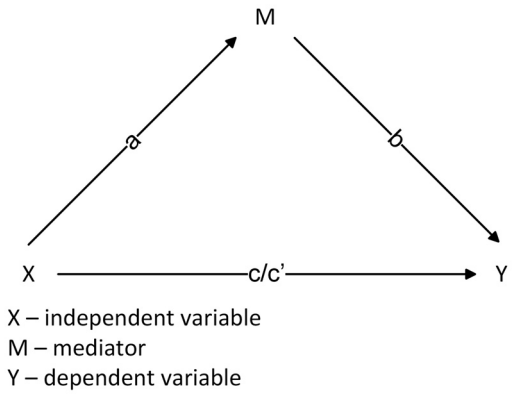

Figure 4.3 Diagram of relationships in the classic mediation analysis (Baron & Kenny, 1986)

significant, essentially justified indirect effect is obtained (Hayes, 2009, 2013; Rucker et al., 2011; Zhao et al., 2010). Therefore, such interpretation was adopted in this paper for the mediation analysis. The null hypothesis of indirect effect was tested with the use of a non-parametric bootstraping procedure recommended by Preacher and Hayes (2008). The effect size for path "a" of the mediation model is indicated by the values of correlation coefficients adequate to the usual values for correlation coefficients proposed by Cohen (1988) for using in social science studies where the correlation coefficient of 0.1 represents a small effect size, 0.30 – a medium effect size and 0.50 – a large effect size. The coefficient of path "b" (beta weight β) indicates how much the value of the dependent value will change if the value of the mediator changes by one standard deviation, with the independent variable being controlled. In the models calculated in this paper the standardized coefficients are close to the coefficients of partial correlation; therefore, the assessment of path "b" may be made based on the interpretation of correlation effect sizes: product indirect effect value of 0.01 represents a small effect size, 0.09 – a medium effect size and 0.25 – a large effect size (Shrout & Bolger, 2002). The mediation analysis was conducted with the use of the SPSS macro recommended by Preacher and Hayes (2009, 2013).

4.2 Health behaviour of medical and physiotherapy students and professionals

The variables being examined in this study include four basic health behaviours of future and present medical personnel: physical activity, nutrition, smoking and alcohol consumption. These are the most important behaviours related to health which are also the most common risk factors for lifestyle diseases. Usually, the epidemiological structure of the occurrence of individual behaviours is subject to analysis. However, a special concern may be raised by the accumulation

of adverse behaviours in particular social groups. Therefore, the aim of this part of the study is to analyse the level of the four main health behaviours (physical activity, nutrition, smoking, alcohol consumption) and the patterns of their co-occurrence among medical students and professionals. The study will also result in distinguishing the so-called "weakest links" in the lifestyle of the respondents, i.e. behaviours adverse to health frequently occurring in the social groups subject to analysis. We will also attempt to identify differences in the frequency of occurrence of specific Health Behaviour Profiles (*destructive, passive, ambivalent, average, beneficial*) in the social and professional groups subject to analysis.

4.2.1 Physical Activity

Unsurprisingly, both students and graduates of the University School of Physical Education lead the way in physical activity (Tab. 4.4). The level of physical activity of physiotherapy students and physiotherapists is significantly higher than that of nurses (p<.0001 and p<.0001, respectively) and physicians (p=.0010 and p=.0412, respectively). The nurses participating in the study are characterized by particularly low physical activity that is also significantly lower than physical activity of medical students (p=.0012). The social and professional diversification of the respondents (in this case affiliation to one of the following groups studied: physiotherapy students, medical students, physiotherapists, physicians, nurses) explains approximately 5% difference in the level of physical activity of respondents (p<.0001). Also, a higher level of physical activity, on average, can be observed in students compared to professionals (p<.0001, Hedges' g=.318). Gender shows no effects.

Table 4.4 Descriptive characteristics and test statistics for differences in respondents' physical activity

		students			professionals			
PA[a]	**All**	**all**	**medical**	**physio-therapy**	**all**	**physi-cians**	**nurses**	**physio-thera-pists**
Low n (%)	157 (20.4)	62 (14.5)	36 (16.1)	26 (12.7)	95 (27.9)	29 (26.8)	45 (41.7)	21 (16.9)
Medium n (%)	224 (29.2)	132 (30.8)	80 (35.9)	52 (25.4)	92 (27.1)	37 (34.3)	23 (21.3)	32 (25.8)
High n (%)	387 (50.4)	234 (54.7)	107 (48.0)	127 (61.9)	153 (45.0)	42 (38.9)	40 (37.0)	71 (57.3)

	all groups			students/professionals		
	F	p value	η^2	t	p value	Hedges' g
PA (METs)[b]	10.793	<.0001	.05	4.09	<.0001	.318

[a] *- according to IPAQ score PA measure in METs and divided in 3 categories;*

[b] *- test t or one way ANOVA were used for differences between studied groups; effect size: Hedges's g, eta-squared (η^2)*

As people grow older, their level of physical activity decreases and this fact is clearly reflected in the scores obtained by the respondents. A professional group that is most exposed to health consequences of low physical activity among the respondents is that of nurses. Numerous studies exist documenting the professional difficulties (both physical and mental) of nurses. Often these can also serve as "excuses" or form objective obstacles to following more active lifestyles. Clearly, fatigue associated with professional duties, combined most frequently with low salaries, do not contribute to the implementation of health recommendations in that regard.

Another question is how educationally effective a medical service worker can be, especially in the context of the process of internalising his/her behaviours by patients, in a situation in which every fourth physician and almost every second nurse participating in the study do not meet a minimum health criterion in that regard.

4.2.2 Nutrition

Nutrition is one of the basic determinants of health. It may promote and build health or contribute to the occurrence of diseases, in particular lifestyle diseases (chronic). The professional groups studied have nutrition education included in their training process. All standards concerning best practices related to medical profession contain provisions showing the need for those specialists to implement elements of health education, including nutrition education. It is anticipated that this would be reflected in the implementation of good standards of health behaviour in this field by the professionals themselves.

Nutrition behaviours of the respondents were analysed based on the recommendations set out in the Golden Chart of Proper Nutrition (1997) and the guidelines of the National Food and Nutrition Institute (2009). Those documents constitute a consensus reached by numerous organizations dealing with the promotion of healthy nutrition within the scope of nutritional recommendations for healthy adults. The elements that play a special role in diet-related disease prevention include the consumption of vegetables and fruits as well as whole grain products. Moreover, the analysis focused on the type and frequency of consumption of dairy products, leguminous plants, meat, fish and plant oils, body hydration as well as the regularity and number of meals consumed during a day. The respondents indicated the frequency of consumption of individual products during a week or at rarer intervals. Table 5 presents a percentage of persons implementing health beneficial nutrition recommendations.

The highest percentage of individuals implementing beneficially healthy recommendations includes 80% of respondents who consume white meat (poultry) several times a week. On the one hand, this can be seen as a positive change because poultry is healthier than red meat. On the other hand, this is not necessarily what actually happens since the percentage of persons choosing red meat products

Table 4.5 Percentage (%) of respondents pursuing beneficial dietary patterns.

dietary patterns	All %	students %			professionals %			
		all	medical	physiotherapy	all	physicians	nurses	physiotherapists
vegetables *every day*	45.3	41.8	52.0	30.5	49.6	55.0	39.5	54.0
fruits *every day*	39.5	32.2	35.0	29.3	48.4	56.8	46.5	42.7
whole grains *every day*	49.2	49.3	57.4	40.5	49.0	45.0	36.8	63.7
dairy *every day*	34.1	31.5	32.7	30.2	37.2	61.3	24.6	27.4
legumes *few days in the week*	23.8	20.2	20.2	20.2	28.2	33.3	23.3	28.2
white meat *few days in the week*	79.1	78.2	78,5	78.0	80.2	67,5	90.3	82.3
red meat *rarely or never*	29.4	31.0	27.3	34.9	27.5	29.7	25.5	27.4
fish *few days in the week*	46.8	41.7	41.7	41.7	53.1	50.4	58.1	50.8
vegetable oils *few days in the week*	47.1	52.1	47.1	57.6	40.9	39.6	49.1	34.6
water, vegetable juices *every day*	56.4	65.6	77.6	52.7	45.3	53.1	34.2	48.4
breakfast *always*	72.5	69.8	68.5	71.2	75.9	82.7	71.9	73.4
the number of meals *>3*	69.5	75.0	80.3	69.3	62.6	60.0	63.2	64.5

less frequently is quite low, around 30%. The popularity of poultry is driven not only by health reasons but also by its price and ease of preparation. Particularly alarming are the statistics for everyday consumption of vegetables, fruits and whole grain products. None of the recommendations were implemented by even a half of the total respondents. Nurses and physiotherapy students compare particularly unfavorably in this regard. Only a third of respondents consume milk and dairy products every day. Milk is the subject of much controversy and reports about its harmfulness and excessive consumption have been reported in the Polish media. Half-truths and the lack of factual reporting of the issue may, affect respondents' consumption. Interestingly, physicians compare significantly favorably in this regard with over 60% consuming dairy products every day. Similarly, legumes are included more often in their diet though they still are not popular products among the respondents. Only one in four respondents consume them frequently enough, with slightly more frequent consumption among professionals compared to students. Despite a number of advertising campaigns promoting the consumption of fish and the tradition of abstaining from eating meat on Fridays and replacing it with fish, still maintained by many Polish families, fewer than half of respondents eat fish several times a week (one time at minimum). Plant oils and margarines have become more and more popular and they are used for various purposes in Polish kitchens. Still, most often they are used for frying and that's why their consumption is not recommended on a daily basis, also due to trans fats in hydrogenated margarines. These patterns are followed by almost a half of the respondents. In order to comment on the special role of fats in the respondents' diets it would be necessary to analyse their dietary patterns in greater detail than allowed by the scope of this study. It may only be assumed that oils are used increasingly often and saturated fats are partially supplanted by them in cooking. Neither water nor vegetable and fruit juices are included in the everyday menu of the respondents. It may be assumed that they supplement fluids with other drinks, including sweetened carbonated beverages which, as is well known, are one of the most important factors contributing to overweight and obesity. The proper number of meals per day is declared by almost 70% of respondents, especially students (75%). Clearly, their organization of both work and leisure time during the academic year contributes to getting the proper number of meals better than professional duties of physicians, nurses or physiotherapists (63%). Professionals, however, appreciate more the value (role) of breakfast, with only 24% of them starting their day without this meal. In the group of students it amounts to approx. 30%. The presented degree of implementation of the selected beneficial dietary habits of the current and future medical personnel causes great concern and offers a wide field for education and promotion interventions which, as it turns out, are needed also in the case of health educators.

According to the procedure described in the chapter on research tools, two summary indexes, namely Nutrition Index 12 (NI12) and Nutrition Index 3 (NI3), were distinguished for the evaluation of dietary habits. The first one took all twelve

nutrition behaviours (see Tab. 4.5 above) into account and each respondent got a score between 12 and 36; moreover, the NI12 values were converted to standard ten scores and classified as low, medium or high. On the other hand, the other index included three basic health-protective diet elements, i.e. the consumption of complex carbohydrates, vegetables and fruits, and it allowed the classification of behaviours as adverse, moderate and beneficial. The characteristics and differences related to the Nutrition Indexes are presented in Table 4.6.

The obtained results relating to nutrition behaviours (NI12) clearly show that the diet of professionals is better than that of students (p=.0113, Hedges' g=-.185). While analyzing average NI12 scores for individual groups, we can also see significant differences among them (p=.0005, η^2=.03). In this context, physiotherapy students compare particularly unfavorably to physiotherapists (p=.0412) and physicians (p=.0004) whereas nurses compare significantly worse than physicians (p=.0379).

Differences can be observed in the consumption of the three health-essential diet elements (complex carbohydrates, vegetables and fruits) – NI3 – among present and future medical personnel, in favor of the first group (p<.0001, Hedges' g=-.349). The result shows significant differences between groups (p<.0001, η^2=.06) with physiotherapy students demonstrating worse nutrition behaviour than other groups (p<.0001 compared to physiotherapists and physicians, p=.0289 compared to nurses and p=.0018 compared to medical students). On the other hand, physiotherapists compare favorably to nurses (p=.0488), physiotherapy students (p<.0001) and medical students (p=.0229).

Gender differentiates the respondents in terms of the implemented dietary patterns (NI12). Men demonstrate worse nutrition behaviour more often than women (p=.0015, η^2=.01). When analyzing differences in individual social and professional groups we can find them among physiotherapists (p=.0043) and medical students (p=.0004). The analysis focusing only on the three most important health behaviours (the NI3) reveals again that it is women who implement more health-promoting nutrition (p<.0001, η^2=.02). We can also observe better nutrition indices in women than in men among physiotherapists (p=.0036), medical students (p=.0004) and physiotherapy students (p=.0483).

Table 4.6 Descriptive characteristics and tests statistics for differences in respondents' Nutrition Indexes

		students			professionals			
Nutrition Index [a]	**All**	**all**	**medical**	**physiotherapy**	**all**	**physicians**	**nurses**	**physiotherapists**
NI12 (Pnt) M ± SD	28.1±3.3	27.9±3.1	28.2±2.9	27.5±3.2	28.5±3.4	29.1±3.2	27.8±3.5	28.5±3.5
NI12								
Low n (%)	262 (33.7)	161 (37.6)	72 (32.3)	89 (43.4)	101 (28.9)	31 (27.9)	42 (36.8)	28 (22.6)
Medium n (%)	250 (32.2)	144 (33.6)	79 (35.4)	65 (31.7)	106 (30.4)	24 (21.6)	35 (30.7)	47 (37.9)
High n (%)	265 (34.1)	123 (28.7)	72 (32.3)	51 (24.9)	142 (40.7)	56 (50.5)	37 (32.5)	49 (39.5)
NI3 (Pnt) M ± SD	6.8 ± 1.6	6.5 ± 1.6	6.8 ± 1.6	6.2 ± 1.6	7.1 ± 1.5	7.1 ± 1.6	6.7 ± 1.6	7.3 ± 1.4
NI3								
Low n (%)	343 (44.1)	218 (50.9)	96 (43.0)	122 (59.5)	125 (35.8)	41 (36.9)	52 (45.6)	32 (25.8)
Medium n (%)	145 (18.7)	79 (18.5)	41 (18.4)	38 (18.5)	66 (18.9)	14 (12.6)	22 (19.3)	30 (24.2)
High n (%)	289 (37.2)	131 (30.6)	86 (38.6)	45 (22.0)	158 (45.3)	56 (50.5)	40 (35.1)	62 (50.0)

	all groups			students/professionals		
	F	p value	η^2	t	p value	Hedges' g
NI12 [b]	5.03	.0005	.03	-2.54	.0113	-.185
NI3 [b]	11.54	<.0001	.06	-4.89	<.0001	-.349

NI12 – Nutrition Index for 12 dietary behaviour; NI3 – Nutrition Index for 3 dietary behaviour (whole grains, vegetables, fruits);
a – according to nutrition questionnaire results presented in points and divided in 3 categories (STEN);
b – test t or one way ANOVA were used for differences between studied groups; effect size: Hedges' g, eta-squared (η^2)

4.2.3 Smoking

Smoking is one of the most harmful health behaviours. Similar to most European countries, a number of legal measures putting a ban on smoking in public places and advertising of tobacco products in the mass media have been implemented in Poland over the last decade. Still, it is difficult to find any significant improvement in the indices in the past few years. However, we can observe a clear decrease in the percentage of smokers compared to the 1990s.

Table 4.7 Descriptive characteristics and test statistics for differences in respondents' smoking behaviour

		students			professionals			
Smoking	**All**	**all**	**medical**	**physio-therapy**	**all**	**physi-cians**	**nurses**	**physio-therapists**
Current n (%)	145 (18.7)	60 (14.1)	34 (15.4)	26 (12.7)	85 (24.4)	20 (18.0)	36 (31.9)	29 (23.4)
Ex n (%)	81 (10.5)	34 (8.0)	20 (9.1)	14 (6.8)	47 (13.5)	16 (14.4)	12 (10.6)	19 (15.3)
Never n (%)	548 (70.8)	332 (77.9)	167 (75.6)	165 (80.5)	216 (62.1)	75 (67.6)	65 (57.5)	76 (61.3)

	all groups			students/professionals		
	Chi-square	p value	V	Chi-square	p value	V
Smoking[a]	32.64	.00007	.15	23.33	.00001	.17

a - Chi-squared test were used for differences between studied groups; effect size: Cramer's V

Medical service workers play a significant role in prevention programmemes and that's why it is particularly important how they manage this bad habit themselves. Table 7 shows the attitude to smoking of students and medical professionals included in the study. The studied groups vary in terms of intensity of the occurrence of this habit (p<.0001, Cramér's V=.15). The percentage of smokers is highest among nurses and physiotherapists. Every third nurse included in the study smokes on a regular basis – this percentage is higher than the average for women in Poland (Stan zagrożenia epidemią palenia tytoniu w Polsce, 2009). Given their important role in the process of patient education, it is particularly alarming information. We can also notice a higher percentage of regular smokers among current professionals compared to medical students (p<.0001, Cramér's V=.17). The students, preparing for their professional roles, show much more common sense when it comes to their attitude to smoking. Therefore, we might be slightly optimistic about their future without cigarettes. Gender differentiates individual groups of respondents in terms of their attitude to smoking. Such differences can be observed among physicians where men

are more frequent smokers (p=.0268, Cramér's V=.26) and among medical students where men also smoke more often than women (p=.0075, Cramér's V=.21).

4.2.4 Alcohol Consumption

Polish traditions and experience related to the patterns of alcohol consumption have not been beneficial to health. Similar to other post-communist, so-called eastern block countries, alcohol in Poland was consumed mainly in the form of high-proof alcoholic beverages and in large quantities. Social and political changes have contributed to a slow change in the patterns and "trends" related to the alcohol use. The consumption of low-proof alcoholic beverages (mainly beer but also wine) has increased while the use of high-proof alcohol (e.g. vodka) has dropped – this issue is discussed in more detail in Chapter 3. Based on the WHO recommendations, the patterns of alcohol consumption by the respondents were classified into four groups: binge, heavy, moderate, abstinent. The percentage values for individual alcohol consumption patterns among the respondents can be found in Table 4.8.

Table 4.8 Descriptive characteristics and tests statistics for differences in respondents' alcohol consumption

		students			professionals			
Alcohol	**All**	**all**	**medical**	**physio-therapy**	**all**	**physi-cians**	**nurses**	**physio-therapists**
Binge n (%)	28 (3.6)	16 (3.7)	11 (4.9)	5 (2.4)	12 (3.4)	0 (0)	0 (0)	12 (9.7)
High n (%)	185 (23.8)	126 (29.5)	73 (32.7)	53 (25.9)	59 (16.9)	23 (20.7)	10 (8.8)	26 (21.0)
Medium n (%)	495 (63.7)	242 (56.5)	109 (48.9)	133 (64.9)	253 (72.5)	85 (76.6)	86 (75.4)	82 (66.1)
Abstinent n(%)	69 (8.9)	44 (10.3)	30 (13.5)	14 (6.8)	25 (7.2)	3 (2.7)	18 (15.8)	4 (3.2)

	all groups			students/professionals		
	Chi-square	p value	V	Chi-square	p value	V
Alcohol[a]	76.97	<.0001	.18	22.51	<.0001	.17

a - Chi-squared test were used for differences between studied groups; effect size: Cramer's V

The groups of respondents vary in the frequency of occurrence of individual alcohol consumption categories (p<.0001, Cramér's V=.18). As far as this behaviour is concerned, the worst scores were obtained by the both groups of students and physiotherapists in the case of whom both heavy and binge alcohol consumption are particularly frequent patterns. On the other hand, nurses are a

professional group which is least likely to implement adverse patterns of alcohol consumption. As for differences between students and professionals, we can also observe an opposite trend compared to smoking. This time, it is the students who more often demonstrate a level of alcohol use that is detrimental to health ($p<.0001$, Cramér's $V=.17$). Gender differentiates the patterns of alcohol consumption in the whole studied group ($p<.0001$, Cramér's $V=.18$) where an excessive consumption is observed more frequently among men and similar differences of the average effect size can be observed among medical students ($p<.0001$, Cramér's $V=.30$).

4.2.5 Search for the Weakest Link

The analysis of health behaviours in the studied groups of both current and future medical service workers showed considerable differences between them. Each of the evaluated groups has different strengths and weaknesses in their lifestyles. Figures 4.4 and 4.5 present the percentages of both beneficial and adverse patterns of health behaviours implemented by the respondents. As a result, it is possible to identify specific areas requiring educational and promotional intervention with regard to the respondents.

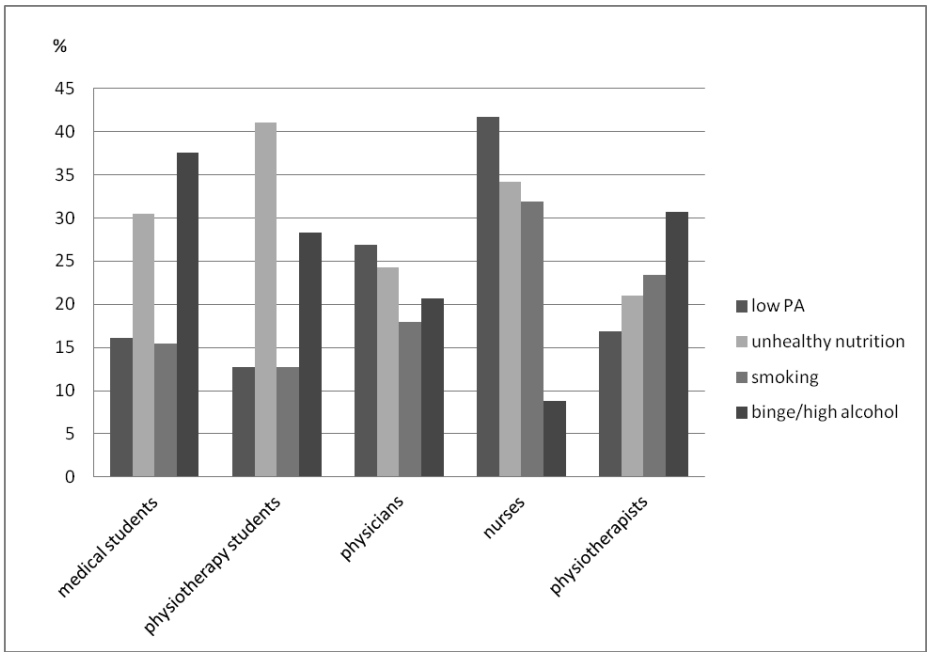

Figure 4.4 The weakest links in the chain of the studied health behaviours of the respondents (in percentages of respondents)

Figure 4.4 clearly shows that nurses are a professional group particularly vulnerable to health effects of their adverse behaviours. For three out of the four studied behaviours at least one in three demonstrates adverse behaviours. The weakest link in the studied behaviours of nurses is their low physical activity. The biggest problem amongst physicians participating in the study is also a sedentary lifestyle. One in four also demonstrate low levels of physical activity. On the other hand, the biggest challenge for physiotherapists is their heavy and excessive consumption of alcohol. Almost one in three exhibits this problem. Improper nutrition is the main problem among physiotherapy students. Over 40% of the respondents demonstrate adverse eating habits. A dominant problem among medical students is that of an excessive consumption of alcohol. Almost 40% of them declared particularly adverse patterns within that scope.

Each of the four social and professional groups demonstrate different weakest links in the chain of health behaviours, and consequently, there are slightly different priourities from the perspective of health promotion.

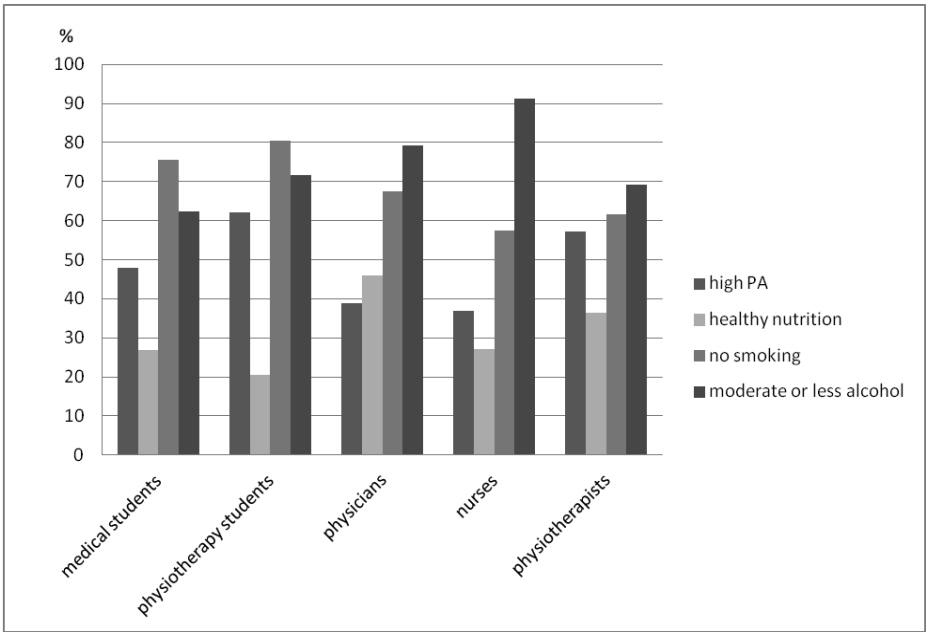

Figure 4.5 The strongest links in the chain of the studied health behaviours of the respondents (in percentages of respondents)

Figure 4.5 presents the percentages of the respondents implementing particularly health-beneficial patterns of behaviour. Here, we can also observe differences between the groups. The vast majority of nurses participating in the study (over 90%) do not abuse alcohol. Most physicians and a considerable part of physiotherapists also implement health recommendations concerning this behaviour. On the other hand, non-smoking is a strength of the studied group of students (almost 80%).

4.2.6 Co-Occurrence of Analysed Health Behaviours

To be able to develop multiple behaviour interventions, one needs to develop a better understanding of the complex relationships among multiple risk behaviours (Stretcher, 2002). In the present study, we attempted to understand the interrelationships between four health risk behaviours – physical activity, nutrition, tobacco use, and alcohol use – among health students and professionals.

At the next stage, patterns of accumulation of the studied health behaviours were sought. Percentages of persons who accumulate adverse or beneficial health behaviours were determined (see Fig. 4.6 and 4.7). Furthermore, percentages of persons following a respective number of the studied health behaviours at the level beneficial to health (from 0 to 4 possible) or destructive to health were determined.

Differences between the studied groups as for the frequency of accumulation of both adverse ($p=.0018$, Cramér's $V=.11$) and beneficial ($p<.0001$, Cramér's $V=.13$) behaviours were observed. A similar difference can be observed between students and professionals as for the accumulation of adverse ($p=.0048$, Cramér's $V=.14$) and beneficial ($p<.0001$, Cramér's $V=.18$) behaviours. Generally, we can see a more frequent occurrence of accumulation of adverse behaviours among medical professionals. Nurses compare particularly unfavorably in this regard. Interestingly, a slightly more frequent occurrence of accumulation of all the behaviours beneficial to health can be observed among medical professionals (physiotherapists and physicians in particular). While comparing medical students to physiotherapy students, we can see both less frequent accumulation of beneficial behaviours and more frequent accumulation of adverse behaviours in the first group. Gender does not differentiate the respondents in terms of accumulation of both beneficial and adverse behaviours.

In order to make a more thorough analysis of the co-occurrence of individual health behaviours and their interactions cluster analyses were performed. Four distinct clusters were identified based on four lifestyle risk factors: physical activity, nutrition, smoking and alcohol consumption. The following indicators of behaviours were chosen: two levels of physical activity: low or moderate and high; sum of points for NI12 for nutrition; three levels for smoking: current smoking, ex-smoking, never smoking; two levels for alcohol consumption: moderate and heavy or binge drinking. Four clusters were found to be the optimum number of clusters. Table 4.9 presents the size and features of the distinguished clusters.

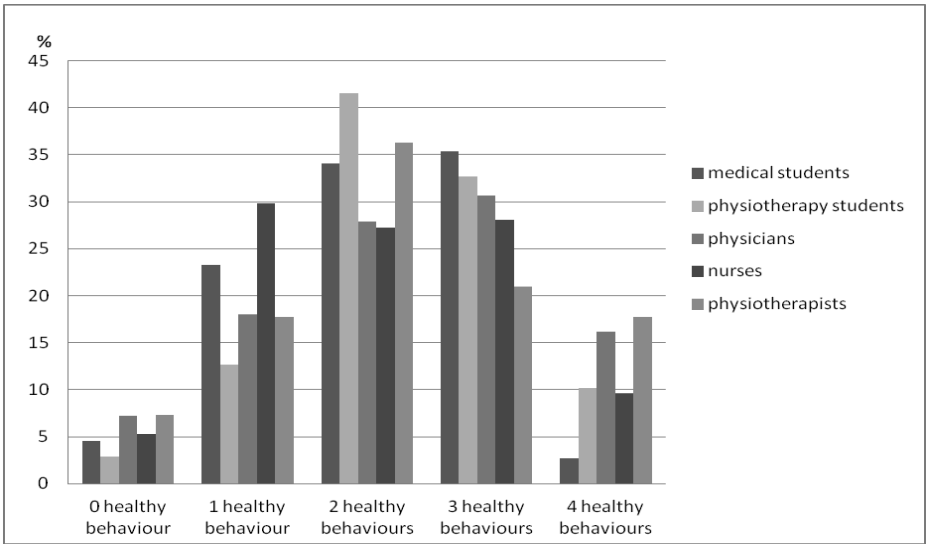

Figure 4.6 Accumulation of healthy behaviours (percentages of respondents)

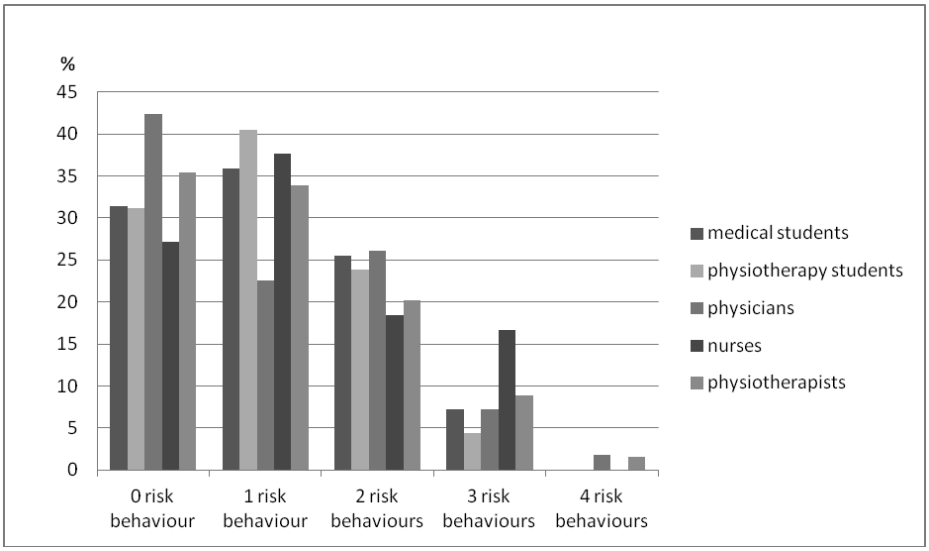

Figure 4.7 Accumulation of risk behaviours (percentages of respondents)

Table 4.9 Descriptive characteristics for each cluster

	Clusters					p value, effect size
	1 unhealthy	2 healthy	3 unhealthy	4 moderate healthy	All	
N (%)	212 (28)	204 (27)	132 (17.5)	208 (27.5)		
NI12 M ± SD	27.8 ± 3.0	29.1 ± 3.1[a]	27.4 ± 3.9[b]	28.1 ± 3.2[b]	28.2 ± 3.3	p<.0001, η^2=.04
PA (%)		a	b	a, b, c		
low/ moderate	24.0	0	19.9	56.1	49.1	p<.0001, V=.60
high	31.9	53	15.1	0	50.9	
Smoking (%)		a	a, b	a, c		
never	24.4	37.4	0	38.2	72	p<.0001, V=.59
ex	26.6	0	73.4	0	10.5	
current	43.9	0	56.1	0	17.5	
Alcohol (%)		a	a	a		
moderate	0	37.5	24.3	38.2	28.0	p<.0001, V=1.00
heavy/ binge	100	0	0	0	72	

a – difference from cluster 1 using Bonfernoniego test, chi-squared test or Fisher's exact test for categorical values

b – difference from cluster 2 using Bonfernoniego, test, chi-squared test or Fisher's exact test for categorical values

c – difference from cluster 3 using Bonfernoniego test, chi-squared test or Fisher's exact test for categorical values

Three clusters include 28% of individuals from the sample. The smallest cluster includes 17.5% of persons. Cluster 1 is characterized by heavy or binge drinking status and quite poor diet, i.e. it contains people following adverse lifestyle behaviours. Clusters 2 and 4 are characterized by relatively beneficial nutrition behaviours, moderate consumption of alcohol and non-smoking but they differ in terms of physical activity, where for cluster 4 it can be considered as moderate whereas for cluster 2 as beneficial. Cluster 3 contains current smokers, moderate drinkers with quite poor diet and varying physical activity, i.e. it groups persons adopting adverse lifestyle. The analysed behaviours significantly differentiated individual clusters: physical activity (chi-squared (3,756)=419.3, p<.0001, Cramér's V=.60), smoking (chi-squared (6,756)=523.5, p<.0001, Cramér's V=.59), alcohol (chi-squared (3,756)=756.0, p<.0001, Cramér's V=1.00), nutrition (F (3,756)=8.8, p<.0001, eta squared=.04). We can observe also differences between individual clusters in terms of the percentage of persons representing given behaviours or averages characterizing them (see Tab. 4.9).

Individual clusters differ from each other as for the representation of the analysed career stage groups: professionals and students (chi-squared (3,756)=38.0, p<.0001, Cramér's V=.22). The difference is particularly visible in cluster 1 and cluster 3. Cluster 1, containing persons abusing alcohol with adverse nutrition behaviours, consists mostly of students whereas cluster 3, containing persons with poor diet, not abusing alcohol and currently smoking or ex-smoking, consists mostly of professionals (see Fig. 4.8).

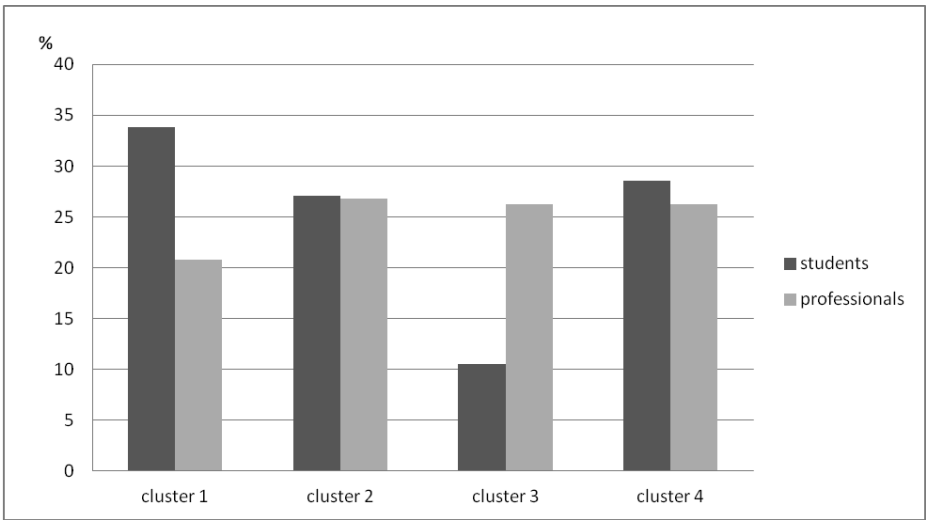

Figure 4.8 Representation of students and professionals in clusters (percentages)

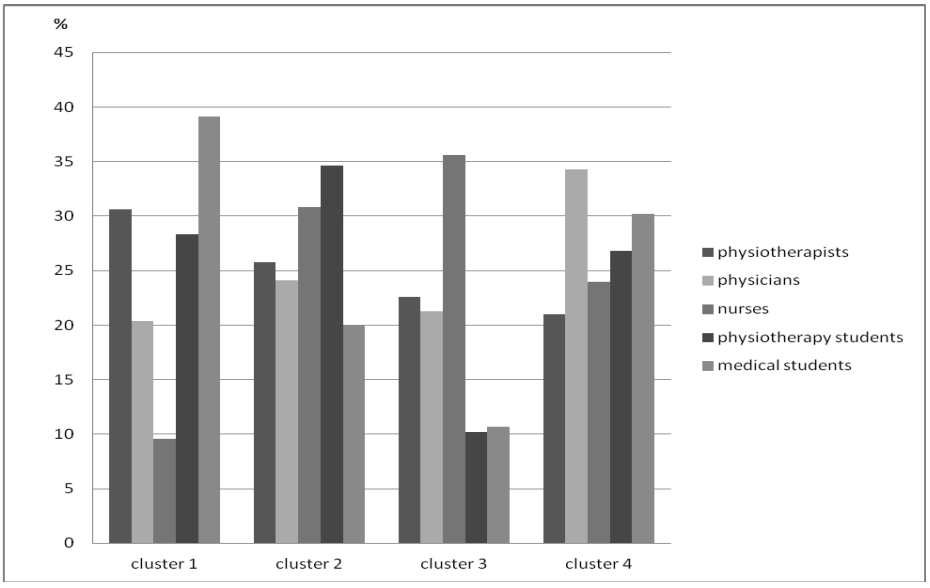

Figure 4.9 Representation of each studied groups in clusters (percentages)

Similarly, the five surveyed social and professional groups vary in the frequency of representation of individual clusters (chi-squared (12,156)=72.63, p<.0001, Cramér's V=.18). The cluster most frequently represented among physiotherapists is cluster 1, among physicians cluster 4, among nurses cluster 3, among physiotherapy students cluster 2 and among medical students cluster 1 (see Fig. 4.9). Gender does not differentiate the respondents in respect of the frequency of belonging to individual clusters.

Next, differences were sought between persons assigned to the distinguished clusters in terms of the following subject variables: health locus of control, place of health as a personal value, self-rated health and BMI. Both a chi-squared test and an analysis of variance were used for that purpose. The respondents from the individual clusters differed in self-rated health (chi-squared (12,747)=43.35, p<.0001, Cramér's V=.14). The respondents rating their health as very bad, bad or moderate are more rarely represented in cluster 2 which is more often represented by persons rating their health as very good. On the other hand, cluster 3 is more rarely represented by persons rating their health as good and very good and relatively often by persons rating their health as moderate or worse. The valuation of health as a prerequisite for happiness does not differentiate the respondents in terms of belonging to particular clusters (chi-squared (15,756)=17.44, p=.2912, Cramér's V=.09). However, the respondents differ in the perception of health as an important, personal value (chi-squared (15,756)=29.57, p=.0143, Cramér's V=.11). The persons who do not value health more often represent cluster 1 or cluster 3, whereas persons who appreciate the value of health more often represent cluster 2 and cluster 4. As for health locus of control, we can see the following differences between the distinguished clusters. Internal Health Locus Of Control differentiates the respondents (chi-squared (3,755)=8.74, p=.0333, Cramér's V=.11). The respondents with high Internal Health Locus of Control, i.e. believing that the state of their health depends on them most frequently represent cluster 2. The respondents with low belief in that regard more frequently represent clusters 1 and 4. Similarly, others health locus of control differentiates the respondents in the distinguished clusters (chi-squared (3,755)=12.91, p=.0047, Cramér's V=.13). The persons placing control over their own health in the hands of health specialist more frequently represent clusters 1 and 4 whereas the persons who do not entrust the control over their health to specialist can be more frequently found in cluster 2. Also the third type, Chance Health Locus of Control differentiates the respondents (chi-squared (3,755)=9.60, p=.0221, Cramér's V=.11). The respondents with low Chance Health Locus of Control more often represent cluster 1 whereas those with high Chance Health Locus of Control, i.e. entrusting control over their health to chance, fate or God more frequently represent cluster 4.

The analysis focused also on differences in the BMI category between the respondents representing individual clusters (chi-squared (39,744)=41.21, p<.0001, Cramér's V=.14). The overweight respondents most frequently represent cluster 3, persons with normal body weight represent cluster 2 whereas underweight persons represent clusters 1 and 4.

The study focused also on the analysis of how the individual behaviours (nutrition, smoking, alcohol consumption), affiliation to one of the studied social and professional groups and their interaction differentiate a level of physical activity among the

respondents. For that purpose, a two-way analysis of variance was employed and the percentage of explained variation for the variable "level of physical activity" by the aforementioned factors was determined. The results are presented in graphs.

A relationship between nutrition behaviour (for both NI12 and NI3), professional career stage or affiliation to one of the studied groups and a level of physical activity of the respondents was subject of analysis. The main effects of NI12 and career stage and the effect of interaction (NI12 x career stage) are significant (p<.0001). Students declare a higher level of physical activity than professionals (p<.0001). The respondents demonstrating beneficial nutrition behaviour have physical activity score higher than those with adverse nutrition behaviour (p=.0011). The level of nutrition does not differentiate physical activity among students but it does among professionals. The professionals demonstrating adverse nutrition behaviours have physical activity score significantly lower than those with moderate (p<.0001) and beneficial (p<.0001) nutrition behaviours. The career stage differentiates a level of physical activity only among those with adverse nutrition behaviours – physical activity of students is higher than that of professionals (p<.0001). In the whole group professionals with adverse nutrition behaviours compare unfavorably, demonstrating a level of physical activity significantly lower than that of all the other respondents (p<.0001). The model explains 8% of the variance in the dependent variable ($F(5,762)=13.24$, $p<.0001$, $R^2=.08$) – see Figure 4.10.

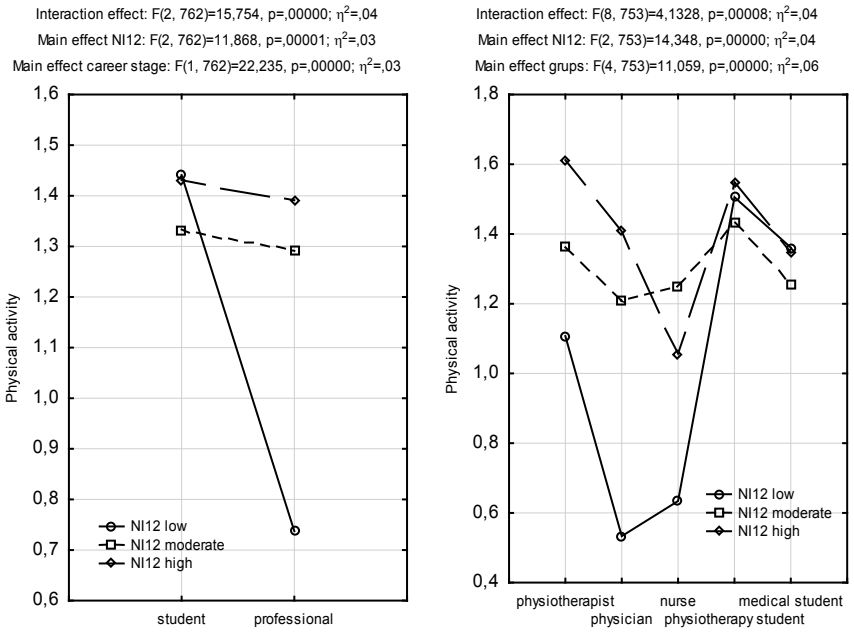

Figure 4.10 NI12, physical activity and career stage or studied groups interaction (two-way ANOVA results)

The main effects of NI12 and group and the effect of interaction (NI12 x group) are significant (p<.0001). The respondents demonstrating beneficial nutrition behaviours have physical activity score significantly higher than those with adverse nutrition behaviours (p=.0009). A level of physical activity of both physiotherapists and physiotherapy students is significantly higher than that of physicians and nurses (p<.05). The nutrition behaviour differentiates a level of physical activity among physicians and nurses. The physicians demonstrating adverse nutrition behaviours have physical activity score significantly lower than those with beneficial nutrition behaviours (p=.0001). The nurses demonstrating moderate nutrition behaviours have physical activity score significantly higher than those with adverse nutrition behaviours (p=.0382). The biggest differences between the social and professional groups can be observed among persons demonstrating adverse nutrition behaviours. The model explains 10% of the variance in the dependent variable ($F(14,753)=6.8$, $p<.0001$, $R^2=.10$) – see Figure 4.10.

The same procedure was carried out for NI3. The main effects of NI3 and career stage and the effect of interaction (NI3 x career stage) are significant (p<.0001). Students declare a higher level of physical activity than professionals (p<.0001). The respondents demonstrating adverse nutrition behaviours have physical activity score significantly lower than those with moderate (p=.0046) and beneficial (p=.0001) nutrition behaviours. The level of nutrition does not differentiate physical activity among students but it does among professionals. The professionals demonstrating adverse nutrition behaviours have physical activity score significantly lower than those with moderate (p<.0001) and beneficial (p<.0001) nutrition behaviours. The career stage most often differentiates a level of physical activity among those with adverse nutrition behaviours – physical activity of students is higher than that of professionals (p<.0001). In the whole group professionals with adverse nutrition behaviours compare unfavorably, demonstrating a level of physical activity significantly lower than that of the other respondents (p<.0001). The model explains 9% of the variance in the dependent variable ($F(5,762)=15.31$, $p<.0001$, $R^2=.09$) – see Figure 4.11.

The main effects of NI3 and group and the effect of interaction (NI3 x group) are significant (p=.0020). The respondents demonstrating adverse nutrition behaviours have physical activity score significantly lower than those with moderate (p=.0040) and beneficial (p<.0001) nutrition behaviours. A level of physical activity of both physiotherapists and physiotherapy students is significantly higher than that of physicians and nurses (p<.05). The nutrition behaviour differentiates a level of physical activity among physiotherapists, physicians and nurses. The physiotherapists demonstrating adverse nutrition behaviours have physical activity score significantly lower than those with beneficial nutrition behaviours (p=.0093). The physicians demonstrating adverse nutrition behaviours have physical activity scores significantly lower than those with beneficial nutrition behaviours (p=.0143). The nurses demonstrating adverse nutrition behaviours have also physical

activity scores significantly lower than those with beneficial nutrition behaviours (p=.0032). The biggest differences between the social and professional groups can be observed among persons demonstrating adverse nutrition behaviours. The model explains 11% of the variance in the dependent variable (F(14,753)=7.50, p<.0001, R^2=.11) – see Figure 4.11.

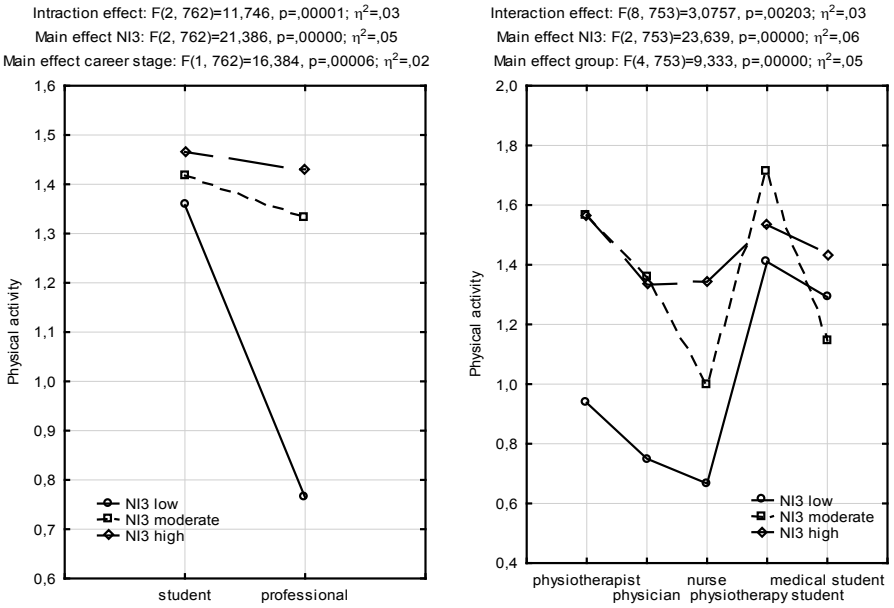

Figure 4.11 NI3, physical activity and career stage or studied groups interaction (two-way ANOVA results)

Furthermore, the study focused on the analysis of a relationship between smoking, professional career stage or affiliation to one of the studied groups and a level of physical activity of the respondents. The main effect of career stage and the effect of interaction (smoking x career stage) are significant (p<.0001, p=.0055, respectively). The effect of smoking proved to be insignificant. Students declare a higher level of physical activity (p<.0001). Smoking does not differentiate a level of physical activity among students whereas smoking professionals have significantly lower activity score than non-smoking ones (p=.0012). The career stage differentiates a level of physical activity mainly among smokers. Smoking students declare a higher level of physical activity than professionals (p=.0003). Generally, as for physical activity, smoking professionals compare particularly unfavorably to almost all the other groups (p<.002), except for ex-smoking professionals. The model explains 4% of the variance in the dependent variable (F(5,759)=6.62, p<.0001, R^2=.04) – see Figure 4.12.

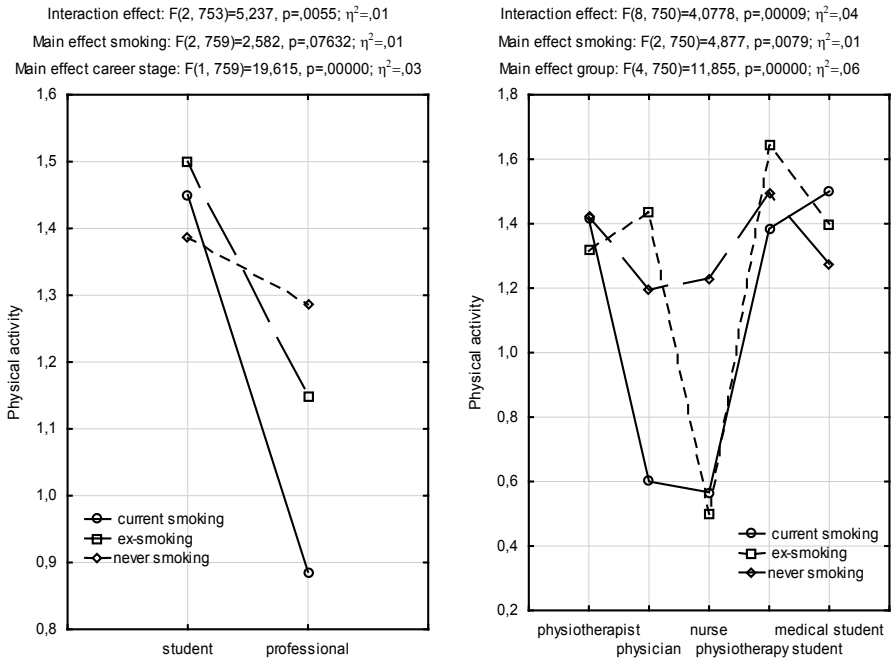

Figure 4.12 Smoking, physical activity and career stage or studied groups interaction (two-way ANOVA results)

The main effects of smoking and group and the effect of interaction (smoking x group) are significant (p<.0001, p=.0079, p=.0001, respectively). The level of physical activity of both physiotherapists and physiotherapy students is significantly higher than that of physicians and nurses (p<.04). Physical activity of smokers is significantly lower than that of non-smokers (p=.0068). Smoking differentiates a level of physical activity only among nurses where smokers have significantly lower physical activity score than non-smokers (p=.0059). On the other hand, social and professional groups differentiate physical activity most often among smokers. Smoking physicians and nurses have physical activity scores significantly lower than smoking physiotherapists, medicine and physiotherapy students (p<.04). Generally, smoking nurses have the worst score with physical activity significantly lower (p<.01) compared to all the other non-smoking respondent groups and ex-smokers (except for nurses who gave up smoking). On the other hand, smoking physicians have physical activity score significantly lower than smoking and ex-smoking physiotherapy students as well as non-smoking physiotherapists and medical students (p<.01). The model explains 8% of the variance in the dependent variable ($F(14,750)=5.82$, $p<.0001$, $R^2=.08$) – see Figure 4.12.

The main effects of alcohol and career stage and the effect of interaction (alcohol x career stage) are insignificant. The main effects of alcohol and group are significant (p=.0242, p=.0002, respectively). The effect of interaction (alcohol x group) proved to be insignificant. Moderate drinkers have higher physical activity score than those with heavy alcohol consumption (p=.0063). The model explains 5% of the variance in the dependent variable ($F(14,753)=4.10$, $p<.0001$, $R^2=.05$) – see Figure 4.13.

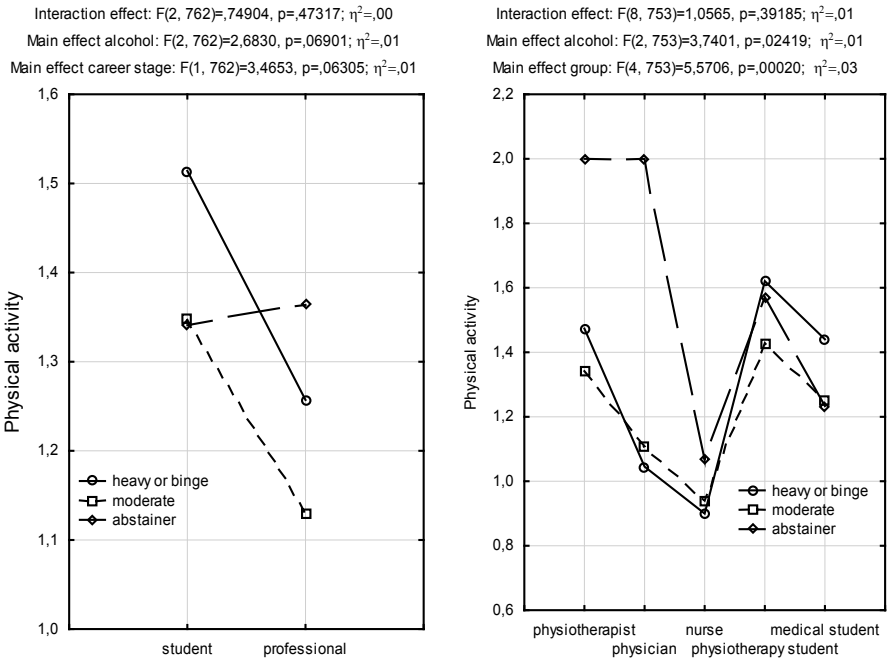

Figure 4.13 Alcohol consumption, physical activity and career stage or studied groups interaction (two-way ANOVA results)

Next, the study focused on the analysis of a relationship between alcohol consumption, professional career stage or affiliation to one of the studied groups and nutrition behaviour of the respondents. The main effects of alcohol and career stage and the interaction (alcohol x career stage) are insignificant. These factors do not differentiate nutrition behaviour (NI12) of the respondents. On the other hand, the main effects of alcohol and group and the interaction (alcohol x group) are significant (p<.03). Physiotherapy students demonstrate a significantly worse nutrition behaviour than physiotherapists (p=.0373) or physicians (p=.0003) whereas nurses' nutrition behaviour is worse than that of physicians (p=.0343). The consumption of alcohol differentiates nutrition behaviour only among nurses where, interestingly, drinking or abstinent respondents rarely demonstrate a significantly worse nutrition behaviour

than moderately drinking ones (p=.0472). However, social and professional groups do not differentiate nutrition behaviour among those with heavy or binge alcohol consumption. There is minimal difference between the other alcohol consumption groups. The biggest difference can be found between abstinent nurses demonstrating a significantly worse nutrition behaviour than moderately drinking physiotherapists (p=.0108), physicians (p=.0022) and nurses (p=.0472) as well as abstinent students (p=.0239). The model explains 4% of the variance in the dependent variable (F(14,762)=3.54, p<.0001, R^2=.04) – see Figure 4.14.

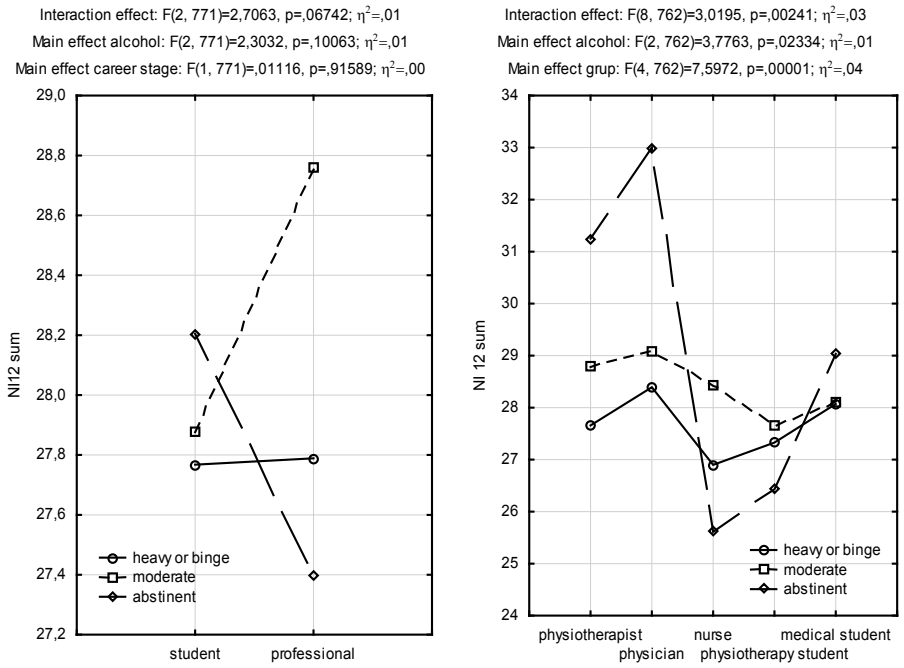

Figure 4.14 Alcohol consumption, nutrition status (NI12) and career stage or studied groups interaction (two-way ANOVA results).

The main effect of career stage and the interaction (alcohol x career stage) are significant (p<.04). These factors differentiate nutrition behaviour (NI3) of the respondents. The main effect of alcohol proved to be insignificant. Professionals demonstrate a significantly better nutrition behaviour than students (p<.0001). The consumption of alcohol does not differentiate nutrition behaviours in the group of students and professionals. A distinguishing group here includes moderately drinking professionals with nutrition behaviour significantly better than that of students with heavy, binge or moderate alcohol consumption (p<.003).

The model explains 3% of the variance in the NI3 dependent variable (F(5,771)=36.31, p<.0001, R^2=.03) – see Figure 4.15.

The main effect of group and the effect of interaction (alcohol x group) are significant (p<.02). These factors differentiate nutrition behaviour (NI3) of the respondents. The main effect of alcohol proved to be insignificant. Physiotherapist demonstrate significantly better nutrition behaviour than nurses (p=.0462), physiotherapy students (p<.0001) and medical students (p=.0214). Physiotherapy students demonstrate significantly worse nutrition behaviour than physicians (p<.0001) and medical students (p=.0017) and better than nurses (p=.0271). The level of alcohol consumption does not differentiate nutrition behaviours in the studied groups of respondents. A distinguishing group here includes moderately drinking physiotherapists and physicians with nutrition behaviour significantly better than that of physiotherapy students with rare or moderate (p<.005) and heavy or binge (p<.0105) alcohol consumption. The model explains 7% of the variance in the NI3 dependent variable (F(14,762)=4.87, p<.0001, R^2=.07) – see Figure 4.15.

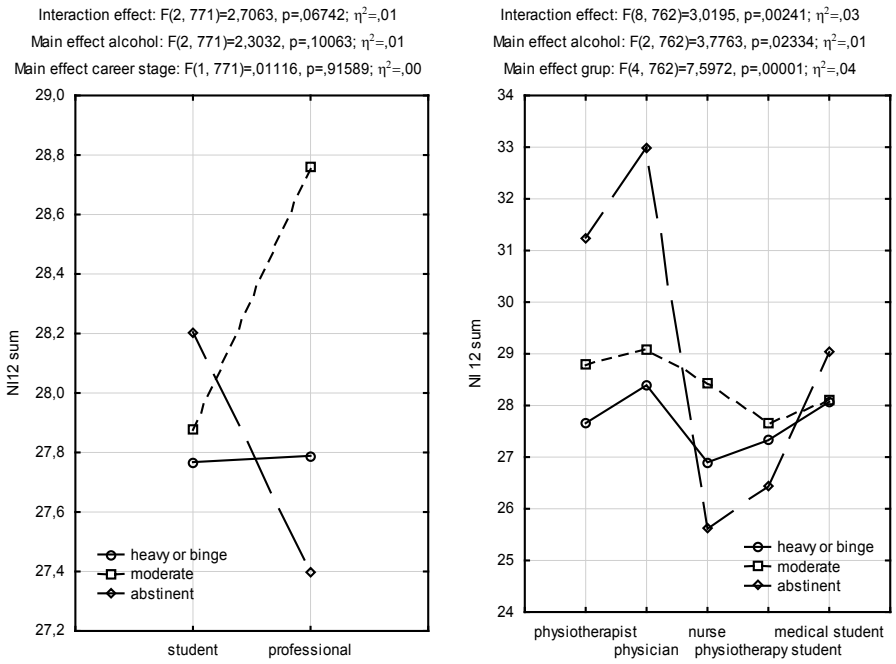

Figure 4.15 Alcohol consumption, nutrition status (NI3) and career stage or studied groups interaction (two-way ANOVA results)

Below, a relationship between smoking, professional career stage or affiliation to one of the studied groups and nutrition behaviour of the respondents (NI12 and NI3) was analysed.

The main effect of career stage is insignificant. The main effect of smoking and the effect of interaction (smoking x career stage) are significant (p<.01). These factors differentiate nutrition behaviour (NI12) of the respondents. Current smokers demonstrate a significantly worse nutrition behaviour than ex-smokers (p=.0012) and non-smokers (p<.0001). Professionals demonstrate a significantly better nutrition behaviour than students (p<.0001). Smoking differentiates nutrition behaviour only among professionals. Smoking professionals demonstrate a significantly worse nutrition behaviour than their colleagues who are ex-smokers (p=.0012) and non-smokers (p<.0001). A distinguishing group here includes non-smoking professionals with nutrition behaviour significantly better than that of smoking students (p<.003) as well as both non-smoking (p<.0001) and smoking (p<.0001) professionals. Ex-smoking professionals demonstrate also a better nutrition behaviour than smoking ones (p<.0012). The model explains 6% of the variance in the NI12 dependent variable ($F(5,768)=11.36$, $p<.0001$, $R^2=.06$) – see Figure 4.16.

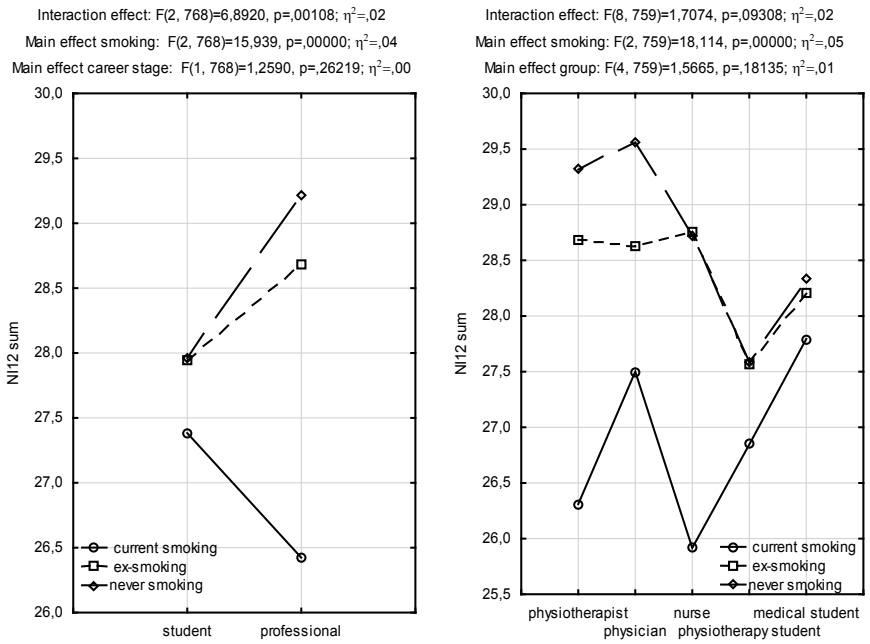

Figure 4.16 Smoking, nutrition status (NI12) and career stage or studied groups interaction (two-way ANOVA results)

The main effect of group and the effect of interaction (smoking x group) are insignificant. These factors do not differentiate nutrition behaviour (NI12) of the respondents. The main effect of smoking proved to be significant (p<.0001). Smokers demonstrate a significantly worse nutrition behaviour than ex-smokers (p=.0011) and non-smokers (p<.0001). The model explains 7% of the variance in the NI12 dependent variable ($F(14,759)=4.94$, p<.0001, $R^2=.07$) – see Figure 4.16.

The main effects of smoking and career stage and the effect of interaction (smoking x career stage) are significant (p<.02). These factors differentiate nutrition behaviour (NI3) of the respondents. Current smokers demonstrate a significantly worse nutrition behaviour than ex-smokers (p=.0001) and non-smokers (p<.0198) whereas, interestingly, nutrition behaviour of non-smokers is worse than that of ex-smokers (p=.0071). Professionals demonstrate a significantly better nutrition behaviour than students (p<.0001). Smoking differentiates nutrition behaviour only among professionals. Smoking professionals demonstrate a significantly worse nutrition behaviour than their colleagues who are ex-smokers (p=.0038) and non-smokers (p<.0003). It is only in the group of non-smokers that students demonstrate worse nutrition behaviour than professionals (p<.0001). A distinguishing group here includes non-smoking professionals with nutrition behaviour significantly better than that of both smoking (p<.003) and non-smoking (p<.0001) students as well as smoking professionals (p<.00001). Ex-smoking professionals demonstrate also a better nutrition behaviour than smoking ones (p<.0012). The model explains 6% of the variance in the NI3 dependent variable ($F(5,768)=10.77$, p<.0001, $R^2=.06$) – see Figure 4.17.

The main effects of smoking (p<.0001) and group are significant (p=.0045). These factors differentiate nutrition behaviour (NI3) of the respondents. The effect of interaction (smoking x group) is insignificant. Physiotherapy students demonstrate significantly worse nutrition behaviour in all the studied groups (p<.02) whereas nutrition behaviour of medical students is worse than that of physiotherapists (p=.0231). Smokers demonstrate a significantly worse nutrition behaviour than ex-smokers (p=.0001) and non-smokers (p<.0182) whereas nutrition behaviour of ex-smokers is better than that of non-smokers (p=.0065). The model explains 8% of the variance in the NI3 dependent variable ($F(14,759)=5.76$, p<.0001, $R^2=.08$) – see Figure 4.17.

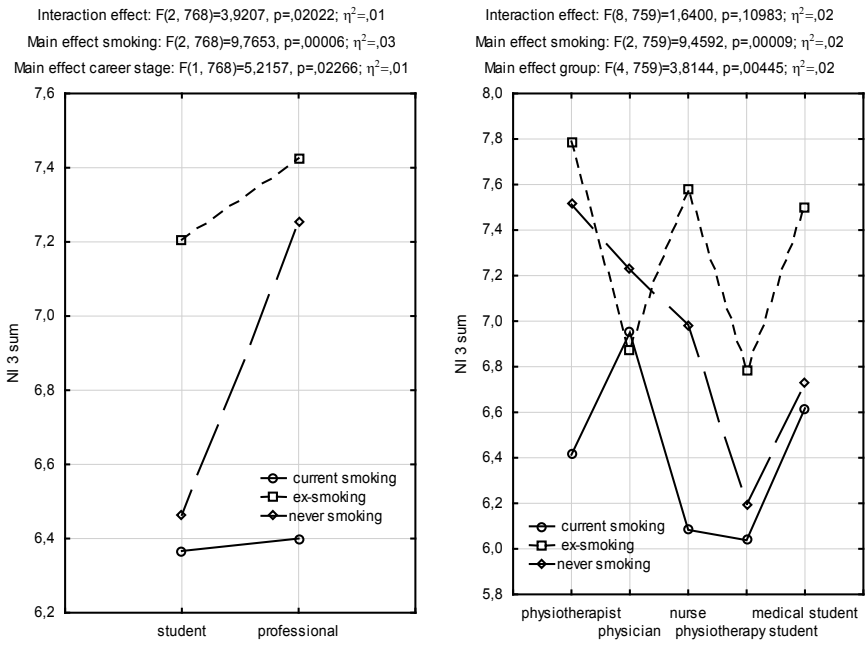

Figure 4.17 Smoking, nutrition status (NI3) and career stage or studied groups interaction (two-way ANOVA results)

4.2.7 Health Behaviour Profiles

In accordance with the procedure described in the methodological part of the study, an original classification of health-related activities was proposed, taking the four studied health behaviours into consideration, including two health-enhancing behaviours and two health-compromising behaviours. Five Health Behaviour Profiles were distinguished: *destructive*, *passive*, *ambivalent*, *average*, *beneficial*. Descriptive statistics for each profile were designed in Table 4.10.

The frequency of occurrence of individual Health Behaviour Profiles varies between the group of students and the group of professionals (p<.0001, Cramér's V=.18). The *destructive* profile is more common among professionals whereas the *ambivalent* and *average* profiles are more common among students. Differentiation between all the studied groups proved to be significant, albeit of small effect size (p<.0001, Cramér's V=.14). The *destructive* profile is observed in the biggest percentage most frequently among nurses, the *passive* profile among physiotherapists, the *ambivalent* profile among physicians, the *average* profile among medical students and the *beneficial* among physiotherapy students. Gender does not differentiate the

respondents in respect of the frequency of the Health Behaviour Profiles represented by them.

Table 4.10 Descriptive statistics for Health Behaviour Profiles

Health Behaviour Profiles	students				professionals			
	All	all	medical	physio-therapy	all	physicians	nurses	physio-therapists
destructive n(%)	104 (14)	37 (9)	22 (10)	15 (7)	67 (20)	16 (15)	33 (31)	18 (14)
passive n (%)	91 (12)	56 (13)	27 (12)	29 (14)	35 (10)	16 (15)	9 (8)	10 (8)
ambivalent n(%)	94 (12)	54 (13)	32 (15)	22 (11)	40 (12)	12 (11)	6 (6)	22 (18)
average n (%)	154 (20)	101(23)	59 (27)	42 (21)	53 (16)	17 (16)	11 (10)	25 (20)
beneficial n (%)	322 (42)	178(42)	81 (36)	97 (47)	144(42)	47 (43)	48 (45)	49 (40)

	all groups			students/professionals		
	Chi-square	p value	V	Chi-square	p value	V
Health Behaviour Profiles [a]	58.53	<.0001	.14	24.56	<.0001	.18

[a] *- Chi-squared test were used for differences between studied groups; effect size*: *Cramer's V*

Next, differences between the distinguished Health Behaviour Profiles (HBP) were determined in terms of the following subject variables: health locus of control, place of health as a personal value, self-rated health and BMI. Self-rated health differentiates the respondents representing individual HBPs (chi-squared (16,756)=75.20, p<.0001, Cramér's V=.16). The highest percentage of respondents rating their health as bad or very bad can be observed among the destructive and ambivalent profiles. The persons who most frequently rate their health as very good belong to the beneficial profile (see Fig. 4.18).

The respondents representing individual profiles differ in their valuation of health as a prerequisite for personal happiness (chi-squared (20,765)=49.26, p<.001, Cramér's V=.13). Persons with the destructive and ambivalent profiles most frequently do not regard health as necessary for personal life satisfaction. On the other hand, it is most often highly valued by representatives of the beneficial profile. The situation is quite similar with reference to health as an important, personal value (chi-squared (20,765)=45.96, p=.001, Cramér's V=.12). Most frequently health is not chosen as an

important personal value by persons representing the destructive profile while it is perceived as important by persons from the beneficial profile and, interestingly, as very important by persons from the ambivalent profile.

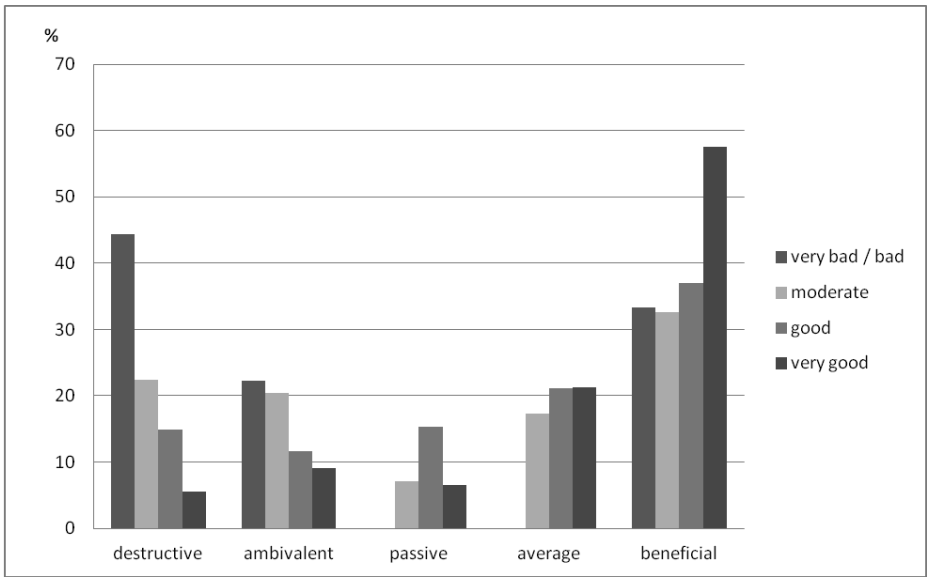

Figure 4.18 Self-rated Health of respondents in each health behaviour profile

Health locus of control also differentiates the respondents. As for Internal Locus Of Health Control (chi-squared (4,764)=24.11, p<.0001, Cramér's V=.18) persons with a high sense of control over their own health most often represent the beneficial and average profiles while persons with low sense of such control represent the destructive, ambivalent and passive profiles (see Fig.4.19). Powerful Others Health Locus of Control did not differentiate the respondents whereas external control related to the role of chance and fate, i.e. Chance Health Locus of Control did differentiate them (chi-squared (4,764)=19.00, p<.001, Cramér's V=.16) but the situation was opposite to that for internal control - persons representing the beneficial, average and ambivalent profiles less frequently give control over their health to the indicated external factors but such control is more often given by representatives of the destructive and passive profiles (see Fig. 4.20).

Also BMI differentiates the respondents representing individual HBPs (chi-squared (12,753)=42.34, p<.0001, Cramér's V=.14). We observe that overweight persons are most often representatives of the destructive profile whereas representatives of the beneficial and average profiles are most frequently those with normal body weight. Underweight can be observed most often among persons representing the average and passive profiles.

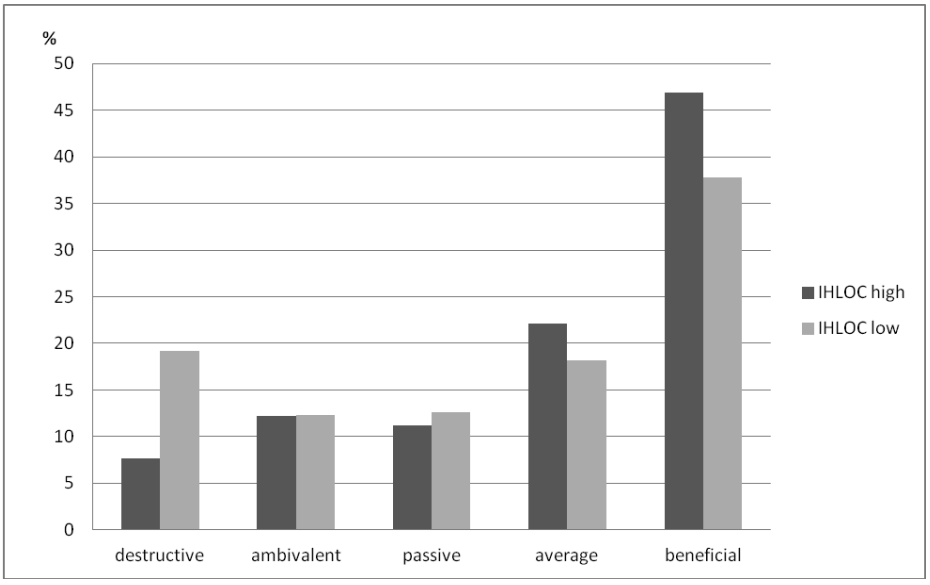

Figure 4.19 Internal Health Locus of Control (IHLOC) differentiation of health behaviours profiles

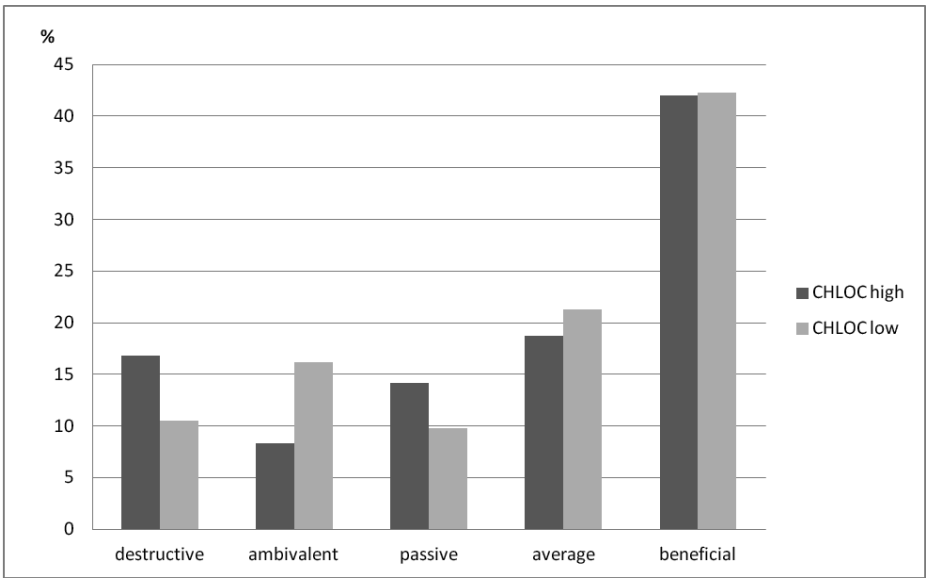

Figure 4.20 Chance Health Locus of Control (CHLOC) differentiation of Health Behaviours Profiles

4.3 Individual Differences Among Medical and Physiotherapy Students and Professionals

During the search for subjective determinants of health behaviours a focus was placed on variables appearing in a number of theories explaining the adoption of a certain lifestyle by an individual. The following were found to be the basic ones: health locus of control, health-specific self-efficacy, health as a personal value, self-rated health. The variations in them within the surveyed social and professional groups are presented in Table 4.11.

Differences in the level of the five distinguished psychosocial determinants were observed between the groups of students and professionals, i.e. in relation to the stage of professional career. For most of the aforementioned variables significantly higher scores were obtained by students: Self-rated Health (p=.026, Glasses' g=.08), physical activity self-efficacy (p=.0004, Hedges' g=.25), nutrition self-efficacy (p=.0012, Hedges' g=.33), Internal Health Locus of Control (p=.014, Hedges' g=.25). Compared to their older professional colleagues, students are more certain of their ability to deal with obstacles to being physically active or to implementing proper diet. Though this conviction does not always go hand in hand with more beneficial behaviours (which is particularly visible in the case of nutrition), you can have an impression that even if they don't adopt health-beneficial behaviours, they still believe that such adoption is mainly up to them and that they can change their habits for the better if only they want to. Maybe they still do not see any need for doing so since, as already mentioned, they have Self-rated Health scores also significantly higher than those of professionals. On the other hand, unsurprisingly, professionals appreciate more the value of health (p<.0001, Glasses' g=.17).

The larger baggage of experience related to the years of work makes them more appreciative of the value of health in life. Furthermore, over all these years they have probably achieved a satisfactory level in respect of other important values and at present they may focus more and more on what often begins to fail with age. Gender differentiates the respondents only in terms of health evaluation as a condition of personal happiness (chi-squared (5,777)=24.56, p<.001, Cramer's V=.18). Women often choose health as an important or very important value in their life more often than men.

While analyzing the position of other values in the hierarchy of values of the respondents, we can see numerous generation differences (see Tab. 4.12).

The hierarchy of values being symbols of personal happiness is similar in the both surveyed groups (Tab. 4.13); however, certain values prove to be important and very important significantly more often to professionals: family (p<.0001, Cramér's V=.17), good health (p=.0009, Cramér's V=.16), doing favorite job (p=004, Cramér's V=.15). On the other hand, other values generally less important to the respondents, prove to be important more often to the group of students: many friends (p<.0001, Cramér's V=.19), being needed by others (p=.0092, Cramér's V=.14), good financial situation (p=.0093, Cramér's V=.14). These results are not surprising and they are an

Table 4.11 Descriptive statistics for psychosocial variables

		All	students		professionals			p value[a] effect size	p value[b] effect size
			medical	physiotherapy	physicians	nurses	physiotherapists		
MHCL M ± SD	Internal	27.9 ± 4.4	27.8 ± 4.6	28.7 ± 3.9	28.2 ± 4.0	27.2 ± 4.4	27.1 ± 4.9	.014 .25	.010 .02
	Powerful	17.3 ± 5.6	17.4 ± 5.7	17.5 ± 4.9	17.0 ± 5.2	18.6 ± 6.6	15.8 ± 5.5	.321 Ns	.003 .02
	Change	16.6 ± 5.6	16.2 ± 5.5	17.3 ± 5.2	15.9 ± 5.0	17.7 ± 5.8	16.0 ± 6.3	.578 Ns	.018 .02
PA SE	M ± SD	12.4 ± 4.2	12.7 ± 4.3	13.0 ± 3.9	12.6 ± 4.1	10.4 ± 4.1	12.4 ± 4.1	.000 .25	.000 .04
Nutrition SE	M ± SD	13.9 ± 3.6	14.3 ± 3.4	14.3 ± 3.1	14.1 ± 4.4	13.2 ± 3.5	13.0 ± 3.8	.001 .33	.002 .02
Smoking SE	M ± SD	31.9 ± 7.2	31.6 ± 7.2	32.7 ± 6.7	33.0 ± 6.4	30.2 ± 8.3	31.6 ± 7.2	.276 Ns	.018 .02
Alcohol SE	M ± SD	10.2 ± 2.3	11.4 ± 1.4	10.0 ± 2.2	10.1 ± 2.8	10.3 ± 2.0	7.8 ± 3.4	.449 Ns	.000 .10
Health as a value	M ± SD	3.4 ± 1.6	3.2 ± 1.5	3.3 ± 1.6	3.2 ± 1.8	4.0 ± 1.4	3.5 ± 1.6	.000 .17	.000 .02
Health as a happiness symbol	M ± SD	3.3 ± 1.6	3.3 ± 1.7	3.3 ± 1.6	3.2 ± 1.6	3.9 ± 1.1	3.2 ± 1.4	.594 .03	.590 Ns
SRH	M ± SD	4.1 ± .7	4.2 ± .7	4.1 ± .6	4.2 ±.7	3.8 ± .7	4.2 ± .5	.026 .08	.026 .001

a – test t or Mann-Whitney U test were used for differences between students/professionals and Hedges' g or Glass' g effect size
b – one-way ANOVA or Kruskal-Wallis test were used for differences between all groups and eta squared or epsilon squared effect size

Table 4.12 List of Personal Values (LPV) – symbols of personal happiness – mean values of importance and distribution of significance for students (S) and professionals (P)

Symbols of happiness	Mean value of importance TOTAL/S/P	SD TOTAL/S/P	Distribution of significance: S (%) / P (%)					
			5	4	3	2	1	0
1. Many friends	1.49/ 1.67/ 1.27	1.7/ 1.7/ 1.6	4/5	13/8	20/12	15/12	5/10	43/53
2. Being needed by others	1.28/ 1.37/ 1,16	1.6/ 1.6/ 1.4	7/3	8/5	9/12	15/13	12/19	49/48
3. Success at work, school	.93/ 1.03/ .81	1.4/ 1.4/ 1.3	4/2	5/5	8/5	13/12	15/12	56/64
4. Good health	3.34/ 3.27/ 3.43	1.6/ 1.7/ 1.4	31/24	24/35	15/20	12/10	9/5	9/6
5. Life full of adventure, journey	.47/ .54/ .38	1.0/ 1.1/ 0.9	½	3/0	3/2	4/4	17/13	72/79
6. Successful family life	3.94/ 3.82/ 4.09	1.4/ 1.4/ 1.4	41/54	32/28	10/5	7/3	6/4	4/6
7. Good financial situation	1.18/ 1.23/ 1.13	1.4/ 1.5/ 1.3	6/2	5/4	11/11	10/15	19/24	49/44
8. Fame, celebrity	.02/ .00/ .04	0.3/ 0.0/ 0.4	0/1	0/0	0/0	0/0	0/0	100/99
9. Doing favourite job	2.03/ 1.95/ 2.14	1.5/ 1.5/ 1.4	6/3	9/12	23/29	21/27	17/10	24/19

S-students; P-professionals; Distribution: 5 – the most important value; 0 – not selected

Table 4.13 List of Personal Values (LPV) – personal values - mean values and distribution of significance for students (S) and professionals (P)

Personal values	Mean value of importance TOTAL/S/P	SD TOTAL/S/P	Distribution of significance S (%) / P (%)					
			5	4	3	2	1	0
1. Love, friendship	3.90/ 3.98/ 3.81	1.6 / 1.6 / 1.6	61/51	16/22	4/5	3/7	12/7	5/7
2. Good health	3.38/ 3.22/ 3.57	1.6 / 1.6 / 1.6	19/32	39/39	12/6	12/7	7/5	10/10
3. Joy, satisfaction	1.72/ 1.79/ 1.62	1.6 / 1.6 / 1.5	4/4	12/10	22/15	16/20	12/14	34/36
4. Sense of humour	.85/ .83/ .87	1.3 / 1.3 / 1.4	2/3	4/2	8/13	9/8	15/11	62/63
5. Knowledge, wisdom	1.29/ 1.22/ 1.38	1.5 / 1.5 / 1.4	4/1	4/6	15/20	15/15	9/15	53/42
6. Attractiveness, appearance	.29/ .33/ .25	0.8 / 0.9 / 0.7	1/0	1/0	1/2	3/5	10/9	83/84
7. Intelligence	1.87/ 2.00/ 1.72	1.5 / 1.5 / 1.6	3/2	14/14	26/19	20/20	9/7	28/37
8. Courage, firmness	.42/ .49/ .32	0.9 / 1.0 / 0.8	1/1	2/0	4/3	8/2	12/13	74/81
9. Wealth	.29/ .37/ .19	0.9 / 1.0 / 0.7	2/1	2/0	3/2	2/2	7/4	84/91
10. Kindness, softness	.75/ .72/ .80	1.3 / 1.3 / 1.3	1/1	5/2	5/11	11/9	8/13	70/64

Distribution: 5 – the most important value; 0 – not selected

effect of well-known socializing mechanisms, social maturation. Still, they provide information that is essential from the perspective of educational efforts which should more often include the elements of support by a group of peers and should refer to altruism, especially with reference to young people.

The analysis of the second part of the respondent's answers to questions about personal values important to them shows again that this hierarchy is similar for both students and professionals. However, we can see differences between the two groups as to the frequency of choices. Professionals choose significantly more often good health ($p<.0001$, Cramér's $V=.18$) as well as knowledge and wisdom ($p=.0012$, Cramér's $V=.16$), and kindness ($p=.0021$, Cramér's $V=.16$) as important and very important values. On the other hand, compared to professionals, students valued more love and friendship ($p<.0001$, Cramér's $V=.17$), intelligence ($p=.0487$, Cramér's $V=.12$), courage ($p=.0028$, Cramér's $V=.15$), wealth ($p=.0482$, Cramér's $V=.12$) and good looks ($p=.0252$, Cramér's $V=.13$). From the perspective of education, in order to more effectively influence medical and physiotherapy students it is necessary to refer more frequently to such values as friendship and love, hedonistic needs as well as good looks and intelligence development. In order, however, to have an effective influence on professionals with reference to health, apart from the superior values such as love and friendship a stronger focus should be put on the value of health as a prerequisite for intellectual efficiency as well as joy of life and satisfaction.

Let's try to identify differences existing between all the five surveyed social and professional groups in respect of individual subjective determinants. The differences in self-rated health ($p<.0001$, Cramér's $V=.13$) result mostly from very low self-rated health of nurses and it is a difference statistically significant compared to all the other surveyed groups (from $p<.00001$ for medicine students to $p=.0058$ for physiotherapists). Students do not differ significantly with respect to each other. At the same time, the respondents differ in a similar way in terms of their attitude to health as a personal value ($p<0001$, Cramér's $V=.13$). This time it is the nurses for whom the value of health is significantly higher than for physicians ($p=.0078$), physiotherapy students ($p=.0004$) and medicine students ($p<.0001$). The situation is similar as for the perception of health as a prerequisite for happiness. The surveyed groups differ in this regard ($p=.0001$, Cramér's $V=.14$). Most often such health value is highly important to nurses and they differ here significantly from physiotherapists ($p=.0049$) and physiotherapy students ($p=.0317$). Therefore, nurses are characterized on the one hand by the awareness of limitations or decreasing potential of their own health, visible in low self-rated health, and on the other hand by a higher valuation of health as a prerequisite for happiness. And students, for whom the time of education, youth and independence quite often is the best time of their lives, irrespective of their field of study, made very similar choices regarding the health value and self-rated health.

In the next stage, the analysis focused on self-efficacy in individual health behaviours. The differences in self-efficacy related to all the analysed health

behaviours were observed between the surveyed groups in the field of physical activity self-efficacy ($p<.0001$, $\eta^2=.04$), nutrition self-efficacy ($p=.0019$, $\eta^2=.02$), alcohol self-efficacy ($p<.0001$, $\eta^2=.05$) and smoking self-efficacy ($p=.0184$, $\eta^2=.02$). Among professionals nurses have physical activity self-efficacy significantly lower compared to physiotherapists ($p=.0012$) and physicians ($p=.0008$). Students of physiotherapy and medicine do not differ from each other while their physical activity self-efficacy is significantly higher than that of nurses ($p<.0001$ for the both groups). Similarly to students, professionals do not differ in their self-rated nutrition self-efficacy. A group least confident in their nutrition self-efficacy among all the respondents includes physiotherapists whose scores are lower than those of both physiotherapy ($p=.0118$) and medical ($p=.0135$) students. As for alcohol self-efficacy, physiotherapists had the lowest scores among professionals ($p=.0198$ compared to physicians, $p=.0119$ compared to nurses). The difference was also visible among students. Physiotherapy students assessed their ability to cope with the temptation to drink alcohol lower ($p=.0012$) than medical students. Generally, in all the surveyed groups physiotherapists ranked the lowest in terms of alcohol self-efficacy, also compared to medical ($p=.0012$) and physiotherapy ($p=.0345$) students. Professionals differed also in the assessment of their smoking self-efficacy, where nurses had the lowest self-efficacy for ability to cope with the temptation to smoke ($p=.0324$ compared to physicians). Students had a similar assessment of their self-efficacy. Nurses scored their self-efficacy also significantly lower than physiotherapy students ($p=.0254$).

The analysis included also differences in the respondents' health locus of control. Such differences between the groups were revealed in all the three distinguished types of health locus of control. Internal Health Locus of Control ($p=.0058$, $\eta^2=.02$) did not differentiate the groups of professionals and students. However, it was highest among physiotherapy students and, interestingly, lowest among physiotherapists ($p=.0097$). Physiotherapy students have also Internal Health Locus of Control significantly higher than nurses ($p=.0289$). Confidence in own abilities and conviction of independence in deciding about own health is also relatively high among physicians. It may be assumed that as a result of life experience, especially professional experience, this conviction is lower among physiotherapists. The respondents show differences ($p=.0035$, $\eta^2=.02$) also in the area of external health control related to authorities (Powerful Others Health Locus of Control). Physiotherapists ranked the lowest and they significantly differ from nurses ($p=.0012$). In other words, they least trust external authorities when it comes to their own health and, contrary to nurses, are not willing to give them control over their own health. However, they showed the highest scores for Powerful Others Health Locus of Control. Though both professional groups are related to the area of health and disease, they still have quite different profiles with regard to health locus of control. It may be assumed that physiotherapists should be or necessarily have to be independent in their therapeutic activities. However, because they often encounter physicians' ignorance about the health services provided by physiotherapists, they, lack confidence in physicians' and medical authorities' competence. On the other

hand, due to their professional relations, especially with physicians, nurses should trust authorities in that regard in order to competently and safely perform their professional duties. It is also a kind of adaptive mechanism to the professional role they fulfill. The third type of control, also external but independent from anyone and anything but fate or chance, namely Chance Health Locus of Control was highest also among nurses ($p=.0175$, $\eta^2=.02$). This professional group is particularly vulnerable to external influences and least confident in their own ability to decide about their own health.

The analysis included also biological determinants (correlates) of health behaviours, such as BMI, waist circumference, WHR, incidence of lifestyle diseases. They are listed in Table 4.14.

One of the basic nutrition indexes, resulting from a particular lifestyle, is BMI. BMI values are age-independent and the same for both sexes. However, BMI may not correspond to the same degree of fatness in different populations, in part due to different body proportions. The average for the respondents is within the norm. Students have BMI significantly lower than professionals ($p<.001$, Hedges' $g=.29$) – small effect. Nurses compare unfavorably since their average falls within the overweight category. Around 7% of BMI variance is explained by the membership in the surveyed groups ($F(4,760)=13.71$, $p<.0001$, $\eta^2=.07$). Similarly, as shown by epidemiological trends, the percentage of overweight people increases with age and this problem affects particularly often nurses, slightly less often physicians and every fifth physiotherapist. It is a particularly important observation in the context of the educational role that the both professional groups should play in the promotion of physical activity and proper nutrition, directly related to this index.

The most recent WHO recommendations indicate significant prediction between waist circumferences/WHR and cardiovascular as well as metabolic diseases (Waist Circumference and *Waist-Hip* Ratio, 2011). In this study we have respondents' statements regarding this issue and the research recorded the highest number of missing answers to that question (up to 30% for individual groups); therefore, we present only approximate trends achieved while being aware of limitations of the material gathered. Nevertheless, similar to the case of BMI, the percentage of higher waist circumferences increases with the age of the respondents. A particularly unfavorable increase can be observed among women, where students have significantly lower scores than professional women ($p<.0001$, Hedges' $g=.76$) – large effect, whereas circumferences risky to health are most frequently observed in nurses (27%) (see Fig. 4.21), and the unfavorable WHRs is present in approximately 30% of the respondents.

Table 4.14 Stratification of respondents' biological characteristics

		All	students		professionals			p value[a] effect size	p value[b] effect size
			medical	physiotherapy	physicians	nurses	physiotherapists		
BMI	M ± SD	22.8 ± 4.0	22.1±4.1	22.2±2.9	23.4±3.0	25.1±4.1	22.4±5.1	p<.001 g=.29	p<.001 η^2=.07
Waist (cm)									
♂	M ± SD	74.7±8.8	75.0±8.1	71.1±6.5	74.9±8.7	80.2±9.2	71.7±7.3	p<.0001 g=.76	p<.0001 η^2=.19
♀	M ± SD	86.4±11.3	89.0±10.1	86.1±11.6	92.0±9.0	96.7±12.7	96.0±8.1	p=.742 ns	p=.998 ns
Diseases:									
Hypertension	n	57	10	1	19	19	8		
Overweight	n	61	16	12	8	14	11		
Atherosclerosis	n	4	0	0	2	1	1		
Diabetes	n	4	2	2	0	0	0		
CVD	n	25	9	0	7	9	0		
Allergy	n	142	58	54	13	11	6		

a – test t was used for differences between students/professionals and Hedges' g effect size
b – one-way ANOVA was used for differences between all groups and eta squared effect size (η^2)

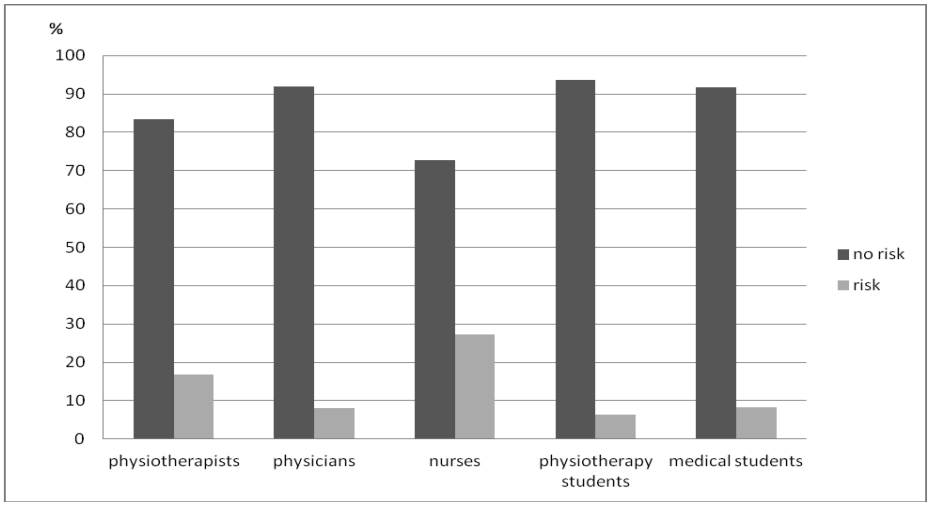

Figure 4.21 Risky waist circumferences (percentages of respondents)

According to respondents' statements only a few have been diagnosed as having one of the lifestyle diseases. Allergy is the most frequent chronic disease reported by the respondents. When we look at the interaction between the frequency of incidence of particular diseases and BMI, we can see that the co-occurrence of overweight and hypertension is more often declared by overweight persons whereas CVDs by persons with normal BMI ($p<.00001$). Persons who declared that they suffered from any particular lifestyle related disease (hypertension, CVD, atherosclerosis) either failed to provide information on their waist circumferences or had them normal. It was only obesity that was reported more often by persons with dangerously higher waist circumferences or WHRs. This fact may suggest that some remedial actions were already taken, the etiology of the mentioned diseases is different.

4.4 Personal and Social Determinants of Health Behaviour

The second stage of the analysis included the search for relationships between individual determinants (psychosocial and biological), social determinants and health behaviour. The following subjective health determinants were taken into account in the analysis: health locus of control, health-specific self-efficacy, place of health in the hierarchy of values, health as a prerequisite for happiness, self-rated health, BMI as well as social health determinants such as stage of professional career and type of education. The same analysis procedure was employed with regard to each of the analysed behaviours. There were two models distinguished in the procedure. In order to assess the relationship between each of the behaviours and each independent variable, first we conducted a logistic regression analysis with

each of the behaviours as the dependent variable and each variable as the independent one. This model (Model I) estimated the potential risk of behaviour adverse to health with reference to all the analysed independent (subject and social) variables. Then, all factors were entered in a logistic regression model with backward elimination of variable selection. As a result, the final model (Model II) was estimated, which consists of significant variables only.

4.4.1 Physical Activity

Physical activity is one of those behavioural factors the decline of which has been observed in the developed countries for years. In this chapter the assessment was made of relationships between subject variables (health locus of control measured by Multidementional Health Locus fo Control Scale – MHLC, physical activity self-efficacy – PA SE, place of health in the hierarchy of values, health as a prerequisite for happiness, self-rated health, BMI) as well as social variables (stage of professional career and type of education) and the level of physical activity. Physical activity was analysed as a dichotomous measure. Behaviour beneficial to health was considered to be the one in which health recommendations are implemented within that scope (high level in the IPAQ questionnaire). The other behaviours were found to be adverse. Models of one- and multi-dimensional logistic regression were estimated (Tab. 4.15). Model I contains the results of estimation of the risk of low (insufficient for health) physical activity with reference to all the analysed subject and social variables. Model II presents the final determination model resulting from multiple backward logistic regression for $p<.05$.

Table 4.15 Risk factors associated with low PA – odds ratio from logistic regression

Factors		MODEL I Physical activity		MODEL II Physical activity		
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
PA SE	High	ref.				
	Medium	3.88 (2.56-5.87)	.000	0.40	1.49 (1.17-1.90)	.001
	Low	4.14 (2.74-6.24)	.000	0.43	1.53 (1.20-1.95)	.001
MHCL Internal (ref.[a] high)		1.55 (1.14-2.10)	.005			
MHCL Powerful (ref. high)		0.81 (0.59-1.10)	.170			
MHCL Chance (ref. high)		0.54 (0.40-0.74)	.000	0.27	0.77 (0.65-0.91)	.003

continued **Table 4.15** Risk factors associated with low PA – odds ratio from logistic regression

Factors		MODEL I Physical activity		MODEL II Physical activity		
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
HEALTH as a value	5 the most important	ref.				
	4	1.04 (0.70-1.54)	.851			
	3	1.19 (0.68-2.09)	.540			
	2	1.54 (0.88-2.69)	.127			
	1 the least important	1.12 (0.57-2.23)	.736			
	0 not chosen	1.45 (0.81-2.61)	.214			
HEALTH as a happiness	5 the most important	ref.				
	4	1.25 (0.84-1.88)	.277			
	3	1.22 (0.77-1.94)	.405			
	2	0.78 (0.45-1.36)	.382			
	1 the least important	0.77 (0.40-1.45)	.417			
	0 not chosen	1.57 (0.84-2.93)	.158			
Self-rated Health	very good	ref.				
	good	2.41 (1.63-3.57)	.000	0.33	1.39 (0.90-2.13)	.134
	moderate	3.32 (1.96-5.62)	.000	0.34	1.40 (0.85-2.31)	.185
	bad or very bad	2.16 (0.55-8.38)	.267	0.15	0.86 (0.29-2.60)	.792
BMI	normal weight I	ref.				
	underweight	2.22 (1.10-4.47)	.026	0.39	1.48 (0.83-2.65)	.188
	normal weight II	1.69 (1.11-2.58)	.015	0.20	1.22 (0.84-1.78)	.295
	overweight	1.59 (1.08-2.35)	.019	0.24	0.79 (0.54-1.14)	.208
Career Stage	student	ref.				
	professional	1.44 (1.06-1.95)	.021			
Groups	medical st.	ref.				
	physiotherapy st.	0.56 (0.37-0.85)	.007	0.70	0.50 (0.36-0.69)	.000
	nurse	1.49 (0.90-2.45)	.122	0.24	1.27 (0.84-1.92)	.250
	physiotherapist	0.74 (0.46-1.18)	.202	0.34	0.71 (0.50-1.02)	.065
	physician	1.33 (0.81-2.20)	.265	0.62	1.85 (1.22-2.80)	.004

a – ref: reference group; b – CI: Confidence interval

Self-efficacy is a well-known predictor of health behaviours. One might have expected that its role would be strong in the analysed relationships. Persons with an average level of this competence are at almost four times greater risk of being physically inactive whereas the risk is more than four times greater for persons having a low self-efficacy level. Out of the three types of Health Locus of Control only two – Internal Control and Chance Control – proved to be significantly related to the risk of low physical activity but in different ways. Persons with a low sense of internal control are 55% more at risk of sedentary behaviour whereas a low sense of control over one's health, i.e. reluctance to leave health choices to chance or fate reduces this risk to 46%. The valuing of health as both an important personal value and a prerequisite for happiness does not differentiate respondents in terms of their physical activity. On the other hand, self-rated health is visibly related to the level of the respondents' physical activity. The lower the respondents rated their health the greater was the risk of being physically inactive (two or three times). Similarly, the risk was higher as the body weight increased and even more (more than two times) when the body weight was below the norm. Social factors related to education and career stage also differentiated the respondent's behaviours. In the case of professionals the risk of no activity increases by 44% whereas based on the comparison of all the analysed social and professional groups the risk of being insufficiently physically active was lowest for physiotherapy students.

In the next stage (Model II) we sought multidimensional prediction of sedentary behaviours, taking all the aforementioned variables into consideration. Within 7 steps the best-fitting model was obtained, with 5 out of all the distinguished factors taken into account: physical activity self-efficacy, Chance Health Locus of Control, Self-rate Health, BMI and Groups. The following can be considered as factors predisposing to low physical activity: declining self-rated health, underweight, average or low sense of physical activity self-efficacy, high sense of control over our health by fate or chance. Physiotherapy education seems to be a particularly protecting factor whereas being a physician significantly increases the risk of sedentary behaviours.

4.4.2 Nutrition

Adverse nutrition behaviours are one of the essential risk factors for chronic diseases and diseases of civilization. People who do not put any effort or do not find any pleasure in proper nutrition most often excuse themselves by citing a lack of time, so typical of all the analysed respondent groups. Another factor related to nutrition behaviours is specialist knowledge (nutrition literacy). The surveyed professional groups should form the first front line group for educational activities in this area. Medical and physiotherapy studies are supposed to prepare also for that role; however, the effects of this education in the form of preferred nutrition models may give rise to considerable reservations which are further analysed in this chapter.

The analysis procedure used was the same as for physical activity determinants. The adverse pattern of behaviours was determined in two ways. First, by taking into account all the 12 studied behaviours (NI12), indicating both quantity and frequency of consumption of individual products and meals and by developing sten norms for them in the analysed group. The analysis of the results obtained can be found in Table 16. In the logistic modeling the adverse pattern of behaviour was assumed to be values corresponding to 1 sten (low values), the value of two subsequent ones were treated jointly. The other method used was based on the most important dietary risk factors: consumption of complex carbohydrates, vegetables and fruits (NI3). Each of these behaviours was described as: beneficial (3 points) – everyday consumption of the aforementioned products, moderately beneficial (2 points) – several times a week, adverse (1 point) – more rarely than several times a week (details see: section Study Design). On that basis, a beneficial pattern was developed and it assumed the possibility of moderate departure from one behaviour at maximum, i.e. obtaining at least 8 points. The lowest score indicated the adverse pattern of nutrition behaviours.

The results of the prediction of the nutrition behaviour pattern adverse to health (NI12 and NI3) are presented in Model I whereas Model II shows the results of multiple backward logistic regression.

Table 4.16 Risk factors associated with unhealthy nutrition habits NI12.

Factors		MODEL I NI12			MODEL II NI12	
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
NI12 SE	High	ref.				
	Medium	1.29 (0.88-1.91)	.196	0.12	1.13 (0.88-1.44)	.333
	Low	1.89 (1.29-2.79)	.001	0.25	1.28 (0.99-1.66)	.056
MHCL Internal (ref.[a] high)		1.09 (0.81-1.47)	.566			
MHCL Powerful (ref. high)		0.71 (0.53-0.96)	.026			
MHCL Chance (ref. high)		0.56 (0.41-0.76)	.000			
HEALTH as a value	5 the most important	ref.				
	4	1.12 (0.76-1.66)	.554			
	3	1.40 (0.80-2.46)	.236			
	2	1.09 (0.62-1.91)	.772			
	1 the least important	0.83 (0.41-1.68)	.610			
	0 not chosen	2.19 (1.27-3.77)	.005			

continued **Table 4.16** Risk factors associated with unhealthy nutrition habits NI12.

Factors		MODEL I NI12		MODEL II NI12		
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
HEALTH as a happiness	5 the most important	ref.				
	4	0.74 (0.44-1.11)	.143			
	3	1.15 (0,73-1.80)	.548			
	2	1.02 (0.61-1.71)	.945			
	1 the least important	0.83 (0.44-1.57)	.567			
	0 not chosen	1.57 (0.88-2.79)	.124			
Self-rated Health	very good	ref.				
	good	2.36 (1.59-3.49)	.000	0.00	1.00 (0.65-1,54)	.992
	moderate	3.43 (2.03-5.78)	.000	0.34	1.41 (0.83-2.38)	.203
	bad or very bad	3.29 (0.96-11.33)	.059	0.22	1.24 (0.41-3.75)	.703
BMI	normal weight I	ref.				
	underweight	1.26 (0.66-2.42)	.487	0.29	1.34 (0.76-2.36)	.315
	normal weight II	0.54 (0.34-0.87)	.012	-0.61	0.54 (0.36-0.83)	.004
	overweight	1.89 (1.32-2.72)	.001	0.50	1.65 (1.14-2.38)	.008
Career Stage	student	ref.				
	professional	0.68 (0.50-0.91)	.011			
Groups	medical st.	ref.				
	physiotherapy st.	1.61 (1.09-2.39)	.018	0.66	1.93 (1.40-2.65)	.000
	nurse	1.22 (0.76-1.96)	.403	-0.20	0.82 (0.54-1.24)	.343
	physiotherapist	0.61 (0.37-1.01)	.057	-0.44	0.65 (0.43-0.98)	.038
	physician	0.81 (0.49-1.34)	.417	-0.12	0.89 (0.57-1.39)	.607

a – ref: reference group; b – CI: Confidence interval

Similar to physical activity, self-efficacy as to how prepare healthful foods is related to more beneficial nutrition behaviours. Persons with low self-efficacy in that area are almost twice as likely to have improper diet. As for the analysed types of Health Locus of Control, Others Control and Chance Control proved to be significantly differentiating the risk of adverse behaviours. Persons with a low sense of external control, both related to authorities and to chance or fate are 29% and 44%, respectively, less likely

to follow an unhealthy diet. The tendency for giving control over one's own health to external factors such as physicians, specialists or fate, God and chance contributes to more frequent abandonment of efforts made by the respondents to follow a diet more beneficial to health.

The position of health in the system of values and its appreciation in the context of personal happiness are not factors differentiating behaviours of the respondents. However, the worse the respondents rated their health the more likely they were to have adverse behaviours, with the risk higher more than three times for the poor and bad rates. On the other hand, unsurprisingly, the risk of adverse nutrition behaviours increased by almost 90% can be observed in overweight persons. While analyzing differences between the surveyed social and professional groups, we can see that the fact of being a student increases that risk whereas the risk is lower in the case of physiotherapists and physicians by almost 40% and 20%, respectively, compared to medical students.

Model II presents the results of multidimensional prediction of nutrition behaviours adverse to health, taking all the aforementioned variables into consideration. In the final model obtained in 8 steps 4 factors were included, namely: nutrition self-efficacy, BMI, Self-rated Health, Groups. Factors particularly protecting against adverse nutrition behaviours seem to include high self-efficacy in dealing with the organization of proper nutrition, low sense of external control as well as working as physiotherapist or physician.

Table. 4.17 Risk factors associated with unhealthy nutrition habits NI3

Factors		MODEL I NI3		MODEL II NI3		
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
NI3 SE	High	ref.				
	Medium	1.85 (1.30-2.50)	.001	0.23	1.26 (0.99-1.59)	.060
	Low	2.35 (1.63-3.39)	.000	0.60	1.82 (1.41-2.34)	.000
MHCL Internal (ref.[a] high)		1.06 (0.80-1.41)	.678			
MHCL Powerful (ref. high)		0.91 (0.69-1.22)	.539	-0.18	0.83 (0.70-0.99)	.041
MHCL Chance (ref. high)		0.76 (0.57-1.01)	.056			
HEALTH as a value	5 the most important	ref.				
	4	0.98 (0.68-1.41)	.915			
	3	0.98 (0.57-1.68)	.942			
	2	1.02 (0.60-1.73)	.939			
	1 the least important	1.63 (0.84-3.15)	.149			
	0 not chosen	1.15 (0.67-1.96)	.621			

continued **Table. 4.17** Risk factors associated with unhealthy nutrition habits NI3

Factors		MODEL I NI3		MODEL II NI3		
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
HEALTH as a happiness	5 the most important	ref.				
	4	0.88 (0.60-1.28)	.500			
	3	0.94 (0.61-1.46)	.788			
	2	0.76 (0.46-1.24)	.269			
	1 the least important	0.82 (0.45-1.47)	.498			
	0 not chosen	1.28 (0.71-2.31)	.403			
Self-rated Health	very good	ref.				
	good	1.31 (0.94-1.83)	.108			
	moderate	1.44 (0.88-2.34)	.146			
	bad or very bad	0.53 (0.15-1.88)	.328			
BMI	normal weight I	ref.				
	underweight	0.82 (0.44-1.53)	.530	-0.40	0.67 (0.38-1.19)	.172
	normal weight II	0.76 (0.51-1.12)	.168	0.02	1.02 (0.70-1.48)	.938
	overweight	1.46 (1.01-2.10)	.045	0.55	1.73 (1.18-2.54)	.005
Career Stage	student	ref.				
	professional	0.44 (0.33-0.59)	.000			
Groups	medical st.	ref.				
	physiotherapy st.	1.83 (1.22-2.76)	.004	0.98	2.68 (1.89-3.78)	.000
	nurse	0.91 (0.58-1.44)	.702	-0.06	0.94 (0.63-1.40)	.752
	physiotherapist	0.47 (0.30-0.73)	.001	-0.49	0.61 (0.43-0.88)	.008
	physician	0.47 (0.30-0.75)	.001	-0.58	0.56 (0.38-0.84)	.005

a – ref: reference group; b – CI: Confidence interval

A prediction analysis was made for NI3 based on the three most important diet elements: everyday consumption of complex carbohydrates, vegetables and fruits. Factors related to the greatest risk of adverse nutrition are similar to those for NI12. Persons with moderate or low self-efficacy are almost twice or over twice, respectively, as likely to have improper diet. Persons with a low sense of external control related to chance or fate are 24% less likely to follow an unhealthy diet. The valuation of health does not differentiate nutrition behaviours. Similarly, health self-rating does not differentiate the respondents in terms of risk of low consumption of vegetables, fruits and complex carbohydrates but it differentiates them in terms of NI12. The observation of the risk of adverse nutrition behaviours increased by 46% in overweight persons is not surprising. The risk of insufficient consumption of

vegetables, fruits and complex carbohydrates occurs more often in students than in professionals whereas in the case of physiotherapists and physicians it is lower by more than 50% compared to medical students.

Model II presents the result of multidimensional prediction of nutrition behaviours adverse to health, taking all the aforementioned variables into consideration. In the final model obtained in 8 steps 4 factors were included, namely: nutrition self-efficacy, Powerful Others Health Locus of Control, BMI, Groups. Factors particularly protecting against adverse nutrition behaviours seem to include high self-efficacy in dealing with the organization of proper nutrition, low sense of external control as well as working as physiotherapist or physician.

4.4.3 Smoking

Smoking is one of the most important risk factors for the diseases of civilization, including in particular tumors and diseases of circulatory and respiratory system. The combined forces of medicine, politics, governmental and non-governmental organizations have gone to war against this terrible addiction. As a result, for years we have observed a downward trend in the number of smokers and various statutory solutions contribute to this trend. Unfortunately, medical circles in Poland do not set a good example in this regard, especially if we look at certain specializations, e.g. surgeons. The sight of a smoking physician or even a smoking physician seeing patients is still not so rare. A ban on smoking in public places introduced in Poland in November 2010 has definitely improved the situation. We can observe alarming statistics among young people where the percentage of smokers is even growing in certain circles; therefore, both monitoring and an attempt to define new remedies are required. A procedure identical to the one used for physical activity and nutrition was employed also for the analysis of determinants of smoking among the respondents.

The analysis was performed with reference to the risk of smoking at any time, i.e. being both a current smoker and an ex-smoker were considered to be a risky behaviour. The results of smoking prediction are presented in Model I whereas Model II gives the results of multiple backward logistic regression (Tab. 4.18).

It is no surprise that people overcoming various temptations and obstacles in the process of quitting smoking or not taking up smoking are definitely less exposed to this risk. The risk increases strongly when this confidence is missing, from more than 5 times in persons with moderate self-efficacy to more than 50 times in persons with low self-efficacy in this regard. It is by far the most significant competence out of those analysed in the context of smoking. As for Health Locus of Control, Internal Control and Powerful Others Control differentiated the behaviours in a similar way. The risk of succumbing to addiction increases by almost 40% when the respondents have a low sense of Internal Control, i.e. they do not rely on their own judgments and are not sure about their resolutions related to health. Also people with a low sense

Table 4.18 Risk factors associated with smoking

Factors		MODEL I Smoking			MODEL II Smoking	
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
Smoking SE	High	ref.				
	Medium	5.30 (3.14-8.94)	.000	-0.16	0.85 (0.58-1.26)	.421
	Low	56.04 (33.72-93.11)	.000	2.11	8.24 (5.63-12.07)	.000
MHCL Internal (ref.[a] high)		1.38 (1.01-1.89)	.042			
MHCL Powerful (ref. high)		1.47 (1.07-2.02)	.016			
MHCL Chance (ref. high)		1.11 (0.82-1.52)	.496			
HEALTH as a value	5 the most important	ref.				
	4	0.85 (0.57-1.26)	.415			
	3	0.62 (0.32-1.17)	.141			
	2	1.05 (0.59-1.87)	.867			
	1 the least important	1.67 (0.87-3.19)	.121			
	0 not chosen	1.80 (1.04-3.13)	.037			
HEALTH as a happiness	5 the most important	ref.				
	4	1.00 (0.66-1.53)	.991			
	3	1.79 (1.13-2.84)	.013			
	2	0.81 (0.45-1.45)	.474			
	1 the least important	0.90 (0.46-1.77)	.766			
	0 not chosen	1.42 (0.77-2.61)	.257			
Self-rated Health	very good	ref.				
	good	1.93 (1.28-2.91)	.002			
	moderate	4.64 (2.72-7.92)	.000			
	bad or very bad	5.57 (1.61-19.24)	.007			
BMI		1.13 (1.08-1.18)	.000	0.12	1.13 (1.06-1.21)	.000
Career Stage	student	ref.				
	professional	2.16 (1.57-2.96)	.000			
Groups	medical st.	ref.				
	physiotherapy st.	0.75 (0.47-1.19)	.222	-0.64	0.53 (0.33-0.85)	.009
	nurse	2.28 (1.41-3.70)	.001	0.06	1.07 (0.63-1.81)	.816
	physiotherapist	1.95 (1.22-3.14)	.006	0.68	1.96 (1.21-3.20)	.007
	physician	1.48 (0.90-2.45)	.123	0.59	1.80 (1.07-3.01)	.026

a – ref: reference group; b – CI: Confidence interval

of Powerful Others Control are nearly 50% more likely to smoke. The reluctance to become influenced by authorities that may be associated with those informing about dangers arising from smoking as well as the fact of not accepting information already publicly available on the dangers of smoking may be a mechanism that facilitates succumbing to temptation or otherwise hinder the fight against addiction. However, the awareness of health damage related to smoking can be observed among the students and professionals participating in the study. The risk of smoking clearly increases along with the decrease in Self-rated Health (from two to five times). A particular increase can be observed among those rating their health as moderate or bad and very bad. Due to incomplete categories in some classes, BMI was treated as continuous variable in the model. The higher the index the more likely a person is to smoke. While analyzing differences in the risk of smoking in the surveyed groups we can observe that the risk faced by professionals is two times higher and nurses compare particularly unfavorably (risk greater more than two times) in a detailed analysis of all the distinguished groups.

Model II presents the result of backward logistic regression analysis. In the final model obtained in 9 steps three factors were included, namely: smoking self-efficacy, BMI and Career Stage. The factors particularly predisposing to a higher risk of smoking include: low sense of self-efficacy in dealing with the temptation to smoke, higher BMI and taking up a professional job.

4.4.4 Alcohol Consumption

Poland is quite unequivocally associated with a particular alcohol use pattern, the so-called eastern pattern, still typical of Russia or post-communist countries, i.e. the consumption of mainly high-proof alcohols and in large quantities. This model has been quite strongly evolving though it is still present or even popular in some social circles. Currently, the problem of alcohol abuse more and more often concerns the elite, including medical circles, and not only the poor from the dregs of society. It is extremely difficult to get real answers from such aware and educated groups as those included in this study. Nevertheless, with a probable underestimation of the problem in mind, determinants of alcohol consumption in the groups of respondents are presented below. The employed procedure was analogous to that described in the preceding chapters: Model I – the results of a logistic regression analysis, Model II – the results of a backward stepwise logistic regression analysis (Tab. 4.19).

Just like in the case of the other addictions, a low sense of self-efficacy is associated with more than five times greater risk of an adverse behaviour pattern related to alcohol consumption. As for Health Locus of Control, a low belief in Powerful Others Control reduces the risk of adverse behaviours by 28% whereas a low belief in Change Control increases it by more than 50%. In other words, persons not submitting to influences of others on their own health are less likely to face the risk of alcohol consumption adverse to health, similarly to those who count on luck or chance in maintaining good health. Distinct differences emerged between the surveyed groups. Professionals

Table 4.19 Risk factors associated with alcohol consumption

Factors		MODEL I Alcohol			MODEL II Alcohol	
		OR (95% CI[b])	p value	Beta	OR (95% CI)	p value
Alcohol SE	High	ref.				
	Medium	3.77 (2.04-6.97)	.000	0.50	1.65 (1.12-2.45)	.012
	Low	5.49 (3.09-9.74)	.000	0.57	1.77 (1.25-2.50)	.001
MHCL Internal (ref.[a] high)		1.08 (0.78-1.48)	.650	0.29	1.34 (1.02-1,75)	.034
MHCL Powerful (ref. high)		0.72 (0.52-0.99)	.041	-0.39	0.68 (0.52-0.89)	.004
MHCL Chance (ref. high)		1.54 (1.11-2.12)	.009	0.42	1.52 (1.16-2.00)	.003
HEALTH as a value	5 the most important	ref.				
	4	0.73 (0.48-1.10)	.130			
	3	1.05 (0.58-1.89)	.870			
	2	1.17 (0.65-2.09)	.608			
	1 the least important	1.86 (0.98-3.55)	.059			
	0 not chosen	1.10 (0.61-1.96)	.753			
HEALTH as a happiness	5 the most important	ref.				
	4	0.78 (0.51-1.20)	.263			
	3	0.95 (0.59-1.54)	.838			
	2	0.90 (0.51-1.58)	.716			
	1 the least important	1.08 (0.57-2.04)	.824			
	0 not chosen	1.47 (0.80-2.69)	.214			
Self-rated Health	very good	ref.				
	good	1.18 (0.81-1.72)	.393			
	moderate	1.21 (0.71-2.09)	.484			
	bad or very bad	0.65 (0.14-3.08)	.583			
BMI	normal weight I	ref.				
	underweight	1.66 (0.87-3.17)	.125			
	normal weight II	1.11 (0.72-1.72)	.630			
	over weight	0.74 (0.49-1.13)	.164			
Career Stage	student	ref.				
	professional	0.51 (0.36-0.71)	.000			
Groups	medical st.	ref.				
	physiotherapy st.	0.62 (0.41-0.93)	.020			
	nurse	0.16 (0.08-0.32)	.000			
	physiotherapist	0.69 (0.43-1.10)	.120			
	physician	0.41 (0.24-0.70)	.001			

a – ref: reference group; b – CI: Confidence interval

are about half as likely to drink alcohol in a risky manner as students. Moreover, if we look at the groups in detail, it appears that the risk of too excessive consumption of alcohol in almost all the surveyed social and professional groups is from 40% to 80% lower than in the case of medical students.

Model II presents the result of backward logistic regression analysis. In the final model obtained in 8 steps four factors were included, namely: Chance Health Locus of Control, Powerful Others Health Locus of Control, Internal Health Locus of Control and alcohol self-efficacy. The factors protecting against alcohol use adverse to health include: high sense of self-efficacy, high sense of Chance Control and Internal Control as well as low sense of Powerful Others Control.

4.5 Mediation of Health Behaviours

In the third stage of the analysis a question was posed about the mediator role of selected variables in taking up the analysed health behaviours. The selection and classification of variables were made taking the strength and stability of the studied psychological constructs defined as determinants of health behaviours into account. The analysis relied on Wiefferink et al. (2006) clustering of health behaviours and their determinants, based on the Theory of Triadic Influence (TTI) (Flay & Petraitis, 1994). This integrative theory combines determinants of health behaviours at different levels (i.e. proximal, distal, ultimate) but also determinants of different types (i.e. intrapersonal and interpersonal). This analysis did not include any ultimate-level variables. Only social economic status in self-perception of respondents is known from this level. However, the surveyed group is quite homogenous in many respects since it includes medical service workers educated in the same – biomedical – field and students preparing to work in similar jobs. The analysis included the following distal level variables: in the biology/personality stream – health locus of control; in the culture stream – health place in the personal values system and health place as a symbol of personal happiness. The analysis included also the following proximal level variables: in the biology/personality stream: health-specific self-efficacy. On that basis, the models verified by mediation analysis were developed. Health-specific self-efficacy was considered to be the main mediator variable for the analysed behaviours.

In the study dependency hypotheses were verified according to the mediation analysis described in the section on statistical analysis. First, a relationship was sought between the independent variable (from the group of distal determinants) and the mediator variable (from proximal or distal determinants). The correlation coefficients for this relationship were defined as path "a" value. If the value proved to be insignificant, and as a result, did not allow confirming the mediation hypothesis, such results were not presented in the paper. However, if a significant value of the coefficient of path "a" was obtained, the null hypothesis of indirect effect

was tested according to the assumptions described in the section Statistical Analysis. The results of the completed analyses are presented in Table 4.20. They are described for individual health behaviour below.

4.5.1 Physical Activity

First, a mediator role of physical activity self-efficacy was examined in the relationship between health valuation as a symbol of happiness or as a personal value and physical activity (PA). The self-efficacy does not play a mediator role in this relationship. Next, a mediator role was examined in the relationship between Health Locus of Control and the level of physical activity. Physical activity self-efficacy plays such a role in the relationship between Internal Health Locus of Control and physical activity. The indirect effect was estimated at .07 (the medium size effect). The 95% confidence interval did not include 0 (C.I.: .06-.10), indicating that the proposed mediation was significant. People with high Internal Health Locus of Control have higher physical activity self-efficacy which affects the level of physical activity. Also Chance Health Locus of Control mediates this relationship. The indirect effect was estimated at -.04 (C.I.: (-.06- (-.01)) – the small size effect. People with a low Chance Health Locus of Control have higher physical activity self-efficacy which affects the level of physical activity. No such correlation was found for Powerful Others Health Locus of Control. Next, a mediator role of individual types of health locus of control was examined for the relationship between the valuation of health as a symbol of happiness or as a personal value and physical activity. Internal Health Locus of Control plays a mediator role for the relationship between the valuation of health as a symbol of happiness and physical activity. The indirect effect was estimated at .02 (C.I: .003-.03) – the small size effect. People who valuated health as an important symbol of happiness have more likely high Internal Health Locus of Control which affects physical activity.

4.5.2 Nutrition

Just like in the case of physical activity, nutrition self-efficacy does not mediate the relationship between the valuation of health as a symbol of happiness or as a personal value and nutrition index taking all the twelve studied nutrition elements into account (NI12). However, nutrition self-efficacy plays a mediator role in the relationship between health locus of control and nutrition – NI12. It is true for Internal Health Locus of Control – the indirect effect was estimated at .05 (C.I.: .03-.08), Chance Health Locus of Control – the indirect effect was estimated at -.03 (C.I.: -.05-(-01)) and Powerful Others Health Locus of Control – the indirect effect was estimated at -.02 (C.I.: -.04-(-.001)). All observed effects are rather small. People with high Internal Health Locus of Control and with low Chance Health Locus of Control

or a low Powerful Others Health Locus of Control have more often higher nutritional self-efficacy what affect their dietary habits. Next, a mediator role of individual types of health locus of control was examined in the relationship between the valuation of health as a symbol of happiness or as a personal value and nutrition (NI12). Only Internal Health Locus of Control plays a mediator role for the relationship between the valuation of health as a symbol of happiness and nutrition. The indirect effect was estimated at .01 (C.I.: .001-.02) – small effect. People who value health as a condition of their happiness have more likely high Internal Health Locus of Control what affect physical activity.

For NI3, being an index based on three important diet elements: the consumption of vegetables, fruits and complex carbohydrates, the mediation models similar to those for NI12 were obtained. Nutrition self-efficacy plays this role in the relationship between Internal Health Locus of Control – the indirect effect was estimated at .05 (C.I.: .03-.08), Chance Health Locus of Control – the indirect effect was estimated at -.02 (C.I.: -.04-(-.009)) and Powerful Others Health Locus of Control – the indirect effect was estimated at -.02 (C.I.: -.03-(-.0003)) and nutrition NI3. All observed effects are rather small. People with high Internal Health Locus of Control and with low Chance Health Locus of Control or a low Powerful Others Health Locus of Control have more often higher nutritional self-efficacy what affect dietary habits.

4.5.3 Smoking

Smoking is a categorical variable and therefore, the mediation analysis was performed for dichotomous dependent variables whereas smoking was classified in two categories: a never-smoker and a smoker or ex-smoker. Smoking self-efficacy plays a mediator role in the relationship between the valuation of health as a personal value and smoking – the indirect effect was estimated at .20 (C.I.: .05-.37), as well as in the relationship between Internal Health Locus of Control and smoking - the indirect effect was estimated at .22 (C.I.: .07-.37). These effects are rather large. People who have valued health high or who have high Internal Health Locus of Control have more likely high smoking self-efficacy which effects smoking status. On the other hand, Internal Health Locus of Control (indirect effect: .02 (C.I.: .002-.05)) and Powerful Others Health Locus of Control (indirect effect: .02 (C.I.: .0002-.04) play a mediator role in the relationship between the valuation of health as a symbol of happiness and smoking – small effects. People who have valued health as a symbol of happiness have more likely high Internal Health Locus of Control and they have more likely high Powerful Others Health Locus of Control what effects smoking.

4.5.4 Alcohol Consumption

The consumption of alcohol is a categorical variable and therefore, similar to smoking, it was classified as a dichotomous variable: moderately or less drinking and heavy and binge drinking. Neither alcohol self-efficacy or health locus of control plays a mediator role in the analysed relationships with the level of alcohol consumption.

Table 4.20 Direct, indirect and total effect on health behaviours

Variables			**Effects**		
Independent	Mediating	Dependent	Direct	Indirect	Total
Internal HLOC	PA SE	PA	.10**	.07 (.06-.10)	.16***
Chance HLOC	PA SE	PA	-.08*	-.04 (-.06-(-.01))	-.11**
Health as happiness	Internal HLOC	PA	.002	.02 (.003-.03)	.02
Internal HLOC	nutrition SE	NI12	.04	.05 (.03-.08)	.09*
Chance HLOC	nutrition SE	NI12	-.09*	-.03 (-.05-(-01)	-.11**
Powerful HLOC	nutrition SE	NI12	.001	-.02 (-.04-(-.001)	-.02
Health as happiness	Internal HLOC	NI12	.02	.01 (.001-.02)	.02
Internal HLOC	nutrition SE	NI3	-.02	.05 (.03-.08)	.03
Chance HLOC	nutrition SE	NI3	-.06	-.02 (-.04-(-.009))	-.09*
Powerful HLOC	nutrition SE	NI3	-.001	-.02 (-.03-(-.0003))	-.02
Health as value	smoking SE	smoking	.09	.20 (.05-.37)	.20**
Internal HLOC	smoking SE	smoking	.001	.22 (.07-.37)	.18*
Health as happiness	Internal HLOC	smoking	.04	.02 (.002-.05)	.06
Health as happiness	Powerful HLOC	smoking	.05	.01 (.0002-.04)	.06

**p<.05, **p<.01, ***p<.001*