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EDUCATIONAL INTERVENTION ON NUTRITION AMONG THE ELDERLY POPULATION WITH HIGH LEVELS OF SELF-EFFICACY: IS IT EFFECTIVE?
EDUKACYJNA INTERWENCJA ŻYWIENIOWA DLA POPULACJI OSÓB STARSZYCH O WYSOKIM POZIOMIE POCZUCIA WŁASNEJ SKUTECZNOŚCI – BADANIA WSTĘPNE

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Summary: The aim of the study was to assess the effectiveness of the educational intervention on nutrition in the elderly population with high level of self-efficacy.

Material and methods: Pretest-posttest quasi-experimental study was used. Educational intervention on nutrition consisting of the cycle of 5 workshops was conducted among 32 people aged 60 years and above. The levels of self-efficacy and sense of responsibility for health were assessed using standardised tools. The effectiveness of the intervention was assessed by the analysis of the pre-test and post-test results.

Results: Intervention effectiveness analysis has shown the increase of the knowledge both on a global result level (χ^2=7.20; p<0.01) and the domain related to the healthy eating plate guidelines (χ^2=10.90; P<0.01).

Conclusions: Educational intervention aiming to increase the nutritional knowledge in the elderly population with high level of self-efficacy is effective. However, the role of psychological variables in the effectiveness of the intervention is unclear and requires further investigation.

Keywords: intervention, nutrition, elderly population, self-efficacy, responsibility, health

Streszczenie: Celem pracy była ocena efektywności edukacyjnej interwencji żywieniowej dla osób starszych z wysokim poziomem poczucia własnej skuteczności.

Materiał i metody: Kwazi-eksperymentalne badanie z pomiarem przed- i poeksperymentalnym bo zastosowane w badaniu. Interwencja żywieniowa składająca się 5 cyklicznych warsztatów została przeprowadzona wśród 32 osób po 60 roku życia. Nasilenie poczucia własnej skuteczności I poczucia odpowiedzialności za zdrowie oceniono przy użyciu wystandaryzowanych narzędzi. Efektywność interwencji oceniono poprzez analizę wyników testu wiedzy przed wdrożeniem interwencji (pre-test) z wynikami po zakończeniu warsztatów (post-test).

Wyniki: Analiza efektywności interwencji wykazała zwiększenie wiedzy zarówno na poziomie wyniku globalnego (χ^2=7.20; p<0.01) oraz domeny dotyczącej zaleceń zdrowego talerza (χ^2=10.90; p<0.01).

Wnioski: Edukacyjna interwencja żywieniowa mająca na celu zwiększenie wiedzy żywieniowej u osób starszych z wysokim poczuciem własnej skuteczności jest skuteczna. Jednakże, rola zmiennych psychologicznych w efektywności interwencji nie jest jasna i wymaga dalszych badań.

Słowa kluczowe: interwencja, żywienie, populacja osób starszych, poczucie własnej skuteczności, odpowiedzialność, zdrowie

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Introduction

The elderly population which is defined as people aged 60 and over is increasing all over the world (Hodder et al, 2018). According to data presented by World Population Prospects: the 2017 Revision (United Nations Publications, 2017) Europe will be inhabited by 35% of people aged 60 and over in 2050 and 36% in 2100. Furthermore, the global increase of the population aged over 80 will rise to 425 million in 2050, reaching almost 909 million in 2100. It has its implications on their expectations towards healthcare and health promotion. This is why modern healthcare systems are trying to meet these expectations and introduce proper actions (Chu, Hu, Lo, Chang, 2020, Golinowska, Groot, Baji, Pavlova, 2016). One of these actions is educational intervention, especially in the context of promoting active aging with emphasis on healthy nutritional behaviours (Scult et al, 2015). This educational intervention might be implemented as cognitive-behavioural intervention that is an action aiming not only at sharing the knowledge (cognitive element), but also practical utilisation of this knowledge (behavioural element). It is noted that nutrition education should not only increase the nutritional knowledge or shape the proper skills, but also raise self-awareness in the scope of the role of nutrition in maintaining good health (Scult et al, 2015).

Educational intervention on nutrition are very important when it comes to enhancing the health of the population. It is highlighted that proper nutrition influences health and may reduce the risk of many diseases (e.g. cardiovascular diseases) as well as reduce mortality (Hodder et al, 2018, Phillips, Wójcicki, McAuley, 2013). Improper nutritional behaviours among the elderly population result in deterioration of health and progress of some chronic diseases such as type II diabetes, atherosclerosis, ischemic heart disease and malnutrition. It will also have negative influence on the quality of life, as well as deterioration of cognitive function and physical condition (Kaur et al, 2019). Therefore properly adjusted educational intervention on nutrition is going to be significant in the elderly population (Scult et al, 2015, Shamsalinia et al, 2019).

It must be noted that lifestyle of the elderly population may be modified by many factors which must be taken into account when designing educational activities for this group. These factors include involution factors related to the aging process, current health state, social, economic and psychological factors (Niknami, Namjoo, Baghaee, Sedghei Sabet., Atrkar Roshan, 2010). They may influence these people's motivation to adhere to healthy eating guidelines.

One of psychological variables which has well-documented relation with eating behaviours is self-efficacy, which may be defined as one's belief in one's own impact on life events. According to Bandura (Bandura, 2017) self-efficacy may be seen as one's subjective perception of one's abilities or ability to act and achieve a given goal. According to Social Cognitive Theory (SCT), self-efficacy is one of basic factors conditioning the engagement in initiation and maintenance of health behaviours and therefore influences motivation (Guay, Marsh, McInerney Craven, 2017).

Self-efficacy is considered a psychological trait which increases one's ability to self-regulate and control over consumption of food. It is an important variable in the context of social and emotional factors influencing one's health behaviours. Because of that individuals with hight levels of self-efficacy should control their nutritional behaviours more effectively and present healthier food choices (Lombardo et al, 2021). In this context self-efficacy may have an important meaning in elderly population, especially in relation to increase of motivation to adhere to healthy diet (Shwarzer, Renner, 2009). Preliminary studies show that in case of older adults self-efficacy is related to positive health effects (Kostka, Jachimowicz, 2010).

Increase of self-efficacy appears to be one of the key action in the scope of health education because it is related to better overall health, including mental health (Scult et al, 2015, Grembowski et al, 1993). This is why it is justified to assess the level of self-efficacy before implementation of nutrition intervention. According to the authors special attention should be put to individuals with hight level of self-efficacy at the very beginning,

that is before implementation of nutrition intervention. In case of these individuals perhaps it will be necessary to introduce other strategy of conducting nutrition education than in the individuals with low or average level of self-efficacy. The result of the meta-analysis shows that self-efficacy may be increased by different strategies such as incorporated self-monitoring (tracking one's own food-related behaviour), provided feedback on performance, prompted review of behavioural goals, provided contingent rewards (rewarding diet success), or planned for social sup-port/social change increased dietary self-efficacy (Prestwich et al, 2014).

Individuals with high level of self-efficacy will probably be very cognitively active, searching for information about health and healthy lifestyle. However they may find trouble in the assessment of reliability of the information that they reach to. The number of studies analysing the role of self-efficacy in health behaviours of the elderly population is limited.

Another important psychological variable having impact on nutritional behaviours is sense of responsibility for health. Preliminary studies have shown that individuals with high level of sense of responsibility for health present better health behaviours (Jaworski, Adamus, 2015, Jaworski, Adamus & Bojar, 2017, Jaworski, Adamus, 2017). However there are no studies analysing this variable in the elderly population. Trough analogy it can be assumed that high level of sense of responsibility for health will be correlated with high level of self-efficacy, therefore resulting in more frequent decisions on healthy eating behaviours.

The aim of the study was to assess the effectiveness of educational intervention on nutrition in the elderly population with high level of self-efficacy. Sense of responsibility for health and the relation between these two variables were also assessed.

Materials and Methods

Measures

Demographic information, including age, sex, and education level was obtained from the screening questionnaires developed by the researchers. Psychological variables such as self-efficacy and sense of responsibility for health were collected with utilisation of standardised research tools.

Design and Setting

Pretest-posttest quasi-experimental study was used. This study consisted of four important elements: (I) Administration a pre-test to a group of individuals and recording their scores; (II) Administration of the intervention designed to change the score of individuals; (III) Administration a post-test to the same group of individuals and recording their scores; and (IV) Analysis of the difference between pre-test and post-test scores.

Participants were recruited by a special recruiting team. Participants willingly took part in the study. At the beginning potential participants could learn about the programme from the posters, local press or radio. The programme consisted of a few workshops. One of them was the healthy lifestyle workshop. During programme inauguration potential participants could sign to the workshop of choice.

Assessment of the level of self-efficacy was performed by a psychologist during the recruitment process. Participants were informed of the test results. Individuals with high level of self-efficacy were invited to take part in the workshop ac-cording to given schedule. Individuals with average and low level of self-efficacy received a different schedule of work-shops. Great care was put so that all individuals could take part in the intervention.

Sample

The study was conducted on deliberately chosen 32 people aged 60 or above. Inclusion criteria were the age 60 or above, consent to take part in the study and high level of self-efficacy. Exclusion criteria were the age below

60, no consent for taking part in the study and moderate or low level of self-efficacy. Sample was collected in the non-random selection.

Bioethical consideration

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by Bielany City Hall of Warsaw. Participants were informed in detail of the aim, scope and actions taken in workshop participation. Each participant could withdraw their consent at any point without justification.

Educational intervention on nutrition

Presented intervention was based on the workshop model according to the literature guidelines. Based on literature research it can be observed that nutrition interventions aimed at the elderly population may have very different forms. One of them being educational workshops or participation in professional counselling groups. They are both mainly based on personalised educational programme prepared by professionals (Poscia et al, 2018). The intervention presented in this study was prepared in a similar manner. Because of this there were several activities planned which engaged the workshop participants, encouraged reflective thinking and learning trough experience. There was also some space provided for the participants to share their own thoughts.

The participants took part in 5 workshop meetings about healthy eating (intervention) which were conducted from April 12th, to April 26th, 2023. Each meeting lasted 120 minutes. The first four meetings were supposed to share the knowledge about healthy nutrition. The last one had a practical form and was shaping the skills of preparing healthy meals (culinary workshop). All workshops were prepared on the basis of the nutritional guidelines prepared by the National Public Health Institute – National Research Institute (Nagel, 2024, med., 2018).

First part of the intervention (meetings 1-4) aimed at increasing the nutritional knowledge and described different issues regarding nutrition in the elderly. During meetings 1 and 2 basic issues regarding the nutrition in the elderly were covered, such as what changes can be observed in the elderly population, the changes in demand for different nutrients in the elderly population, nutritional guidelines in the form of healthy food pyramid for the elderly and healthy eating plate (Nagel, 2024, med., 2018), the food sources for different nutrients, basics of menu planning for healthy elderly population. Additionally, pre-test was filled by the participants during the first meeting.

The third meeting covered the nutritional guidelines recommended for different diseases. Mediterranean diet, DASH diet, MIND diet, low-glycaemic index diet, diet with restriction of simple carbohydrates and protective diet rules were described.

The fourth meeting was regarding the issues of being an aware consumer. Obligatory information listed on the food labels, optional information listed on the food labels were covered, the rules of comparing the ingredients and prices of food as well as the basic consumer's rights were described.

During fifth meeting culinary workshop was organised where each participant could prepare meals according to the guidelines of healthy eating and enjoy them with the rest of the participants during the feast with the workshop summary. Additionally participants filled the post-test of nutritional knowledge. Scripts of meetings can be found in Table 1.

Table 1. Intervention

	Class/meeting 1	Class/meeting 2	Class/meeting 3
Title	Senior's plate part 1	Senior's plate part 2	Diets in prevention and treatment of diseases
Time	100 minutes	100 minutes	100 minutes
Description	**Introduction** Welcoming the participants. Introducing yourself. Giving information on the cycle of meetings and its purpose. Participants' expectations analysis. Pre-test. Introduction to nutrition in the group of senior citizens Working in teams 2-3 person each using the brainstorm, reflective thinking and discussion about the factors influencing nutritional preferences of senior citizens. After finishing the work participants share their experiences/thoughts with other participants. The host sums up the work and supplements the information. **Minilecture about the link between nutrition and health** along with the discussion on presented content. Presentation of the newest nutritional guidelines based on healthy food pyramid for senior citizens and healthy eating plate. Expectations and problems Working in teams 2-3 person each using the brainstorm, reflective thinking and mental map on the problems that may make sticking to the nutritional guidelines difficult. There was a wide scope of problems included. Participants note their ideas in the form of short statements. Then they are presented and discussed with the host. The host sums up the work and supplements information. Wrap-up Time for questions Time for asking questions regarding participants' expectations. End of the class	**Introduction** Welcoming the participants. Revision of the most important issues from previous class. **Minilecture on impact of nutrition on physical and mental health** along with the discussion on presented content. Impact of nutrition on health and cognitive functions. My healthy meal – introduction to preaparing meals according to the healthy eating guidelines Revision of most important rules of preparing meals according to the healthy eating plate. Working in teams 2-3 person each using the brainstorm method. Participants design a one-day nutrition plan based on discussed information. Participants share their ideas with other groups. The host sums up the work, corrects any mistakes and supplements information. Participants try to use the knowledge they have gained in practice. Wrap-up Time for questions Time for asking questions regarding participants' expectations. End of the class	**Introduction** Welcoming the participants. Revision of the most important issues from previous class. **Minilecture on the role of diet in prevention and treatment of diseases covering mediterranean, DASH, MIND, protective and limiting simple carbohydrates diets** with examples of practical actions. **Why being on a diet can be a challenge?** Participants are split into 5 groups. Each group received a short chracteristic of one of the diets: Group 1 – mediterranean diet, Group 2 – DASH diet, Group 3 – MIND diet, Group 4 – protective diet, Group 5 – diet limiting simple carbohydrates. The task is to assess the health benefits of following the diet. Then to name the problems that may occur in practice as well as preparing the axamples of actions that may help them introduce the rules of the diet into everyday life. Participants share their ideas. The host sums up the work, corrects any mistakes and supplements information. In this exercise participants try to use the knowledge they have gained in practice. Wrap-up Time for questions Time for asking questions regarding participants' expectations. End of the class

	Class/meeting 4	Class/meeting 5
Title	Aware consumer – mindful shopping	Diets in prevention and treatment of diseases
Time	100 minutes	100 minutes
Description	A. **Introduction** Welcoming the participants. Revision of the most important issues from previous class. B. **Understading the term „aware consument"** Working in small groups (2-3 persons each) using the snowball method to try to create the definition of an aware consumer in the eyes of the participants. Participants write their ideas down. Then they share their thoughts. C. **Reading the labels** Working in small groups (2-3 persons each) using the mental map method to analyse how often they take advantage of the information provided on the labels of food products. Participants share their thoughts and experiences in small groups. D. **What can you find on the label?** – minilecture on the information that is compulsory on the labels of food products, nutrition value assessment based on information provided on the label, comparing prices and ingredients of food as well as consumer's rights. E. **What is on the label of my favourite product?** Working in small groups (2-3 persons each) to analyse the labels and find the information and assess its usefulness. Analysis of the frequency of using the information provided on the label. Participants share their experiences in small groups. F. **Expectations and problems** Working in teams 2-3 person each using the brainstorm, reflective thinking and mental map on the problems that may make aware and economical shopping difficult. There was a wide scope of problems included. Participants note their ideas in the form of short statements. Then they are presented and discussed with the host. The host sums up the work and supplements information. G. **Wrap-up** H. **Time for questions** Time for asking questions regarding participants' expectations. I. **End of class**	A. **Introduction** Welcoming the participants. Revision of the most important issues from previous class. B. **Post-test.** C. **Culinary workshop** Preparing the entree, soup, main course and dessert according to the healthy eating guidelines. Each group prepares a different dish. D. **Tasting of the prepared dishes** Tasting and discussion on each of the dishes, nutritional value and possible variations. E. **Wrap-up** F. **Time for questions** Time for asking questions regarding participants' expectations. G. **End of class**

Source: Own work based on research.

The assessment of effectiveness of educational intervention on nutrition was performer with utilisation of measuring the change of nutritional knowledge based on the information given during the workshop meetings. In order to do this, 10 statement true-false test was designed regarding the guidelines of healthy eating according to the national recommendations described in the healthy eating pyramid for the elderly and the healthy eating plate (Nagel, 2024, med., 2018). The participants' task was to decide whether those statements were true. Points were given according to the test key. For each correct answer participants were given 1 point. There were 10 points to be awarded in total. No points were awarded for incorrect answer. All 10 statements from pre- and post-test were split into two categories. First – nutritional knowledge regarded general knowledge of food (statements no: 5, 7, 8, 9, 10) and second – healthy eating plate guidelines regarded the guidelines presented in the healthy eating plate [23] (statements no: 1, 2, 3, 4, 6) according to national nutrition recommendations [22, 23]. The split into two domains was related to the statements specificity. The list of statements was presented in the Table 2.

Table 2. List of statements used in pre- and post-test

No.	Statement
S1	The guidelines allow to substitute one portion of vegetables or fruits with a glass of juice
S2	The elderly should consume 4-5 meals a day
S3	There are wholegrain products in the base of the healthy eating pyramid
S4	According to the guidelines protein products should cover half of the plate
S5	„White" bread is a good source of fibre
S6	The guidelines recommend limitation of red meat (pork, beef, game) to 300g a week
S7	The elderly should remember about proper hydration of the organism (in case of healthy individuals they should drink 1,5 to 2 litres of water a day)
S8	Energy density and nutritional density are different names for the same thing
S9	Diet should be suited to the individual needs and health status
S10	Peas, bean and chickpeas are good sources of protein in the diet

Source: Own work based on research.

During the first meeting the participants were asked to subjectively assess the level of their knowledge of nutrition using 1-10 scale with 1 being very low, 10 being expert knowledge. The effectiveness and ability to prepare healthy meals were assessed by the workshop teacher (dietitian and trainer) using observation. The teacher could observe and adjust participants' abilities while preparing the meals. Feedback was given directly while preparing the meals as well as during the consumption of prepared meals.

Research tools

The level of self-efficacy assessment was performer by psychologist with utilisation of standardised diagnostic tool - General Self-efficacy Scale, (GSES). GSES was designed by Ralf Schwarzer, Michael Jerusalem and Zygfryd Juczyński. GSES measures the strength of one's general feeling of ability to cope with difficult situations and obstacles.

In order to assess the sense of responsibility for health the Sense of Responsibility for Health Scale (HSRS) by Mirosława Adamus was used with PAPI gathering method. The scale consists of 14 statements and is used to assess the total level of sense of responsibility for health. Alpha-Cronbach coefficient for this scale is 0.7. Respondents may obtain from 14 to 70 points. The more points the higher level of the variable. The assessment of this psychological variable was performed in all participants during workshop one along with pre knowledge test.

Statistical analysis

Descriptive statistics were employed to analyse the data, including the calculation of mean and median for continuous variables, as well as frequency and number for nominal variables. Due to the limited sample size, non-parametric methods were utilized to test the null hypothesis, including the Friedman Rank Sum test and the McNemar's Chi-Square test with continuity correction. Additionally, Spearman's rank correlation coefficient was computed. A p-value of less than 0.05 was considered statistically significant. All calculations were performed using STATISTICATM 13.3 software (TIBCO Software, Palo Alto, California, United States).

Results

General characteristics of educational intervention on nutrition participants

It must be noted that 27 out 32 participants completed the full cycle of workshops. The characteristics split into sex, age and education are presented in the table 3. All participants were living in a big city.

Table 3. Participants' characteristics

Trait	N	%
Sex		
Female	23	85.19
Male	4	14.81
Education		
Professional	2	7.41
Secondary	16	59.26
Higher	9	33.33
BMI		
normal	8	29.63
overweight	9	33.33
obesity	10	37.04

	Mean	SD	Median	IQR/2	Min	Max	CV [%]
Age	74.22	6.33	73.00	6.00	64.00	86.00	8.52
BMI	27.71	4.56	26.84	3.07	18.43	37.64	16.46

Source: Own work based on research.

Participants' characteristics by psychological variables and their correlations

All workshop participants had high levels of self-efficacy. Calculating crude results into standardised sten score [24] it can be observed that 14 had their results on sten 7, 6 on sten 8, 3 on sten 9 and 10 on sten 10.

Average level of participants' sense of responsibility for health was 45.12 (SD=8.556). Minimum value was 23 with maximum of 57. Calculating crude results into standardised sten scale it can be observed that 7 participants had low levels of this trait (stens 1-4), 8 participants had average levels of this trait (stens 5-6) and 12 participants had high levels of sense of responsibility for health (stens 7-8).

With utilisation of rho Spearman coefficient positive correlation between levels self-efficacy and sense of responsibility for health was shown (rho=0,596; $p<0.001$).

Intervention effectiveness analysis

The study participants subjectively assessed their knowledge at the level of 4 (SD=1,085) on the scale from 1 (very low) to 10 (expert knowledge). In the analysed group there was one person who assessed their knowledge as expert (10 points) and 10 participants chose 1 point – very low nutritional knowledge.

Comparing of the test results before introduction of the intervention (pre-test) with those after the workshop completion (post-test) it can be observed that there was an increase of knowledge both in the global result and the domain regarding healthy eating plate guidelines. There was no noticeable change in the domain of nutritional knowledge (Table 4).

Table 4. Knowledge comparison globally and in domains

		Mean	Median	χ^2	*P*-value*
Global score	pre	7.22	7	7.20	0.007
	post	8.19	8		
Knowledge level in the nutritional knowledge domain	pre	4.30	4	0.00	1.000
	post	4.33	4		
Knowledge in the guidelines of healthy eating plate domain	pre	2.93	3	10.90	<0.001
	post	3.85	4		

Source: Own work based on research.

Detailed analysis of statements listed in the knowledge test has shown that S1 and S3 were the most problematic for the participants when it comes to giving a correct answer. There were also some participants, who despite giving correct answers in pre-test gave incorrect one in the post-test. This might suggest higher level of difficulty for these statements (S3-S6 and S8) (Tabel 5).

Table 5. Detailed analysis of statements in pre and post-test

State-ment no.	Pre-test* [%]	Post-test** [%]	NC	NP	NW	NK	χ^2	*P*-value^
S1	67	93	7	18	2	-	5.14	0.023
S2	93	96	1	25	1	-	0.00	1.000
S3	26	56	9	6	11	1	4.90	0.027
S4	30	56	9	6	10	2	3.27	0.070
S5	93	78	2	19	0	6	1.13	0.289
S6	78	85	5	15	1	3	0.125	0.724
S7	89	100	3	24	-	-	-	-
S8	59	56	7	8	4	8	0.00	1.000
S9	96	100	1	26	-	-	-	-
S10	93	100	2	25	-	-	-	-

Source: Own work based on research.
^ McNemar's Chi-Square test with continuity correction
*-percentage of participants giving a correct answer in the pre-test
**- percentage of participants giving a correct answer in post-test
NC- number of participants who gave an incorrect answer in the pre-test, but gave a correct one in the post-test.
NP - number of participants who gave a correct answer both in pre-test and post-test.
NW - number of participants who gave an incorrect answer both in pre-test and post-test.
NK- number of participants who gave a correct answer in the pre-test, but gave an incorrect one in the post-test.

Despite the correlation between self-efficacy and sense of responsibility for health, no impact of sense of responsibility for health on the knowledge increase was observed, both on a global level and in both domains: nutritional knowledge and healthy eating plate guidelines (Table 6).

Table 6. Analysis of impact of sense of responsibility for health on increase of knowledge (delta)

		Δ global score	Δ nutritional knowledge	Δ healthy eating plate guidelines
The sense of responsibility for health	Spearman's rho	0.235	0.049	0.296
	P-value	0.238	0.807	0.134

Source: Own work based on research.

Discussion

The results of presented study show the effectiveness of educational intervention aiming at increase of nutritional knowledge and acquiring the skill of healthy eating in the elderly population. Furthermore, they suggest the validity of de-signing and introducing this type of intervention in individuals with high levels of self-efficacy.

It is worth noting that in the analysed group there were approximately 37% of participants, who despite high level of self-efficacy assessed their knowledge as very poor. Additionally, some of those individuals had excess body weight – there were overweight or obese. This suggests that having high level of self-efficacy alone does not determine healthy behaviours in practice, despite that self-efficacy is considered an important factor increasing the likelihood to follow healthy eating behaviours (Scult et al, 2015, Grembowski et al, 1993). However, high level of self-efficacy might be expressed as self-reflection and need for change. In order to follow healthy eating behaviours it is required to have sufficient knowledge and skills in this scope. The study participants could be aware of lack of this knowledge and/or skills and the need to explore it from verified sources. It is worth noting that some participants had problems with differentiating nutrition facts and myths. Because of this they developed incorrect beliefs regarding food behaviours which they shared with other participants. The workshops created space for correcting these beliefs which often left the participants surprised.

High level of self-efficacy could be observed in the educational intervention participants' activity. The participants were very active, they gladly engaged in different activities proposed during workshops, they were asking questions and sharing their thoughts and opinions. Furthermore, they showed their emotions spontaneously, such as surprise and astonishment. One could sense that they participated in the intervention because they wanted to, not because they had to. They also had high expectations when it come to the person conducting educational intervention on nutrition. Among others they expected professional and scientific knowledge and passing it on in an accessible way, asking for the teacher's qualifications before the workshops as well as asking a lot of questions during the workshops.

Apart from substantial part, a large dose of elasticity was required from the person conducting the workshops as well as ability to work with the group so that the activity of one person would not dominate the entire meeting. Furthermore, the teacher had to complete the educational intervention on nutrition according to the script, but on the other hand they had to actively react to the participants' questions, give them answers and stop the attempts to take control over the workshop or its domination by one person or a small group. Additionally, the questions were often personal and it would be difficult to expect the teacher to sacrifice the time of the entire group to solve the problems of individuals or explain the personal doubts. It was essential to think whether the answer to the question may bring benefits to the entire group, or is it better to ask for a possibility to answer that question during the break or after the workshop. The communication with the group was equally as important

for the right course of workshops as the content, especially taking the style of communication and the needs in this age group into consideration. This was the greatest challenge.

Presented study is the first one of its kind which focuses on the effectiveness of educational intervention on nutrition for individuals with high level of self-efficacy. As it was mentioned, self-efficacy is one of important factors which determine following healthy eating behaviours and it is essential to strengthen this psychological trait in participants of the workshops aiming at healthy behaviours promotion (Scult et al, 2015, Grembowski et al, 1993). These actions are validated in individuals with high or average level of self-efficacy. Strengthening the self-efficacy in the individuals with high levels of it remains disputable. The authors' observations has shown that the participants were highly motivated and ready to gain knowledge, especially practical one, from the very beginning of the intervention. This is why further strengthening of this trait could be very difficult or even impossible. Furthermore, it could lead to resistance from the participants or to overstimulation. This is why it was decided to use a different strategy of cooperation based on the models of reflective learning and learning through experience with utilisation of self-monitoring, provided feedback on performance, and planned for social support/social change increased dietary self-efficacy (Prestwich et al, 2014).

Sense of responsibility for health was also analysed in the study participants. However no correlation was shown between this variable and the effectiveness of educational intervention on nutrition expressed as increase of knowledge, both in the global scale and in domains of nutritional knowledge and healthy eating plate guidelines. Despite that the correlation between self-efficacy and sense of responsibility for health was shown. With the increase of self-efficacy there was also an increase in sense of responsibility for health. Therefore the individuals showing high level of feeling that they can cope with difficult situations and obstacles had also higher sense of responsibility for their eating behaviours. It can be assumed that these two psychological traits have positive impact on following healthy behaviours. It requires further research though.

Limitations and strengths

The presented study is not free from limitations. One of them being lack of comparison of intervention effectiveness in groups of individuals with high and low levels of self-efficacy. Further research will cover this issue. Women were the vast majority of the participants which did not allow for examination of possible differences in the effectiveness of investigated intervention caused by the sex. Because of this in further analyses it is crucial to take more diverse groups into consideration. Despite these limitations the study has its strengths. One of them being a specific study group and intervention scheme consisting of 5 meetings. Another strength is including the psychological variables. Presented study is the first one of its kind which focuses on the effectiveness of the intervention in the individuals with high levels of self-efficacy and regarding sense of responsibility for health.

Conclusions

Educational intervention aiming at increase of nutritional knowledge in the elderly population with high level self-efficacy is effective. However it requires a proper script which includes the cooperation strategy based on reflective learning and learning through experience. Despite that there was no direct correlation between the level of sense of responsibility for health and the effectiveness of the intervention expressed as the change in knowledge level, this psychological variable may have an important role in shaping healthy eating behaviours. It is demonstrated in its correlation with self-efficacy. Further research on the topic is recommended.

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