

Longevity, lifestyles and eating

The importance of education

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Edited by
Donatella Rita Petretto,
Roberto Pili



Health is a goal to be addressed in each day of life and in each phase of life. Again, ageing well is a goal to be addressed early in life. According to World Health Organization, eating attitudes and behaviours, physical activity, healthy lifestyles, and psychological aspects of life are central pillars in the promotions of wellbeing, health and ageing well. In this book we aimed to approach the complex themes of health, health promotion, longevity, and ageing. The topics are discussed with a multidisciplinary approach, aiming to compare and share current knowledge in physiology, genetics, medicine, psychology and education.



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Introduction

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The subject of the progressive ageing of the population worldwide, together with the promotion and diffusion of a culture of “well living and ageing” is the guiding thread of the contributions published in this volume on “Longevity, lifestyles and eating: the importance of education”. A complex system deals with longevity, lifestyle and nutrition, which involves medical and cultural issues, including education. A multidisciplinary University, like the University of Cagliari, is engaged in all these aspects of research and together with the Belarusian Institutions: State Pedagogical University, National Academy of Science, Bobruisk City Polyclinic, State Medical University and the Global Community on Longevity, creates a perfect background to examine and study these issues at the same time. Never as today, it is important to develop knowledge around health topics related to longevity since these are still insufficiently or inadequately known.

Sardinia and Republic of Belarus have a long standing cultural exchange started several years ago, thanks to the tireless support of the Republic of Belarus Consul in Sardinia, Giuseppe Carboni. In the frame of those initial activities, a dynamic collaboration among Universities and Research Centers of the two Countries, brought to the organization of a Summer School in which the different experiences and activities in the field of longevity and promotion of life style education were at the center of the seminars of the School.

The Summer School organized in Cagliari in September 2019, was an excellent occasion to gather different expertise from gene polymorphism, taste physiology, role of phytochemicals, importance of physical activity and Mediterranean diet. These more oriented biomedical issues were combined with sociological and educational issues creating a unique and very interesting environment of exchange. En-

hancement of Research in these areas is mandatory for a modern society in which life expectancy has grown exponentially. Moreover, the discussed topics were the generator of several positive opportunities among participants.

Thanks to the research project on International Cooperation funded in 2018 by L.R. 11/04/1996 N°19 of Sardinian Region (RAS) and the responsible of the project prof. Donatella Petretto, this volume contains the contributions originated from the Summer School organized in the frame of this project which paved the way for further collaboration on this important field of study.

Longevity, healthy lifestyles and eating: the importance of education

Donatella Rita Petretto

University of Cagliari, Italy, on the behalf of the project's working group

Since the last decades of the 20th century, there have been an increasing attention on the ageing of population and on the need to develop specific interventions, aiming to promote wellbeing and quality of life (Petretto et al., 2016, 2017, 2018, Pili and Petretto, 2019).

World Health Organization (WHO) considered the development of those interventions as a priority and asked countries to create a research and intervention agenda with a focus on the promotion of healthy and active ageing. According to a biopsychosocial approach, WHO defined some pillars at the base of healthy and active ageing. Moreover, WHO focused attention on eating and healthy lifestyles as ways to promote wellbeing and longevity (WHO, 2012).

In January 2004, WHO proposed the “Global Strategy for Diet, physical activities and health” and asked worldwide governments to promote integrated actions to guarantee health for all the individuals in the World (WHO, 2004).

There are increasing research findings in this field, with a focus on the role of mediation and prediction variables, on wellbeing and longevity, also by cross-national comparisons and by the development of intervention models aimed to prevent “not-communicable disorders” and to promote wellbeing.

According to this approach, we developed this project that is based on a comparison between Sardinia and Republic of Belarus, two countries with some commons features and with some differences.

Sardinia is an island with about 1.600.000 inhabitants. Sardinia has about 470 centenarians and high longevity index. Some cities and sites in Sardinia are known as the first “BlueZone” due to the high number of oldest olds. In the last decades, Sardinia became a sort of “natural experiment” for the study of longevity, with a focus on eating, diet, and healthy lifestyles.

“Mediterranean Diet” is a specific diet followed in Italy, in Sardinia and in other countries around the Mediterranean Sea. Since the first study of Lorenzo Piroddi and the Ancel Keys’s research, this diet received great attention from clinicians and researchers, both for its role of eating attitudes and for its influence on general lifestyles (Piroddi, 1990, 2008, Keys et al., 1966).

More recently, other scholars focused their attention on the effects of this kind of diet on wellbeing, on the prevention of non-communicable disorders, also considering nutritional properties and/or links with microbiological aspects. Some authors analyzed the role of culture and of environment and the role of genetics, and psychological, social and anthropological variables. Some other authors focused on the role of the so-called “ecological niche” and argued the need of cross-national studies aimed to assess the specific features of each “omestatic system” (Govindaraju, 2015, Laland et al., 2016).

Republic of Belarus is situated in the Est of Europe, with about 9.500.000 of inhabitants. Since 1991, Republic of Belarus is a member of CIS (Commonwealth of Independent States). Life expectancy is about 72.7 years (with a gender gap: 67.2 years for men and 78.6 years for women). Even if life expectancy is lower than those of some European countries, in the Republic of Belarus there are about 480 centenarians. The numbers of olds and oldest olds is lower than in Italy and in Sardinia. Belarusian Diet shares some common features with Mediterranean diet but there are also some differences, that are mainly related to the use of animal fats and the use of alcoholic beverages. In 2017, World Population Prospect estimated an increasing of life expectancy in the Republic of Belarus in the next 20 years. But an increasing of life expectancy does not mean a complete and parallele increasing of healthy life expectancy and the ageing of population could have the effect to increase the risk of age-related disorders and of disabilities (Pili and Petretto, 2019).

Taking into account these aspects, it is mandatory to develop a way to run the demographic transition: now in the Republic of Belarus is on-going the progressive ageing of population, a few years behind other countries. The first years of this demographic transition are crucial for the development of model to run the ageing of population and to promote active and healthy ageing. The Republic of Belarus

is focusing attention on these aspects, also with the creation of an interministerial working group with the aim of developing a national strategy in this field.

In 2018, we developed an international working group aimed to study the relationship between ageing, wellbeing, eating and healthy lifestyles with a specific cross-national project based on International Cooperation, supported by the Sardinian Region (RAS) and funded in 2018 by Sardinian Regional Law n. 19 of 11/04/1996. The working group is coordinate by the University of Cagliari and it is composed by the Belarusian Pedagogical State University named after “Maksim Tank”, Belarusian State Medical University, Belarusian National Academy of Science, Bobruisk City Polyclinic n. 3 and the Global Community on Longevity, with the support of the Republic of Belarus Consul in Sardinia. The working group and the project are aimed to disseminate the state of art in the field of the promotion of health and longevity in both countries, with a focus on the role of eating, healthy lifestyles and the promotion of health and wellbeing. In this book we discuss some research findings in the field, according to the specific field of study and research of each partner of the project and of the working group. The topics discussed in this book were presented and discussed also in an International Summer School, held in Cagliari in September 2019.

All the chapters of this book aimed to approach the complex themes of health, health promotion, longevity, and ageing. Each chapter is focused on specific field of research and interest of each group. The topics are discussed with a multidisciplinary approach, aiming to compare and share current knowledge in physiology, genetics, medicine, psychology and education and aiming to discuss the pillars of health and wellbeing according to World Health Organization: eating attitudes and behaviours, physical activity and healthy lifestyles and psychological aspects of life.

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Genetic Basis of Nutrition and Longevity: the experience of Belarus

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According to modern concepts, ageing is a result of complex changes in gene functions caused by mutations, epigenetic deregulation, impaired protein processing and their interaction in metabolic pathways. A key-stone of ageing is the gradual degeneration of the entire cell transcriptome, that is, dysfunctions of regulatory and structural genes caused by various exogenous and endogenous factors. In old age, a metabolic activity level decreases in tissues. In people who have reached senile age, gross metabolic disorders are noted in 70% of cases. Cell fission slows down, the tissue ability to regenerate decreases. In most tissues, cell atrophy develops, fatty degeneration of cells or replacement of tissue cells with connective tissue cells occurs and inert, potentially hazardous substances accumulate in cells. Therefore, in modern theories of ageing and active longevity, more attention is paid to the lifestyle and nutritional preferences of a human being.

One of the challenging directions of molecular medicine is the study of genetic ageing mechanisms and the relationship between genetic variations and a diet. Candidate genes associated with longevity are primarily genes encoding transcription factors (NF- κ B, FOXO1 and FOXO3), as well as sirtuin family proteins (SIRT1). A large-scale search for genes whose functional polymorphisms are associated with various non-infectious age-related diseases is conducted in scientific laboratories across the globe. A key role among them is played by the genes of lipid metabolism, a renin-angiotensin system, antioxidant defense, an immune system, and a detoxification system. Many of them regulate the energy metabolism of cells and an organism and thus are directly involved in the ageing process.

450 residents of elderly and senile age (50-89 years) and 170 long-livers (90 years and older) of Belarus admitted to the Departments of the Re-

publican Clinical Hospital for the Disabled in World War II named after P.M. Masheroval have been examined.

A multiple polymorbid pathology was noted in the examined patients, especially of elderly and senile age. The most common one is the pathology of a cardiovascular system. Arterial hypertension and type 2 diabetes were more frequently occurring in people of the senile age group and were decreasing in the group of long-livers. When analyzing the anthropometric parameters of the examined patients, it was noted that "overweight" occurs in 30.5% of the examined and may be associated with the impaired lipid metabolism and development of type 2 diabetes.

A comprehensive analysis of gene polymorphisms of transcription factors in different age groups showed that a combination of polymorphic variants that determine a high activity of transcriptional cytoplasmic proteins NF-kappa B, FOXO3A, and SIRT1 ($\chi^2 = 9.54$; $p = 0.002$) was significantly more frequent among long-livers. Therefore, patients with polymorphic gene variants, leading to a decrease in the activity of transcription proteins NF-kappa B, FOXO3A and sirtuins, can be recommended to take geroprotectors.

Thus, the carriage of combinations of normal gene variants of transcription factors is associated with an increased life expectancy in the Belarusian population. Identification of molecular genetic markers associated with ageing will contribute to the development of effective preventive measures aimed at early diagnosis and timely treatment of major age-related diseases (obesity, diabetes, cardiovascular and oncological diseases) and the prolonged period of active life.

Prospects for collaboration with the University of Cagliari: large-scale population studies of the genetic characteristics of lipid, carbohydrate and peptide metabolism among the residents of Belarus and Sardinia, as well as the studies related to the impact of a traditional diet of Belarusians on health, taking into account the experience of such studies at the University of Cagliari.

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Taste physiology and food choice

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Taste is the sensory modality that guides organisms to identify nutrient-rich food from toxic substances, and acts as a final checkpoint for food acceptance or rejection behavior. In humans the gustatory system can discriminate five primary sensory qualities (sweet, umami, sour, salty, and bitter). In addition, one other sensory quality has been proposed concerning the ability to taste fatty acids. Each taste quality is considered to represent different nutritional or physiological requirements or indicate a potential dietary risk.

Taste sensitivity varies greatly among individuals (Tepper, 2008). In the last several decades, researchers started to investigate the mechanisms underlying the individual differences in taste perception. In this context, 6-n-propylthiouracil (PROP) phenotype has gained considerable attention as a paradigm of general taste perception (Tepper, 2008, Tepper et al., 2014). The ability to taste PROP is a heritable trait, and the gene that expresses the PROP-binding bitter receptor is known as TAS2R38 (Kim et al., 2003). The allelic diversity of this gene can explain most phenotypic differences in PROP tasting (Kim et al., 2003) but not all, this implies that other factors may be involved in the expression of this complex trait. In this regard, individual differences in PROP bitterness have also been attributed to chemical composition of saliva. The role of the zinc dependent salivary protein, gustin (also known as carbonic anhydrase VI (CA6)), has been studied in PROP tasting. A polymorphism (*rs2274333*) of the gustin gene that seems to be related with the capacity of the protein to bind zinc which accumulates in saliva, may affect PROP sensitivity by acting on the protein function as growth factor for taste buds (Padiglia et al., 2010). Subsequently, the same polymorphism has been associated strongly with fungiform papilla density and morphology (Melis et al., 2013a). Thus, the gustin

gene polymorphism provides the first mechanistic explanation for why PROP super-tasters are more responsive to a wide range of stimuli that are not mediated via the specific bitter receptor.

In addition, among other salivary proteins it has been shown that PROP tasting is directly associated with salivary levels of two specific salivary peptides (Ps-1 and II-2) belonging to the basic proline-rich protein family (bPRP) and amino acids, such as L-Arg (Melis et al., 2013b). Subsequently, in psychophysical experiments oral supplementation with these peptides enhances PROP bitterness perception mostly in non-taster subjects, who have low levels of these proteins and L-Arg in their saliva (Melis et al., 2013b). Furthermore oral supplementation with L-Arg mainly modified sucrose perception, enhanced the umami taste, increased NaCl saltiness and caffeine bitterness only in tasters, decreased citric acid sourness (Melis and Tomassini Barbarossa, 2017), and increased the perceived intensity of oleic acid. Together these results suggest that oral supplementation with L-Arg could be a strategy for selectively modifying taste responses.

PROP phenotype has been shown as an oral marker for food preferences and eating habits that ultimately impacts nutritional status and health. This role is based on data showing that PROP sensitivity is associated with variation in taste perception and preference for various oral stimuli. It is known that PROP super-tasters (individuals who

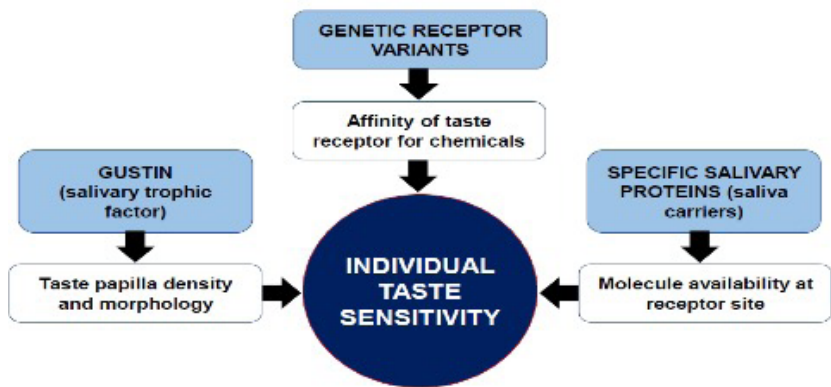


Figure 1. Genetic factors that contribute to determine differences of individual taste sensitivity.

perceive PROP as a more bitter), compared to non-taster (individuals who perceive PROP only at high concentration or not at all), have more taste buds on the tongue and great taste acuity to various oral stimuli, including other bitter substances, sweet substances, sour compounds, umami taste, fats and high-energy foods, compounds which give rise to astringent sensations, chemical irritants and show lower acceptance of fruits and vegetables. In addition, some studies suggested that PROP related sensory differences may be extended to the olfactory system. However, other studies did not confirm these associations suggesting that other factors may contribute to dietary predisposition and eating behaviour (Tepper et al., 2014). PROP perception has also been associated to health markers including: body mass index (BMI), antioxidant status, colonic neoplasm risk, smoking behaviours, consumption of



Figure 2. Relationship between taste sensitivity and eating behavior: Super-tasters show low preference for fruits and vegetables, strong-tasting and high-fat foods, while non-tasters show high preference for the same foods.

alcoholic beverages, predisposition to respiratory infections and even neurodegenerative diseases.

Since several studies reported that the PROP non-taster phenotype is associated with the susceptibility to prefer and consume high-fat/high-energy foods, we investigated whether the endocannabinoid system, which also modulates hunger/satiety and energy balance, plays a role in modulating eating behavior influenced by sensitivity to PROP. Results showed that in normal weight subjects the reduced endocannabinoid levels observed in non-tasters represent a mechanism attempting to normalize feeding behavior components (such as increased hunger and reduced restraint) explaining why these subjects still exhibit a lean phenotype despite their preference for fat. Differently, in subjects with obesity, we found lower circulating endocannabinoids in super-tasters vs. non-tasters. This finding suggests that the obesity state disrupts the aforementioned adaptive mechanisms and possibly creates the conditions for an endocannabinoid-mediated “obesity vicious circle” in non-taster individuals (Carta et al., 2017). In addition, the CD36 polymorphism, *rs1761667*, whose allele A is characterized by reduced protein expression, which has been associated with taste sensitivity to and preference for fat (Melis et al., 2015), was also recently associated to distinct metabolic patterns in normal-weight and obese subjects (Melis et al., 2017).

In conclusion, these findings open new perspectives by evaluating factors involved in the physiology of eating behavior control which, by counteracting impaired eating behaviors triggered by taste sensitivity, may restore the physiological balance of nutritional status and health of the individual.

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Functional foods and health: probiotics in health promotion and prevention

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Functional foods are the result of a new approach to nutrition science: from the concept of adequate nutrition to that of optimized nutrition. In the 20th century nutrition was aimed primarily at avoiding dietary deficiencies in the population, establishing nutritional standards and guidelines, while in the 21st century food has become a tool in disease prevention and in improving the quality of life and ageing, due to the increasing life expectancy and a consequent increase in chronic degenerative diseases, improving scientific knowledge, exponentially growing health care costs (Roberfroid, 2002).

Functional foods have no universally accepted definition. The concept was first developed in Japan in the 1980s when, faced with escalating health care costs, the Ministry of Health and Welfare initiated a regulatory system to approve certain foods with documented health benefits in hopes of improving the health of the nation's ageing population. Several organizations have proposed definitions for this new food category. The International Life Sciences Institute defines them as *"foods that, by virtue of the presence of physiologically-active components, provide a health benefit beyond basic nutrition"*. The European Commission Concerted Action on Functional Food Science in Europe (FuFoSe) regards a food as functional, *"if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well-being and/or reduction of risk of disease"*. In a 1999 position paper, the American Dietetic Association defined functional foods as foods that are *"whole, fortified, enriched, or enhanced,"* but more importantly, states that such foods must be consumed as *".... part of a varied diet on a regular basis, at effective levels"* for consumers to reap their potential health benefits. In summary, a functional food may be defined as any food that has

a positive impact on an individual's health, physical performance, or state of mind, in addition to its nutritious value. Other additional considerations have been proposed to define a functional food, including three conditions in particular:

1. it is a food (not a capsule, tablet, or powder) derived from natural ingredients;
2. it can and should be consumed as part of the daily diet;
3. it has a particular function when eaten, serving to regulate a particular body process, such as enhancement of biological defense mechanisms; prevention of specific diseases; recovery from specific diseases; control of physical and mental disorders; slowing of the ageing process.

It is important, for a functional food, to identify the specific food constituents that could promote health and well-being as well as the exact conditions where they can have this beneficial effect. Practical examples of a functional food are:

- a natural whole food such as fruit or grain which may or may not be modified by plant breeding or other technologies (e.g. lycopene-enhanced tomatoes, vitamin E-enriched vegetable oils, vitamin A-enriched rice);
- a food to which a component has been added (e.g. a spread with added phyosterols);
- a food from which a component has been removed or reduced (e.g. a yogurt with reduced fat);
- a food in which one, or several components, have been modified, replaced or enhanced to improve its health properties (e.g. a juice drink with enhanced antioxidant content, a yogurt with added prebiotic or probiotic) (Rincón-León, 2003)

The functional food market is expanding, especially in Japan, with further growth prospects in Europe and the United States, and in most countries the largest share of its products is held by probiotics. The word probiotic derived from the Greek phrase 'pro bios' which means 'for life'. The works of Metchnikoff and Tissier were the first to make scientific suggestions concerning the probiotic use of bacteria. According to the report of the joint "Food and Agriculture Organization/World Health Organization (FAO/WHO) Expert Consultation on Evaluation of Health and Nutritional Properties of Probiotics in Food including

Powder Milk with Live Lactic Acid Bacteria”, probiotics are defined as: “Live microorganisms which when administered in adequate amounts confer a health benefit on the host”. Most probiotics fall into categories of lactic acid-producing bacterial organisms, including *Lactobacillus* and *Bifidobacterium*. Other bacterial probiotics belong to the genera *Streptococcus*, *Enterococcus*, *Propionibacterium*. In addition, yeast probiotics, namely, *Saccharomyces boulardii*, are frequently used (Table 1).

Table 1. Main microorganisms used as probiotics

<i>Lactobacillus</i>	<i>Bifidobacterium</i>	Other lactic acid bacteria	Other
<i>L. acidophilus</i>	<i>B. adolescentis</i>	<i>Enterococcus faecium</i>	<i>Escherichia coli</i> strain Nissle
<i>L. casei</i>	<i>B. animalis</i>	<i>Lactococcus lactis</i>	<i>Saccharomyces cerevisiae</i> var. <i>boulardii</i>
<i>L. crispatus</i>	<i>B. bifidum</i>	<i>Leuconostoc mesenteroides</i>	
<i>L. curvatus</i>	<i>B. breve</i>	<i>Pediococcus acidilactici</i>	
<i>L. delbrueckii</i>	<i>B. infantis</i>	<i>Streptococcus thermophilus</i>	
<i>L. farciminis</i>	<i>B. lactis</i>		
<i>L. fermentum</i>	<i>B. longum</i>		
<i>L. gasseri</i>	<i>B. thermophilum</i>		
<i>L. johnsonii</i>			
<i>L. paracasei</i>			
<i>L. plantarum</i>			
<i>L. reuteri</i>			
<i>L. rhamnosus</i>			

Legal regulations on probiotics are complex, and current health and medical claim legislations differ from country to country (Sanders et al., 2013). A health claim relates to that of a health benefit in a general

population of healthy consumers. In the European Union, the European Food Safety Authority (EFSA) plays an important role in regulating health claims. At the time of the writing of this manuscript, there are no health claims regarding probiotics approved by the EFSA. Still, individual countries may have regulatory systems permitting probiotic-based claims. For instance, Canada, Italy, Japan and Switzerland have allowed a number of probiotic claims. In Italy, according to the official guidelines recently revised, the only claim for use in food products and food supplements of probiotic micro-organisms is “*It promotes the intestinal flora balance*” (Italian Ministry of Health, 2018).

For use in food, important criteria for probiotics are required. In 2002, a joint FAO/WHO working group generated Guidelines for the evaluation of Probiotics in Food (FAO/WHO, 2002). The minimum requirements needed for probiotic status include:

- (i) the assessment of strain identity (genus, species, strain level);
 - (ii) in vitro tests to screen potential probiotic properties such as: resistance to gastric acidity, bile acid and digestive enzymes; antimicrobial activity against pathogenic bacteria; adhesion to mucosal and epithelial surfaces; bile salt hydrolase activity;
 - (iii) assessment of safety: requirements for proof that a probiotic strain is safe and without contamination in its delivery form;
 - (iv) in vivo studies for substantiation of health effects in the target host.
- Probiotics must be able to exert their benefits on the host through growth and/or activity in the human body. Therefore, the ability to remain viable at the target site and to be effective should be verified for each strain.

Probiotics have various mechanisms of action although the exact manner in which they exert their effects is still not fully elucidated. The mechanisms and the efficacy of a probiotic effects often depend on the interactions with the specific microbiota of the host or with the immuno-competent cells of the intestinal mucosa. The immunomodulation effect has been the subject of numerous studies and there is considerable evidence that probiotics influence several aspects of the acquired and innate immune response by inducing phagocytosis and IgA secretion, modifying T-cell responses, enhancing Th1 responses, and attenuating Th2 responses (Erickson K.L., Hubbard, 2000). Probiotics are also able to modulate the intestinal microbiota and/or inhibit the colonization of

the gut by potential pathogens, as well as translocation of pathogenic bacteria through the intestinal wall by competition for adhesion sites and nutrients, by the production of H_2O_2 , the acidification of the environment and production of antimicrobial substances (Figure 1). In addition to producing anti-pathogenic bioactive compounds that directly affect pathogens, probiotics also stimulate host antipathogenic defense pathways, such as stimulating or activating the pathway involved in the production of defensins (Figueroa-Gonzalez et al., 2011).

The beneficial effects on host health, attributed to probiotics are numerous and include effects on systemic and infectious diseases such as acute diarrhoea and Crohns disease, cardiovascular disease, urogenital infections, oropharyngeal infections, cancers, food allergies, lactose intolerance, reduction of antibiotic associated side effects, dental and oral disorders. The main effects were established as a result of clinical studies while others have been acquired on the basis of in vitro tests.

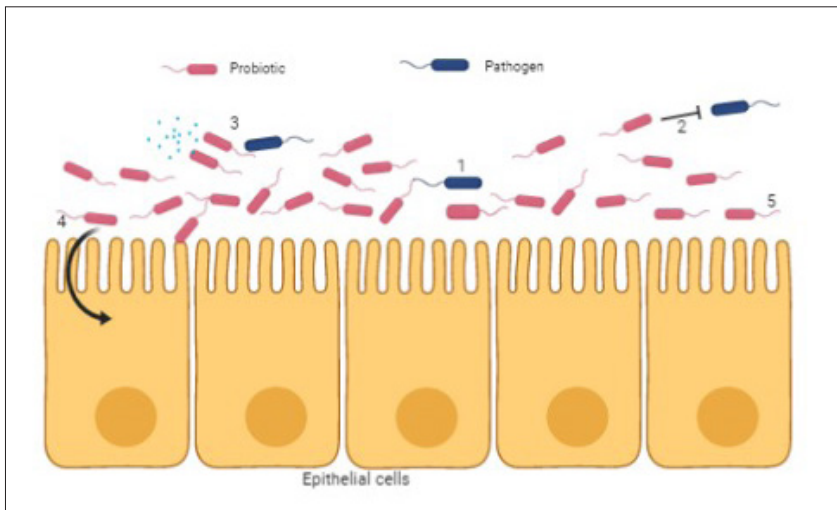


Figure 1. Some mechanisms by which probiotics might interact with the intestinal epithelium and induce several beneficial host responses. Most effects consist on: 1) competitive exclusion of pathogens adhesion, 2) competition for nutrients and prebiotic products, 3) production of antimicrobial substances (e.g. bacteriocins, H_2O_2), 4) release of polyamines which exert trophic actions to stimulate epithelial cells proliferation and differentiation and 5) protection of intestinal barrier integrity.

Several studies suggest that probiotic use is associated with a reduced risk of antibiotic-associated diarrhoea. A limited number of strains have been tested for their efficacy in the treatment and prevention of allergy in infants. Other studies have shown a positive impact on cardiovascular risk (Reid et al., 2003). For example, several randomized trials showed an increase in HDL, and a reduction in triglycerides and LDL, body mass index, fasting sugar, and insulin sensitivity (Agerbaek et al., 1995). In vitro studies have demonstrated that probiotic strains *Lactobacillus fermentum* NCIMB-5221 and -8829, have highly potent in suppressing colorectal cancer cells and promoting normal epithelial colon cell growth through the production of SCFAs (ferulic acid) (Kahouli et al., 2015). Two different probiotic strains *L. acidophilus* LA102 and *L. casei* LC232 have also been found to show pronounced cytotoxic activities, with in vitro anti-proliferative activity against two colorectal cancer cell lines (Caco-2 and HRT-18) (Awaisheh et al., 2016).

In conclusion, probiotic bacteria are believed to confer several health benefits. However, it is essential to understand that not all probiotics are equal, as the benefits of these agents are both strain-specific and dose-specific. Consumers choosing probiotics should ensure that the health claim(s) regarding the product are substantiated with well-controlled studies and that the product has been adequately characterized for content and stability.

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Functional foods and health: phytochemical compounds in the prevention of degenerative diseases

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During the last twenty years, nutritional science has developed and consolidated new views on the conceptual role of the diet. Diet may play a key role in health and disease, contributing to an improved state of well-being, a reduction of risks related to certain diseases and even an improvement in the quality of life. These new concepts have led to the introduction of new categories of health-promoting foods, such as functional foods. The functionality of such foods is based on bioactive components, able to modulate various functions in the body, which may be contained naturally in the product or added or removed by technological or biotechnological means, in order to optimise the desired beneficial properties (The European Parliament and the Council of the European Union , 2006).

The largest group of bioactive compounds present in functional foods is that of phytochemicals, that, in the common opinion, have tremendous impact on human health. Phytochemicals are defined as bioactive non nutrient plant chemicals present in fruits, vegetables, grains, and other plant foods that may exert health benefits beyond basic nutrition. In particular, they may reduce the risk of major chronic diseases (Liu, 2004). More than 5000 individual phytochemicals have been isolated and characterized, however a large part is still unknown. Phytochemicals may be classified in several categories based on the chemical structure: carotenoids, alkaloids, nitrogen-containing compounds, organo-sulfur compounds and phenolics (Liu, 2004). The biggest and the most studied is the group of phenolics. The major sources of dietary phenolic compounds are cereals, legumes (barley, corn, nuts, oats, rice, sorghum, wheat, beans, and pulses), oilseeds (rapeseed, canola, flaxseed and olive seeds), fruits, vegetables and beverages (fruit juices, tea, coffee, cocoa, beer and wine).

Most of these compounds, once ingested, are absorbed, although in minimal quantities. The passage in the gastro-intestinal tract often involves profound changes in the chemical structure of the initial compound and the appearance of metabolites with structural and functional characteristics that can be very different from those of the compound initially ingested. Nonetheless, numerous experimental studies, carried out on the main groups of phytochemicals, demonstrate that originated metabolites are able to reach, in the target tissues, concentrations compatible with a biological activity *in vivo* (Benzie and Wachtel-Galor, 2013); metabolites generally retain the potential beneficial effect of the parent compounds, which may even be enhanced (Serreli and Dina, 2019).

Several epidemiological studies have shown that regular consumption of plant foods is strongly associated with a reduced risk of developing chronic diseases such as cancer, cardiovascular and neurodegenerative diseases (Liu, 2004, Islam et al., 2016). On this basis, the main world organizations for food safety and education have formulated promotional messages to increase the consumption of fruits and vegetables in the context of healthy eating.

First of all, they suggest to consume whole foods, not individual dietary supplements, as an isolated pure compound either loses its bioactivity or may not behave the same way as in whole foods, where additive and synergistic effects may be responsible for the activities.

Second, fruits and vegetables should be consumed daily because the residence time of most of these compounds in the tissue in which they perform their action before being removed from the body (half-life) is often short. Then, it is necessary to consume fruits and vegetables regularly, in order to ensure a tissue concentration of phytochemicals more or less constant over time.

Lastly, to maximize the health benefits of phytochemicals you should consume a wide variety of plant foods, as quantity and quality of phytochemicals present in various foods of plant origin are very variable, as well as their biological activity that depends on the chemical structure. The bioactive compounds present in fruits and vegetables are in many cases the same ones that give these foods the characteristic bright colors; a specific color often corresponds to a different group of bioactive compounds. It is so particularly easy and immediate for the consumer to

identify the foods that contain different groups of phytochemicals and then arrange for them to be assorted in the best way in the diet.

The five colors prevalent in fruits and vegetables, which identify groups of foods that contain similar bioactive compounds, are: blue-violet, red, yellow-orange, green and white.

The blue-violet color, for example, indicates the prevalent presence of anthocyanins, often accompanied by carotenoids and vitamin C. Dark berries (raspberries, blackberries, currants, blueberries), red grapes, figs and plums are the main representatives fruits of this group. Among vegetables, there are red cabbage and onion, eggplants, purple cauliflower, radicchio, etc.

Anthocyanins of purple color possess antioxidant and antiinflammatory properties and exert an important role in the prevention of cardiovascular and neurodegenerative diseases. Regarding cardiovascular prevention, anthocyanins may modify plasma lipid profile (lower LDL and triglycerides and increase HDL); lower blood pressure; reduce platelet aggregation; protect the blood vessel wall from oxidative stress; reduce expression of adhesion molecules on endothelial cells and migration of immune cells; inhibit secretion of proinflammatory mediators (cytokines) and exert direct cardioprotective effects (Kruger et al., 2014).

Regarding the prevention of neurodegenerative diseases, some anthocyanins, such as cyanidin 3-O-glucopiranoside, are able to cross the blood-brain barrier and so they can reach brain regions important for learning and memory; in these sites, thanks to the antioxidant and anti-inflammatory action, they may protect neurons from oxidative stress and inflammation, which, in degenerative diseases like Alzheimer and Parkinson, cause functional changes until death of cells (Elks et al., 2013).

Other important phytochemicals, for example, are carotenoids, that characterize the orange/yellow and red group. The most representative vegetable of the red group is tomato, the king of the Mediterranean diet, consumed fresh or as processed products. It is believed to have antioxidant, anti-inflammatory and anticarcinogenic activity, thanks to the presence of several phytochemicals (Chaudhary et al., 2018). Tomatoes contain a good amount of β -carotene and lycopene, but while β -carotene may be found in higher concentrations in other plant foods, tomatoes are the main source of lycopene (80% of dietary intake).

It has been shown that β -carotene, besides being a precursor of vitamin A, possess antioxidant activity, being able to protect cells from oxidative damage in synergy with other antioxidants (vit C and vit E). It also originates metabolites with biological activity independent of vitamin A, which control cell proliferation, stimulate differentiation and induce cell death. β -carotene induces the activation of detoxifying enzymes, thus facilitating the elimination of carcinogens. Thanks to these biological activities, an increase of β -carotene intake has been correlated with a reduced risk of developing some types of cancers, as breast and lung cancers (Fiedor and Burda, 2014).

The biological activity of lycopene has been extensively studied. Lycopene has been shown to exert an important preventive action in cardiovascular diseases, thanks to its ability to raise plasma antioxidant defenses, to lower total plasma cholesterol (especially LDL) and triglycerides and, once incorporated in LDL lipoproteins, to make them more resistant to oxidation, therefore less atherogenic. Epidemiological and clinical studies demonstrated that plasma concentration of lycopene is inversely correlated with plasma lipid concentration, the presence of advanced atheromatous plaques and the incidence of myocardial infarction. Lycopene has also shown, *in vitro* and *in vivo*, a preventive action in the onset of some types of cancer. It inhibits the proliferation of different types of cancer cells, induces the death or differentiation of cancer cells, increases the activity of detoxifying enzymes, favoring the elimination of carcinogens, and modulates gene expression and hormone and immune-dependent response. In the context of several studies funded by the European Community, it has been found that tomatoes could play a decisive role in cancer prevention. Lycopene consumption, as fresh tomatoes and derivatives, is inversely correlated with the incidence of bladder, ovary, breast and prostate cancer (Grabowska et al., 2019).

Although further research on the health benefits of phytochemicals in whole foods is needed, it is worldwide believed that increasing the daily consumption of these compounds, through a wide variety of fruits, vegetables, and whole grains, is an appropriate strategy for significantly reducing the risk of chronic diseases and to meet nutrient requirements for optimum health.

The World Health Organization recommends, since the 1990s, the daily

intake of fruits and vegetables as one of the main strategies in cancer and chronic diseases prevention. Currently, the consumption of several daily portions of fruits and vegetables, depending on the individual's caloric requirement, is strongly suggested. At each meal, half of the foods consumed should be fruit or vegetables.

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Biopsychosocial approach in the promotion of longevity

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Since the second half of the 20th century, the worldwide ageing of population received an increasing attention from researchers and from clinicians. Europe is the oldest continent, with over 20,3% of people aged over 65 in 2019. In 1990 there were 13% of people aged over 65, it is estimated that in 2060 there will be more than 30% of people aged over 65. Before 2060, there will be two individuals aged between 15-64 for each individual aged over 65, while now we have four individuals aged between 15-64. In Italy, that is very similar to Japan, people aged over 65 are 21% (about 14 million) and people aged over 80 are more than two million. As of January 1, 2019, there were 14.456 centenarians in Italy, and between them 1.112 were aged 105 and over. There is a great sex gap: 87% are female. Supercentenarians were 21, while ten years before were only 10.

In Sardinia, people aged over 65 are 22% (about 360.000). Sardinian Longevity gained attention all over the world, with over 470 centenarians (about 29 centenarians in 100.000 inhabitants). In the island there is a peculiar centenarian gender gap: two women for each man, while in other countries there are 6 women for each man. In Ogliastro, a specific site in Sardinian, known for its exceptional longevity, the frequency of centenarian men is similar to women. In little cities, with less than 1000 residents, there are about 51 centenarians in 100.000 inhabitants. In those little cities in the center of Sardinia, people keep healthy and traditional lifestyles, and they keep traditional diet. The role of elderly is central in the society, people consider the elderly as bearers of wisdom and ancient values. All these aspects keep the elderly in the social network during all the phases of the lifecycle.

In the study of ageing, there is a clear awareness that ageing is a complex phenomenon that is related to a complex network of variables and

there is an increasing interest in the study of these different variables related to ageing (genetics, environmental and epigenetical factors). There are two different speeds in achieving results: a quicker achievement in medicine and a slower achievement in other fields (like education, providing of services, the development of institutions and the social development). It is mandatory to develop specific programs aimed to run the increasing ageing of population, bearing in mind the huge economic, social and political consequences. Since 1982, a report from ONU claimed "the ageing of population is both a consequence and a feature of the socio-economic development (from a qualitative and quantitative point of view). It is important to note that there is a high and increasing attention on healthcare and welfare aspects of ageing, rather than empowering elderly people to use strategies and systems that can increase their quality of life". There is also another aspect: how guarantee that elderly people could maintain their cognitive and cultural patrimony, a crucial factor for the prevention of decline? Ageing is not just a biological process; psychological and social factors have specific effects also on biological ones. Bearing in mind these aspects, the support to elderly must go further to a medical approach to age-related diseases and disorders and it must consider the mutual relationship between physical, social, psychological and spiritual factors. Moreover, it is important to consider the effect of environment. Looking at the old man/old woman of today, it is simple to realize that his/her psychology is influenced by two kinds of factors: the physical state and a social adjustment, where the pathological ageing is the result of a disadjustment syndrome. There is a relationship between ageing and social disadjustment syndrome because disadjustment in social domain negatively influences aging. Taking into account this point of view, ageing is a process, not a state. In this process it is important to maintain a balance between internal and external state and in the relationship with the environment. It is important to learn how to become old. Since the first phases of life, it is crucial to put attention to "learn to age": education, culture, longlife learning are means useful to maintain a good mental and physical efficiency. The role of Geragogy, a specific field of study in education, is crucial, and it is important that people learn to age since the first phases of life. How can define Geragogy? Geragogy can be defined as the psychopedagogy of aging, and from a practical point of view, it can be described as the

prevention of psychic, physical and social pathological ageing and the promotion of active ageing. The main aims of Geragogy are to promote active and successful ageing, with the higher possible level of physical, psychic, and social efficiency and able to develop new ways for adjustment and new coping strategies. Geragogy has three field of study and intervention: the promotion of healthy lifestyles (aiming to prevent the so-called “age-related disorders and disabilities”), the promotion of psychological health and wellbeing and of new ways to adjust to new life conditions, and the promotion of a new vision of ageing and of oldest olds. In geragogical programs, the promotion of healthy lifestyles and healthy eating have a central role, for their effects on the increasing of healthy life expectancy. Moreover, eating has a central role in prevention in geriatrics. Today, research in eating shows its complexity, it considers eating as a cultural process and it highlights the role of education in eating. From this regard, research shows the need of eating education on all the phases of life, with a focus of the late adulthood.

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On the results of the implementation of the international project “longevity, lifestyles and eating: the importance of education”, in the educational establishment “belarusian state medical university”

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Aims of the research: To study longevity, wellbeing and lifestyle of the people of Republic Belarus.

Materials and methods; Implementation of the project was based on a phased approach. 2 faculties of the University and the Ostrovets Central District Hospital health care institution have participated in various studies.

Clinical study design: selective, one-dimensional, cross-sectional.

Research object: inhabitant of the Republic of Belarus applying for medical care at healthcare facility.

Criteria for inclusion: Domicile (city/countryside) – resident of a settlement with population of less than 25 000 people (villager), Minsk city

Age: 25 years and above

Health status: absence of cognitive impairment for ones 60 years old and above

The volume of the study comprised 500 observation units. It was studied 250 observation units

Venue for the research: Ostrovets district of the Grodno region (one of the typical regions of countryside) and Minsk city.

Sampling design and distribution of the volume of the study provided homogeneity across the gender and age of the research group. It was as follows:

Sociological(interview) and statistical methods were employed during the research. The study was time-consuming. Allocation of time were ranging from 1 to 2.5 hours per interview.

Total questionnaire was made; it consists of 3 sections: Section A, Section B and tests of odour and taste estimation.

Requirements of ethical and deontological principles for medical care

Table 1. – The volume of the study

Age (years)	Total questionnaire (n=500)				Including Odour /Taste (n=100)			
	Ostrovets		Minsk		Ostrovets		Minsk	
25-39 (n=100)	50	25 Male/ 25Female	50	25 Male/ 25Female	10	5 Male/ 5Female	10	5 Male/ 5Female
40-59 (n=100)	50	25 Male/ 25Female	50	25 Male/ 25Female	10	5 Male/ 5Female	10	5 Male/ 5Female
60-74 (n=100)	50	25 Male/ 25Female	50	25 Male/ 25Female	10	5 Male/ 5Female	10	5 Male/ 5Female
75-89 (n=100)	50	25 Male/ 25Female	50	25 Male/ 25Female	10	5 Male/ 5Female	10	5 Male/ 5Female
90 and above (n=100)	50	25 Male/ 25Female	50	25 Male/ 25Female	10	5 Male/ 5Female.	10	5 Male/ 5Female
Overall (n=500)	250	125 Male/ 125Female	250	125 Male/ 125Female	50	25 Male/ 25Female	50	25 Male/ 25Female

quality evaluation has been met. Every participant of study has signed the informed consent.

Preliminary data excluding the results of tests of odour and taste estimation are going to be submitted for your consideration.

The results of the study

The research group was homogenies in gender and age. Statistically significant differences were not found (Chi-square test: $\chi^2 = 0.77$. $p = 0.94$). The gender distribution among participants were 50% (Fig. 1, Fig. 2). The age distribution to age-groups were 20%.

Evaluation of body mass index proved that more than half participants (58%) have excess body mass, of them 26% are having obesity; 41.2% are within the accepted medical norms, 0.8% are being underweight (Fig. 3). It was established that weight disorder depends on the age of participant. Overweight is registered for 48% of patients from 25 to 39 age group, for 59.6% from 40 to 59 age group, for 77.5% from 60 to 74 age group, for 59.1% from 75 to 89 age group, for 46% for patients of 90 years old and above. Prevalence of underweight

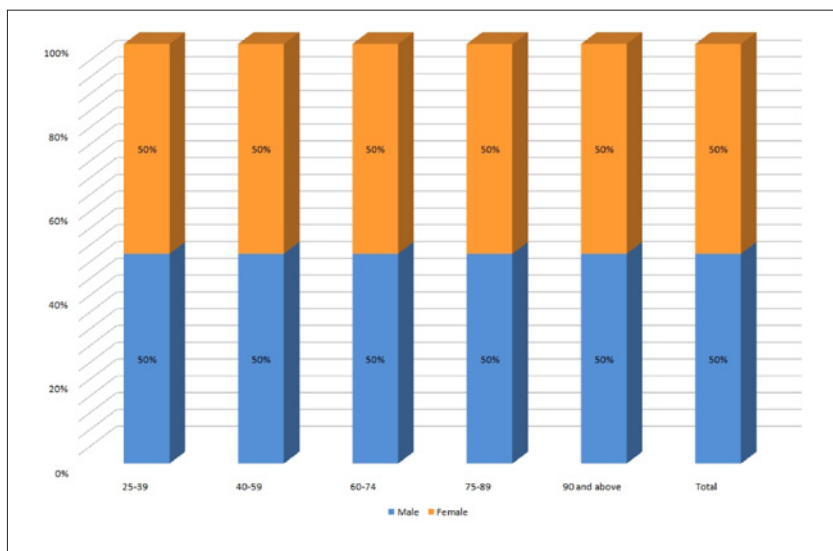


Fig. 1. - Age-groups depending on gender (%)

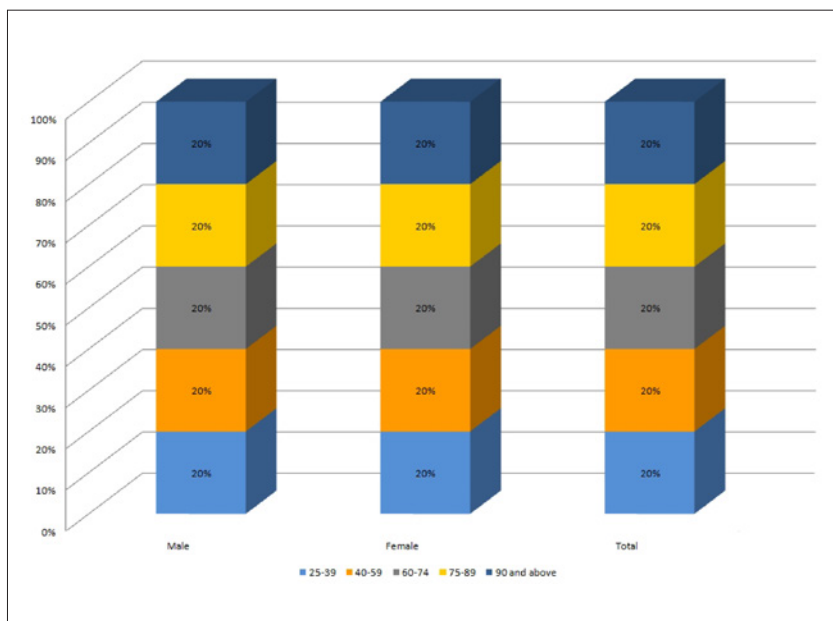


Fig. 2. - Gender groups depending on age (%)

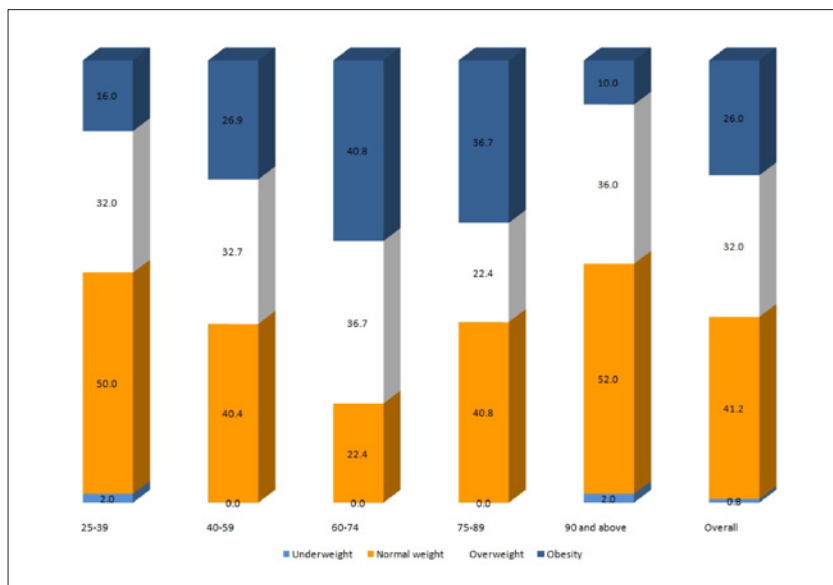


Fig. 3. - Body mass index (BMI) for patients of different age-groups

2% was the highest among respondents from 25 to 39 and 90 years and above.

It was determined that body mass within the accepted medical norms is common only for 48% of men and 34.6% women. 51.3% of men and 64.5% of women have excess body mass.

Quality- of-life assessment based on WHOQOL-BREF questionnaire. Overall assessment of quality of life comprises of 4 aspects: Area 1 is a physical and mental well-being, area 2 is a self-perception, area 3 is a microsocial support, area 4 is a social welfare. It was found that 0.4% of participants have high level of life quality, 79.6% have above average life quality, 19.2% have average life quality and 0.8% of respondents have low level life quality.

Majority of respondents regardless of body mass index evaluated the quality of life quite high. 80.6% of respondents with the body mass index within the accepted medical norms, 73.85% of respondents with obesity, 82.5% of overweight respondents and 100.0% of underweight respondents evaluated the quality of life as above average.

It must be pointed out that overall assessment of quality of life is ensured mainly through life areas of self-perception (Area 2), microsocial support (Area 3) and social welfare (Area 4). Estimating the constituent element - physical and mental well-being (Area 1) revealed that only 22.0% of participants gave above average evaluation, 70% of participants gave an average evaluation (Fig. 4). Every fourth respondent with obesity (24.6%) and every fifth respondent with normal and overweight body mass index evaluated physical and mental well-being as above average.

The adherence of respondents to Mediterranean diet. Statistically significant differences of respondent's adherence to the Mediterranean diet depending on age were established (Kruskal-Wallis test: $H=38.71$, $p=0.0001$). Minimal level of the overall assessment of respondents adherence to the Mediterranean diet was observed among the age group of 90 years old and above, median was 25.0 points ($Q25=22.0$; $Q75=28.0$) (Fig. 5). Maximal level of the overall assessment of respondents adherence to the Mediterranean diet was observed among the age group of 75-89 years old, median was 32.0 points ($Q25=28.0$; $Q75=34.0$).

Statistically significant differences of respondent's adherence to the Mediterranean diet depending on body mass index was not found (Kruskal-Wallis test: $H=4.41$, $p=0.22$). Minimal level of the

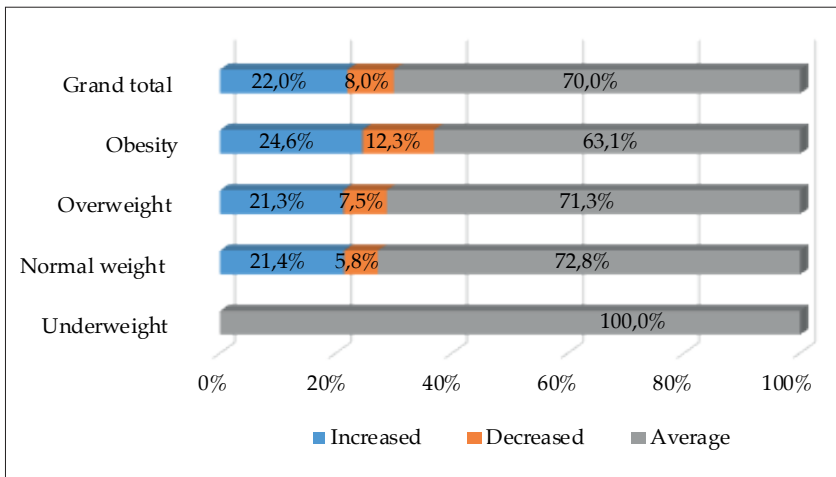


Fig. 4. - Physical and mental well-being of quality of life (WHOQOL-BREF) (%)

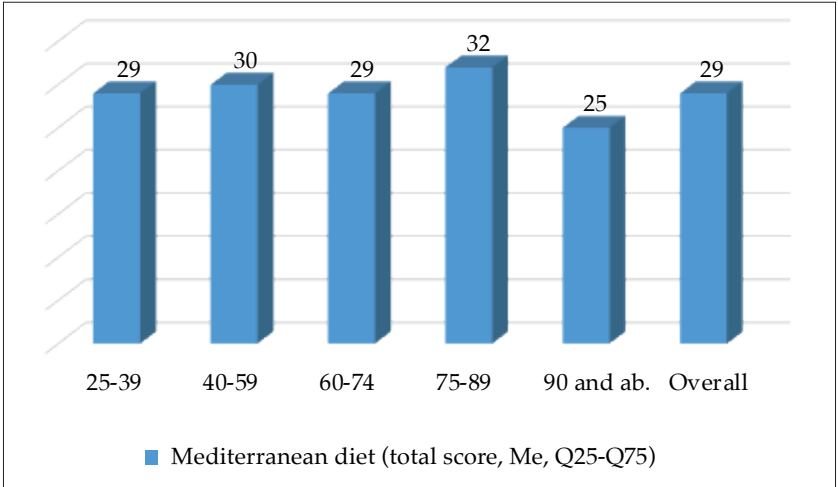


Fig. 5. - The adherence of respondents with different age groups to Mediterranean diet (total score, Me, Q25-Q75)

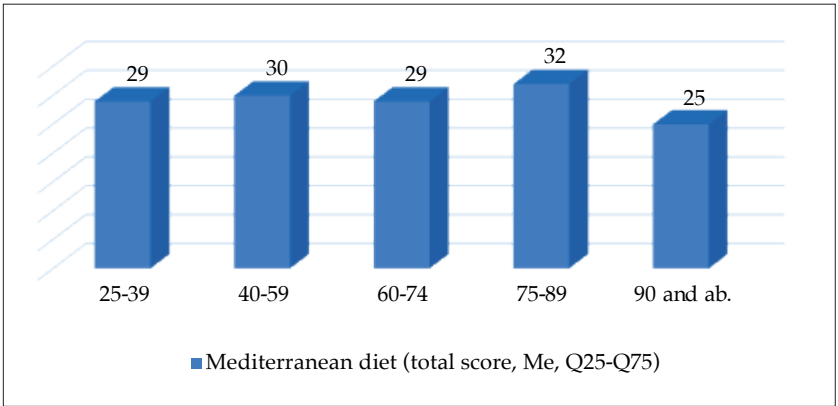


Fig. 6. - The adherence of respondents with different BMI to Mediterranean diet (total score, Me, Q25-Q75)

overall assessment of respondent's adherence to the Mediterranean diet was observed among underweight participants, median was 27.0 points (Q25 =27.0;Q75 =27.0) (Fig. 6). Maximal level of the overall assessment of respondent's adherence to the Mediterranean diet was observed among overweight participants, median was 30.5 points (Q25 =27.0;Q75 =33.0).

Conclusions

More than half of respondents (58%) have excess body mass, including participants of the age group from 25 to 39, 59.6% participants of the age group from 40 to 59, 77.5% participants of the age group from 60 to 74, 59.1% participants of the age group from 75 to 89, 46% participants of the age group from 90 and above. It has shown the need of development of activities to promote the active life position of people to enhance the protective approach of own health.

Quality-of-life assessment based on WHOQOL-BREF questionnaire was evaluated quite high by majority of respondents regardless of body mass index. The high estimate of life quality is based on three aspects: self-perception, microsocial support, social welfare.

Estimating the physical and mental well-being revealed the low quality of life. Only 22.0% of participants gave above average evaluation. There were no respondents who would estimate this aspect at high rate.

Conclusion. Therefore, preliminary results of the study require the development of set of measures relating to issues of medical service (clinical examinations), physical activity, nutrition, education, combine efforts of different experts (doctors, teachers, psychologists).

Pedagogical longevity: essence, conditions, personalities

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Professional longevity – “duty” – the basis of teacher’s professional activity – is one of the main categories of ethic, which is reflecting a special moral attitude to the activities. Meanwhile, the person acts as an active subject of duty. The term «professional» reflects the combination of mental and psychophysical characteristics of a person, which are required and sufficient for effective work in the profession. Pedagogical longevity is a process and the result of self-awareness in the professional sphere, purposeful regulation of one’s behavior, activity and relationships on this basis.

To date, there are several implemented approaches to the consideration of professional pedagogical longevity:

- medical, studying the “Self” of the teacher as a source of mental activity;
- age-specific, explaining the course of certain physiological processes;
- energetic, ensuring the sustainability of the “Self” of the teacher;
- integrative, studying the integrity of the personality;
- functional, revealing the “Self” in the self-esteem of the teacher and his self-regulation;
- hermeneutic, explaining to the teacher the self-image;
- systemically-personalized, highlighting the various stages of development of the “Self”.

The development conditions are: organizational, temporary, innovative, design, intergroup interactions, as well as other components that ensure the development of pedagogical longevity.

The organizational development conditions are the creation of a comfortable environment as a result of the process of integration and its constituent environments: sanitary, hygienic, creative, social, cultural, scientific, methodological, psychological.

The temporary development conditions are determined by the stages of individual development of teachers and are characterized by cyclicity: the periodic nature of breathing, heart function, sleep and wakefulness, daily and seasonal rhythms, and others.

The main potential subject of innovative activity is a teacher as an individual with his subjectivity. Potential capabilities of innovational environment determine the body's self-adjustment for new activities, stimulation of development. The inclusion of teachers in such activities becomes a decisive factor in their pedagogical longevity.

Intergroup interaction consists of social identity, which turns out to be an important regulator of the teacher's social behavior, which consists of the teacher's perception of himself as a member of a certain group. The teacher's satisfaction with the work in the team reflects well-being or disadvantage of his position in the team.

The design development conditions are considered from the perspective of the culture of professional conduct, which acts as a personal, creative form and is realized in the abilities for personal dialogue: recognition of freedom, personal contacts based on empathy and mutual understanding. It manifests itself in the free choice of goals and means, responsibility for their consequences, is recorded in professional personal settings. Culture is a result of human activity, a combination of spiritual values, methods, means and images of a person's creative activity in the system of social norms. Two levels of the connection between culture and pedagogical activity currently are considered: public, when pedagogical activity is considered as a transmission of general cultural experience to a new generation and individuals, when it is the teacher who is the intermediaries in this process. The general culture of pedagogical activity is considered at the following levels:

- adaptive as satisfying vital needs and using "natural" opportunities,
- conformal as the predominance of corporate needs,
- reproductive as independence and creativity in pedagogical activity,
- creative as an autonomy of consciousness and reorientation from external evaluations to a system of personal values, taking into account the recognition of the significance of another person.

The compensatory function of the general culture is expressed in two aspects: for beginning teachers, culture replaces the lack of experience,

and for professional teachers it is relevant as a condition for combating psychological fatigue.

To date, the factors that shape and influence the growth of pedagogical longevity have been identified: personal, professional, and also a system of dynamic factors has been developed.

Personal factors determine three types of attitudes, where attitudes are the willingness to perceive and act in a certain way, the person's selective activity, which regulates forms of actions. These are operational, target, semantic settings, which are manifested at three levels of regulation of the teacher's activity: methods (how I do), purpose (what I do), meaning (why I do). The teacher's acme acts as an indicator of personal development. The concept of «acme» was first introduced into scientific circulation by the religious philosopher O.P. Florensky in the context of Russian religious and philosophical anthropology (N.A. Berdyaev, V.V. Soloviev, A.N. Losev). In the context of development of psychological knowledge, a person is considered as the highest value and integrity, capable of development and self-development in the context of a life path (B.G. Ananyev, K. Rogers, S.L. Rubinshtein, A. Maslow, V. Frankl and others). At the same time, reaching the «pinnacle of life» (S.L. Rubinshtein) not only retains its creative potential, but also increases it, realizing it for the common good. In real pedagogical activity, the «acme» indicator is real actions of teachers, which make a great contribution to the basic values of life and culture, have specific characteristics and work for development, for its individual level of formation of pedagogical longevity.

Self-concept of a teacher in the context of professional longevity, the desire for acme is characterized by multi-level, hierarchical, determining the life strategy and activities of teachers with identifying internal problems aimed at their own continuous development. In the self-concept, the emotional component is distinguished (the teacher's assessment of himself and is manifested in the system of self-esteem through self-resect and level of aspirations), the behavioral component (interaction from the standpoint of certain states of the «Self» formed on the basis of relations to the world and himself), motivational component (regulation of the teacher's personality in the system of integrated affective and cognitive processes).

The professional factor reflects three components of teachers work:

- pedagogical activity as a technology of labor,
- pedagogical communication such as climate and atmosphere,
- personality as value orientations, ideals, internal meaning of teachers work.

The system of dynamic personal factors that preserve teachers' creative activity includes: a set of character traits, worldview, love for students, the ability to work with them, energy, optimism and a sense of humor, work and rest, heredity, a rational lifestyle and nutrition, sobriety and physical exercise. The non-standard nature of teachers' professional activity is determined by the need for implementing programs of professional self-improvement and longevity. The basis of professional longevity is self-development, which determines the ability of a professional pedagogical personality to turn his own life activity into an object of practical transformation, managing its duration. Inclusion in the system of lifelong education and self-education allows you to develop the ability to change, to stand in a different position, to assimilate the values and life meaning of people of younger generations, which are necessary conditions for overcoming old age. They become factors of professional youth under the following conditions:

- rational use of self-educational opportunities,
- variability of self-educational programs depending on fixed gaps,
- changes in educational objectives depending on the psychodiagnostics of aging.

At present, the Republic of Belarus is developing a draft of the national strategy on decent longevity. It incorporates the idea of educating older people and the ability to continue professional activities. In the city of Minsk, about 70% of working pensioners (age 60 or more) are employed in education. There has been an increase in interest among residents of Minsk over 60 years of age in training in various fields.

Today in our country, a system of continuing education has been created through the functioning of state and private institutions of additional adult education, which offer various types of programs for the preservation and development of pedagogical and other areas of professional longevity. Consider the example of The Institute of advanced training and retraining of Belarusian state pedagogical University named after Maxim Tank (hereinafter – the Institute), which opportunities are used by more than three thousand people annually. The Institute implements

educational programs in 30 specialties of retraining in 6 areas. Of these, 21 specialties provide the assignment of pedagogical qualification. In 18 specialties, the condition for admission is higher education in the field of "Pedagogy". This suggests that teachers choose further professional development in their field. In 2019, this is 64% of all students in retraining specialties.

The Institute also offers 27 advanced training programs on topics that are implemented only at the request of teachers. More than 700 people annually master them. Over the past 3 years, internship programs, both individual and group, were developed. For the same period, representatives of 13 countries also chose the Institute's programs for the development of pedagogical professionalism. Today, all age groups, starting from the age of 22, are represented fairly evenly. And students demonstrate active perception of the world, commitment to humane ethical standards and expansion of their own cognitive sphere.

The resulting effect of the dynamics of pedagogical longevity is a combination of psychological, general cultural and axiological indicators of teachers' professional status. Today, long-term professionals are working in teaching activities at Belarusian State Pedagogical University (BSPU). The result of their professional longevity is quality performance of professional functions, the presence of an individual style of activity and social recognition, and pedagogical activity.

Kolominsky Yakov Lvovich (01/11/1934 – 09/25/2019) (84 years old), PHD in Psychological Sciences, professor, was teaching at the Institute of Psychology of BSPU until 1984. In 1955, he graduated from the Minsk State Pedagogical Institute named after A.M. Gorky (today it is BSPU), specializing in Pedagogy and Psychology, since 1955 he was teaching. His professional interests are the psychology of relationships in small groups, the social psychology of personality development, social pedagogical psychology and psychological culture. Y.L. Kolominsky is the author of more than 400 scientific, educational and popular science works, including 30 foreign publications in 16 languages. It should be noted that, along with membership in various scientific communities, he was a member of the International Acmeological Academy (St. Petersburg) and was a chairman of the Belarusian Society of Psychologists.

Ioffe Emanuel Grigorievich (80 years old) – Doctor of Historical Sciences, historian, political scientist, sociologist, cultural scientist, literary

critic, local historian and journalist. He is a member of the Belarusian Union of Journalists and the International Association of Belarusianists. E.G. Ioffe received additional education in the field of political science and sociology. Since 1978 he has been teaching at the Belarusian State Pedagogical University and has become one of the first lecturers who switched to the Belarusian language in the teaching of political science. He developed a number of new lectures and special courses, wrote and edited textbooks.

Rozhina Liliya Nikolaevna (83 years old) – PHD in Psychological Sciences, professor of BSPU. She began her teaching career in 1964. Her scientific achievements are confirmed by the American Biographical Institute (USA) with the certificate “Woman of 2003” and the biographical encyclopedia “Who is who?” (USA, 2004). Since 1987, she headed the All-University Department of Psychology, BSPU. L.N. Rozhina developed a concept and a project for the training of practical psychologists, which was implemented at the university. She is the author of more than 350 scientific works, including 5 monographs, 16 educational and teaching aids, 6 chapters in monographs, more than 250 articles devoted to the problems of artistic knowledge of the human psyche, the role of art in the development of self-identity of a person, its emotional sphere, image structures thinking and cognitive styles, moral and aesthetic education.

Yuri Mikhailovich Dosin (70 years old) is a professor at the Belarusian State Pedagogical University, who began his professional career in medicine and continues to teach. His scientific interests are normal physiology, rheumatology, immunology, endocrinology, valeology. Since 2002, he became the head of the department of anatomy, physiology and valeology, and since 2009, he became a professor in the department of biomedical foundations of physical education at BSPU. Y.M. Dosin is the author of about 200 scientific papers, a scientific editor and co-author of educational and methodological manuals for students, an encyclopedic reference book on resorts and health resorts of Belarus. He is the inventor of the USSR, rationalizer, developer of methods for the diagnosis and treatment of severe rheumatic diseases. Today, Y.M. Dosin teaches at the Institute of Advanced Studies and Retraining of the Belarusian State Pedagogical University on the specialty of retraining «Physical culture and recreational work in educational institutions».

Chechet Viktor Vladimirovich (83 years old) – PHD in pedagogical sciences, professor, since 2000 he has been working at the Department of Management and Educational Technologies of The Institute of advanced training and retraining of BSPU. His scientific interests are problems of family, patriotic education, social pedagogy, higher education, the history of pedagogy. V.V. Chechet is a member of the National Commission on Children's Rights, one of the authors of the Laws of the Republic of Belarus «Law on Education in the Republic of Belarus» (1991) and “On Children's Rights” (1993), a member of the Presidium of the Scientific and Methodological Council under Ministry of Education of the Republic of Belarus on social and educational work.

Shilova Elena Savelievna (72 years old) – PHD in Pedagogical Sciences, associate professor of the department of management and educational technologies of The Institute of advanced training and retraining of BSPU. Her research interests are adult education, primary education, the use of intensive technologies and active teaching methods in the educational process. She began teaching in 1971 as a primary school teacher, and since 1997, E.S. Shilova began to work in the teacher training system.

Thus, professional longevity today is viewed through a person who determines his attitude to activities. Pedagogical longevity acts as a result of a conscious choice of the type of activity and its maintenance in the current state. Consideration of pedagogical longevity from the point of view of various approaches, development conditions, factors leading to the formation of a general culture of pedagogical activity provides a positive result of pedagogical activity, its adoption as a necessary condition for active human longevity.

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Psychological aspects of the formation of motivation for a healthy lifestyle and active longevity

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According to the data of the World Health Organization, over the years there has been an increase in life expectancy of the population, ageing of the population. However, despite the increase in life expectancy, the main issue in the demographic policy of many countries remains the issue of active longevity, one of the key factors of which are the various components of a healthy lifestyle.

Health lifestyle, it is a specific form of purposeful human activity – activity aimed at the preservation, strengthening and improvement of health. The main sources of activity are needs. Need is a state that is created by a person experiencing a lack of objects necessary for his existence and development. Needs are determined by the process of education, familiarization with the world of human culture, and also are a source of individual activity. About consciously requirements take the form of motifs that attaches to a person's character consciously regulated activity. However, all activity is prompted not by one motive, but by several, i.e. activity is usually polymotivated. The set of all motives for this activity is called the motivation of the activity of this individual. Thus, the motive - it is something that meets the need, and on the other – this is what causes a certain activity. Needs cause motives, motives cause activities to meet the need. Motivation for a healthy lifestyle and active longevity is a combination of external and internal motives that encourage health preservation activities and conditions conducive to the implementation of health-saving behavior.

The formation of motivation for a healthy lifestyle and active longevity is due to many factors. The choice of lifestyle, on the one hand, is objectively determined by the prevailing socio-psychological, environmental, cultural and other conditions in a given society, and on the other hand, it is determined by the subjective set of life values of the individ-

ual. The formation of motivation for a healthy lifestyle is the creation of a personality-developing environment that forms a system of value orientations and attitudes of an active life position, positive motivation for self-development and self-improvement, taking responsibility for one's destiny, and interest in supporting one's own healthy lifestyle.

Thus, the formation of motivation for a healthy lifestyle and active longevity can be represented in the form of a model that describes four interconnected and subordinate subsystems (social environment, extended family, nuclear family and individual), which create the basis for the formation of a unified system of motivation for a healthy lifestyle and active longevity. Each of the subsystems contains characteristics of the cognitive emotional and behavioral aspects of motivation for a healthy lifestyle and active longevity.

Social environment.

The main goal of society and states in the formation of a healthy lifestyle and active longevity should be a policy that will make it possible to improve the situation that progress has led to. The conditions for active, creative, professional longevity should be created, programs aimed at creating a healthy lifestyle should be developed. The formation of motivation for a healthy lifestyle, health promotion, longevity should be associated with a differentiated approach, taking into account general social, group and personality characteristics, as a result of which a healthy lifestyle, mental health will become a natural, organic human need, perceiving which he will follow it without coercion throughout your life. In a well-functioning state system, the cognitive, emotional and behavioral aspects of the formation of motivation for a healthy lifestyle and active longevity are presented as follows.

Cognitive aspect: the presence in society of clear and consistent norms and criteria for a healthy lifestyle; maintaining in society the ideas about the value of a healthy lifestyle and active longevity.

The emotional aspect: the presence in society of a system of emotional encouragement (for example, the attitude toward a positive assessment and group acceptance) of people leading a healthy lifestyle and long-livers.

Behavioral aspect: the organization of various activities related to the promotion of a healthy lifestyle and active longevity.

Extended family.

One important indicators of the effective functioning of the family system is the availability of family values, aimed at creating a healthy lifestyle, to torye approved and are cultivated in the family, contribute to the creation of ties between family members, help maintain the family identity by passing from one generation to the behavior aimed at creating a pattern and maintaining a healthy lifestyle and active longevity. Thus it is important that the members of the extended family's cognitive, emotional and behavioral aspects of the motivation for a healthy lifestyle and active longevity were as follows.

Cognitive aspect: members of an extended family have ideas about a healthy lifestyle and active longevity; the presence of models (image) of positive experiences associated with a healthy lifestyle and longevity among relatives in different generations.

Emotional aspect: the presence of members of an extended family of positive experiences associated with stories of longevity in different generations.

Behavioral aspect: maintaining extended family members actions related to a healthy lifestyle and active longevity.

The nuclear family.

The family is an important factor in the formation of discipline and behavior in the child. Parents influence their child's behavior by encouraging or condemning certain types of behavior. The child learns from parents what they should do, how to behave. The formation of motivation for a healthy lifestyle and active longevity should be based on two important principles: age and activity. The first principle says: the education of motivation must begin in early childhood. The second principle states: motivation should be created through recreational activities in relation to oneself. In order to motivate children to a healthy lifestyle, you need to find the right motives that make sense in their lives. If the family has the habit of observing the elementary rules and norms of a healthy lifestyle and there are many motives for an active, healthy life, then children will easily accept it. All this happens as a result of a process that is called internalization in psychology, a process in which the formation of the internal structures of the human psyche takes place through the assimilation of external social activity. Any complex action, before becoming the property of the mind, must be realized outside. According to L.S. Vygotsky, any function of the human

psyche initially develops as an external, social form of communication between people, as a labor or other activity, and only then, as a result of interiorization, becomes a component of the human psyche. Each cultural form of behavior arises initially as a form of cooperation with other people, as an imitation of another or an appeal to an adult. Only at the next stage does this form become an individual function of the child himself. Initially, the behavior of a child is a social form of cooperation with an adult. Thus, parents are the first significant figures in the formation of a healthy lifestyle. But, for this it is also important that the parents have formed the cognitive, emotional and behavioral aspects of a healthy lifestyle and active longevity.

The cognitive aspect: the presence in parents' self-images of self-image as active centenarians; the presence of a model (image) of a healthy lifestyle and active long-livers in the parental family.

Emotional aspect: the presence of members of the parental family of positive experiences associated with a healthy lifestyle and longevity.

Behavioral aspect: the implementation by parents of stereotypical behavior that contributes to the formation of a healthy lifestyle.

Also, when forming motivation for a healthy lifestyle and active longevity, it is important to consider patterns of development of human motivation:

1. at the turn of preschool and primary school ages, new, different in nature motives appear, leading, dominant motives are formed that can subordinate all other motives to themselves, the motives and immediate motives are subordinated;
2. motivation not only encourages a person to any activity, but also itself is formed in the process of activity;
3. a person often unconsciously and steadily prefers to do what he does better;
4. human behavior is polymotivated. In a conflict of motives, the one that is consistent with the general interests of the individual and social norms most often prevails.
5. with age, motives change, transform, change. Steadily dominant behavior motives acquire leading significance for a person and thereby subordinate to himself all his other motives.
6. there is a development of external (motivation or compulsion to do something external to the person circumstances or incentives) and

internal (not related to external circumstances, but with the content of the activity) motivation. In the formation of a healthy lifestyle, it is important that external motivation passes into internal. If the process of interaction between the social environment, the extended and the nuclear family is successful, taking into account the patterns of development of motivation, the cognitive, emotional and behavioral aspects of a healthy lifestyle and active longevity in an individual will be presented as follows.

Cognitive aspect: a person's interest in longevity issues, the formation of ideas about a healthy lifestyle, his place in the system of individual life values, and about himself as a future long-liver.

Emotional aspect: the presence of positive experiences associated with ideas about a healthy lifestyle and about yourself as a future long-liver.

Behavioral aspect: the presence of activity aimed at maintaining a healthy lifestyle, maintaining health, the desire for physical activity.

Thus, health care and its strengthening should become valuable motives that shape, regulate and control the way of life. Needed s new concept and a comprehensive program built taking into account the psychological factors of a healthy lifestyle, health promotion, the creation of the cult of longevity. A comprehensive program should be based not only on a conceptual understanding of the impact of public opinion attitudes on a healthy lifestyle, health and longevity, but also on the use of health-enhancing technologies.

Formation of students' value attitude to health through the technology of psychophysical training

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An important component of a healthy lifestyle, in any age period, is the formed need for physical activity and full-fledged physical culture and health activities. Unfortunately, this task has not yet been solved sufficiently by either domestic or foreign pedagogical practice. The increase in the number of people with poor health eloquently indicates that the problem is unresolved. Physical education is mainly aimed at meeting the standards of physical and technical readiness, little account is taken of the interests and needs of students. Health and a healthy lifestyle have not yet become the main value of the population.

There is an urgent need for the formation of students' needs for a healthy lifestyle, education in their conscious, value-based attitude to health, because human health is an important indicator of personal success. An effective solution to this problem involves working in two directions-the formation of a value attitude to health (in theoretical terms); the definition of the content, means and methods of physical education, focused on the priority of physical and mental health (practical plan).

A teacher of a higher educational institution can and should contribute to the solution of the specified tasks within the framework of training sessions by organizing educational activities accordingly. The purpose of our reflections is to describe a variant of modeling educational activities that contribute to the formation of students' value attitude to health through the technology of psychophysical training.

First, in our opinion, it is necessary to define the concept and essence of the process of forming a value relationship.

So, according to the scientist B.I. Dodonov, it is necessary that the subject "planned" a certain value in his mind, directed his activity to mas-

tering it (Додонов, 1979, p. 131). Value-oriented activity, in contrast to the usual, involves the participation of the student as a full-fledged subject of the pedagogical process, since it is accompanied by a strenuous mental work of his consciousness:

- initially, in accordance with the requirements of the value, the subject decides what to do this activity;
- then there is a search for a solution – what should be done to realize this value;
- at the next stage, the subject is looking for a solution to the development of value: how to perform this activity? (Буторин, 2008, p. 7).

In case of violation of the sequence of these actions in the process of mastering the value, there will be a mechanical acceptance of other people's stereotypes of thinking or behavior; the activity will lose its creative, conscious character.

K.A. Abulkhanova-Slavskaya notes that the main mechanism in this process is to solve specific repetitive tasks, during which a person learns to evaluate their own capabilities in relation to the tasks and themselves according to their real achievements (Абульханова-Славская, 1980, p.185).

The content side of the value relation is the comprehending relation of the subject to the object embodied in it, reflecting the real, vital and practical relation of this object to the subject. In other words, we are talking about the worldview of the subject, since the worldview of the subject is nothing but a system of values.

The teacher is obliged to promote a healthy lifestyle in the process of forming a culture of healthy and safe lifestyle among students. This means that the educational process requires the introduction of effective technologies for the formation of a healthy lifestyle.

A striking example of health-forming technology is the technology of psychophysical training, the author of which is the doctor of medical Sciences N.N. Nezhkina (Нежкина, 2010).

The health-forming potential of the technology is realized due to the fact that, in addition to the practical section, the training program contains relevant theoretical material that explains the importance of various types of exercises in the prevention and improvement of the body's condition in the most common health disorders. A mandatory part of

the implementation of the technology is the section of self-diagnosis which involves the awareness of students' individual ideas about their health and the desire to achieve them. In other words-to form a value attitude to their health.

Developed specifically for physical training, the technology of psychophysical training, however, can be implemented in the course of educational activities. Elements of psychophysical training technology that can be implemented in lectures and practical classes as a physical culture minute:

- dynamic aerobic exercises that provide training of the heart muscle, increasing the body's tone," working off "stress, i.e." burning "adrenaline and a number of other effects;
- statical exercises that form a muscle corset and train the ability to arbitrarily regulate muscle tone, allowing you to develop flexibility, the ability to focus, wait, slow down, be sustained, consistent and persistent in achieving the goal, as well as other important psychological qualities;
- relaxation exercises, during which the assimilation of the formulas of the desired level of health: "I believe in myself and my strength", "All difficulties will be overcome", "I will succeed". Such installations are able to release the body from stress, to stop the negative emotional state.

By implementing the elements of psychophysical training technology, you can achieve the goal of forming students' value attitude to their health, which involves:

- having a conscious interest in your health;
- the need to get knowledge about ways to improve your health and mood;
- improve self-organization skills in the field of health,
- provide a reasonable output of accumulated hypersthenic emotions, emotions of joy, calmness, peace, etc.

Thus, the value attitude of students to health is manifested in their way of life and style. To implement the axiological approach to the formation of a value attitude to health in the course of educational activities, it is necessary to focus the attention of students on the need for daily and constant work in this direction (Ле-ван, 2021).

The leading factor in any type of activity of students should be a con-

scious need for a value attitude to their health and the consolidation of such a conscious need. This need is stimulated by a sense of pleasure from activity, performance, a sense of health and the ability to manage their physical and emotional state. The main tools of the teacher in achieving this goal are health-saving pedagogical technologies.

The strategic goal of the teacher's activity is to form an understanding of the value of spiritual and moral health, increase responsibility for their health and education of the ability and need to take care of their own health and the health of others.

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The Mediterranean Diet and the lifestyle evaluation

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The Mediterranean Diet: definition and features

The Mediterranean Diet (MedDiet) is a nutritional model inspired to the traditional eating habits of people living in countries of the Mediterranean area, such as Greece and Italy (Davis, 2015). It was first defined by the american physiologist Ancel Keys, who in the late 1950s observed that people living in Mediterranean regions had lower cardiovascular disease mortality compared with northern European populations or the US, probably as a result of a different lifestyle and especially nutrition (Keys, 1995). In fact, in the epidemiological study named “The Seven Countries Study”, Keys investigated the relationship between lifestyle and cardiovascular disease (CVD), including coronary heart disease and stroke, in over 12.000 adult men of different populations from seven countries: United States, Finland, the Netherlands, Italy, the old Yugoslavia, Greece and Japan, and he found that the greatest correlation for the risk of death from coronary heart disease (CHD) was with a high intake of saturated fats, as occurs with a diet rich in animal products. By contrast, the dietary pattern low in saturated fat and high in vegetable oils, observed in Greece and Southern Italy was associated with a reduced risk of CHD after 25 years follow-up (Menotti, 1999). The Lyon Diet Heart Study later, showed that the MedDiet was also effective in reducing recurrence after a first myocardial infarction, suggesting the inclusion of a cardioprotective diet among the strategies aimed to decrease the cardiovascular diseases (de Lorgeril, 1999). From these first studies, several other studies confirmed the benefits of MedDiet on health, and in a recent meta-analysis, a strong evidence for the association between a greater adherence to the Mediterranean Diet and a reduced risk

of overall mortality, cardiovascular diseases, coronary heart disease, myocardial infarction, overall cancer incidence, neurodegenerative diseases and diabetes has been reported (Dinu, 2018). The adherence to the Mediterranean Diet was also associated with a reduction of central obesity, with a lower risk of depression and with a greater likelihood of healthy ageing (Critselis, 2019). Despite the variability in the specific nutritional patterns of the different Mediterranean countries, and despite the evolution of the original nutritional model over time, the essential characteristics of the Mediterranean Diet are the daily consumption of fruit and vegetables, the daily use of olive oil for cooking and seasoning, the high intake of whole grains, legumes and fish, the moderate wine intake with meals, and the low consumption of meat and dairy products (Radd-Vagenas, 2017). Being poor in saturated fats and rich in monounsaturated fats, it provides a high amount of fibre, antioxidants, and a balanced ratio of n-6/n-3 essential fatty acids (Davis, 2015). Other important features of this diet were traditionally frugality and a regular physical exercise, which already Hippocrates in the 5th century BC, considered included in diet as a condition for maintaining good health. Finally, the respect for the seasonality of foods, the way of cooking, the portion sizes, but also conviviality, resulting from eating in the company of family or friends, may influence the health impact of this diet and in virtue of its complex interaction with culture, UNESCO in 2010 recognised the MedDiet as an Intangible Cultural Heritage of Humanity (Radd-Vagenas, 2017).

An attempt to graphically represent the mediterranean model as a pyramid, on the basis of the common features described above, has been made since 1995. The layers in the pyramid corresponded with frequency of intake, from daily at the wide base, recommended for fruit, vegetables and cereals, but also for low fat dairy and olive oil, through to weekly, indicated for fish, meat, eggs and legumes and then much less frequently at the top, where we find sweets and moderate red wine. Moreover, the recently refined version of the pyramid, along with the nutritional principles, includes some cultural and lifestyle elements such as a regular physical activity, an adequate rest and the conviviality (Lluís Serra-Majem, 2020).

The adherence to the Mediterranean Diet

The other topic of this brief summary concerns the analysis of the existent tools to measure the adherence to the Med Diet. This evaluation makes use of Questionnaires structured on specifying questions that enquire about the frequency and/or the portion size of different foods and/or beverages, with special focus on typical mediterranean products. The answers are then converted into a score or a semi-quantitative measure. Several scales have been published since the original one proposed by the greek researcher Trichopoulou in 1995, adapted by the same author in 2003, and then redesigned by Panagiotakos in 2006, up to the adherence index validated in the spanish “Prevención con Dieta Mediterránea (Predimed) Study”. Despite the variation between these indexes of adherence, little difference has been found in the size of the risk associations reported in the studies using them (Zaragoza-Martí, 2018).

Moreover, it has to be highlighted that the favorable effects of MedDiet are not only due to the synergic action of the diet as a whole rather than the single foods or nutrients, but also to other factors that characterize people’s lifestyle, particularly the physical activity level. A recent review, suggests that Mediterranean lifestyle instead of Mediterranean Diet evaluation, can provide a valuable tool to holistically promote health and wellness (Diolintzi, 2019).

Despite the strong evidence for the health benefits associated with a great adherence to MedDiet, insufficient levels of adherence have been reported especially among young people living in Mediterranean countries, such as Southern Italy and Greece, where the spread of the obesity epidemic has been linked, among others, to a shift in the nutritional habits toward a Western type Diet rich in saturated fats and refined carbohydrates, poor in quality and high in calorie intake. The progressive abandonment of the MedDiet is making children in the Mediterranean area fatter and less healthy than the Swedish, who grow in an environment where fish and vegetables are among the most commonly eaten foods. The authors concluded suggesting that directing the health policies towards the dissemination of the MedDiet’s principles, would not only be beneficial from a public health perspective, but also in terms of economic sustainability (D’Innocenzo, 2019).

With regard to Sardinia, due to the absence of data about the adherence to the MedDiet, our research group started to evaluate this aspect together with the analysis of physical activity and of quality of life, both in general population and in overweight or obese patients; although we still aren't able to report definitive results, our preliminary data are consistent with those of other Italian studies (Veronese, 2019) showing a moderate adherence to Med Diet in general population, higher in older than in younger people; furthermore in overweight and obese patients a significantly lower adherence in comparison with normal weight individuals was observed. On the basis of these differences, we can hypothesise, in agreement with other studies, a potential role of the Mediterranean diet within the intervention programmes aimed to reduce obesity and obesity-related chronic diseases, as well as within prevention programmes aimed to reduce the risk of these conditions in the general population.

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Physical activity and health

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The genus *Homo* has developed in evolution the endurance race, unique among primates (Endurance running) defined as the ability to run for at least 5 km in aerobiosis. The *Erectus* was the most formidable hunter of all time despite the absence of fangs and claws. The race as a defense from predators and to prey: after the Lion, before the Hyena. In the early periods of human evolution - between 6 and 2 million years ago (Pliocene) our ancestors, for example the Australopithecines, were frequently killed by predators such as *dinofelis* (a feline similar to the jaguar with powerful front legs and long canines slightly compressed laterally). Since the appearance of the genus *Homo*, about 2.4 million years ago, our ancestors, for about 84,000 generations, survived as hunter-gatherers. To survive in nature, a large daily energy expenditure was required for necessary activities such as procurement and/or hunting for food and water, social interaction, confrontation with or escape from predators, construction and maintenance of shelters and clothing. This way of life represents the prototype of physical activity (PA) for which our genome remains adapted. As a result, humans are very adept at performing the wide variety of PA required by a collector/hunter in nature. Humans are considered to be exceptional endurance athletes compared to other primates (Bramble, 2004). The demand for physical performance for hunting determined: 1) increase in blood pressure; 2) hyperglycaemia; 3) hyperlipemia 4); energy savings. These responses were exhausted in carrying out the physical activity required. The absence of physical performance in the presence of chronic stress can determine: 1) stable increase in blood pressure 1) hypertension; 2) diabetes; 3) early cardiovascular disease 4) atherosclerosis; 5) abdominal obesity. These pathological sequelae are called non-communicable diseases. Sedentary lifestyle is the cause of 10% of premature deaths

in the world, 10% breast and colon cancer, 7% type 2 diabetes, 6% coronary heart disease. Only in Europe, 121 thousand people could have been saved if they had regularly practiced a “little sport”. Large cohort studies suggest that participation in sport is associated with a 20-40% reduction in all-cause mortality, compared to non-participation. Randomized and cross-sectional studies suggest that sport is associated with specific health benefits (Khan, 2012).

Mechanism of action of physical activity. Many proteins produced by skeletal muscle depend on contraction; therefore, physical inactivity leads to reduced myochine production, which is a potential mechanism for the association between sedentary behavior and many chronic diseases. Caloric restriction (CR) and exercise through NAD activation are able to increase the activity of SIRT3 (NAD-dependent deacetylase sirtuin-3, mitochondrial). A strong association between SIRT3 alleles and longevity in males and a modulation of the AMPK have been observed (Bellizzi, 2005) and the physical activity has been defined as real “multipill”. Sprint interval training (SIT) has been proposed as a time-efficient alternative to Endurance to increase the oxidative capacity of skeletal muscle, improve certain cardiovascular functions, decrease arterial stiffness, improve microvascular skeletal muscle, macrovascular function, and insulin sensitivity, increase capillarization of skeletal muscle and eNOS content. Twelve weeks of SIT achieved an improvement in cardiometabolic health to the same extent as Endurance (Gillen, 2021) and Sprint Interval Training (SIT) is a low volume alternative to endurance. These data provide support for SIT as a strategy for increasing energy expenditure and may have implications for healthy body weight maintenance (Sevits, 2013). A growing body of evidence shows that high intensity, but low volume High Interval Training (HIT) effectively replaces traditional endurance activity by inducing similar or even higher results in both healthy and sick subjects (Gibala, 2012). These results are important, given that the lack of time remains the barrier commonly cited for regular exercise.

Participants to the 2007-08 Australian National Health Survey (n = 10,785) reported on their job (mostly sitting, standing, walking or working hard), walking, whether free seated. Those who sat less than four hours a day had a significantly lower risk of obesity regardless of physical and professional activity. The association between time spent

sitting and obesity can be broken by breaking up prolonged sitting that reduces postprandial glucose and insulin responses. This action may improve glucose metabolism and potentially be an important public health and clinical intervention strategy for reducing cardiovascular risk (Rebar, 2014). The breaking up prolonged sitting influences skeletal muscle gene expression of nicotinamide N-methyltransferase, which modulates anti-inflammatory, anti-oxidative pathways and triglyceride metabolism and other 10 genes involved in carbohydrate metabolism, including increased expression of dynein light chain, which may regulate translocation of the GLUT-4 glucose transporter. Several intervention studies on the prevention of type 2 diabetes have shown a reduction of 58% of progression from prediabetes to diabetes and the effects persist significantly from 6 to 20 years after the end of the intensive treatment (Knowler, 2009).

The American College of Sport Medicine and the American Heart Association for Healthy Adults, aged 18-65 years, recommended fast walk that significantly accelerates the heart rate and that can be distributed in two or three moments lasting 10 minutes or more. The high intensity activity is exemplified by jogging and causes rapid breathing and a substantial increase in heart rate. In addition, adults will benefit by performing, at least twice a week, activities that use the body's main muscles, which maintain or increase muscle strength against endurance. Due to the dose-response relationship between health and physical activity, this can be further increased by reducing the risk of chronic diseases and disabilities and preventing weight gain. Recent results of systematic reviews and/or meta-analysis (based largely on epidemiological studies consisting of large cohorts) have demonstrated an L-curve in the dose-response relationship between physical activity and death as the marked health benefits are observed with relatively less volumes of physical activity. Clinically relevant health benefits can be accumulated simply by becoming more physically active. An intriguing question is if the great athletes live longer. Kettunen JA, showed that elite athletes have 5-6 years additional life expectancy when compared to men who were healthy as young adults (Kettunen, 2015). In a recent systematic review and meta-analysis performed by Carr RM in 2019 (Carr, 2019) on dyadic interventions to promote physical activity and reduce sedentary behaviour, was observed that

dyadic interventions had a small positive, highly heterogeneous, effect on PA, compared to conditions including equivalent interventions targeting individuals. Shared target-oriented goals (where both dyad members hold the same PA goal for the main target of the intervention) and peer / friend dyads, were associated with larger effect sizes across most analyses. Dyadic interventions produced a small homogeneous reduction in SB. Given that dyadic interventions promote PA over-and-above equivalent interventions targeting individuals, these interventions should be more widespread. However, moderating factors such as the types of PA goals and dyad need to be considered to maximize effect. In conclusion, the close link between sedentary lifestyle and well-being diseases called non-communicable diseases, can be reduced by a recovery of daily physical activities carried out directly, giving up some “mechanical advantage”.

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Center “Active Ageing”

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UZ “Bobruisk city polyclinic N. 3” and “World Society for Longevity” located in the University of Cagliari in autonomous region of Sardinia (Italy) have been bound for several years by active cooperation in implementing of international project “Longevity, lifestyle and nutrition: importance of being aware”. This project was developed by the University of Cagliari which aims to slow ageing at most and maintain people’s health and activity even in late adulthood. Center “Active Ageing” was established in the polyclinic thanks to this productive cooperation with the university. Our center helps to support health in elderly age, gives an opportunity to get knowledge needed to improve one’s health and prolong active ageing by means of addressing a set of issues – health, poor awareness and coping with modern world realities.

The main factor in the system of active ageing is a healthy lifestyle. This is the term of a wider comprehension. Followers of healthy lifestyle get together and form health groups of «Active Ageing» center at the premises of our polyclinic where personal approach to every participant is guaranteed and implementation of Head Doctor’s own unique programme is fostered.

“Ways to achieve active ageing” is a special programme which embraces series of measures aimed at emotional, mental and physical health.

The programme includes the following important elements:

- keep-fit exercises “Active ageing workout” held both in the green area on the territory of the polyclinic and in a gym. Outdoor classes include elements of terrain cure, wellness coaching and breathing exercises;
- Mudras exercises: yoga in your fingertips (these classes involve nervous, muscular and vision systems that contributes to stimulation of speech and memory and eventually prevents senility);

- healthy eating classes (healthy nutrition master classes) enable to demonstrate how a balanced diet can contribute to health maintenance, mental and physical strength, prevent numerous diseases and slow ageing process;
- psychotherapy aimed at activation of mental processes, stress management, communication skills development and improvement of psychic health. ART-therapy with a specialist is available (drawing, modelling, floristry, origami);
- teaching of self- and mutual aid skills when feeling unwell (participants get trained to measure blood pressure using automatic and semi-automatic tonometer, measure blood glucose level using glucometer as well as basic principles of aid in medical emergencies, bandageing etc.);
- classes to improve computer literacy which help to acquire user skills for the Internet. Participants learn to install health related applications that will assist them in improving quality of life and achieving active ageing;
- classes in “School of Third Age” are held based on individual approach to every participant;
- social partnership.

According to the survey results, 36% of the participants noted improvements in their health condition, 42% said they overall feel better. 31% found new friends and acquaintances, 22% were happy to find a hobby. Many participants keep in touch after completion of the course – they meet, speak on the phone and visit each other. Currently administration of Pervomaiskiy district of Bobruisk, healthcare, educational and social care establishments are involved in the project implementation.

Ageing and Teulada's neurocognition – Functioning, quality of life in oldest olds in Teulada

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In the last decade, the increasing ageing of population received a great interest in research. Ageing, especially in the last years, represents a subject of study and research of high interest. It includes various disciplines, such as: medicine, philosophy, sociology, cultural anthropology and it is a subject crossing over all branches of psychology. Analyzing demographic projections, we understand how the world population is modifying and it will modify in the next years. As indicated by World Population Prospects 2019 (UN, 2019), in the next years the number of people older than 65 will be double compared to the number of 0–5-year-old children. But this data does not concern small children, only. It is estimated that in 2050 the number will be much larger than the number of teen and young adults, (it is estimated 1.5 billion vs. 1.3 billion). At a global level the number of women older than 65 is greater than the number of men over 65 and this is due to an increase in the life expectations. In 2019 the number of women older than 65, at a global level, was 55 %, while women older than 80 was up to 61 % (UN, 2019). These data are meaningful because they let us understand how population gets old.

By analyzing world population, we observe how the percentage of older people in the world in 2019 increased by 9 %. It is thus foreseen that it will reach 12 % in 2030, and 16 % in 2050 and it will probably be greater than 23 % in 2100. Europe and America have the highest rate of people over 65 and it is estimated that in 2050 one person out of four will be older than 65. A more specific issue, instead, for population over 80. This range of population is growing faster than the range over 65. In 1990 at a global level there were but 54 million of people older than 80, number who became triple in 2019 with 143 million. It is foreseen that this number will triple again in 2050 with 426 million of over 80 and

reaching one billion in 2100. In 2019 38 % of people older than 80 were living in Europe and North America (UN, 2019).

As can be worked out from the reported data, the challenge for active ageing is still fully going on because it includes many factors such as the politic, economical and health factors, as well as the social one.

How to age, and most of all, how to age well, is the challenge that we all must face starting from the younger age ranges, because by laying its foundations starting from the early age it is going to be simpler facing the challenges that old age implicitly involves. People often talk about ageing, but how can we define it in a clear way?

We can define it as a process, or more than one process, taking place in living being and that with passing time decrease its odds of survival.

People very often associate, wrongly, ageing to disease; growing old leads to changes that we cannot avoid, but it is not necessarily invalidating, disease may be present, cured, eased, or delayed through prevention factors.

Ageing is a multi factor process in which different factors take part such as biological, environmental and social factors.

Based on this definition the research team of Global Community on longevity, built its own model: a model created after careful analysis of existing literature at an international level, called "Developmental Dynamic Aging" (Pili et al, 2017, Petretto et al, 2016). The model proposed defines ageing as an "evolutionary and dynamic process in the sense that it evolves during life based on different situations that the person meets in his/her path". Such path may be determined by genetic factors which would explain how 25-30 % of we grow old, and the remaining is explained by epigenetic features referring to daily habits, such a health generating lifestyle, food; all these factors are called "modifiable factors". The target to be reached is well being, which is a situation, a status to be reached, affecting the quality of life of an individual and determining his/her ageing path, not merely at a personal/individual level but at a collective level, as well, since you must keep into account the social context in which the person is taking part and the constant interaction with the environment, fundamental part of every individual. This model, besides, highlights the role of psychological variables and how such variables help people face and forget negative events, the capability of keeping control in different sectors of life, such as auton-

omy and in independence in daily life. It is also fundamental, in self definition, keeping a role within the relevant social context, feeling like an active part of community and not a burden; letting the elder people produce different aspects and behaviors that become a resource and a precious good not only for themselves but for their entire community and social group. Feeling as an active part of a group allows to avoid isolation, that sense of inadequacy and dependence that spring into depression symptoms and negatively affect perception of themselves and their own ageing path.

For such reason the model proposed by Global Community on longevity allows to analyze the ageing process in all its aspects since it identifies in bio-psycho-social approach all the features defining ageing itself (Pili et al, 2017, Petretto et al., 2016). 2012 was the European Year of active ageing, in Europe but not just in Europe, and programs were developed for promotion, intervention, and to promote such issue. The term Active Ageing was used for the first time by OMS in 1990 and it was thought to transmit a more inclusive message of ageing in health and to recognize, apart from sanitary cures, factors affecting the individuals during ageing (Kelache and Kickbusch, 1997). The same was re-taken and analyzed again in 2002 during the Second World Meeting of United Nations about aging, held in Madrid. In this case the interest of researchers started to develop more and more around issues of Active Aging. According to World Health Organization (WHO) active ageing is meant as: the process of optimizing health opportunities, participation and safety, aiming to improve quality of life of people. It allows people to fulfill their physical, social and mental well being during their entire life, taking part in social life as per their interests, wishes and needs and providing them an adequate protection and safety every time they ask for it (WHO, 2002).

One of the fundamental aspects of this research project refers, as mentioned above, to the concept of Quality of Life of WHO and is well structured and it is an integral part of Active Ageing as proposed by WHO itself.

WHO defines health as “A state of complete, mental and social well being, not simply the absence of disease”. For such reasons measuring health and effects produced by health care has to necessarily keep into account not just the rising, course and changes of various pathologies

that an individual may have or develop but also an estimate of the individual well being, that can be measured through measuring the improvement of life quality.

OMS defines quality of life as: “The perception of an individual of their own position in life and cultural context and in the value systems in which he lives and relating to their targets, expectations, standards and worries”. It is a concept of large significance affected in a complex way by physical health, psychological state, personal ideas, social relationships and from their relations with their environment main features (WHO, 1998). Based on this premises is the project A.Te.Ne., aiming to indentify factors specifying different conditions of the older, analyzing important variables such as environment, personality, quality of life and any pathologies, particularly dementia, which can affect a healthy and serene aging, as proposed from the dogmas of active ageing (UN.2019, Petretto et al. 2016).

The A.Te.Ne. (Ageing and Teulada’s Neuro-cognition) deals with active ageing in Sardinian population and it is born from the cooperation of Global Community of Longevity with the Municipality of Teulada, town of more than 300 dwellers, locates South West at about 60 kilometers from Cagliari.

The Municipality during the years presented a high number of people older than 90 still alive.

Aim of the project was to evaluate the cognitive state and the autonomies in performing daily life in a sample of Oldest Old. The terminology “Oldest Olds” refers to a population of people between 80 and 85 years up to 100 years (De Beni, 2009). In the Municipality Lists, the number of oldest old at the time was 368 people. People between 80 and 89 were 277, in which 177 women and 100 men. In the range 90-99 the number was 86 people, in which 61 women and only 25 men. In the range 100 and more, there were 5 centenaries, all women. The oldest woman in town was 105 year old (Petretto et al., 2016).

The research protocol included the following instruments:

- informed consent for participants and/or caregiver (Informer);
- informed consent for general practitioner doctor;
- standard questionnaire for participants and/or caregiver (Informer);
- test of Neuro Psychological Test;
- functional evaluation (Petretto et al., 2016).

The results achieved from the research protocol were specifically analyzed and they show a generally positive situation.

The evaluation performed by a clinical expert showed that in both age ranges analyzed 80-89 and 90-99 the dementia impact, evaluated by CDR scale (Clinical Dementia Rating Scale), (Hughes et al., 1982) was between 0 and 0.5, which means that the sample was showing a low form of dementia or none at all. Also, the results from other instruments were encouraging. Results from BIMC Dementia Information Memory Concentration Test (Lucca et al., 2011), highlighted a cognitive state of the sample as normal.

Results from ADL Activities of Daily Living, (Katz et al., 1963) showed that in daily life activities the oldest old from Teulada were still able to achieve a certain level of independence.

In most cases help required was for personal care activities (i.e. showering), in which they were supported by care givers, to avoid traumas or the danger of falling.

From IADL scores Instrumental Activities of Daily Living, (Lawton 1969), it resulted that the sample from Teulada in daily life activities was almost completely dependent from a son, parent, or from the care giver.

This level of dependency needs to be specifically contextualized.

Mentioned activities were for evaluation, and they referred to activities such as:

Cooking, shopping, paying bills, driving; such activities were not performed, in most cases, not because the old one was not really able to, but because the care givers thought they were dangerous or unsuitable for the mentioned older one.

This was evident most in the 90-99 years range (Petretto et al. 2016).

Currently the second stage of follow up of A.Te. Ne. project is being performed, in which specific analysis, besides from neuro cognitive evaluation, is being aimed at lifestyles and eating habits of Sardinian elders.

Such follow up boasts the cooperation with another project from Global Community on longevity, called Nutri-Action (Pili and Petretto, 2020).

Such project aims to link the adolescent and the elder (mission is to reevaluate on a social level the role and status of the elder one, to be meant as a cultural and social resource fundamental for the new generations), through the knowledge of the correct report between nutrition, health and well being.

The adolescent will star in a reflection and research process about food choices and their link with well being and longevity, and all this shall happen in a real dynamical confrontation among the young of today and a group of elders, (the young of yesterday). Aim of this cooperation between two specific projects is to collect important information about prevailing diets and their effects on health conditions, on real knowledge of Sardinian Mediterranean diet and on lifestyles adopted with particular attention on physical activity and family and community relational skills (Pili and Petretto, 2020).

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The cooperation between generations and healthy lifestyles: the “Nutri-Action” model

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The Global Community on Longevity is an association that has been operating for some time in Sardinia, and also in the rest of Italy, and internationally, through training and research aiming to collect current knowledge in Longevity, Health, Well Being and Active ageing fields. The area of activities aims to promote well being of the individual and in general on the individual in becoming, in all his/her life cycle, taking as a fundamental assumption that it is necessary to learn to grow old well since we are children.

Nutri-Action is a project born from the mission the Global Community on Longevity and from the wish to form younger generations to the knowledge of health nutritional values. As its main element the project means to teach younger generations to grow old well and healthy through an inter generational confrontation with people who achieved in their life a successful aging.

Students involved in project activities must wear the shoes of young researchers and become first-hand the protagonists of the research activity, investigating about life styles and food choices of oldest people in the territory and start a dynamic confrontation with these people who are living and part of some communities in Sardinia, and who lived the evolutionary and young stages of life in another epoch, with different life and food habits, often dictated by economical and social hardships. The project means to involve a particular range of the young population, the one attending the last three classes of high School because they are the most dynamical ranges of student population and able to develop easier the needed skills to start a profitable intergenerational confrontation, and at the same time the one more susceptible to the food transaction.

Often, in fact, in the following stages of life as in autonomous life expe-

rience and in University Life, the immersion in environments of strong emotional and time stress negatively affects food habits and food choices (Trigueros et al., 2020).

The DALY Disability Adjusted Life Years, is the indicator of global impact of one or more risk factors in people's life and it is expressed as the cumulative years of life lost through morbidity, mortality and disability. This new data is an indicator born from the findings that to achieve a more effective and efficient programming in active policies, it is not enough anymore to exclusively use the parameter indicating life expectation of a population as a factor indicating the increase of well being given by one or more actions or choices made. This new indicator is born from the sum of the years lived with disease or disability, plus the years of life lost, meant as a precocious death compared to life expectation ($DALY = YLD + YLL$) (World Health Organization, 2019).

In the past life conditions, work conditions, transmissible pathologies and conflicts used to determine longevity of people. According to geographic regions and social state it was more or less probable to have a life expectation around 50 years of age (Nomura et al., 2017).

In one of the latest reports published by ISTAT about demographic transition, it results that from 1901 to 2017 life expectation has changed (Sources - Istat, historical series: tables of mortality by sex and age (up to 1960) and Eurostat, Life expectancy by age and sex [demo_mlexpec]), leading this to reach eighty years and more. Comparing data related to life expectation in the last years, it results how much the difference between life expectation at birth and at the age of 60 has decreased, and this represents mainly how the improvement of life conditions, the reduction of child mortality and many actions performed in the past helped achieve this result. But this change is not univocal data related to an overall improvement of life and health condition of the population.

The increase related to average life expectation, is not linked directly to life expectation while in health, in fact the constant decrease of transmissible pathologies and newborn complications, which is how much non transmissible pathologies impact the burden of years of life lost and lived with disability (GBD 2015 DALYs and HALE Collaborators, 2016).

Living life with a higher degree of autonomy is nowadays a personal and shared inspiration. The impact disability has in the life of a person is given by interaction of emerging factors from a health situation, but

it does not end with that. Article 1 of ONU convention about the rights of people with disability, clears this element well; disability according to this convention, combines biological, psychological, sociocultural in the interaction, centering on the participation of person with and in Society (United Nations, 2006).

Disability under this light is a situation that we all in the course of our life may experiment. About the increase of life expectation, this increase does not match with an increase of life expectation in health, and this data comes from multiple influences, one among them is given by medicine progress, by the new intervention and diagnostic instruments that allow a person to survive even from strongly impacting events in the life of a person. From this assumption, it is necessary to understand how to avoid generating situations impacting in people's life, by identifying those strategies led the contemporary elder people to age well and healthy.

According to IHME (Institute for Health Metrics and Evaluation, University of Washington), it can be seen that in the last years the burden of mobility places tumor and cardiovascular diseases among the most impacting in the life of the Italian population. In the last years on a global level, there were several studies that show a link with main tumoral diseases and nutrition, lifestyle and particular conditions such as obesity.

About this premise, progressively at a global level an increase of the obesity phenomenon is being spotted, in particular in the younger parts of the population, but also in the ones actively working. Currently, at a world level, there is a phenomenon of a food transition, caused by several factors, and related to modification of cultural and socio-economical paradigms.

The mix between factors related to healthy ageing sees nutrition as the main actor. In nowadays great availability of food, it becomes important in a vision aiming to achieve healthy aging, the choice of which food. The contemporary situation of lack in western diets of several nutritional elements, not strictly related to the lack of these in one's own ecological niche, but related more to the lack of those due to a more widespread and complex phenomenon of food transitions, puts the younger and adult generations on front of a risk related on one side to the lack of nutrients, on the other side related to the abun-

dance and over feeding in an unbalanced way, leading these people to experience more easily heavy obesity conditions, with all related problems. In particular the high BMI is strictly related to the risk of tumor pathologies.

Adopting a Mediterranean diet is not just a data concerning a certain kind of nutrition, but a food and behaviour modality related to a lifestyle coherent to the respect of environment (Cavaliere et al., 2018).

The disaffection to diet from one's territory, with a strong historical and cultural link, and related to the local ecological link, puts the adoption of Mediterranean diet in school ages, but also in ranges of population more exposed to food transition, in a large crisis.

In a vision aiming to get over that already started trend inversion, according to which well being in older age ranges of population and related to the ever increasing difference according to which increase in average life expectation, does not lead an increase of average life in health, interventions are urgently needed on multiple fronts. A recent transdisciplinary approach, done in a gerontological key, psycho pedagogical and with a strong influence of preventive medicine is the approach experimented by the researchers the World Community of Longevity and the Association of Social Medicine. The experimentation proposed was conceived and actuated in a territory context, that for some specific reason, in particular the presence of a great deal of people who reached the age of longevity, may be considered places of intervention and research.

Educational / training activities through an inter generational method mean to rebuild the false beliefs on healthy foods, tending to empty the concept of diet itself (Miller et al., 2015), to expose the current food transition, and to offer an alternative.

Among the first experiences of taste transmissions, we may assume, after the transmission of the territory with its water springs, and the hunting techniques, the knowledge of other nutritional components apart from animal meat, in fact the wrong collection of herbs, fruits or roots might have caused death for that person or most probably for more persons living together feeding together. Apart from the transmission of techniques to choose food it was probably equally important the knowledge of techniques to cook food, in fact many foods main elements for the diets of many population have neuro-toxicity features

such as manioc, a plant that may provoke serious intoxications if eaten raw (Olsen & Schaal, 1999).

Transmission of food culture and food cooking was historically an activity full of pedagogy, like the sharing of knowledge not only to build a shelter, to build a fire, or hunting techniques. The central role of the old one in history was to tell tales and transmit through tale and in particular through working together in a context in which the strength of the younger generations fuses with the experience of the elder, as shown by several ethnologists often invested with the name of wise men.

Methodology of the project

The age ranges facing the final stages of a school experience are heading for adulthood, with the need for a training setup aiming more and more to interactivity, careful about confrontation and for taking in charge by themselves the training situations, in modality similar to the one proposed for training of adult people. Training practice, in school environment of high school classes and in particular in late adolescence, should be active as much as possible, with an anticipated sharing of intents, possibly a formative contract. The modality of training and action in field, in this interactive vision, is actuated through a method of learning through an inquiry (Nybo & May, 2015), which means an approach capable of investing the students in the role of young researchers, that by facing the research issues, may learn elements about foodstyles, lifestyles, and more generally about how to live well, long and healthy.

The inquiries started with students aiming to collect data to start a relevation on lifestyles, food styles, and social relations of the dwellers of some areas of Mediterranean lands and in particular to find out the factors that allowed reaching longevity targets, already known in the so-called Blue Zone, and related to a correlation of more factors, such as lifestyles, foodstyles, and in particular to Mediterranean diet (Murphy & Parletta, 2018).

To train students for the intervention phase by administering tests another two learning phases are foreseen, the first one aims to assimilate the contents related to Mediterranean diet, to the concept of health, food, lifestyles and terms used. In the second phase the knowledge to administer questionnaires will be provided, firstly by filling it in by

themselves, and secondly, after analyzing all parts of the questionnaire and having cleared how it works, with a useful simulation experience. Simulation is performed at the end of phase 2, living the experience of administering through a role playing in which the students, in groups and in turns, play the role of the interviewer and then the interviewed. At the end of the classroom phase there is another one in field in which the students are involved in the town or the village or the area formerly selected. The choice of the town in which live the experience, for various reasons, must be done before all other activities, firstly to know what one can anticipate to the involved students, and secondly because people in the territory must be identified, and in particular Municipalities and administrations, because they know the territory and can involve the needed people, associations and structures to enrich the experience for students and for all.

Phases of the Project:

Project phases in Nutri Action involve five temporal stages, the first, the preliminary phase is the one aiming to program the actions and the internal coherence of the project and the relationships with partners. In this phase it is necessary, based on theoretical models and intents mentioned in above pages (in other words contents to be shown in the training phase with students and in the active phase with the administration of questionnaires, and to propose cooperation with Local Authorities) identify a settlement of interest and in it the partners providing interest, in particular local administrators, with which to identify temporal schedules and older people to involve. Once done the preliminary programming, local school administrators can be contacted, the project can be exposed to them, and to students' families, and, in case it is accepted, a Convention Agreement is needed in which the involved partners and their legal representatives are indicated, and also the classes, the activity schedule the economical resources to be used, the finalities and the internal tutors in the School Institution and the ones outside from the institution promoting the project.

The second phase is the training one in the schoolroom, and it starts by administering questionnaire about the adoption of Mediterranean diet and an inquiry about lifestyle. The training phase is a didactic moment

in which the tutors from outside, cooperating with other professionals, offer their training contribution about the concept of health and well being, diet and food styles, and daily movement to achieve well being of people, longevity in the world and in Sardinia, and some elements of social research. The research to be lived in the third phase is performed through an inquiry instrument that must be experimented upon in the conclusive moments of Phase 2 in the classroom. Based on this assumption it is important to have clearly understood the structure of the questionnaire, its ends, the administering modalities, and for this it is useful to start a moment of Role Playing in which the students, in turn, live the administration by playing the role of the interviewer and then the interviewed. The second phase ends by preparing the action phase in field by preparing the details the travel to the chosen town, small town, or settlement.

Third Phase starts with students and internal tutors from the school to the chosen town, by bus, usually provided by the school secretary. External Tutor must monitor times and coordinate, together with the designated municipality partners, the activities to be performed there. At the arrival in the Municipality, it is important to provide a meeting with the local partners in which students introduce themselves as young researchers, their school and their research project. Local institutions introduce the resources that they will be providing, people to refer to for activities and they anticipate times and modalities of the activities in the territory.

At the end of the initial meeting the activities start, firstly to achieve a better immersion in that reality, the exploration of the settlement begins, next there is the visit to one or more structures or meeting places identified in the former phase of preliminary programming and the questionnaires are collected. Structures or Meeting Places are meant as homes for the elderly or other places selected with the local partners in order to meet, through a specific pre-planned event, the designed population and to allow administering the questionnaires.

Once in the town/location/settlement students supervised by internal and external tutors have to outline to future interviewed the aims of the research, its modality, the motivations who pushed them to take care of such issues and the elements that caught their attention during visit of the town.

The moment of the interview is the main one, in which the interviewer or the interviewers get in touch with the person and a real intergenerational Exchange takes place, that is why it is important that the questionnaire is not to be meant as an instrument to be self filled, because that moment often becomes a moment of personal story. These moments are extremely useful because they activate modeling processes aiming to impact the living experience of students involved. (Fryling et al., 2011).

At the end of the interview

Collected questionnaires shall be given to external tutors related to the Institution promoting the Project, and they shall be archived and analyzed by them. Collected data shall be used in the moment of final confrontation with the students.

The journey back home represents a moment of confrontation with the internal tutors of School Institution, and in moments summarizing the journey the most important points of the experience shall be shown, criticalities shall be identified and also the most significant activities for the personal living experience of students.

The Final event takes place a few months from third phase, to allow time for the experience to be fully assimilated, and takes place in the same training place in which the second phase took place and, in these events students, involved fill in once again the questionnaire for adopting the Mediterranean diet, and to lifestyles, in order to evaluate which modifications happened in food habits and life habits of students involved in the project

During the meeting the experiences lived in the two former phases are recalled, and data collected during third phase is analyzed, the intergenerational exchange phase.

During such activities involved students act as young researchers and under tutor supervision they introduce the project that they loved to other classes of interested students, to representative of School Institution, and to the partners of the Municipality in which the field research took place.

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The experience of the authenticity of life as a condition of psychological health in the period of emerging adulthood

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According to the World Health Organization, health is «a state of complete physical, spiritual and social well-being, and not merely the absence of disease or infirmity» (Sysoeva, 2008). Speaking about psychological health, E.R. Kaliteevskaya and V.I. Il'icheva consider this concept as a person's ability to transcend his social and biological determinacy, to act as an active and autonomous subject of his own life in a changing world» (Sysoeva, 2008).

We will consider psychological health in this work through the prism of existential psychology.

From the existential point of view, interrelated aspects affecting the psychological health of a person can be defined as follows: hardiness, existential fulfillment and values of a person.

These aspects are especially important for the modern generation, as can be seen if we look at the Strauss–Howe generational theory (Shamis, 2016), showing clearly that the present is full of worldliness, wide range of opportunities, careerism, superficial relations, pragmatism, momentary pleasures, consumption, full performance and also a certain infantilism of society and an individual faced with a choice. All these things make it impossible for a person to think about the fulfillment of his life.

In addition, considering the period of emerging adulthood, it is impossible to ignore the fact that a person chooses between two alternatives: intimacy and isolation. E. Erickson pointed out that intimacy requires true love based on trust, acceptance of another individual, but not complete fusion with him. Here, intimacy is understood quite widely – it is not only «true genitality» (Erikson, 2000, p. 221), but also the forging friendships, values, trust, professional development – on the basis of which the whole system of a person's relations to the world is built.

E. Erickson defined emerging adulthood as the period between ages 18-25 years. External stresses and the choice of isolation as a life strategy can lead to various negative consequences, such as depression, emotional exhaustion, self-dissatisfaction etc.

In considering the concept of psychological health, we cannot ignore the philosophical views of M. Heidegger (Heidegger, 2003), in particular, his concept of being.

M. Heidegger defines 2 types of being:

1. Authentic. It is based on care and commitment, transcendence (going beyond one's own limits) as the main way of being in the world. Being is considered in the context of the future – although human is here-and-now, he has plans, goals, dreams.
2. Not authentic. This being, based on «dissolution within society», doomed fate, abandonment, the need for «chatter». The person focuses on the past or the present, depersonalizing himself in his beingness, avoiding the fear of finitude of his own being. Both ways of existence, one way or another, are inherent to each person, but, in the opinion of M. Heidegger, a person should strive for privacy. Which is mean to align his life towards care, without becoming miring in excessive communication.

British psychotherapist E. Van Dorzen believes that to be authentic means to be honest with yourself, to feel the depth of your own reality. The feeling of non-being arise because of the absence of valuable, it is the cause of sinking in a false life based on the imposed duty, the experience of dissatisfaction with one's own fate. "Living out of a sense of duty" is the avoidance of life, or complete withdrawal from it. If a person has not found his own meaning of life and has not become the master of his own destiny, existential guilt arises as a reminder of the duty to himself. Moral debt for not defending his choice, hiding it, not trying to change the situation. This passive being may seem simple, but it is not limited to a stalemate and stagnation. One should not postpone life until tomorrow, when it becomes better by itself. Each person is able to create meaning and order despite the chaos and absurdity surrounding him, but it requires time, perseverance and reflection (Dorzen, E. Wang, 2007).

A. Längle, based on the dimensional model of V. Frankl, considers psychological health at four levels, calling them fundamental motivations

(Längle, 2008). It is equally important to note how the basic motivations change under the influence of apathy and boredom. Under such circumstances, there is often an experience of mental need – a strong sense of deficiency at the level of a particular motivation (or all of them) that leads to inauthenticity.

1. Attitude towards the world. In this context, the deficiency leads to the sense of insecurity and threat, which force a person to look for a job with strict rules to create the illusion of support.
2. Attitude towards life. Disorders at this level consist in emotional blockage, fear of relationships, emotional (depressive) overload, it leads to commitment instead of openness to life experience. The motives of communion change to into the motives of commitment. The person driven by a sense of guilt and his own mental need, ignoring his own needs, looks for helping professions,
3. Attitude towards person. The lack of motivation leads to weakness to the enticements of the profession (career opportunities, recognition, power, money, etc.). The reason is the lack of self-worth, causing dependence on social recognition. Aspiration is imbued with a thirst for respect and popularity with other people.
4. Attitude towards the future. Human is full of «seeming meanings» (e.g. fashion trends, socially recognized goals, ideological statements, etc.).

A. Längle defines existential fulfillment of life as follows: “Existence is real life, full of deep feelings, successful endeavors and decisions, even if they are erroneous”; “fulfilment” means “experiencing a deep inner consent with what is happening or with what has been done” (Längle, 2001). Consequently, the fundamental aspects of the existential fulfillment of the person’s life, according to A. Längle, are: “a feeling of inner accordance», «lead a free and responsible life full of meaning», «turning one’s own decisions into reality”.

These ideas formed the basis of the Existence Scale (ES) aimed at identifying the quality of a person’s life associated with a sense of fullness of life with meaning. Another construct we consider is «Hardiness» which was conceptualized by S. Maddi and also based on an understanding of the authenticity of life and the person’s belief system aimed at overcoming stressful situations (Leontyev, 2006). This belief system consists of three components:

1. Commitment. The scale indicates person's pleasure and satisfaction from his own activities.
2. Control. The person's tendency to control and manage his actions in one way or another.
3. Challenge. Gaining experience through the assimilation and use of knowledge.

The lead researcher of values is social psychologist Sh. Schwartz. "values as «cognized» needs, directly depending on the culture, environment, and mentality of a particular society" (Ivanchenko, 2008). He discriminated 10 values, which are divided by characteristics into 2 groups of alternatives:

1. Openness to change / conservation.
2. Self-transcendence / self-enhancement.

Thus, values of openness to change and self-transcendence can be viewed as values of authentic being.

The study involved 35 participants (22 females, 13 man). The subjects were aged 18 – 25 years. All subjects were students receiving a higher technical education. The study was carried out in 2019.

According to the median values of «Existence Scale» the following trends can be concluded.

The sample member demonstrated an average score on the Self-Distance (SD) scale (33 points). This may indicate that the average person of this age period is able not only to follow his momentary desires, ideas, feelings and intentions, but also can see himself and the situation from the outside – to perceive and reflect on it, to look at it more realistically. The scale "Self-Transcendence" (ST) shows that the median values are also within the average range (72 points). That shows that a person is able to feel a full spectrum of emotions and his own value attitude to life. He can distinguish between important and unimportant things, accepts himself along with his needs and. desires. However, a complete self-acceptance did not take place. The "Freedom" (F) scale score was also within the average range (47 points). Thus, subjects are able to find real opportunities to act freely, to choose options appropriate to their values and come to a reasoned personal decision. They have both clarity and strength in argumentation and finding a solution.

The "Responsibility" (R) scale score was also within the average range (50 points). In the period of emerging adulthood people tend to devel-

op more reflective and caring approach to life. They seek to complete their decisions, based on personal values, because they understand better the commitment to themselves and society.

Both factors “personality” and “existentiality”, as a result, were also within average range (107 and 95 points respectively), indicating openness to the world and in treating oneself. In addition, they are sufficiently decisive and responsible for their own life. Activity and creativity are important for them which reflects their aspiration for authenticity. Thus, it can be said that for most of the sample members there is harmony with the world outside, other people, oneself, and one’s own values. The basic principles of life for them are activity, creation, self-acceptance, awareness of results (choice, values, actions), responsibility. There was no significant difference between scales scores which suggests that most of the sample are not threatened by psychological health disorder.

In considering such a personal disposition as the hardiness, we also obtained average values. All hardiness components – commitment (36 points), control (30 points) and challenge (18 points) were also within average range.

That indicates that the majority of subjects have all the qualities necessary to overcome internal tension in stress situations. This is based on the following beliefs:

- Getting pleasure from their own activities,
- Opportunities to influence the result of what is happening to them, although they realize that their influence is not absolute and there may not be successful.
- Everything that happens to them (both positive and negative), they consider as an experience that contributes to personal growth.

As for value orientations, their hierarchy, both in terms of specific actions and life principles, is presented in Table. 1 (the median value is shown in parentheses).

The table illustrates that the most important priorities in life of the subjects are kindness and independence as life principles which occupy an important place in interaction with other people. Such value like a power takes lasts position in both lists. Thus, emerging adults are guided by the values of being true.

By using correlation analysis, we found that all the characteristics of

Table 1. The hierarchy of values in the period of emerging adulthood.

Value	Values as life principles	Values as specific actions
1	Benevolence (5,6)	Benevolence (3)
2	Self-Direction (4,9)	Self-Direction (2,7)
3	Security (4,7)	Universalism (2,6)
4	Achievement Conformity (4,5)	Hedonism (2,1)
5	Universalism (4,5)	Security (2)
6	Stimulation (3,6)	Achievement (1,9)
7	Tradition (3,2)	Stimulation (1,8)
8	Hedonism (3,1)	Conformity (1,7)
9	Power (2,3)	Tradition (1,5)
10		Power (1)

hardiness and the components of existential fulfillment were intercorrelated

Commitment had a positive moderate correlation with self-distance ($r = 0.66$, $p < 0.05$), self-transcendence ($r = 0.69$, $p < 0.05$), responsibility ($r = 0.52$, $p < 0.05$), freedom ($r = 0.62$, $p < 0.05$), existential ($r = 0.59$, $p < 0.05$). In addition, there was a strong correlation with personality ($r = 0.76$, with $p < 0.05$) and fulfillment ($r = 0.73$, $p < 0.05$).

The person involved in life has great chances to live a life full of a sense of fulfillment. Getting pleasure from things he does is expressed only if everything that he is surrounded by is consistent with his values and enable him to develop himself and be constructively involved in the world. Control was positively moderately correlated self-distance ($r = 0.48$, with $p < 0.05$), self-transcendence ($r = 0.58$, $p < 0.05$), responsibility ($r = 0.68$, with $p < 0.05$), personality ($r = 0.59$, $p < 0.05$). There was a strong correlation with existentiality ($r = 0.77$, $p < 0.05$) freedom ($r = 0.8$, with $p < 0.05$), and fulfillment ($r = 0.74$, $p < 0.05$).

Therefore, a person who struggles with circumstances is condemned to freedom. Freedom full of reflection, responsibility, meaningful activity and emotional attitude to values.

Challenge had a positive moderate correlation with self-distance ($r = 0.4$, $p < 0.05$), self-transcendence ($r = 0.38$, $p < 0.05$), freedom ($r = 0.42$, p

<0.05), responsibility ($r = 0.41$, $p < 0.05$), personality ($r = 0.43$, $p < 0.05$), existentiality ($r = 0.43$, $p < 0.05$) and fulfillment ($r = 0.44$, $p < 0.05$).

Drawing lessons from various kinds of life events, a person develops his reflexivity, awareness of freedom and responsibility, and understands what he should ignore to prevent the loss of values that guide him through life.

Hardiness correlated strongly positively with performance ($r = 0.62$, with $p < 0.05$). This suggests that a person who strives for true being and transcendence, living in harmony with the world and himself is less likely to fall victim to negative events in his own life.

Now consider the correlation of resilience and value orientations. Commitment had a positive and moderate correlation with tradition ($r = 0.37$, $p < 0.05$), kindness ($r = 0.37$, $p < 0.05$) and safety ($r = 0.39$, $p < 0.05$) both by conviction and security ($r = 0.4$, $p < 0.05$). Kindness or value attitude to people already have a basis for authenticity. Without kindness, as well as without security it is impossible to be involved in the life processes. Traditions may act as base for interest in what is happening around, or else to act as a result of involvement in life.

Also, there was an important relationship between hardiness and hedonism. Hedonism as a belief had a moderate correlation with control ($r = -0.36$, $p < 0.05$), challenge ($r = -0.35$, $p < 0.05$) and overall hardiness ($r = -0.38$, $p < 0.05$). Hedonism displayed in behavior correlates with commitment ($r = -0.48$, $p < 0.05$), control ($r = -0.44$, $p < 0.05$) and hardiness ($r = -0.48$, $p < 0.05$). The person who lives on the principle of pleasure is a person who is hindering his development or is not capable of it. One of the consequences of the Descartes principle in M. Mamardashvili's philosophical views was: "To be, one must transcend". The inclination to live in pleasure as fun does not allow a person to transcend himself. M. Heidegger considered the propensity to pleasure as a symbol of the fact that a person loses himself in a *das man*, goes into being unauthentic.

Now consider the relationship of values and existential fulfillment. Self-transcendence had a moderate positive correlation with traditions as a belief ($r = 0.44$, $p < 0.05$). We have already established a link between the creative attitude towards life and traditions as pivot points. Traditions set the conditions for feeling of values. The lack of a feeling of values negates the importance of tradition.

Self-distance ($r = 0.43$, $p < 0.05$) and person ($r = 0.34$, $p < 0.05$) have

correlation with the value of kindness. This may indicate that reflection, ability to control one's urges and at the same time to be objective and opened to the world, is an expression of the need to preserve the well-being of others. Security was also interrelated with personality ($r = 0,34$, with $p < 0.05$) and self-transcendence ($r = 0.34$, with $p < 0.05$). The person who is opened and sensitive is inclined to create conditions for the safety of others. On the other hand, if he has no sense of security, he is closed, especially for the feeling of values.

As a conviction, hedonism had a moderate correlation with freedom ($r = -0.32$, with $p < 0.05$), responsibility ($r = -0.32$, with $p < 0.05$), and personality ($r = -0,35$, with $p < 0.05$), existential ($r = -0.34$, with $p < 0.05$) and performance in general ($r = -0.37$, with $p < 0.05$). Like behavior, it relates to fulfillment scales ($r = -0.49$, with $p < 0.05$) which is further proof that hedonism is a manifestation of *das man*. It can be concluded that a person who put pleasure at the core of his value system sooner or later descend into the abyss of an existential vacuum, which can also be expressed in burnout. These results correspond to P. Tillich understanding of meaningfulness: «Courage is the universal self-affirmation of one's Being in the presence of the threat of non-Being» (Rastopin, 2010). He said that there is no being without the threat of being. The person who lives in pleasure is not anxious. Therefore, hedonism is not a transcendental path. Stimulation has a moderate inverse correlation with self-distancing ($r = -0.34$, with $p < 0.05$) Both as behavior and as conviction. Experiencing a strong need for vivid experiences, a person cannot look at himself from the outside. His current needs do not allow him to do that. Attachment to an emotional outburst as a value and the desire to acquire it also speaks of the inability of being. Human care is aimed at gaining emotional experience. What can also cause apathy and boredom over time.

Behavior determined by the value of self-reliance can also be genuine. As evidenced by feedback moderate communication with responsibility ($r = -0.32$, with $p < 0.05$). It turns out to be a rather paradoxical situation: as soon as a person begins to seek independence, he finds the fear of living without guarantees and assignments, loses his sense of duty. If a person lives through a responsible attitude towards the world, then he has no need for independence.

Power as a value in behavior has an inverse interaction with self-tran-

scendence ($r = -0.43$, with $p < 0.05$), personality ($r = -0.40$, with $p < 0.05$) and fulfilment ($r = -0.39$, at $p < 0.05$). Such a character of correlation may indicate that the higher a person's desire for domination and prestige, the less he is inclined to reflection, self-control in relation to his own momentary desires. The desire for power can indicate the immaturity of the individual, his isolation from the outside world, in the same non-genuine being.

Thus, it can be said that values, hardiness and existential fulfillment are important aspects in understanding of psychological health. The person who has the meanings of life and realizes them has more chances to cope with a stressful situation. In addition, he is guided by values that can be defined as the values of authentic being — these values guide a person to create and to transcend himself.

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The promotion of health, healthy lifestyles in all the phases of life and health psychology: conclusions and future research directions

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The 20th century showed an important epidemiological transition from acute and infective diseases to chronic disorders, with important effects on quality of life and on health and wellbeing of individuals. This epidemiological transition influenced also human mortality and human life expectancy. It is noteworthy that in 1948, taking into account this epidemiological transition, World Health Organization (WHO) proposed a new definition of health. Moreover, in the same years WHO changed the name of its first Classification model in “International Classification of diseases”, while earlier it was named “International classification of Causes of Death” (since 1893 to 1948). The main effect of this epidemiological transition was that disease was seen as a cause of changes in life and in quality of life of individuals, more than a cause of death. The promotion of health, good quality of life and wellbeing gained a role in the healthcare scenario, and quality of life and wellbeing became the focus of any intervention. Some years later, WHO defined the so-called “pillars” in the promotion of health and healthy life: eating attitudes and behaviors, physical activity, lifestyles, psychological wellbeing, quality of life and social aspects of life (WHO, 2002, WHO, 2004, WHO, 2012). In the last twenty years two more events influenced the health scenario: the worldwide increasing of life expectancy, with a slower increasing of healthy life expectancy and the “nutrition transition”. With reference to the first mentioned event, the awareness that the increasing of life expectancy does not correspond to similar increasing of healthy life-expectancy put great attention on the need to gain knowledge about age-related diseases and about the risk that in the late phases of life there could be diseases and disabilities (the so-called “age related diseases”). Aiming to reduce this risk and to prevent the “morbidity” in the late phase of life, a high attention was put on the role of “age related

diseases” and on the role of “non-communicable disorders”. According to this shift of attention, healthy lifestyles and healthy behavioral choices gained new interest from researchers and clinicians. The consequences of this new attention on healthy lifestyles are that they also gained a crucial role in each step of life, since infancy to ageing (Petretto et al., 2016, 2017, 2018, Pili and Petretto, 2019). Regarding ageing and according to Rowe and Kahn (1987 and following), the use of healthy lifestyle and of healthy behavioral choices can change the quality of ageing. These authors highlighted that in the promotion of health and healthy ageing the so-called “usual ageing” is a strategic focus, because people with “usual ageing” have all the constitutional and genetic risks to switch to a “pathological aging” (a kind of ageing where people have age-related diseases and disorders) but they can also control some variables related to lifestyles and prevent the development of age-related disorders. From this regard and with the main aim to add life to years and not only years to life and to prevent “pathological ageing”, it’s crucial to better understand how to prevent age-related diseases, disorders, and disabilities and how to prevent and to control the effect of the so-called “non-communicable disorders”.

The second event in the last decades is the so-called “nutritional transition”, a deep change in eating habits and eating attitudes, that has different effects in different sites around the world. In some sites, the “nutritional transition” has the effect to create a mixed situation, where under-nutrition and over-nutrition coexist leading to deficiency states and at the same time all the effects of an obesogenic diet; in other sites, the over-nutrition and incorrect and unhealthy behavior choices and lifestyles led to a progressive and dangerous increase in non-communicable diseases. Again, the focus on “non-communicable disorders” that can be the negative consequences of the “nutritional transition”.

But there is still an open debate on how to prevent “non-communicable disorders” and “age-related disorders” and how to promote healthy lifestyle. They are not simple tasks! In agreement with Cockerham (2005) we believe that understanding how people define health and illness, and their everyday knowledge and understanding of what influences health and illness, will increase substantially our knowledge of how people make sense of/interpret the relationship between health and behavior and how people decide to maintain or to change their be-

havioral choices in the field of health promotion. In more detail, Cockerham addressed the relationship between health, social meaning of health and the promotion of healthy lifestyles. In his seminal work of 2005, he described the need to develop a “healthy lifestyle theory” and the different path to the development of healthy lifestyles (Cockerham, 2005). In this paper and in other papers, Cockerham described the role of social determinants of health, and he described the difference between life choices (agency) and life chances (structure) and their interplay in behavioral decisions regarding lifestyles. Cockerham highlighted the role of habits (dispositions to act) and practices in the modifications of the healthy lifestyles and previous attitudes and behaviors related to health. The work of Cockerham highlighted the role of socio- cultural constraints and framework, as well as the role of previous habits and personal and social meaning of health in the adoption of lifestyles and in the change of them. From this point of view, cross-national comparisons are very useful to gain a deeper understanding of the dynamics of healthy choices. Our research project is based on these theoretical and practical approaches, with the awareness that further research is required and that since the first phases of life, it is important to take care of all these aspects. We are also aware that it is not a simple task to address these aspects because it is not simple to promote healthy lifestyles, due to the complex relationship between choices, opportunities, and information. Even when new behavioral models are proposed they need to be used in daily life and to be integrated with previous experiences. According to literature, we believe, that the role of schools is central in the promotion of health in infants, children and adolescents. Moreover, we believe that lifelong learning is central during adulthood and ageing. With this book and this project, we aimed to offer a contribution in this area of study.

In each chapter of this book, we addressed complex topics, like health, promotion of health and ageing, according to the general agreement on the need to discuss these topics with general public to promote the increase of healthy life expectancy and to prevent age-related disorders and age-related diseases, to prevent non-communicable disorders and to promote healthy lifestyles. Because this is not a very simple task, a good cooperation between researchers, scientists and clinicians is crucial to study how to promote health. Moreover, a good cooperation be-

tween research and governments and policy decision makers is central in the spread of knowledge in the field and in the definition of public programs aimed to disseminate knowledge and attitudes towards health and healthy lifestyles. Finally, it is very important that people gain knowledge of all the role of healthy lifestyles and insert this knowledge in their daily life. With this regard, the role of school and of education is very central. Health is a goal to be addressed in each day of life and in each phase of life. Again, "ageing well" is another goal to be addressed early in life. With this book and with the Project "Longevity, we tried to offer a contribute to this field, with a cross-national approach and, even with the awareness that there is a great work to be done. We hope that our work could be useful for individuals that aim to increase their quality of life and their health.

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