VIRTUAL & AUGMENTED REALITY TOOLKIT TO ENGAGE ELDERLY BRAIN WITH INTER-GENERATIONAL UNDERSTANDING

ERASMUS+ PROJECT

# Intellectual Output 1-A2:

# CARE AWARENESS GUIDE

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# Contents




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# INTRODUCTION

Technological change and population ageing are affecting how we work, and many adult learning systems are poorly prepared for the challenges ahead so, adult learning systems need to face the changing needs of the labour market and society. The share of elderly people in the EU continues to increase. The elderly population is known to play an essential role in the world economy and society on a global scale but they tend to be "excluded" from several opportunities. Therefore, the European Commission defined as part of its inclusion policy, the goal of fostering 'active ageing' to contribute to the economy and society.

(VR) and (AR) technologies are finding applications to help the elderly improve their lives. There is thus a need that both VR and AR are exploited within the EU to help elderly citizens to live longer, healthier, and independently. This combination of health and ICT tools is currently not covered in the key competencies of adult education and to get future-ready, we must anticipate these skills to design of a better adult learning policy.

"Virtual & Augmented Reality Toolkit to Engage Elderly Brain with Inter- Generational Understanding-VARTES" Project, funded by Spanish National Agency under the Erasmus+ Program Key Action 2 Strategic Partnerships, aims to empower adult trainers and trainees in Care Attendance and IT with skills that will help to improve elderly' lives, using a peer cooperative approach. They will help each other to co-create joint solutions involving VAR (Virtual and Augmented Reality) that will enhance the elderly life and memory by using an intergenerational approach. It also wants to foster an entrepreneurial spirit in Adult learners and to motivate them to exploit further content addressed to the needs of more elderly using VAR. Participants will implement the VAR content on more elderly and will get the tools for acquiring entrepreneurial skills related to the topic. For more info about VARTES project, the partnership, its outputs, and other activities, you can visit VARTES project website.

# CARE AWARENESS GUIDE

The potential co-presence triggered by VR and AR are playing an increasingly significant role and especially in the world of the elderly. Because of this, VARTES project prepared the Intellectual Output 1 called "Digital Guidelines For Adult Training in Intergenerational Understanding Using VAR". These Digital Guidelines aim to help adult students and trainers learn about how to achieve the cognitive rehabilitation training and knowledge stimulation of the elderly population by using Virtual and Augmented reality tools. The Digital Guidelines of VARTES project will also help to improve the curricula of the participants on fields not previously designed for them. At the same time, they will contribute to helping to support and understand a social sector that needs to be more included in society.

The Digital Guidelines have three parts:

- VR and AR Empowerment Guide
- Care Awareness Guide
- Training Videos

Care Awareness Guide offers complete information and guidelines related to elderly care in eight sections. In the first section, common facts about health in the elderly, the definition of ageing and classification of ageing, and healthy ageing will be explained and detailed information will be given. In the second section, changes that occur in the elderly's body and mind will be explained detail. Especially changes in the cardiovascular system, respiratory system, gastrointestinal system, urinary system, endocrine system, nervous system, immune system, musculoskeletal system, and sensory changes will be clarified.

After giving information about the common facts about health in the elderly and the changes that occur in the elderly' body and mind, the ways and techniques to empower the elderly with cognitive skills will be discussed in the third section. In this section, detailed information will be given about preserving and maintaining physical health, management of high blood pressure, healthy nutrition, being physically active, keeping the mind active, participating in social activities, stresses management, and reducing cognitive health risks. In the fourth section, the importance of safety for the health of the

elderly will be explained, and a list of safety, which should be posted in a corner of the house to raise the awareness of the elderly and those around them, will be given.

In the fifth section, how cultural / learning issues can improve the life and health of the elderly will be explained. In the sixth section, intergenerational strategies to interact with the elderly will be discussed. After giving detailed information about these issues, important points for care in the elderly will be discussed in the seventh section.

Finally in the eighth section, how conditions the elderly face as they age should be taken into account when creating VAR content for them will be discussed. Thus, caregivers, families, and the elderly will know how to use VAR to increase the life quality of the elderly.

This guide will be essential to learn the difficulties the elderly face when creating customized VAR tools for them and learn about the methodology needed to empower them to share their knowledge and to acquire a new one.

## 1. Common Facts about Health in Elderly

The world's population reached 7.7 billion in mid-2019, by having added one billion people since 2007 (World Population Prospects 2019). People worldwide are living longer and getting older (Ageing and Health, 2018; Buskens et al., 2019). The number of people aged 60 years and older in the population is increasing. In 2019, the number of them was one billion and it is estimated that this number will increase to 2.1 billion by 2050 (Preston & Biddell, 2020). While life expectancy at birth for the world's population reached 72.6 years in 2019 and it is estimated that the average length of life globally of around will be 77.1 years in 2050 as a result of further improvements in survival (World Population Prospects 2019). For more information on World Population Prospects, scan QR Code 1).

QR Code 1:
World Population Prospects 2019.

Ageing is a lifelong process and it is a natural, ongoing, universal, and heterogeneous phenomenon (Buskens et al., 2019; del Pilar Díaz-López, López-Liria, Aguilar-Parra, & Padilla-Góngora, 2016). It is classified as biological ageing, psychological ageing, social ageing, chronological ageing, and functional ageing (Chalise, 2019).

- Chronological ageing is defined as "the number of years a person has lived so far".
- Biological ageing is defined as "involves the loss of cells over time".
- Psychological ageing is defined as "involves changes in memory, learning, intelligence, personality, and coping".
- Social ageing is defined as "the changes in roles and relationships as we age".
- Functional ageing is related to how people compare psychologically to others of similar age (Chalise, 2019).

Life expectancy throughout the world has increased dramatically over the past century (Chia, Egan, & Ferrucci, 2018). Improved health care, hygiene, appropriate medical care, and healthier lifestyles have contributed to this advantage (Borras et al., 2020). The ageing population presents opportunities, such as a chance to pursue new activities – education, a new career, etc. ("Ageing and Health," 2018). The vast majority of elderly

live in the community and adapt well to the changes (Bonder & Dal Bello-Haas, 2017). Many of them continue to participate in meaningful occupations that contribute to the quality of life (Bonder & Dal Bello-Haas, 2017). Furthermore, it contributes to the intergenerational transferring of cultural knowledge and values.

Increased life expectancy also brings about some challenges related to physical, social, and cognitive changes by ageing (Rodrigues, Herdeiro, Figueiras, Coutinho, & Roque, 2020). Complex physiological, social, economic, and psychological challenges often present themselves by age (Mauk, 2018). Many of the alterations are characterized by a decline in physiological reserve (Boltz, 2016). While every elderly is different from each other, as it is known physical and mental capacity tend to decline during ageing (Gemma, 2020). Age-related changes are strongly impacted by genetics as well as by long-term lifestyle factors, such as diet, alcohol consumption, tobacco use, and physical inactivity (Boltz, 2016).

The changes with age often cause to decline in bodily functions (Chalise, 2019). The elderly often have multiple conditions that interact to affect function (Bonder & Dal Bello-Haas, 2017). However, a decline in function is different from the loss of function that results from diseases (Chalise, 2019). Age-related changes predispose the elderly to selected diseases (Boltz, 2016). The major population burdens of disability and death in people over 60 arise from age-related losses in hearing, seeing, and moving, and conditions, such as dementia, heart disease, stroke, chronic respiratory disorder, diabetes, and osteoarthritis (World Health Organization, 2017).

Changes that occur with age strongly affect the health and functional status of the elderly (Boltz, 2016). Some of these will be chronic, such as osteoporosis, arthritis, and diabetes, superimposed may be acute illnesses, such as urinary tract infections of influenza (Bonder & Dal Bello-Haas, 2017). At the biological level, ageing results from the impact of molecular and cellular damage over time (Ageing and Health, 2018). Physical changes due to ageing can occur in almost every organ and can affect the elderly health and lifestyle. Physical injuries, mobility and balance impairments, dental problems are particularly common among older adults (Ástvaldsdóttir et al., 2018; Bobić Lucić & Grazio, 2018). Beyond biological changes, ageing is also associated with other life transitions, such as retirement, and the death of relatives (Ageing and Health, 2018). As people get older, physiological changes occur in their bodies as a natural part of ageing

(Gemma, 2020). Some of the challenges of elderly are losing friends, grappling with the meaning of life, maintaining the quality of life during increased disability, adapting to the retirement process, and contemplating death (Mauk, 2018). In this way, depression, social isolation, and loneliness are particularly common among older adults who are susceptible to the effects of those (Dury, 2014; Wiederhold, 2018).

Health is a key determinant for not just adding more years to life, but adding more life to years (Mauk, 2018). In other words, living longer does not always mean we will also have a better or a good quality of life in later years (Chalise, 2019). Although once thought of as merely the absence of disability and chronic disease with longevity, the term healthy ageing has evolved to mean much more (Marsman et al., 2018). World Health Organization (WHO) defines healthy ageing as "the process of developing and maintaining the functional ability that enables wellbeing in older age." Functional ability is about having the capabilities that enable all people to be and do what they have reason to value. This includes a person's ability to: meet their basic needs; learn, grow and make decisions; be mobile; build and maintain relationships; and contribute to society (Ageing: Healthy ageing and functional ability, 2020).

QR Code 2:
The Decade of Healthy Ageing.

Healthy ageing is the focus of WHO's work on ageing between 2015 – 2030 ("Ageing: Healthy ageing and functional ability," 2020). The Decade of Healthy Ageing (2021-2030) was endorsed by the 73rd World Health Assembly on 3 August 2020 (For more information on the decade of healthy ageing, scan QR Code 2). The United Nations General Assembly welcomed the Decade proposal and decided to proclaim 2021-2030 the United Nations Decade of Healthy Ageing on 14 December 2020 ("Decade of Healthy Ageing," 2020). In light of the current situation, it supplies an opportunity to bring together governments, civil societies, international agencies, academia, the media, and collaborative action to improve the lives of older people, their families, and the communities in which they live.

The interest in ageing has progressed from understanding its origins, mechanisms, and processes, to studying how to reduce, delay, or reverse its effects (Marsman et al., 2018). Declining health and cognitive or physical functioning may necessitate moving to supportive care environments for the elderly (Mauk, 2018). Being able to live in

environments that support and maintain the elderly intrinsic capacity and functional ability is key to healthy ageing (Ageing: Healthy ageing and functional ability, 2020). For this purpose, countries are supposed to plan for population ageing and ensure the well-being of older persons by ensuring access to age-appropriate health care services, lifelong learning opportunities, and formal and informal support networks (World Population Prospects 2019). To sum up, designing interventions, educating patients and caregivers about the age-related alterations, and sharing information with the healthcare team will all serve to ensure optimal care for the elderly (Boltz, 2016).

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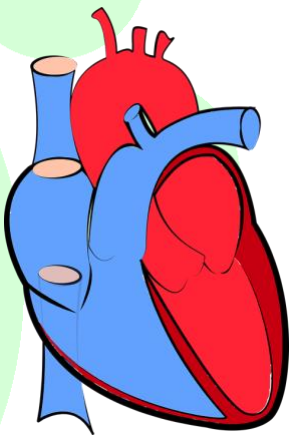
## 2. Changes That Occur In Their Body and Mind

Ageing is an unavoidable and irreversible process in human beings (Jaul & Barron, 2017; Marotta, Zampini, Tinazzi, & Fiorio, 2018). While individuals differ from one another in the timing, rates, and shape of life-span trajectories of physical and cognitive change, all organ systems are exposed to physiological ageing albeit at different rates (Navaratnarajah & Jackson, 2017; Tucker-Drob, 2019). It is well known that ageing is an important risk factor for most diseases and conditions that limit health span (Franceschi et al., 2018). The ageing body experiences several changes that may increase vulnerability to disease (Chun, 2020). Oxidative stress and protein modifications have been forwarded as significant etiological factors of ageing-related changes (Larsson et al., 2019).

### 2.1.Cardiovascular System



Cardiovascular disease remains the most common cause in death of older adults (Jaul & Barron, 2017). Cardiac reserve declines in normal ageing (Boltz, 2016). Ageing decreases the heart rate, cardiac output, maximum exercise level and elevates systolic blood pressure (Nagaratnam, Nagaratnam, & Cheuk, 2016b). Ageing heart cells cause to diminish capacity to use oxygen that may cause decreased tolerance for physical work (Linton, 2015). Decreased functional reserves result in reduced exercise tolerance, fatigue, shortness of breath, and tachycardia (Boltz, 2016). In the elderly, there may be some changes in the cardiac cavity, the response of receptors, valves of the hearth, and coronary arteries.

- Combined right and left ventricular failure is most common in the elderly (Nagaratnam et al., 2016b). The left ventricular wall thickens, left atrium hypertrophies, valves calcify and the heart fills with blood more slowly (Duque, 2016; Nagaratnam et al., 2016b).
- The sympathetic response in the heart is blunt in the elderly because of decreased beta-adrenergic responsiveness (Boltz, 2016; Nagaratnam et al., 2016b).
- Baroreceptor function is impaired with age (Boltz, 2016). Impaired baroreceptor sensitivity results from chronic hypertension and reduced arterial compliance

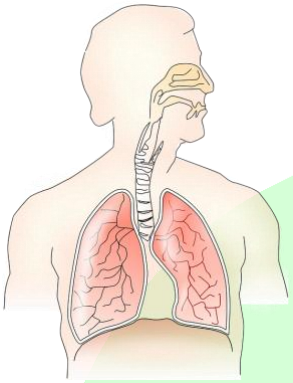
(Hechtman, 2020). After prolonged bed rest, dehydration, and cardiovascular drug use, postural hypotension symptoms can occur (Boltz, 2016).

- Valvular heart disease increases with age (Boltz, 2016). Age-related changes include sclerosis of atrial and mitral valves. Because of these alterations, valves' tight closure impairs and the risk of dysfunction occurs (Boltz, 2016). Aortic and pulmonic valves become stiffer and if they do not close completely, murmurs result (Linton, 2015). The number of pacemaker cells in the sinoatrial node decreases. This increases the risk of atrial fibrillation of elderly (Boltz, 2016)
- With ageing the heart and blood vessels become stiffer, thicken (Duque, 2016). By age 20, thickening and calcification or the intimal layer of the aorta and coronary arteries are evident (Linton, 2015). Age-related thickening of the arterial wall and inflammation play an important role in atherogenesis (Chun, 2020; Nagaratnam et al., 2016b). An increase in the wall thickness and stiffness of the aorta and carotid arteries diminish vessel compliance and greater systemic vascular resistance (Boltz, 2016). Arteries lengthen, dilate, and become more rigid (Linton, 2015). Isolated systolic hypertension is the most common form in the elderly because of arterial stiffness (Nagaratnam et al., 2016b). By 70 years of age, the systolic blood pressure commonly increases to approximately 150 mm Hg, and the diastolic blood pressure increase to approximately 90 mm Hg (Linton, 2015). Vascular changes, hypertension, and atherosclerosis increase the risk of heart disease, myocardial infarction, stroke, and renal disease (Chun, 2020; Linton, 2015).

The carotid disease results from atherosclerosis leading to plaque formation, plaque ulceration, narrowing of the vessels in the thromboembolism, and carotid embolic disease (Nagaratnam et al., 2016b). Many older adults have a blunted baroreceptor response such that the body is not able to adapt to decreases in blood pressure (Chun, 2020). So that many daily activities, such as excretion, postural changes, and eating may cause syncope in the elderly (Nagaratnam et al., 2016b).

## 2.2. Respiratory system

The normal ageing process changes the pulmonary system and decreases its structural, physiologic, and immunologic reserve (Tran, Rajwani, & Berlin, 2018). Respiratory function slowly and progressively deteriorates with age. Normal lung function begins to decline after the third decade of life (Tran et al., 2018). Several age-related changes combine to impair the functional reserve of the pulmonary system (Boltz, 2016). With ageing, respiratory muscles lose strength, lung tissues lose elasticity, the alveolar surface area diminishes, and lung capacity is reduced (Knight & Nigam, 2017). While tidal volume is relatively stable with ageing, residual volume increases (Linton, 2015). Changes in the lung parenchyma, airway, chest wall, and respiratory muscles cause functional decline (Tran et al., 2018). The net result of these changes is a decrease in the alveolar surface area because of the reduced efficient gas exchange (Bonder & Dal Bello-Haas, 2017).



It is known that cough reflexes and ciliary action are less effective during ageing (Linton, 2015). Reduced coughing reflex and a decline in ciliary activity the respiratory system is less able to expel inhaled irritants and pathogens in the elderly (Knight & Nigam, 2017). Pulmonary secretions are handled less effectively (Linton, 2015). The ventilatory response to either a hypoxic or a hypercapnic stimulus is blunted in the elderly (Navaratnarajah & Jackson, 2017). The modifications in ventilator capacity with age are reflected in changes in pulmonary tests measuring lung volumes, flow rates, diffusing capacity, and gas exchange (Boltz, 2016). Because of these age-related changes in the respiratory system, both community and hospital-acquired respiratory tract infections are a major risk factors for them (Knight & Nigam, 2017).

## 2.3. Gastrointestinal System

Age-related alterations in the oral cavity can affect the nutritional status of the elderly (Boltz, 2016). The elderly complains about dry mouth due to decreased saliva secretion (Akdeniz, Kavukcu, & Teksan, 2019). Decrease in saliva secretion, decrease in muscle strength in jaw muscles and tongue, loss of teeth, decrease in sense of smell and taste make feeding the elderly difficult (Akdeniz et al., 2019). Deterioration in the strength of

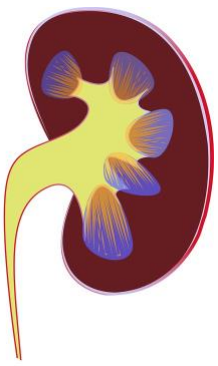
muscles of mastication, tooth loss, medications, and xerostomia because of dehydration may reduce food intake (Boltz, 2016)

Age-related changes occur in esophageal function (Akdeniz et al., 2019). Swallowing becomes slower and less efficient with age (Boltz, 2016). Pharyngeal muscle weakness and reduced peristalsis of the esophagus lead to an increased risk of reflux and aspiration (Preston & Biddell, 2020). Secretion of hydrochloric acid and pepsin decrease and an associated small rise in gastric pH (Navaratnarajah & Jackson, 2017). Chronic atrophic gastritis is more common in the elderly and is associated with helicobacter pylori infection (Gao, Zhang, & Brenner, 2017). An increased prevalence of atrophic gastritis and delayed gastric emptying cause to increased susceptibility to mucosal damage (Preston & Biddell, 2020).

Ageing is associated with several changes in gastrointestinal physiology and function, which can impact the amount and types of nutrients delivered to the small intestine and colon (An et al., 2018). The colon is the gastrointestinal organ most affected by ageing. Stool storage capacity and transit time are prolonged due to mucosal changes, decreased motility, and weakening of muscle structure (Akdeniz et al., 2019). Prolonged transit time associated with ageing can result in constipation (Navaratnarajah & Jackson, 2017). Moreover, there is an alteration of the hepatic metabolism of medications (Preston & Biddell, 2020). Associated with changes in the hepatic system, clearance of a range of medications, such as benzodiazepines declines to result in increased dose-dependent adverse reactions (Boltz, 2016).

### 2.4. Urinary System

In the ageing population, there is a reduction in the number, size, and functions of nephrons, sclerosis of the glomeruli, and thickening of the glomerular basement membrane (Akdeniz et al., 2019; Preston & Biddell, 2020). The glomerular filtration rate is impaired (Navaratnarajah & Jackson, 2017). Moreover, the activity of regulatory hormones diminishes by age. Age-related changes of the kidney decrease the ability to adapt to acute ischemia and heighten susceptibility to acute and chronic kidney diseases (Akdeniz et al., 2019; Navaratnarajah & Jackson, 2017; Preston & Biddell, 2020).



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Age-related changes in the lower tract include reduced bladder elasticity and innervation that cause decreases in urine flow rate, voided volume, and bladder capacity (Boltz, 2016). In older men, benign prostatic hyperplasia can result in urinary urgency hesitancy and frequency (Boltz, 2016). Besides changes in the urinary tracts, such as increased vaginal pH and decreased antibacterial activity of urine contribute to the development of bacteriuria (Boltz, 2016).

### 2.5. Endocrine System

The certain effects of ageing on the endocrine system are not clear. The endocrine system has not been implicated as the direct cause of ageing (Goodman & Fuller, 2020). While the endocrine glands atrophy to varying degrees, they can still maintain normal function in the absence of stressors (Hechtman, 2020). Age-related cellular damage and chronic wear and tear might contribute the endocrine gland dysfunction or alterations in the responsiveness of target organs (Goodman & Fuller, 2020).

The thyroid gland becomes smaller and fibrotic. Both hypo- and hyperthyroidism are more common in the elderly (Preston & Biddell, 2020). The parathyroid gland has tissue changes by age however the parathyroid hormone level has no major change (Goodman & Fuller, 2020). However parathyroid hormone levels are increased with ageing and this is implicated in the development of osteopenia and osteoporosis (Hechtman, 2020).

### 2.6. Nervous System

It is well known that there are pervasive changes throughout various regions of the brain across age (Juan & Adlard, 2019). Some of the age-related changes in the brain are decreased intracerebral blood flow, changes in neurotransmitter levels, cognitive impairment, and reductions in the neuron population (Duque, 2016). Ageing produces a decrease in neural density and there is an age-related deficiency of important central neurotransmitters, including catecholamines, serotonin, and acetylcholine in the elderly (Navaratnarajah & Jackson, 2017). Mild short-term memory loss, word-finding difficulty, and slower processing speed are the normal processes of ageing (Jaul & Barron, 2017). There is a significant reduction in signal transduction rate within the brainstem and spinal cord (Navaratnarajah & Jackson, 2017).

Human cognitive function changes throughout the life span, from infancy through old age (Tucker-Drob, 2019). In the general population, average levels of cognitive function increase across childhood, peak in adulthood, and decline into old age (Tucker-Drob, 2019). It is important to note that the rate and degree of cognitive decline vary widely across individuals (Harris & Korolchuk, 2019). For example, some 70 years olds have better memory than other 60 year olds. This may be caused by biological, psychological, health-related, environmental, and lifestyle factors and mechanisms. Cognitive function is an umbrella term that encompasses many different distinct cognitive abilities, such as fluid reasoning, processing speed, spatial ability, working memory, episodic memory, learning, crystallized knowledge, procedural knowledge (Tucker-Drob, 2019).

Although cognitive decline is inevitable, the extent to which it occurs and the rapidity of onset varies among individuals. There is much evidence that cognitive decline is not uniform among people. The symptoms of cognitive decline associated with aging include: Slower inductive reasoning / slower problem solving, diminished spatial orientation, declines in perceptual speed, decreased numeric ability, losses in verbal memory, and few changes in verbal ability.

Figure 1 shows how these functions decline with age. It can be seen in the Figure 1 that there are almost no changes in verbal ability with age, but spatial orientation has a severe drop with age.

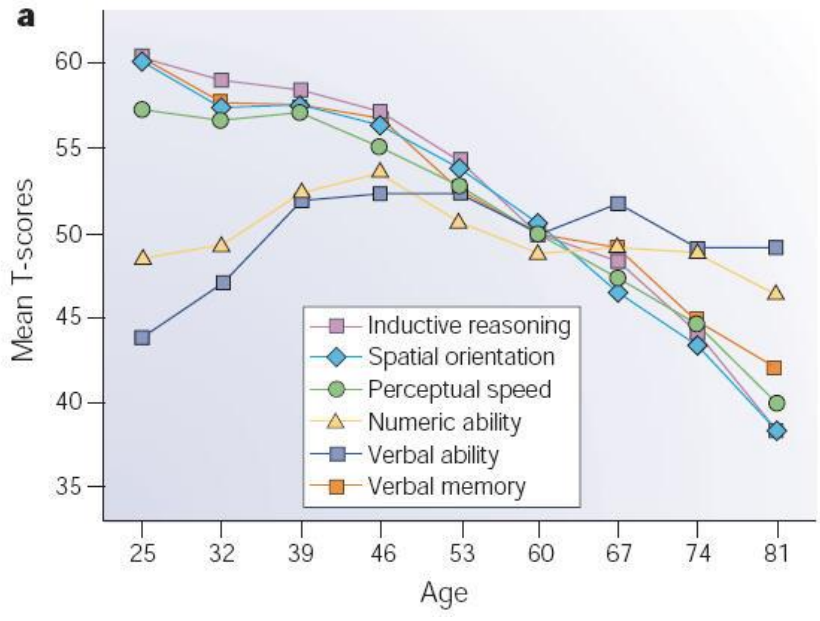


Figure 1. Cognitive Decline with Ageing (Source: The biology of aging. https://sphweb.bumc.bu.edu/otlt/MPH-Modules/PH/Aging/mobile_pages/Aging5.html)

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A variety of risk factors can cause cumulative damage to the brain with age and give rise to cognitive impairments (Murman, 2015). These factors include damage to the brain due to cerebral ischemia, head trauma, alcohol, excess stress hormones, or the development of degenerative dementia, such as Alzheimer's (Murman, 2015).

Cognitive impairment and dementia may be associated with depressive symptoms. People with dementia often present with complaints of mood or behavioral problems, such as apathy, loss of emotional control, or difficulties carrying social activities (Organization, 2017).

Alterations of cognitive function result in age-associated reduction in speed of processing and memory (Navaratnarajah & Jackson, 2017). The term "memory" is usually used the describe various types of memory including sensory memory, short-term memory, working memory, long-term memory, and prospective memory (Bonder & Dal Bello-Haas, 2017).

Ageing is an important risk factor for the development of neurodegenerative diseases including Alzheimer's disease (AD), Parkinson's disease, and Huntington's disease (Juan & Adlard, 2019). However, not all brain functions decline with age (Jaul & Barron, 2017). Cumulative knowledge and experiential skills are well maintained into advanced age (Murman, 2015).

The population of the elderly is unique and requires a thorough understanding of the life span including healthy cognitive ageing (Bonder & Dal Bello-Haas, 2017). Understanding the complex pattern of cognitive ageing can facilitate the development and implementation of training programs and interventions (Bonder & Dal Bello-Haas, 2017).

### 2.7. Immune System

There are a wide variety of age-related changes in the immune system, some mediated by chronic inflammation and a chronic pro-inflammatory state (Jaul & Barron, 2017). Loss of lymphoid tissue and related decrease in immune functions during ageing is called immune ageing (Akdeniz et al., 2019).

These age-related changes of the immune system can cause severe viral and bacterial infections because vaccination efficacy declines with age (Boltz, 2016). The

immunological consequences of reduced B- and T-cell functions include the reduced ability to generate immune memory to novel antigens. As a result of this, the reduced vaccine efficacy and increased vulnerability to certain infections in the elderly (Titorenko, 2019). For instance, influenza vaccinations have a protection rate of only 56% in the elderly (Boltz, 2016).

### 2.8. Musculoskeletal System

The musculoskeletal system performs many functions. The skeletal bones supply a structure that gives the body its shape. The bone marrow produces erythrocyte, leukocytes, and platelets. The muscles provide a power source to move the bones (Williams, 2016). Because the amount of collagen decreases with age, the flexibility of ligaments, tendons, muscles, and joints decline and this affects muscle function over time (Harris & Korolchuk, 2019). Changes in bones, muscles, and joints and especially degeneration in intervertebral discs cause neck shortening and posture disorders in the elderly (Akdeniz et al., 2019).

Ageing reduces the density of cells in joint cartilages (Akdeniz et al., 2019). Age-related changes in the joints are associated with pain and stiffness, which can affect mobility and predispose to falls (Duque, 2016). As the number of chondrocytes and their ability to repair tissue decreases with age, the cartilage hardens and shrinks and undergoes erosion (Akdeniz et al., 2019).

Skeletal muscle is a vital organ to the body and muscle mass and strength decline starting in the fourth decade of life (Jaul & Barron, 2017; McCormick & Vasilaki, 2018). The ageing process is characterized by a decrease in muscle mass and strength (Akdeniz et al., 2019).

Age-related muscle atrophy is associated with significant impairment of function, such as slowing of movement and muscle weakness, and leads to the loss of independence of the elderly (Larsson et al., 2019; McCormick & Vasilaki, 2018). The most prominent morphological changes in muscles are a decrease in the number and size of muscle fibers, a decrease in capillaries, increase in interstitial spaces and connective tissue (Akdeniz et al., 2019). Postural changes can occur as a result of age-related loss of lower limb muscle mass (Duque, 2016).

Insufficient calcium intake and excessive loss of calcium from bone may result in osteoporosis. Osteoporosis makes the bones porous, brittle and fragile (Williams, 2016). Loss of gonadal functions and ageing are two important factors contributing to the development of osteoporosis (Akdeniz et al., 2019). People that have osteoporosis can easily have fractures of the hip, ribs, clavicle, and wrist because of simple traumas or falls (Williams, 2016).

## 2.9. Sensory Changes

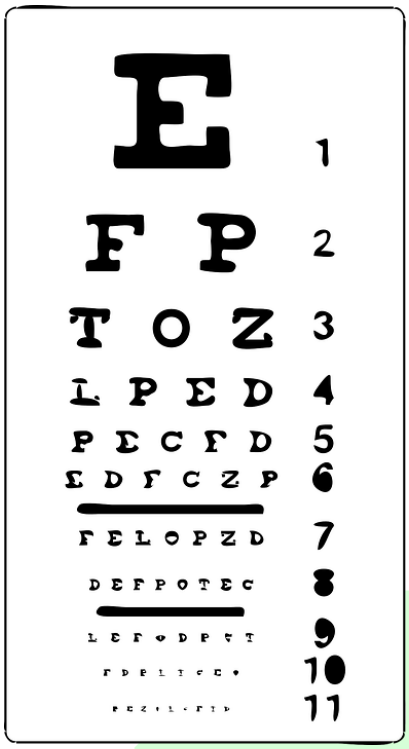
The brain may be impaired in its integration of normal afferent signals on vision, smelling, and hearing (Duque, 2016). Impaired sensory functioning impacts the quality of life of older people. The effect of sensory impairments in the elderly includes not only bodily functions and capacity for action, but also depression and social isolation (Tseng, Liu, Lou, & Huang, 2018).

### *2.9.1. Hearing*

Hearing disorders are most common in the elderly (Löhler et al., 2019). The most common hearing disorder in the elderly is peripheral presbycusis (Fioretti, Poli, Varakliotis, & Eibenstein, 2014). Changes within the cochlea, increased earwax production with ageing and presbycusis, contribute to difficulty hearing (Fioretti et al., 2014; Jaul & Barron, 2017). On the other hand, in the inner ear, changes, such as the loss of elasticity of the eardrum with age, calcification in the middle ear ossicles, the loss of elasticity of the vessels leading to the ear, and the inability to carry enough blood is observed (Akdeniz et al., 2019). Changes to the vestibular system of the inner ear cause balance problems in the elderly (Knight, Wigham, & Nigam, 2017).

### *2.9.2. Vision*

Eye and vision are affected both structurally and functionally by ageing (Akdeniz et al., 2019). Age-related changes of eyes are first noticed as problems with near work due to loss of accommodation and later as decrease in visual acuity due to changes in the lens and retina (Rizzo, Anderson, & Fritzsch, 2018). Glaucoma and corneal dryness are the most common problems in the elderly.



- Another age-related change in the eye is glaucoma as a result of increased lens thickness (Rizzo et al., 2018). Glaucoma is initially characterized functionally by loss of peripheral vision (Rizzo et al., 2018).
- With age, the lacrimal glands produce fewer tears and the wetting efficiency and stability of the tear are reduced (Knight et al., 2017). Corneal dryness, secondary abrasion, redness, and irritation may develop as the eyelids cannot completely close the eye during sleep due to the loss of strength in the eye muscles (Akdeniz et al., 2019). Age-related visual impairments predispose to some problems, such as falls by limiting the capacity to perceive and interact with stimuli from the environment (Duque, 2016).

### *2.9.3. Taste and smell*

Glandular atrophy is the most common change in the nose during ageing. Atrophy of goblet cells and submucosal serous glands causes its density to increase while decreasing the amount of mucus produced (Akdeniz et al., 2019). Alterations related to taste and smell may lead to poor appetite and weight loss in the elderly (Ogawa, Annear, Ikebe, & Maeda, 2017). A decreased appetite also may result in a side effect of medications.

### *2.9.4. Skin*

Although some structural and functional changes that occur in the skin with ageing do not threaten life, they may adversely affect the quality of life (Akdeniz et al., 2019). Ageing skin shows greater sensitivity to excessively dry skin (xerosis) and irritant dermatitis (Akdeniz et al., 2019). With age, thinning of the epidermis and reduction of fibroblasts, mast cells, subcutaneous tissue, and vascular structure lead to increased susceptibility to shearing and friction skin breaks, as well as pressure damage (Akdeniz et al., 2019; Preston & Biddell, 2020). Reduced vitamin D synthesis in the skin leads to decreased calcium absorption and predisposes to osteopenia and osteoporosis (Hechtman, 2020).

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### *2.9.5. Sleep Disturbances*

Ageing is associated with a reduced ability to initiate and maintain sleep (Mander, Winer, & Walker, 2017). Melatonin release secreted by the brain during sleep, especially at night, decreases due to changes in the sleep cycle in the elderly (Ağar, 2020). Chronic diseases, which are more common with age, depression, anxiety, and fear of death, pain, nocturia, and some medications can cause insomnia, and elderly patients often express that they cannot sleep due to decreased sleep quality (Ağar, 2020).

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## 3. How to Empower Elderly with Cognitive Skills

Cognitive health is the ability to think, learn, and remember, and an important component of performing daily activities (U.S Department of Health and Human Service National Institute of Aging, 2020) (For more information about cognitive health, scan QR Code 1). People experience both physical and cognitive changes as they age (Rut, Jose, & Antonieta, 2018). Active agieng is a process in which a person continues to use and even develops his strengths by focusing on them rather than his losses. It is known that individuals experience deficiencies especially in the areas of attention, memory, visual and auditory perception with ageing, on the contrary, active elderly people have more internal memory strategies by overcoming the average obstacles and they are less distracted (Ebaid et al., 2019; André et al., 2018).

QR Code 1:
U.S. Department of Health and Human Service National Institute of Aging.

Older adults are more afraid of losing their mental abilities than their physical abilities. Besides, it is suggested that new approaches arising from a better understanding of risk factors for cognitive impairment are much more promising than current drug therapies (Kueider, Krystal, & Rebok, 2014).

Cognition is the combination of processes such as attention, learning, and reacting to surrounding objects, using language and memory. If cognition becomes weak, the person may have difficulty performing daily tasks. In a study done by Sala et al. (2019), it has been found that the participation of elderly people in leisure activities (playing shogi, practicing tai chi, and going to a public bath) contributes to three basic dimensions of successful ageing (i.e. cognitive function, physical function, and mental health). This study supports the view that an active lifestyle in elderly people is a universal and culturally independent tool that does not change between different countries and cultures and contributes to successful ageing (Rebok et al., 2014).

Structural and functional changes in the brain are related to age-related cognitive changes, including changes in neuronal structure without neuronal death, loss of synapses, and dysfunction of neuronal networks. Age-related diseases accelerate the rate of neuronal dysfunction, neuronal loss, and cognitive decline, and cause severe cognitive disorders

that disrupt daily life activities in many people. However, it is stated that healthy lifestyles can reduce the rate of cognitive decline seen with age and help delay the onset of cognitive symptoms in cases of age-related diseases (Murman, 2015). Although it is thought that the loss of cognitive functions (memory, attention, maintaining social relationships, coping with diseases) is inevitable with ageing, human and animal studies show that the brain can be shaped in every period of life (Kueider, Krystal, & Rebok, 2014). It is stated that engaging in mental stimulation activities can increase cognitive reserve (Cheng, 2016). In a study done by Kouzuki et al. (2020), it has been found that physical exercise, cognitive training, and education on lifestyle habits improve cognitive and physical function in elderly individuals with suspected mild cognitive decline.

Protecting the physical health of the elderly can help maintain cognitive health. In addition to characteristics such as genetics, personality, and mood, it is also important to adopt and implement healthy lifestyles and to carry out mental activities in the protection of cognitive functions in old age and preventing or delaying impairments. It has been stated that there is a link between the protection of physical health in the elderly, controlling high blood pressure, healthy eating, being physically active, keeping the mind active, participating in social activities, stress management, and reducing risks to cognitive health and cognitive health (U.S Department of Health and Human Service National Institute of Aging, 2020).

### 3.1. Preserving and Maintaining Physical Health

- Recommended health screening should be done.
- Chronic health problems, such as diabetes, high blood pressure, depression, and high cholesterol, should be managed.
- Healthcare professionals should be consulted about the drugs used and the possible side effects of these drugs on memory sleep and brain function.
- The risk of brain injuries caused by falls and other accidents should be reduced.
- Limiting alcohol use (some drugs can be dangerous when mixed with alcohol).
- Smoking should be quit.
- Adequate sleep (seven to eight hours) (U.S Department of Health and Human Service National Institute of Aging, 2020).

### 3.2. Management of High Blood Pressure

Preventing or controlling high blood pressure can help not only your heart but also your brain (U.S Department of Health and Human Service National Institute of Aging, 2020). Hypertension is a risk factor that can be modified by antihypertensive therapy, which reduces the risk of stroke and potentially slows down cognitive decline. However, optimal blood pressure levels have not yet been determined to maintain ideal age-related mental performance (Tadic et al., 2016). Regularly taking a drug, stress management, a diet without a salt, healthy diet, regular exercise, and regularly monitoring blood pressure are important for optimal blood pressure level.


### 3.3. Healthy Nutrition

Healthy nutrition can help to reduce the risk of many chronic diseases, such as heart disease and diabetes, and keep the brain healthy. Researchers are investigating whether healthy nutrition can help preserve cognitive function and reduce Alzheimer's risk (U.S Department of Health and Human Service National İnstitute of Aging, 2020). For example, it has been found that there is some evidence that people who consume the Mediterranean diet have a lower risk of developing dementia. Moreover, the researchers have developed another diet called the Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) (U.S Department of Health and Human Service National Institute of Aging, 2020). Research observing changes in the thinking of people consuming the Mediterranean or MIND diet suggests that this may help the brain. There are several studies done on healthy nutrition by Mosconi et al., (2018), Berti, Walters, Sterling, & Quinn, (2018), Morris et al., (2016), and Keenan et al., (2020).

### 3.4. Being Physically Active

It is stated that being physically active by doing regular exercise, household chores, and performing other activities has many benefits. It is also stated that physical activities;

- Preserve and develop strength,
- Cause more energy,
- Provide a healthy balance,
- Prevent heart disease, diabetes, and other concerns,
- Help stay mentally healthy and reduce depression (U.S Department of Health and Human Service National Institute of Aging, 2020).

Present studies show that although a strong relationship between physical activity and prevention of Alzheimer's disease has not yet been determined, there is a positive relationship between sustained physical activity and brain and cognition. (U.S Department of Health and Human Service National Institute of Aging, 2020). There are several studies done on the effects of physical activity for better cognitive skills by Dougherty et al., (2017) and Andre et al., (2018).

### 3.5. Keeping the Mind Active

People who engage in personally beneficial activities such as volunteering or hobbies report that they feel happier and healthier. Learning new skills can improve thinking ability (U.S Department of Health and Human Service National Institute of Aging, 2020). There are several studies done on how to keep mind activity for better cognitive skills by Park, et al, (2014) and Tennstedt and Unverzagt, (2014).

### 3.6. Participating in Social Activities

Connecting with other people through social activities and community programs can keep the brain active and help you feel less isolated and more engaged with the world around us. There are several studies done on the benefits of participating in social activities for better cognitive skills by Cacioppo et al., (2016) and Fu, Li, & Mao, (2018).

### 3.7. Stress Management

Stress is a natural part of life. Short-term stress can focus our thoughts and motivate us to act. However, over time, chronic stress can alter the brain, affect memory and increase the risk of Alzheimer's and related dementia (U.S Department of Health and Human Service National Institute of Aging, 2020). In a study, it has been stated that there is a decrease in the levels of depression, anxiety, and stress in the elderly who are included in the Orientation Program Based on Daily Living Activities (Piadehkouhsar, Ahmadi, & Khoshknab, 2019). Things to do to reduce stress are as follows:

- Keep a diary, writing down the thoughts or concerns, can help to solve a problem or come up with a new solution.
- To practice relaxation techniques. Practices such as breathing exercises can help your body relax. These practices can help lower blood pressure, reduce muscle tension, and reduce stress.
- Staying positive. It is suggested to let go of things beyond your control, feel grateful or slow down to enjoy simple things such as the comfort of a cup of tea, the beauty of the sunrise (U.S Department of Health and Human Service National İnstitute of Aging, 2020).

### 3.8. Reducing Cognitive Health Risks

As the population ages, risks of cognitive decline threaten independence and quality of life for older adults (Fu et al., 2018). Genetic, environmental, and lifestyle factors are all thought to affect cognitive health. Some of these factors can decrease thinking skills and affect the ability to perform daily activities such as driving, paying bills, taking medicine, and cooking (U.S Department of Health and Human Service National Institute of Aging, 2020). Genetic factors are inherited from a parent and cannot be controlled. However, many environmental and lifestyle factors can be changed or managed. These factors are:

- Some physical and mental health problems, such as high blood pressure or depression
- Brain injuries, such as those caused after a fall or accident
- Some drugs or improper use of certain drugs
- Lack of physical activity

- Malnutrition
- Smoking
- Drinking too much alcohol
- Sleep problems
- Social isolation and loneliness (U.S Department of Health and Human Service National Institute of Aging, 2020).

By providing elderly people with the ability to manage their health, their cognitive well-being can be maintained.

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## 4. How Important Safety Measures Are For Elderly

One of the important goals for society is to create suitable home conditions for the elderly. For this reason, the quality of life of the elderly should be increased by adapting to the environment and living conditions of the elderly, not by adopting to the elderly to the environment. (T.R The Ministry of Health Public Health General Directorate, 2017; Grazuleviciute-Vileniske, et al., 2020).

It is seen that the majority of injuries caused by falling and accidents in old age occur at home. When the causes of accidents are examined, it is seen that most of them are caused by preventable human errors, such as ignorance, recklessness, and negligence. There are several studies done on home accidents and injuries done by Dağhan et al. (2017), Haagsma et al. (2019), Mortazavi et al., (2018), Romli et al., (2016), and Şahin & Erkal (2016).

Moreover, it is found in the researches that most of the fall injuries occur in bathroom, bedroom, and kitchen. Figure 1 shows the room/location in home where geriatric fall injuries occur.

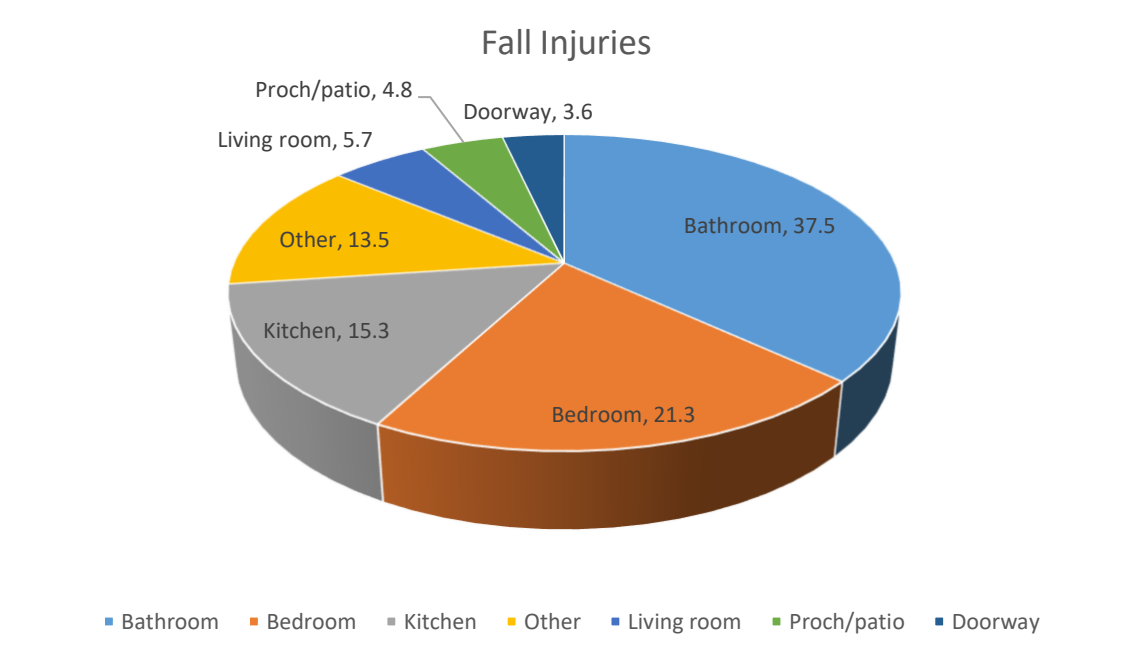


Figure 1. Room/Location in Home Where Geriatric Fall Injuries Occur
(Adatped from: Abraham & Cimino-Fiallos, 2021)

Dangers at home in the elderly are generally unwanted health problems, injuries, and loss of independence (Rowe & Kahn, 2016). However, it has been stated that small arrangements and supports in the environment where the elderly life can significantly reduce accidents and related injuries (T.R The Ministry of Health Public Health General Directorate, 2017; Grazuleviciute-Vileniske, et al., 2020). In elderly individuals, sensory changes, such as vision, hearing, smell, taste, touch, balance problems, drug use, and cognitive status changes increase the risk of accidents and injuries. In this context, the risk of poisoning due to food and harmful substances, traffic accidents, falls and burns is quite high. To prevent these, precautions and arrangements should be made to prevent falls and other accidents at home, in the institution, in the environment where they live (Karadakovan, 2014).

The elderly and the individuals they live with may not be aware of the risk factors which cause a fall in the living environment. It is important to prepare safety lists to raise awareness of the elderly on this issue. The safety list should be posted in a corner of the house to raise the awareness of the elderly and those around them, and it should be ensured that the security list is periodically reviewed (T.R. The Ministry of Health Public Health General Directorate, 2017; Bilgili & Birimoğlu Okuyan, 2017).

### 4.1.Safety List

As it is mentioned above, it is important to prepare safety lists to raise awareness of the elderly on risk factors. An example of a safety list can be seen in Table 1.

Table 1. An Example of Safety List

| No | Safety Measures |
|---|---|
| 1 | Emergency phone numbers (ambulance, fire, etc.) should be affixed to each phone. |
| 2 | Phones with easily selected numbers should be preferred. |
| 3 | If possible, telephones should be placed in each room. It should be at a distance from the ground in case of a fall. |
| 4 | Door handles should be opened easily from inside and should not allow easy opening from outside for security reasons. |
| 5 | Medicines should be kept in safe, cool places without direct light and in their boxes. |
| 6 | Various warnings should be written on the medicine boxes to prevent the wrong drug use. |
| 7 | Carpet, rug, etc. that can slide should not be laid on the floor. |
| 8 | The edges of carpet, rug, etc. should not be twisted or in a way that could cause to fall or slip. |
| 9 | Tools used for lighting must be clean and in good condition. |
| 10 | The cables of electricity, telephone, etc. should not be exposed and in a way that could cause tripping or falling. |

| | |
|---|---|
| 11 | No items that will cause abrasion and damage should be placed on the electrical cables that may cause a fire risk. |
| 12 | Electrical plugs and sockets (grounded) should be easily visible (radiated, illuminated, etc.) at night in emergencies. |
| 13 | Electricity cables should have a feature to prevent electric shock in areas where water is used, such as kitchens and bathrooms. |
| 14 | If possible, fire alarms should be used in home or work areas. |
| 15 | Once a year the smoke detector batteries should be replaced. A date, such as a birthday should be chosen to replace them. |
| 16 | Home floors, especially wet areas, should not be made of material that can easily slip. |
| 17 | Materials that can cause rolling easily and slipping, such as children's toys, should not be left around. |
| 18 | Unused, excessive, or messy items should be reduced as much as possible. |
| 19 | Smoking of the elderly in bed should be prevented. |
| 20 | Ashtrays must be deep and very little water should be put inside. |
| 21 | Slippers or shoes that do not slip the soles of the feet should be worn. |
| 22 | There should be fire escape or emergency exit doors. Besides, warning signs can be placed to protect against falls. Falling generally happens while getting stuck on an object, leaning on an object from the ground, trying to reach, losing balance, and slipping on an item. |

Source: Eriksen, Greenhalgh-Stanley, & Engelhardt, (2015), Fagerstro, Home Care Assistance (2020), T.R. The Ministry of Health Public Health General Driectorate (2017), Home Instead Senior Care, (2020).

### 4.2.In-House Arrangements

It is important to arrange inside of the houses. Examples of the in-house arrangements can be seen in Table 2.

Table 2. Examples of the In-House Arrangements

| Place | The Arrangements |
|---|---|
| General | • The door width should be at most 100 cm and at least 80 cm. All doors must be without thresholds. There should be easy-to-grip handles on the door. The apartment entrance must be sufficiently lit.<br>• All kinds of buttons and sockets for mailbox, doorbell, and electrical equipment should be at most 90-100 cm above the ground.<br>• Phosphoric buttons which can be seen in the dark should be preferred.<br>• The elevator cabin should be at least 110 x 140 cm in size and easily accessible places. |
| Lightening | • Burnt out bulbs should be replaced.<br>• New lighting fixtures should be installed.<br>• Motion detection lighting should be placed inside and outside the house.<br>• All lighting should be tested by standing in a corner of a room and looking across the room. "Can everything be seen clearly?" If not, the interior of the house should be illuminated with more light |
| Entree | • Furniture should be placed along the walls and in the corner of the area to reduce the risk of elderly people falling and knocking.<br>• There should be a seat placed close to the door to allow the elderly person to rest. |

| | |
|---|---|
| | • There should be easily accessible hangers of different heights to hang clothes and walking sticks.<br>• Night light or rope lighting should be used. Night lights are an ideal solution for dark corridors. Rope lighting is a good option for corridors connecting the bathroom to the bedroom. |
| Staircases | • There should be switches at the beginning and end of the stairs. If possible, lamps sensitive to moving objects (with sensors) should be used.<br>• The steps should be at equal spacing and height, and there should not be protrusions that may cause tripping and improper step applications (spiral stairs).<br>• There should be a landing for resting on handles and long stairs.<br>• The step height of the stairs should not exceed 14 cm and the length of the steps should not exceed 28-30 cm.<br>• Non-slip materials should be used in the steps.<br>• Patterned floors, carpets, and rugs which will cause visual disturbances in the depth of vision should not be used.<br>• Stairsteps can be painted in different colours to be visible and noticeable, or the steps can be made visible with different colour tapes. |

Sources: Bilgili & Birimoğlu Okuyan (2017), Eriksen et al., (2015), Home Instead Senior Care (2020), T.R. The Ministry of Health Public Health General Directorate (2017).

### 4.3.Kitchen

It is important to arrange the kitchen. Examples can be seen in Table 3.

Table 3. Examples of the Arrangements in Kitchen

| No | Arrangements |
|---|---|
| 1 | Good lighting and ventilation/chimney facilities should be available. |
| 2 | The workbench must be in a sufficient height and length. |
| 3 | The shelf height of the kitchen cabinet should be a maximum of 150 cm, ideally 140 cm to reach without putting anything underneath. The minimum shelf height of the lower cabinets should be 40 cm. For elderly people using wheelchairs, the place under the counter must be empty for the chair to enter. |
| 4 | The belongings should be placed on the closest shelves or the counter, which is easiest to reach for an elderly person. |
| 5 | Hooks should be attached to the walls for pots and pans which are frequently used by the elderly. |
| 6 | There should be a fire extinguisher in the kitchen. |
| 7 | It is important to wear comfortable shoes or socks with non-slip soles. The flooring should be replaced with one that has a less slippery surface. |
| 8 | Table legs should not protrude to prevent falls and tripping. Tables should not have sharp edges. |
| 9 | The on and off positions of the buttons of the tools such as; stoves and water heaters should be distinct and easily visible. |
| 10 | Cables of electrical equipment used in the kitchen should not be close to the sink or stove. There should be no easily ignitable objects near stoves and ovens. |
| 11 | If natural gas is used, there must be an automatic gas cutting system in case of flame or failure. |

Sources: Bilgili & Birimoğlu Okuyan (2017), Eriksen et al., (2015), Home Care Assistance (2020), Home Instead Senior Care (2020), T.R. The Ministry of Health Public Health General Directorate (2017).

### 4.4. Bedroom

It is important to arrange the kitchen. Examples can be seen in Table 4.

Table 4. Examples of the Arrangements in Bedroom

| No | Arrangements |
|---|---|
| 1 | Good lighting and ventilation should be available. |
| 2 | (If possible) Bedroom, bathroom, and toilet should be planned close to each other. |
| 3 | Frequently used clothes and items should be located inaccessible places, and these items should be easily accessible without getting on the stool/chair. |
| 4 | A sturdy chair with armrests should be available to sit while dressing. |
| 5 | On the doors of the wardrobes, auto-lighting lamps and handles which are easy to grasp should be preferred. |
| 6 | Bedroom furniture should be arranged in such a way that the elderly can easily walk around with a wheelchair, crutches, or walking stick. |
| 7 | There should be a small fixed table/nightstand which can be easily accessible from the bed so that the elderly can put important items, such as bedside lamps, phones, glasses, medicines on it. |

Sources: Bilgili & Birimoğlu Okuyan (2017), Eriksen et al., (2015), Home Instead Senior Care (2020), T.R. The Ministry of Health Public Health General Directorate (2017).

### 4.5. Living Room

It is important to arrange the living room. Examples can be seen in Table 5.

Table 5. Examples of the Arrangements in Living Room

| No | Arrangements |
|---|---|
| 1 | Furniture should be placed in a way that the room can be wide and spacious. |
| 2 | Furniture upholstery should be made of non-combustible, non-slippery fabrics and vibrant colours should be used. |
| 3 | Chairs and sofas should be strong and secure, not too high or too deep, and suitable for easy sitting. |
| 4 | Electric cables should not be in walking areas, they should be fixed at the edges. |
| 5 | Coffee tables should not be in the middle area but should be placed between the seats. |
| 6 | Carpets should not be slippery, the edges should not be upturned and curved in order not to cause falling, and carpets should not have mixed patterns that would mislead the depth of vision. |

Sources: Eriksen et al., (2015), Home Instead Senior Care (2020), T.R. The Ministry of Health Public Health General Directorate (2017).

### 4.6.Bathroom and Toilets

It is important to arrange the bathroom and toilets. Examples can be seen in Table 6.

Table 6. Examples of the Arrangements in Bathroom and Toilets

| No | Arrangements |
|---|---|
| 1 | There should be handlebars near the toilet, shower, and bathtub. Handlebars should be well fixed on the wall on the horizontal axis. Handlebars should be 4-5 cm in diameter and placed 90-100 cm above the ground. |
| 2 | The bathtub should be avoided as it may cause falls in the entry and exit. A shower system with seats should be preferred. |
| 3 | Armatures should have an easy opening and closing feature. |
| 4 | Electrical gadgets must be unplugged when not in use. |
| 5 | The ventilation system and hot water source (boiler/stove) must be safe in the bathroom. |
| 6 | Bathroom cabinets and ventilation systems should be at an accessible height. |
| 7 | The bathroom door should be opened to the outside in order not to narrow the space. |
| 8 | The bathroom floor should be made of non-slip, non-glowing material and the floors should not be left wet. |
| 9 | A night lamp should be placed in the bathroom. This will help the elderly who may go to the toilet frequently at night. One or two night lights should be installed in the route to the bathroom so that the elderly can find their way. |
| 10 | The tiles should be non-slip and rust-proof. |
| 11 | The floor and the wall should be painted in different colours. |
| 12 | Non-slip slippers should be used. |

Sources: Bilgili & Birimoğlu Okuyan (2017), Eriksen et al., (2015), Home Instead Senior Care (2020), Home Instead Senior Care (2020), T.R. The Ministry of Health Public Health General Directorate (2017).

### 4.7.Laundry Room / Basement and Garage

It is important to arrange laundry room, basement, and garage. Examples of the arrangements can be seen in Table 7.

Table 7. Examples of the Arrangements in Laundry Room/Basement and Garage

| Place | The Arrangements |
|---|---|
| Laundry room/ Basement | • There should be appropriate lighting, wall lighting should be used if necessary.<br>• Ideally, at least one guardrail should be added along the wall, although there is a guardrail on both sides.<br>• It is important to paint the last step of the basement in a different colour to distinguish it better.<br>• Laundry detergents should be put into smaller containers.<br>• The elderly should clean the spills immediately in the laundry and they should wear non-slip soled shoes or socks. |
| Garage | • Steps leading up from the garage (like basements and entrances) should have at least one or ideally two solid guardrails.<br>• Make sure that there is enough litter box. Litter should be kept right outside the garage to avoid attracting insects and mice. |

| | |
|---|---|
| | • Electrical gadgets and toxic turf chemicals can be fatal for some elderly, especially those with dementia, as they may be confused about how to use them safely. If necessary, these items should be removed from the garage. |

Sources: Bilgili & Birimoğlu Okuyan (2017), Eriksen et al., (2015), Home Instead Senior Care (2020), T.R. The Ministry of Health Public Health General Directorate (2017).

### 4.8.Ensuring Home Security

Ensuring home security is also so important for the elderly. Examples of the arrangements can be seen in Table 8.

Table 8. Examples of the Arrangements for Ensuring Home Security

| No | The Arrangements |
|---|---|
| 1 | There should be a peephole in the front door of the houses where the elderly live. |
| 2 | The elderly should be informed not to open the door to strangers when they are alone at home. On the wall next to the front door, reminders, such as “Do you know this person? If not, don't open the door" should be placed. |
| 3 | Windows and doors must be kept locked at all times. |
| 4 | The elderly should not accept any phone offers. They should not believe the caller when they assert that a family member is in danger. They should not share their financial information or social security numbers on the phone. They should not forget that if someone is really in danger, a police officer will come to visit the elderly person to report. In this context; they should be warned of swindlers targeting the elderly and loved ones. |

Sources: Home Care Assistance (2020) and Home Instead Senior Care (2020).

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## 5. How Cultural / Learning Issues Can Improve the Life and Health of Elderly

It has been functioning in the public opinion over the years a stereotype of an elderly man, who is in the group of people, who needed social assistance and help. The stereotypical cultural pattern of the elderly man presents sad, ill, and most often the lonely person who is useless to society. He is contrasted with the image of young, strong, and attractive people, willing to work. Such stereotypical thinking leads to the elimination of the aged from society, even though their experience and wisdom should be regarded as great assets (Ageism & Stereotyping the Elderly: Definition and Examples, 2014; Sztompka, 2002).

### 5.1.Cultural Issues

When people retire and end their professional activity, it means that they have more free time. A survey of pensioners carried out in Poland in which they were asked about their free time, presents that 43.5% of men and 36.9% of women complained that they had too much free time (Po co seniorom kultura? Badania kulturalnych aktywności osób starszych, 2012). Active elderly did not complain that they had too much free time (op. cit).

For the elderly, it is important not only to help with their daily activities but also to organize their free time. Appropriate selection of activities can improve physical and intellectual fitness (Cohen et al., 2006). In the subject, literature functions the term "successful ageing". The term was first originated by scholars John Rowe and Robert Kahn. It consists of three elements: low probability of disease and disease-related disability, high cognitive and physical functional capacity, and active engagement with life (Rowe & Kahn Robert, 1997; Po co seniorom kultura? Badania kulturalnych aktywności osób starszych., 2012, p.19).

The cultural activity of people in the third age, elderly and retired people takes very different forms and concerns various areas. There are several types of human behaviour after retirement (Neugarten, 1976):

- reorganization of one's own life to maintain a high and diverse activity different, however, from the current one;
- activity devoted to only one field of interest (e.g. collecting);

- cultural activities - participation in artistic forms (theatre, cabaret, choir, poetry, prose, etc.);
- focus on social and self-help activities and volunteering.

There are many activities offered by various institutions working with the elderly, such as NGOs, cultural centres, libraries, nursing homes. The most popular are: Reading, listening and playing music, dance, doing arts and crafts, going to a place of worship, visit museums, watching or being involved in theatre, intellectual discussions (about books, films, etc.), using a range of media, memoir writing (presentation the results during the meetings with others, exhibitions, on web sites, etc.), collection the local and family histories, photography (for example -creating a family or personal digital albums), textile crafts, wood crafts or knitting, jewellery making, enjoy cuisine, IT activities (how to use a computer, internet, mobile, etc.) (Swindell, 2002).

Social and cultural activity can play a therapeutic role (Fabiś, 2008). Based on research (Zelazny, 2011) it was noticed that playing instruments helps in the treatment of arthrosis in the elderly. (reported that therapeutic instrumental music playing helped hand rehabilitation in older adults with osteoarthritis).

Many cultural institutions offer offers elderly to participate in amateur theatres. It can be a form of therapy for elder people, too. Drama Therapy is based on using dramatic techniques to aid individuals in personal growth and increase emotional wellbeing. There are many forms of theatrical interventions including role-play, theatre games, group-dynamic games, mime, puppetry, performance, and other improvisational techniques (Erasmus+ Project Results Platform Explained; European framework for action on cultural heritage, 2019; Fatyga, Nowiński, & Kukułowicz, 2009).

Research carried out over 12 months on a group of 166 respondents showed that cultural activity improved health. Participants in artistic activities used the doctor's advice less often, felt better, and were more satisfied with life (Cohen et al., 2006).

Another study carried out in a group of 124 elderly aged 60-86, found that their cognitive skills and well-being improved after four weeks of drama (Noice, et al., 2004).

Participation in culture meets the needs of the elderly, such as fighting loneliness, the need to become involved in social life, the need to be appreciated, need for social life,

and the need for contacts with the younger generation (source: https://cpe.ckzamek.pl/media/files/CPE_-_uzyteczny_poradnik.pdf).

The choice of the type of cultural activity is influenced by gender, which can be seen in Figure 1.

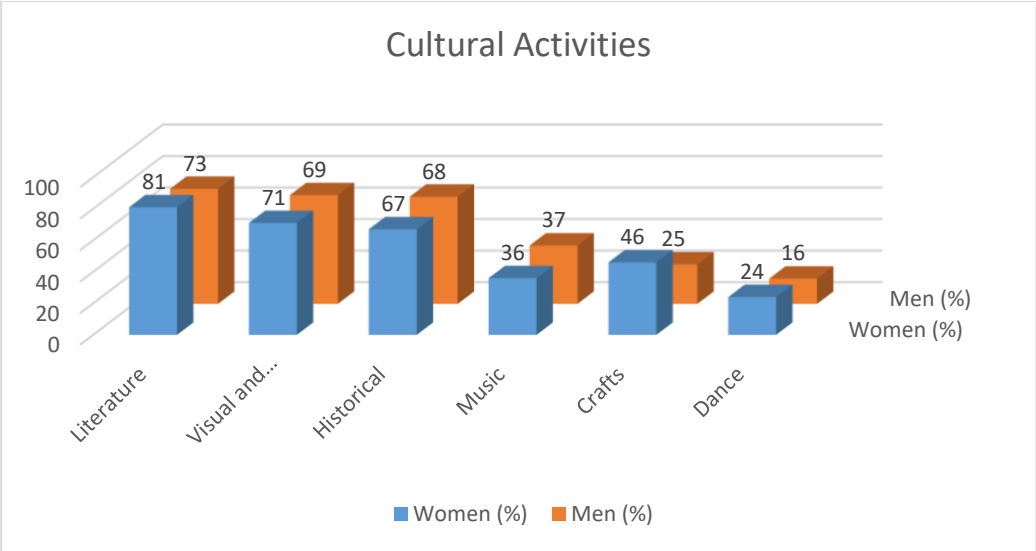


Figure 1. The Choice of the Type of Cultural Activity Influenced by Gender (Adapted from Age UK Policy and Research Department, Creative and Cultural Activities and Wellbeing in Later Life, 2018)

The frequency of cultural activity is influenced by many factors: health, transport, being a carer for another person, friends, place of residence (urban or rural area), and finance (Age UK Policy and Research Department, Creative and Cultural Activities and Wellbeing in Later Life, 2018).

Various activities can help to break down barriers for the elderly. These can be discounts in galleries, museums, and cinemas, discounted transport tickets, open concerts, elderly clubs, activities organized by non-governmental organizations (Butler, 2019).

According to Leon (2021), the benefits for health centre programs to engage in cultural and linguistic competence services can be listed as follows:

- Expand quality and effectiveness of care,
- Improve health outcomes and well-being,
- Increase the effectiveness of the older patient-provider communications,
- Expand provider knowledge and skills,

- Foster mutual respect and shared-decision making,
- Strengthen patient and provider satisfaction.

It is worth encouraging and developing hobbies such as cooking. Cooking and eating together strengthens bonds, it can be an opportunity to meet friends or make new ones. Moreover, it is an occasion for discussion. Cooking can be a teaching tool. Collecting and creating new recipes requires mental activity. The preparation of dishes influences encouraging fine motor skills. Cooking workshops for the elderly are an opportunity to talk and learn healthy eating habits (Mobility Choice Cultural Activity of Older People). Creating a cookery book can be an attractive activity for the elderly who like photography and using IT (text editing, presentations, internet). It is not only a way of spending free time but also due to the development of modern technologies opportunity to learn new skills (Active Seniors Learn, Educate, Communicate and Transmit Active Seniors Learn, Educate, Communicate and Transmit - Towards a better participation of seniors in education and culture, 2018; What Every Teacher Should Know about Reaching Older Learners; Swindell, 2002).

Learning a new skill is a great way to keep one's memory active (6 Easy Ways to Improve Memory for Seniors). Lifelong learning is important for keeping the mind and memory working as we age. Ongoing education and learning activities can compensate for age-related degenerative brain diseases like Alzheimer's, encourage the elderly to develop and maintain social connections, improve their self-confidence and quality of life, and prevent depression due to social isolation (Fergusson, 2018; Schaie, 1990).

Researchers investigating older adult primary care patients pointed out those elderly with a cat or a dog were less likely to report discomfort and a sense of isolation (Branson, et al. 2017). Therefore, having pets, exchanging information about pets, walking, and meeting other owners can have a positive effect on the well-being and physical health of older people.).

### 5.2. Learning Issues

There are many benefits of studying for older learners, such as increased self-confidence, increased feelings of health and well-being, reduced feelings of isolation, and increased engagement in the community (Kieran, 2015).

In all the countries, libraries are the places of lifelong learning. It is not only the place where you can borrow books. They have Open Educational Resources and Massive Open Online Courses. They are free for anyone to use. This is one of the reasons why many elderly are their clients. Lifelong learning, non-formal education let the elderly follow their interests. Some libraries are using VR to allow the clients to visit places and see and hear what they could never experience otherwise (Active Seniors Learn, Educate, Communicate and Transmit Active Seniors Learn, Educate, Communicate and Transmit - Towards a better participation of seniors in education and culture, 2018; Saxon, Etten, & Perkins, 2014).

Unfortunately, the libraries in rural areas are less have as many services as libraries in urban and suburban areas. Libraries are a good place to organize educational activities for elderly because they are usually more active in the morning, and then there are fewer school-age or adult clients in the libraries (10 Free Entertainment Activities for Seniors).

For the elderly one of the opportunities to learn is to be a member of the University of the Third Age. Universities of the Third Age are educational institutions where the elderly acquire knowledge and new skills. The main aim of these institutions is intellectual and physical activation of old people and researching on ageing. The first was created by Pierre Vellas in Toulouse in 1973 (Formosa, 2009). The first Third Age University in Poland was created in 1975 (Fabiś, 2008).

QR Code 1: University of the Third Age in UK.

This form of activity is becoming more and more popular. In 2018, there were 640 Third Age Universities in Poland (universities_trzeciego_wieku_w_polsce_w_2018_r. pdf). We can recognize two models of 3rd Age Universities: French and British. French was associated with universities and its costs were borne by the university. The UK is self-help and does not benefit from external funding (Swindell & Thompson, 1995). For more information about 3rd Age University of UK, scan QR Code 1.

Now, Universities of the Third Age teach about the many ways in which to keep the aged people active and to introduce gerontological preventive measures; they also make it easier to adapt to psychological and physical changes, as well as to adapt to the ever-

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changing environment, and they give the older people a chance to keep on being active and creative. (Hebestreit, 2008).

Another possibility to learning is active involvement in civil society organizations. The organizations can take part in EU programmes like Erasmus+. The Erasmus + program gives the opportunity to study the situation of older people and organize activities for them, exchange experiences in this field (Some projects are Active Seniors Learn, Educate, Communicate and Transmit; Social Inclusion through Digital Skills and Intergenerational Learning; Mobility choice. Cultural activity, SEAL). The advantage is that the results of the projects (studies, brochures, guides) are available free of charge from Erasmus+ Project Results Platform.

The elderly, despite their commitment, willingness, and good instructors, can learn at a slower pace. Especially in the case of people with dementia or Alzheimer's, the learning methods must be very well suited to the patient's condition. They are mainly based on repeating and recording what the patient already knows and can do. Logic games, sudoku, bingo, word puzzles, luminosity are very helpful in these cases (6 Easy Ways to Improve Memory for Seniors).

### 5.3. The Effects of Cultural/Learning Issues to Life and Health of Elderly

Older people want to be active and participate in cultural life. This has a positive effect on their health and well-being. They should also participate in educational activities. This activity keeps their mind working for longer. They also want to have contacts not only with their peers but also with the younger generation. Most of them would like to participate in intergenerational activities (Mott, 1999). The effects of active ageing can be assessed by asking what is important to them (Katz, et al. 2011). Figure 2 also presents expectations, values, and obstacles.


Figure 2. Expectations, values, and obstacles. (Source: Katz, Holland, Peace, Taylor, 2011)

New friendships made while participating in various forms of cultural activities increase their self-esteem, allow them to relax, and the sense of achievement makes them feel part of the community. Moreover, older people want to feel in control of their own lives as long as possible. Learning, participation in organizations, cultural events gives them such an advantage. The activity and contacts with people provided by science and cultural life create a safe environment. A sense of security is very important for the health of older people. For more information about free entertainment activities for seniors, scan the QR Code 2.

QR Code 2: 10 Free Entertainment Activities for Seniors.

Research shows (Creative and Cultural Activities and Wellbeing in Later Life, Age UK Policy, and Research Department Retrieved, 2014) that despite health problems, older people want to actively participate in various forms of social life. In their case, the Internet and VR Technology take on special importance, because thanks to it, physical disabilities do not interfere with being active.

Creating and encouraging the elderly to take part in educational and cultural activities sometimes faces barriers in the form of stereotypes. Older people sometimes think they are no longer good for anything, they feel that at their age certain things are no longer appropriate to do (such as dancing) (Active Seniors Learn, Educate, Communicate and Transmit - Towards a better participation of seniors in education and culture, 2018).

However, the positive effects of activity should encourage people working with the elderly and the elderly's families to overcome these stereotypes. Many leisure activities may be available to older people (Mobility Choice Cultural Activity of Older People). You can find those that will match the interests and health condition of the elderly (Hutsch, Dixon, 1990; Zielińska-Więczkowska, 2010).

### 5.4. The Positive Effect of Using VAR in the Work with the Elderly and Good Practices

There are many researches done on the effect of VAR usage on the improvement of the elderly's cognitive health and overall life conditions. Soltani (2019) reviewed some of the applications of virtual reality (VR) for seniors by using SWOT (Strengths, Weaknesses,

Opportunities, and Threats) analysis. Here are the some studies showing the opportunities of VAR usage listed in Soltani's research:

- Fernandes and Argyriou (2017) used VR as an affordable approach for creating e-health screening AD diagnostic systems. They proposed VR tests that could evaluate memory loss related to common objects, recent events, expressing and understanding languages, and the ability to recognize abnormalities accurately and similarly for the presence of AD. From their research, Plancher et al. (2012) concluded that VR is better adapted for early diagnosis of AD compared to traditional verbal memory tools.
- Manera et al. (2016) tested the feasibility of an image-based VR system in MCI and dementia. Their patients reported high feelings of security and low discomfort, anxiety, and fatigue. Although the VR task was more difficult, they were also more satisfied with the VR condition and preferred it to the paper condition.
- Lin et al. (2018) used means-end chain techniques to examine elderly's awareness and personal values regarding VR activities. Elderly population mentioned leisure VR activities to be fun, safe, easy, and physically and mentally healthy. While playing with VR, they were also seeking enjoyment, improved quality of life, and a sense of belonging.
- Goršič et al. (2017) explored the role of competition while using VR. They concluded that stroke patients (including elderly) who exercise with a peer in an unsupervised situation (e.g. home) exhibit higher enjoyment and exercise intensity compared to those who exercise alone.
- Brunner et al. (2017) explored the effectiveness of their upper extremity VR rehabilitation system and showed that the improvements were similar to the conventional therapy. They also suggested that the motivating nature of VR could be a supplement to standard rehabilitation.
- Saldana et al. (2017) used HMD in VR to objectively assess balance by using visual-vestibular conflict and by comparing the results of postural sway with a force plate. Their preliminary results showed that the HMD is a valid, reliable, and comparable to traditional mechanical perturbation approaches for measuring balance. Popular HMDs allow easy navigation in life-size virtual environments and provide required spatial requirements of non-immersive serious games,

exergames, and motor rehabilitation applications (Borrego et al., 2018). Such interaction allows natural navigation and exploration and therefore, the improved ecological validity of the task while facilitating skill transfer.

- Albiol-Pérez et al. (2017) designed a low-cost active balance rehabilitation system and measured the performance of balance control during 15 sessions of virtual rehabilitation. Although there were no statistically significant differences between the left, central, and right positions, their results indicated a trend of improvement, especially in the left and right sway which are important in avoiding risks of falls. Tsang and Fu (2016) compared the efficacy of their VR balance system with traditional balance training. They attributed the improvements in VR system to the real-time performance feedback and cuing stimuli that supports error-free learning.
- Paquin et al. (2016) used a VR rehabilitation program for fine motor recovery of stroke patients. All of their subjects experienced a perceived increase in hand function and that they would recommend the program to other stroke survivors. McDonald et al. (2013) used a VR pain coach for the effects on the communication of pain by older adults. They measured pain and depressive symptoms before and one month after the intervention. Older adults shared a significant amount of clinically important pain information with the pain coach than the pain communication-only group. Pain intensity and depressive symptoms reduction showed a non-significant trend one month after the intervention. The VR pain coach shows a possible strategy for pain management discussions between practitioners and older adults.

Finally, Soltani (2019) noted the opportunities and strength of VAR usage for the elderly to improve their life conditions. It can be seen in Table 1.

Table 1. Opportunities and Strengths of VAR Usage in Elderly

| Opportunities | Strengths |
|---|---|
| -Ability to modify physics and scenarios according to the needs<br>-Efficiency<br>-Affordable<br>-Possible similar results to traditional interventions | -Short term overall psychosocial state improvements<br>-Improved balance and decreased risks of falls<br>-Improved visual searching<br>-Higher compliance to self-training<br>-Similar validity to traditional memory tests<br>-Enhanced ecological validity |

Moreover, there are good practices of VAR usage in the work with the elderly. Here are some of them (You can click the following headings and read more about the good practices):

- How Virtual Reality Is Benefiting Seniors
- How to Launch a Strong VR Program in Senior Care
- How virtual reality is helping seniors breathe new life into old memories
- Reducing social isolation through the power of virtual reality and shared experiences
- How Virtual Reality Is Providing Comfort To Elderly Hospice Patients And Others
- VR helps seniors to re-engage with the world

Finally, it can be said that VR and AR tools have a positive effect in the work with the elderly and should be used for them. VARTES project aims to be a good practice of VAR usage in the work with the elderly.

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## 6. Intergenerational Strategies to Interact With Elderly

Two terms are sometimes used interchangeably: intergenerational and multigenerational. Intergenerational means that members of different generations work together, share common goals collaborate, and influence each other. Multigenerational means common activities of a generation, but they may not influence one another, they do not interact (Villar, 2007).

Intergenerational learning takes place when people learn from each other. Knowledge is passed down from generation to generation. It happened in families. Nowadays scientists point out that more and more often unrelated people, from outside the immediate family, take part in intergenerational learning (Kaplan, 2002).

The definition of Intergenerational Learning, which can be found on the ENIL platform (https://eaea.org/our-work/projects/enil-european-network-for-intergenerational-learning/) states: "A learning partnership based on reciprocity and mutuality involving people of different ages where the generations work together to gain skills, values, and knowledge." Examples of Intergenerational learning can be found at all stages of education (European Commission, Learning for Active Ageing and Intergenerational Learning: Final Report DG Education and Culture. 2012):

QR Code 1: Learning for Active Ageing and Intergenerational Learning. Final Report.

- Pre-school - older people are encouraged to volunteer;
- Schools- Intergenerational elements can be compulsory learning modules for young people (e.g. Apprenticeships), young people can work as volunteer's people for elderly people in various activities, subjects, programs, and projects;
- Vocational education - intergenerational learning is of particular importance in the professions related to nursing and social work;
- Higher education - some universities propose intergenerational learning as an educational offer for adults.

Schools can be places where intergenerational learning begins. It can be a subject or a module of the family science curriculum. Schools can also be a precursor of changes, where, in addition to theoretical learning, learning through experiments will be conducted.

This can be done in two ways. Elderly people can be mentors, pass on their experience to the younger ones. This can be especially valuable in the case of vocational education. The second way is when students teach the elderly (e.g. new technologies). They will then gain experience as trainers and educators. Such activities can be started already at the level of the older grades of primary school (Janiszewska-Rain, 2005; Szarota, 2013).

An example of a program involving older people and primary school children is the "Intergenerational Academy of Activity - Experiences Bind Generations" which was carried out in 2012-2013 (Leszczyńska-Rejchert, 2014). Teachers and students of *The University of Warmia and Mazury* in Olsztyn (a region in Poland) participated in the program as volunteers. The program included separate activities: lectures for the elderly, physical activities for children, and joint activities for both groups: culinary, music, art, theatre, and literary activities. The meetings always ended with the presentation of the works performed together. Based on the program analysis, a recommendation was given for the creation of intergenerational educational programs. This:

• Proper interpersonal communication - creating conditions for understanding, tolerance, and kindness so that the participants can establish an intergenerational dialogue,

• Identifying resources inherent in people representing different generations,

• Getting to know each other by all participants,

• The subject matter offered to different generations should be of interest to young and old,

• Activities should be planned so that each participant can be active (op. cit).

Another example of intergenerational cooperation is *The Granddad Program* in Stockholm County Sweden (Newmann & Hatton-Yeo, 2008) which is a program involving older people in primary education. Since most of the teachers in these types of schools are women, the presence of older male volunteers (grandparents) serves to shape

the male model.

Examples of higher education programs are described by Newmann & Hatton-Yeo (2008). The University of Valencia has been implementing the NUGRAN program since 1999. It enables older adults to enrol as university students. They can share their experience with younger people and at the same time deepen and consolidate their knowledge. It is not only important to exchange knowledge and experiences. Participation in the program allows you to interact and communicate with younger and older students.

The University of Pittsburgh uses the expertise of retired engineers. Their hands-on approach and practical understanding of the basic engineering principles helped freshmen master the subject. Particularly good results of this program were visible in the case of foreign students entering the University of Pittsburgh (op. cit).

Typically, people achieve a high level of professional skills in late adulthood (European Commission, Learning for Active Aging and Intergenerational Learning: Final Report DG Education and Culture. 2012). After retirement, they have more time. Sharing with younger knowledge and experience gives them a sense of meaning in life and influences future generations. For trainers and teachers, older volunteer tours can be a useful source of information and help in working with young people.

Worth mentioning is the project *Transfert de Competences Acquises et de Savoirs Techniques*, which was implemented under the Grundtvig 2007-2009 program. The idea of the program was that older craftsmen, who were retired or about to retire, were teaching young adepts their trade when they retired or just before retirement. It was an opportunity to improve the skills of both groups and to consolidate these professions.

Another example of intergenerational cooperation is a program launched by The University of Victoria in Canada where the tribal elders co-founded the education and care programs for first nation communities. The curriculum was based upon what the learners could bring to the curriculum from their culture and values because the aim was to integrate while respecting the traditions and history of the nation (Newmann & Hatton-Yeo, 2008).

It has been noticed (European Commission, Learning for Active Aging and Intergenerational Learning: Final Report DG Education and Culture. 2012) that

intergenerational learning in the workplace motivates older people to stay in the labour market and acquire new skills. This is especially important in the face of the ageing of European societies. The importance of contact with older people (e.g. retired specialists of various fields) is of great importance for the life choices of young people (Chusseau & Hellier, 2011), especially those with low social status, such as in which certain dynasties remain unskilled from generation to generation. Programs for cooperation with older people should appear in compulsory primary schools. However, further education is the choice of the individual. Children from families who do not pay attention to education, through contact with retired specialists, may be more motivated to continue learning or even a specific profession.

### 6.1. Embedding Intergenerational Activities in the Educational Work

European Parliament decides that 2012 will be The European Year for Active Ageing and Solidarity between Generations (DECISION No 940/2011/EU). In the document, one of the aims is: to promote social justice and protection (...) and solidarity between generations. During the year, many organizations, institutions organized many activities for the elderly and young people. Programs and actions are another way to promote intergenerational integration. In 2012, around 600 schools across Europe took part in intergenerational activities with the elderly (Eurostat, 2012).

At a time when young people are affected by a crisis of trust towards adults, intergenerational contacts and activities can contribute to the development of young people (Kaplan, et al. 2017). Vanderbeck Robert and Worth Nancy (2015) share the same opinion. Taking into account the way of spending free time, types of activities can be organized to activate both younger and older people. The proportion of the population aged 15+ expressing the opinion that there are not enough opportunities for older and younger people to meet and work together in associations and local community initiatives can be seen in Figure 1.

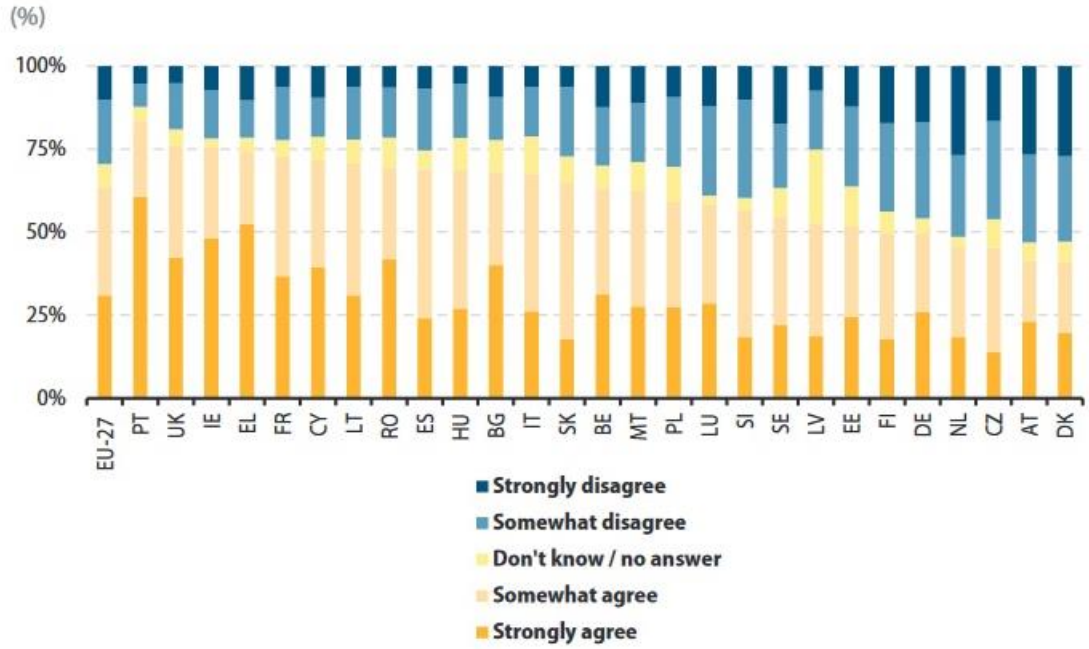


Figure 1. The proportion of the population aged 15+ expressing the opinion that there are not enough opportunities for older and younger people to meet and work together in associations and local community initiatives (March 2009) (Source: European Commission, Flash Eurobarometer No. 269- Intergenerational solidarity)

Intergenerational learning can take place in a variety of contexts, programs, and projects, more or less formally (Angelis, 1996). Such activities prevent age-related stereotypes and violence against the elderly. Negative stereotypes, lack of intergenerational contacts can lead to the disappearance of solidarity in society (Clyde & Ker, 2020). Older people may feel unnecessary and ignored by adult children. Similarly, young people may encounter indifference and a lack of acceptance by their parents (Janiszewska-Rain, 2005). This can bring these two generations closer together: grandparents and grandchildren. The similarity between the situation of young and old people may seem strange, but research conducted in the EU confirms it. The Proportion of the population participating actively or working for one of the specified activities can be seen in Figure 2.

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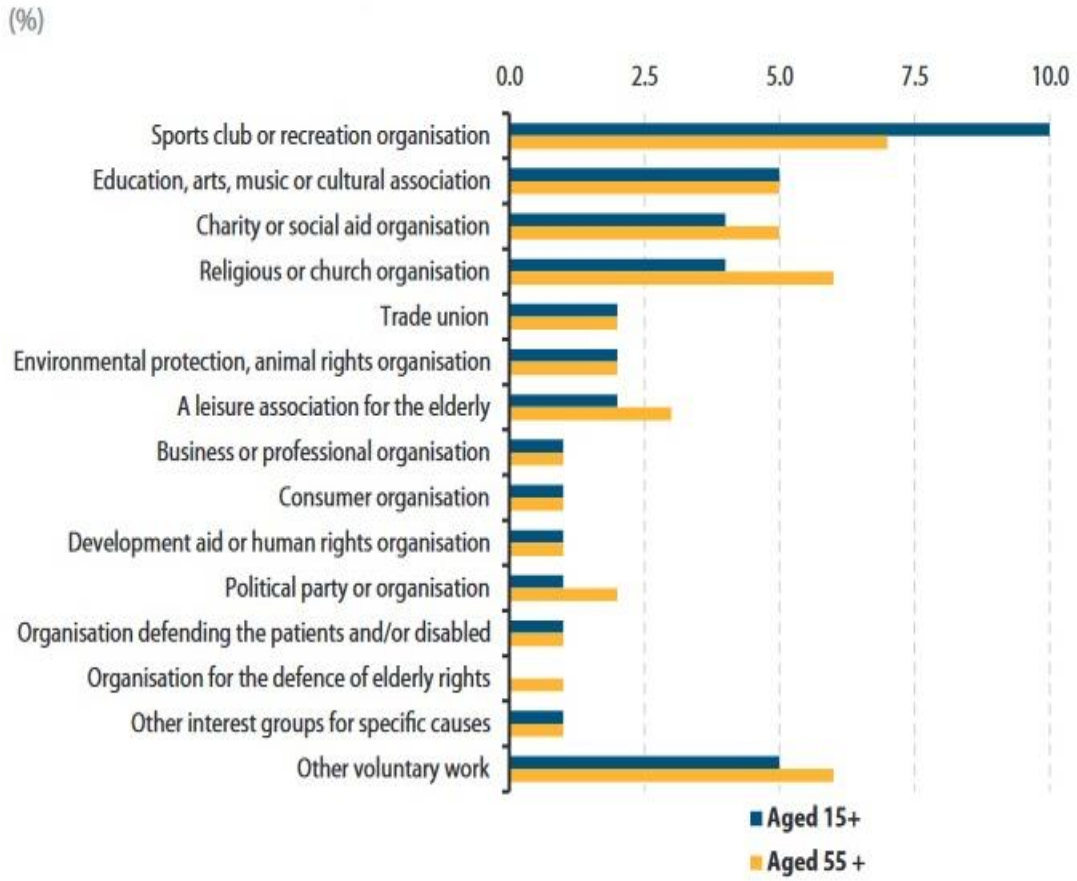


Figure 2. The Proportion of the population participating actively or working for one of the specified activities, EU-27, September-October 2011. (Source: European Commission, Special Eurobarometer No. 378- Active ageing)

There are many more organizations and activities addressed only to the elderly, and much less to both generations: young and old (Szarota, 2013). What is worth mentioning both groups would benefit from joint activities and activities would benefit both groups. Proposals for educational work involving intergenerational integration can be found on the Internet. Fun for pre-schoolers and the elderly can be beneficial for both groups. Children learn and the elderly exercise their memory. Joint activities also shape bonds between representatives of different generations. Such games include body puzzles, Plexiglas portraits, space bingo, bubble fun, family pictures hare, balloon bounce, who took the cookie from the cookie jar? Active storybook time, hike and seek beans, intergenerational name tags, treasure hunt, noisemakers, stained glass transparencies, butterfly making, Gack !, float or sink, painting the seasons, decoupage flower pots, animal puppets, kite making, clay sculpting, leaf rubbing, gourd/pumpkin painting, swamp activity, springtime walk, collecting and pressing flowers, collage, beanbag

games, animal charades, board games, mail time, letter stamping, letter and word sponge painting, letter tracing, giant body letter, the word think, boggle jr., pipe cleaner letters, wild things, musical chairs, ribbon movement, goldfish, and banana snack, making lemonade (Tried and True). Such games are also exercises aimed at: reminisce/reflect, exercise motor skills, sensory stimulation, enhance self-esteem, learning new terms/skills, maintain verbalization.

An example of embedding intergenerational activities in the educational work can be the French program The Lire et Faire Lire (European Commission, Learning for Active Aging and Intergenerational Learning: Final Report DG Education and Culture. 2012). The program made it possible for older people to read to young children. As a result, children were more motivated to learn to read and write. The program has existed since 1999. Older volunteers had the opportunity to be active.

The benefits of intergenerational relationships between old and young people can (The 10 Benefits of Connecting Youth and Seniors):

- Provide an opportunity for both to learn new skills
- Give the child and the older adult a sense of purpose
- Help to alleviate fears children may have of the elderly
- Help children to understand and later accept their ageing
- Invigorate and energize older adults
- Help reduce the likelihood of depression in the elderly
- Reduce the isolation of older adults
- Fill a void for children who do not have grandparents available to them
- Help keep family stories and history alive
- Aid in cognitive stimulation as well as broaden social circles should introduce technology into the life of the elderly.

### 6.2.Involving in the Process of Developing Intergenerational Learning Programs

Intergenerational learning has always happened. It took place in families. It is a natural process. However, this is no longer enough these days. Intergenerational learning and

lifelong learning can increase social capital (Kaplan, et al. 2017). Older people generate an experience that they can pass on to younger generations. Observational learning and dialogue are important to moral growth and personal development.

The Dublin City University (DCU) has been implementing the Intergenerational Learning Project (DCU ILP) since 2008 (Corrigan, et al. 2013). The focus was initially on the benefits of the elderly who had the opportunity to meet and learn from the elderly. They conducted IT classes for the elderly. It was decided on this because poor IT skills among older people and rapid developments in technology mean that they are cut off from what is happening in the world. This basic goal was enriched with modules in many areas including the media, creative writing, genealogy, health and well-being, and science. As a result, students from various fields were involved. About five hundred students have taken part in it in for four years. The conclusion from the implementation of the program is that all universities should treat classes for major students not only as an additional activity or service but also as an educational experience important in educating students.

Kaplan (2001; 2002; Kaplan, Sanchez, Hoffman, 2017), who has been dealing with the problems of older people for many years, recommends that intergenerational classes should not only take place in a one-on-one (student-senior) system but that they should also be of a group nature. He cites examples where cooperation of schools (primary and secondary) with the elderly had a positive effect on preventing early school leaving and strengthening young people's self-esteem and motivation to learn.

World Alzheimer's Day is celebrated each year on September 21. It is always an opportunity to talk about the situation of older people and present work programs with this group of patients and promote activities. Many organizations develop programs to work with people with dementia (Hope for Dementia). It has been found that greater physical activity, education, and a proper diet prevent cognitive decline. Isolation of patients exacerbates the disease, so group activities, including intergenerational activities, play an important role in the programs. Increasingly, modern technologies are incorporated into these programs. They are used to diagnose the symptoms of the disease for preventive measures and for activities aimed at slowing down the disease.

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### 6.3.Developing a Series of Courses

Subject and problems of intergeneration activities become more popular year by year. The results are to create action, websites, organization of it. An example can be Generations Working Together (GWT). It is the nationally recognised centre of excellence supporting the development and integration of intergenerational work across Scotland, which was created in 2007 (Raszeja- Ossowska, 2016).

Projects involving several generations are presented in the report "Impact of intergenerational activities on older people". The subjects of the classes were varied (gardening, healthy lifestyle, playing together, music). The programs featured in the report are Aging Well Torbay, Apples and Honey Nightingale, Brighter Bervie, Anam Cara.

The Aging Well Torbay Project is interesting, as it organizes not only yoga, chess, recreational, crafts, and music classes, but also a festival every year, to which the local community is invited.

An interesting form of the courses was presented in the Grundtvig project - "Seniors in Action" (European Commission, Learning for Active Aging and Intergenerational Learning: Final Report DG Education and Culture. 2012). The project included courses for older people with special skills or professions (honey producers, organic farmers, horseshoe casters, mathematicians, poets, chess players, and painters). These courses aimed to prepare older people to be trainers in non-formal school pupils.

The current pandemic situation has significantly limited face-to-face activities. A large part of human activity has moved to the virtual world. A large proportion of older people have a problem with IT technology. Their number is increasing, but it is still not too many. The percentage of internet use and activities carried out by individuals, by age group, in European countries can be seen in Table 1.

Table 1. Internet Use and Activities Carried Out by Individuals, by Age Group, EU-27 (% of individuals)

| | Total population | | Aged 55-64 | | Aged 65-74 | |
|---|---|---|---|---|---|---|
| | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 |
| **Frequency of use: at least once a week** | 43 | 65 | 26 | 46 | 10 | 25 |
| **Frequency of use: daily** | 29 | 53 | 17 | 36 | 5 | 17 |
| **Used Internet in the last 3 months:** | | | | | | |
| for any training and education related purposes | : | 39 | : | 22 | : | 10 |
| for looking for information about education, training or course offers | : | 23 | : | 10 | : | 3 |
| to do an online course (of any subject) | : | 4 | : | 2 | : | 1 |
| reading/downloading online newspapers/news | 17 | 34 | 10 | 24 | 3 | 14 |
| to subscribe to news services or products to receive them regularly | : | 6 | : | 4 | : | 2 |
| seeking health information | 16 | 34 | 11 | 26 | 5 | 15 |
| sending/receiving e-mails | 42 | 61 | 26 | 43 | 10 | 24 |
| playing/downloading games, images, films or music | 16 | 28 | 4 | 11 | 1 | 6 |
| finding information about goods and services | 39 | 56 | 24 | 40 | 9 | 22 |
| job search or sending an application | 10 | 15 | 2 | 4 | | |
| downloading software | 13 | 21 | 7 | 11 | 3 | 6 |
| telephoning or video calls | : | 19 | : | 10 | : | 5 |
| listening to web radios and/or watching web TV | 10 | 26 | 3 | 13 | 1 | 6 |
| uploading self-created content to any website to be shared | : | 22 | : | 10 | : | 5 |
| posting messages to social media sites or instant messaging | : | 32 | : | 10 | : | 4 |

*Source:* Eurostat (online data code: isoc_bde15cua)

American researchers pointed out (Anderson, et al. 2017) that the use of modern technologies by older people is increasing year by year, but it is still difficult to consider this level as satisfactory. Within two decades, the use of the Internet in the 65+ age group increased by 55 percentage points and in 2016 it amounted to 67%. Researchers also identified the main barriers to IT use reported by the elderly. Among them is a lack of faith in one's abilities. You need help from others to teach you how to use the device or application. Despite this, most of them believe that modern technology has a positive impact on life and society (55%). Only 4% considered this influence mostly negative.

Even those who can use IT often want to improve their skills, but do not know how and where. Young people through school activities and voluntary activities in NGOs can help them in this. Both groups will benefit from this. Elderly will gain new IT skills useful in everyday life, and young trainers will learn to work as a trainer and interpersonal communication. Intergenerational action will strengthen the self-esteem of both groups (Barton, 1999; Grzybek, 2012; Klimczuk, 2016).

The COVID-19 pandemic has made us all realize how helpful is digital technology. For

younger people, it is possible to learn and work remotely. For elderly people it can help buy medicines and food, keep in touch with loved ones and caregivers. It can provide entertainment in terms of watching movies, plays and listening to concerts. That is why it is important to organize classes for the elderly that will help them use modern technologies. Classes should include:

- secure online shopping
- checking the credibility of information on the Internet
- installation and operation of applications
- creating images, videos, texts, or downloading them from the Internet.

There are many definitions of old age, but there is no full agreement on when it begins. The fact is that societies are ageing. Scientists distinguish five types of ageing (Kotlarska-Michalska, 2000):

- Constructive attitude - a person is at peace with the passage of time and the approaching end of life is cheerful, tolerant, and able to enjoy life.
- Dependent attitude - a person is passive, becomes dependent on a spouse or children
- Defensive attitude - a person is afraid of death, has strong fears, which he hides under increased activity, may be characterized by jealousy towards younger people.
- An attitude of hostility towards the environment - a person shifts the grievances onto others - people, institutions. He accuses others of his failings, envies the younger ones.
- Self-hostile attitude - is characterized by people with low self-esteem, they are reluctant to recall memories, and they are inactive and not very resourceful. They have self-regret and self-grudge and treat death as a liberation from a failed life.

When organizing various activities for the elderly, it should be taken into account that they may have different attitudes, and depending on the one they represent, the methods and forms of work should be appropriately developed (Świętochowska, 2012; Tried & True; Corbin, Kagan, Metal-Corbin,1987).

Sociologists wonder what role older people play and will play in societies, what will be

the relations between them and younger families. As the population of old people grows, more and more elements that are aggressive should be introduced into educational programs at all stages. Examples of such courses can be found at the Centre for Healthy Aging of Pennsylvania State University (Intergenerational Learning):

• Digital Media and Social Practice - students learn how to prevent age discrimination through a variety of media.

• Perspectives on Aging/Lighter as We Go - students in contact with old people get to know all stages of life from youth through adult to old age.

• Art & Science of Healthy Aging - students learn how to build intergenerational relationships by using science and art.

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## 7. Important Points in Elderly Care

In this part, physiological changes, problems, and care practices in elderly people will be discussed first. Next, there will be information about the geriatric assessment. Finally, the information about the general care of the elderly will be presented.

### 7.1.Physiological Changes, Problems, and Care Practices in Elderly People

With ageing, physical, psychological, and mental changes occur in the body. In this chapter, physiological changes, common problems, and care practices in the elderly will be explained.

#### *7.1.1. Changes in the Cardiovascular System*

Changes in the cardiovascular system of the elderly cause circulatory slowness, oxygen deficiency, fatigue, difficulty adapting to changing situations, and a tendency to edema. Common diseases related to ageing cardiovascular system are orthostatic hypotension, coronary artery disease, and increased blood pressure (Fleg & Strait, 2012; Houghton, et al. 2016).

Recommended interventions to minimizing age-related cardiovascular changes of elderly;

- Appropriate exercise planning
- Dietary regulation
- Regular health checks
- Regulation of lifestyle
- Diet low in sodium, fat, and cholesterol, rich in fiber
- Adequate fluid intake
- Avoiding sitting for a long time
- Avoiding standing for a long time
- Avoiding using electric blankets
- Avoiding taking a hot bath
- Keeping a healthy weight
- Limiting portion size

QR Code 1: European Guidelines on Cardiovascular Disease Prevention Practice.

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- Stress management (European guidelines on cardiovascular disease prevention in clinical practice-version 2012) (Further Reading Suggestion: Scan QR Code 1).

### *7.1.2. Changes in the Respiratory System*

Ageing cause to decrease in rib cage elasticity, respiratory capacity, coughs reflex, and peripheral perfusion. With ageing, alveolar membrane thickness increases, cilia movements slow down and acid-base regulation can be impaired (Lee et al. 2016; Lalley, 2013).

Common diseases related to ageing respiratory system pulmonary tuberculosis, chronic obstructive pulmonary disease, and respiratory system infections such as pneumonia and pulmonary thromboembolism (Fulop, et al. 2010; Vogelmeier, et al. 2017).

Recommended interventions to minimizing age-related respiratory changes of elderly;

- Prevention of infections by vaccine such as pneumonia and influenza vaccine
- Preventing bladder, bowel, and stomach distension
- Allowing enough time for care
- Appropriate exercise planning
- Dietary regulation
- Regular health checks
- Cough and deep breathing exercises
- Training and counseling
- Avoiding air pollution and other pollutants
- Avoiding smoking cigarette
- Keeping a healthy weight (Fulop, et al. 2010; Vogelmeier, et al. 2017)

### *7.1.3. Changes in Digestive System*

Ageing cause to decrease in all secretions and enzymes, absorption, muscle tone, function, and blood flow to the liver. With ageing pancreatic response and sensitivity of taste and smell, receptors decrease. The elderly are tending to tooth losses (Dumic, et al. 2019).

Changes in the digestive system of the elderly cause broken teeth and prosthetic lesions, loss of appetite, indigestion, changes in eating habits, absorption difficulties,

incontinence, and aspiration risk. Common diseases related to ageing digestive system are malnutrition, atrophic gastritis, diarrhea, and constipation (Rémond, et al. 2015; Cichero, 2018; Dumic, e.t al 2019).

Recommended interventions to minimizing age-related digestive system changes of elderly;

- Solving oral-dental problems
- Preventing dehydration
- Keeping a healthy weight
- Keeping constipation under control
- Training and counselling
- Maintaining a healthy diet
- Reducing salt consumption.
- Avoiding white foods such as bread, rice, and potatoes.
- Drink water or other non-caffeinated, non-alcoholic beverages throughout the day
- Avoiding foods that trigger heartburn or reflux (Rémond, et al. 2015; Cichero, 2018; Dumic, e.t al 2019).

### *7.1.4. Changes in Nervous System*

Ageing causes loss of central nervous system cells and sensitivity in nerve endings and receptors. With ageing, blood circulation and memory become weak. Intellectual capacity, sympathetic and parasympathetic functions decrease by age (Saxon, et al. 2014).

Changes in the nervous system of the elderly cause reflex weakness, increased risk of accidents, frostbite, burns, wounds, aspiration risk, sleep problems, learning difficulties, disorientation. Common diseases related to ageing nervous system are Alzheimer's disease, depression, dementia, anorexia, delirium, and insomnia (Saxon, et al. 2014; O'Callaghan & Kenny, 2016).

Recommended interventions to minimizing age-related nervous system changes of elderly:

- Trying to establish the relationship of the individual with the reality, to ensure his orientation to the person, place, time frequently

- Reminding the things to do
- Care, education, and counselling
- Preventing accidents
- Physical exercise
- Adequate sleep and rest
- Preventing complications
- Suitable environments
- Providing security and freedom
- Providing social support
- Reading books
- Music (playing musical instruments such as a piano)
- Positive perception
- Meditation
- Cognitive therapy
- Joining the University of the Third Age (Kirk-Sanchez & McGough, 2014; Bauman, et al. 2016).

### *7.1.5. Changes in Metabolic-Endocrine System*

Ageing cause to decrease in body mass, energy requirement, and hormone levels in the metabolic-endocrine system. With ageing, the fat ratio increases. Changes in the metabolic-endocrine system of elderly difficulties to cope with stress, menopause, andropause, glucose intolerance. Common diseases related to ageing metabolic-endocrine system are Type II diabetes (Gong & Muzumdar, 2012; De & Ghosh, 2017).

Recommended interventions to minimizing age-related metabolic-endocrine system changes of elderly:

- Coping with stress
- Counselling for menopause and andropause.
- Regular health checks (Stute et al. 2016).

### *7.1.6. Changes in Hematopoietic System*

Ageing cause to decrease in bone marrow and lymphoid tissue function in the hematopoietic system. Changes in the hematopoietic system of the elderly cause fatigue

and decreased resistance. Common diseases related to ageing hematopoietic system are anemia and infections (Snoeck, 2013; Kovtonyuk et al. 2016).

Recommended interventions to minimizing age-related hematopoietic system changes of elderly:

- Activity planning
- Balanced diet
- Preventive measures (Snoeck, 2013; Oliveira et al. 2018).

### *7.1.7. Changes in Immune System*

Ageing cause to decrease in antibody response and an increase in autoantibody. Changes in the immune system of the elderly cause delayed wound healing and infections (Castelo-Branco & Soveral 2014; Ciabattini et al 2018).

Recommended interventions to minimizing age-related immune system changes of elderly;

- Protecting programmes such as vaccination
- Getting active
- Reducing stress
- Spending time outdoors (Castelo-Branco & Soveral 2014; Ciabattini et al 2018).

### *7.1.8. Changes in Senses*

Ageing cause to decrease in the flexibility of the lens and corneal reflex. Visual acuity, peripheral vision, tears decreases in the elderly. Pupils' adaptation is delayed and symmetrical hearing is decreased by age. Changes in the senses of the elderly cause accident risk, eye infection, darkness and excessive light adaptation problem, dependence, communication problem, disorientation, and blindness (Rosenthal & Fischer, 2014; Humes & Young, 2016; Saftari & Kwon, 2018).

Recommended interventions to minimizing age-related sense changes of elderly:

- Taking measures against accidents
- Ensuring communication
- Supporting independence

- Training and consultancy
- Protective measures (Rosenthal & Fischer, 2014; Humes & Young, 2016; Saftari & Kwon, 2018).

### *7.1.9. Changes in Skin*

Ageing cause to decrease in subcutaneous adipose tissue, the function of sweat glands, pigmentation, and the elasticity of the skin. Changes in the skin of the elderly cause increased pigmentation, dryness, wrinkles, heat regulation problem, and pressure ulcers risk. Common diseases related to ageing of the skin are herpes zoster, skin cancer, fungal infections, calluses, and nail thickening (Al-Nuaimi, et al. 2014; Blume-Peytavi, et al. 2016; Humbert et al. 2016).

Recommended interventions to minimizing age-related skin changes of the elderly:

- Taking measures to protect skin integrity
- Ensuring adequate hygiene
- Taking necessary precautions and applying if there is incontinence
- Taking preventive measures against cross infections
- Keeping the skin dry and clean
- Preventing or keeping dehydration and edema under control
- Foot care (Al-Nuaimi, et al. 2014; Blume-Peytavi, et al. 2016; Humbert et al. 2016).

### *7.1.10. Changes in Musculoskeletal System*

Ageing cause to decrease in elasticity, mass, and strength of muscles. With ageing, hip, knee joint synovial membrane changes, and bone mineral loss increases, especially in women. Joint mobility decreases and body fat mass increases by age (Reuter, 2012; Gheno et al. 2012; Saxon et al. 2014).

Changes in the musculoskeletal system of the elderly cause fatigue, hip fracture, balance, and walking problems. Common diseases related to ageing of the musculoskeletal system are atrophy and arthrosis problems, osteoarthritis, osteoporosis, scoliosis, and degenerative arthritis (Reuter, 2012; Gheno et al. 2012; Saxon et al. 2014).

Recommended interventions to minimizing age-related musculoskeletal system changes of elderly:

- Ensuring adequate intake of calcium, protein, and vitamin D in the diet
- To take precautions against accidents
- Exercise practices
- Training and consultancy (Cadore, et al. 2013; Apóstolo, et al. 2018).

### *7.1.11. Changes in Genito-Urinary System*

Ageing cause to decrease in oestrogen level, secretions, and perineal muscle tonus. By age, the uterus becomes smaller, and vaginal epithelium atrophies in women. Ageing cause to decrease of testosterone level and sperm count. By age, testicular atrophies in men (Mannella, et al. 2013; Gunes et al 2016).

Age-related changes in the genito-urinary system of women cause decreasing in intercourse frequency and incontinence. Age-related changes in the genitourinary system of men cause increasing in urination frequency due to prostate enlargement and decreasing in intercourse frequency. Recommended intervention to minimizing age-related genitourinary system changes of elderly is training consultancy as required (Mac Bride et al 2010; Eilber & Lee, 2020).

## 7.2.Geriatric Assessment

Geriatric assessment allows an effectively assessing and actively managing their health care (Elsawy & Higgins, 2011).

Aims of geriatric assessment are;

- To determine the basic characteristics of the patient, his history, and the results of his treatment,
- To make the correct diagnosis,
- To reveal hidden diseases,
- To improve medical treatment,
- To improve functional status,
- To increase the quality of life,
- To make long-term care plans,

- To save on care costs by avoiding unnecessary expenses (Ellis et al. 2011; Michel et al. 2018).

The core domains of geriatric assessment are;

- Functional status,
- Mobility,
- Daily living activities,
- Gait speed,
- Cognition,
- Mood and emotional status,
- Nutritional status,
- Comorbidities and polypharmacy,
- Geriatric syndromes (fall risk, delirium, urinary incontinence, dentition, visual, or hearing impairments),
- Disease-specific rating scales (ie, parkinsonism, dementia),
- Goals of care,
- Advanced care planning (Ward & Reuben, 2016; Pilotto et al 2017).

For more information, you can read "Integrated care for older people: Guidelines on community-level interventions to manage declines in intrinsic capacity" published by World Health Organization in 2017.

## 7.3.General Care of The Elderly

General care such as hygienic care, eye care, nutrition, elimination of drug use, and sleep is important processes in the elderly (Nies & McEwen, 2014). To achieve this goal; it is of great importance to control diseases in the early period, to protect and maintain the current health status, to benefit from existing opportunities for the elderly, to improve existing opportunities, and to develop new areas of needs (World Health Organization, 2017).

### *7.3.1. Hygienic Care*

Skincare and general hygienic care are important due to changes in the skin of elderly people. The elderly should have dry skin and normal temperature (Ackley et al., 2017). Since the skin dries, a bath twice a week using mild soap is sufficient (Brennan-Cook and

Turner, 2019). Alcohol-free soaps and shampoos should be used for hair and should be combed with a soft brush. After bathing, it is important to thoroughly dry the under breasts, armpits, and between the feet.

Foot care is important in the elderly community. After a bath, elderly people should use cream and alcohol should not be used while massaging. Also, between the toes, nail edges and soles should be checked regularly. Nails should be cut straight and should not be cut deeply. Elderly people also do not walk barefoot and they should prefer cotton and thick socks(American Diabetes Association, 2013; Miikkola et al., 2019). Regular eye checkups and artificial tears for tear reduction are recommended (Nies and McEwen, 2014).

### *7.3.2. Oral and Dental Care*

The elderly should brush their teeth at least twice a day to help prevent gum disease and tooth decay. Toothbrush handle used by elderly people should be thick and easy to shape. Mechanical cleaning expresses the removal of plaque using a brush or ultrasonic cleaning. Chemical cleaning products are depending on sodium hypochlorite, peroxides, neutral peroxides with enzymes, enzymes, or acids (Duyck et al, 2016). Also, brush cleaning tablets or solutions for dentures and artificial saliva for dry mouth are recommended. Teeth or dentures should be cleaned after eating. Prostheses used by elderly people should be kept in prosthetic water and avoided from hot food and drinks (Baumgartner et al., 2015; Delwel et al., 2018; Razak et al., 2014).

### *7.3.3. Nutrition*

Elderly people face many problems such as slowness in eating, difficulty in chewing and swallowing generally caused imbalanced nutrition (Ackley et al., 2017). Therefore, the diet of the elderly person should be planned to include carbohydrates, fat, protein, vitamins, and minerals. Soft foods and soups should be preferred, and salt consumption should be reduced. Besides, elderly people should avoid white food such as bread, rice, and potatoes (World Health Organization, 2017). It is advised to elderly people to take a fluid intake of 1.5 to 2 L of fluid each day (ideally, 6 to 8 glasses of water) (Ackley et al., 2017). Three main meals or 3 small meals and 2-3 larger snacks and nutritious drinks are recommended. Main meals should be available every 4 to 5 hours during the day. The

maximum period between the last main meal at night and the following breakfast should not excess 12 hours (LlyWodraeth Cymru Welsh Government, 2019).

### *7.3.4. Elimination*

Elderly people should prefer aqueous and cellulose foods and meet the toilet requirement every day at certain times. Also, regular walking for the elderly is recommended. Besides, strengthening effective muscles in the perineum and micturition is important for elimination in the elderly population (Nies & McEwen, 2014; Sharma and Bhutta, 2020). It is recommended to go to the toilet at certain times (a regular toilet routine) and drink warm water in the morning to prevent constipation in elderly individuals (Schuster et., 2015).

### *7.3.5. Sleep and Movement*

Elderly need to sleep about 7 to 9 hours each night. For healthy sleep, they should avoid short naps during the day and from mental stimulation activities and exercise before bedtime. Advice against the sleep-deprived client's chronic use of caffeinated drinks to overcome daytime fatigue and or drowsiness; focus on elimination of factors that lead to chronic sleep loss(Ackley et al., 2017). Environmental regulations such as night light increase the sleep quality of elderly people. At the same time, safe sleeping pills can be preferred for quality sleep. However, ensuring that the distance between the bedroom and the toilet is close and safe is important for quality sleep (Charlesworth et al., 2015; Cooke and Ancoli-Israel, 2011; Scheuermaier and Loughlin, 2016; Mander et al., 2017; Molano and Vaughn, 2014). Summarily, ensuring a dark and quiet nighttime environment, supplying a suitable sleeping temperature, inducing physical activity, maintaining a consistent schedule of meals and activities, maintaining a bright daytime environment, and facilitating outdoor activity are all methods of improving sleep (Ackley et al., 2017). Establishing suitable home, garden, and landscaping for elderly people, encouraging them to do daily work, regular body exercises, walking, breathing exercises, and good posture and position exercises increase the movement of elderly individuals (Ackley et al., 2017; Nies and McEwen, 2014).

In summary, the exercise training to be taught to the elderly with VR can be as follows.

- Exercise should be appropriate to the capacity of the individual.

- Exercise should be increased gradually.
- Exercise should be a part of the individual's life.
- Exercise should not strain the cardio-pulmonary system.
- Exercise should be easy and enjoyable

### *7.3.6. Body Temperature and Clothing*

Controlling body temperature in the elderly population is important for raising living standards. Elderly body temperature ranges from 35.1 to 37 (Nies and McEwen, 2014; Günes and Zaybak, 2008). Inappropriate clothing for environmental temperature is risk factors for body temperature(Ackley et al., 2017). Wearing comfortable, protective clothing (uniforms and athletic gear) which do not transmit heat and is suitable for the season should be preferred. For example, lightweight cotton clothing is more comfortable In hot weather (Ackley et al., 2017; Schlader et al., 2018; Tan et al., 2020).

### *7.3.7. Auxiliary/Assistive Devices*

With old age, elderly individuals face many problems such as decreased vision loss and walking difficulties. Necessary assistive such as a walker, canes, crutches devices, or equipment needed. If needed, promote the use of glasses, assistive hearing devices, hearing aids, and dentures. For these reasons, auxiliary devices become an important part of their lives. Therefore, elderly people need to be able to maintain the auxiliary devices they use. For example, cleaning dentures, cleaning glasses, preventing breakage of glasses, removing the hearing aid used at night, and the maintenance and cleaning of the hearing aid increase the living standards of the elderly and ensure that they stay safe (Nies and McEwen, 2014). Also, education, monitoring, regular check-up, and improvements should be made when necessary for the adaptation of elderly individuals to assistive devices.

### *7.3.8. Use of Medicine*

Many medications are used due to the high prevalence of chronic diseases in elderly people. Therefore, irregular and improper medicine use is common. Polypharmacy is an area of concern for the elderly because of several reasons such as metabolic changes, reduced drug clearance, and drug-drug interactions. These risks are furthermore exacerbated by increasing the number of drugs used (Dagli and Sharma, 2014). Taking

medicines the wrong way or mixing certain drugs can be dangerous for the elderly. Therefore, the following instructions, are important for the safety of the elderly (Lugo-Trampe and Trujillo-Murillo, 2010; National Institute on Aging, 2019; Nies and McEwen, 2014):

- using the right amount,
- correct and regular use,
- turn on the light,
- tell the doctor about alcohol, tobacco, and drug use,
- checking before stopping,
- do not share own drugs with anyone,
- monitoring of adverse effects,
- cooperation with family and physician,
- monitoring of blood pressure, blood sugar,
- use of drugs such as analgesic, anticoagulant, diuretic, and oral hypoglycemic under the supervision of the doctor. (Further Reading Suggestion: Scan QR Code 2)

QR Code 2: National Institute on Ageing: Safe Use of Medicines for Older Adults.

Daily medicine boxes should be used by the elder population. Medicine reminders such as mobile application and alerts should be used ( Sevais, 2016).

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## 8. How Conditions Elderly Face As They Age Should Be Taken Into Account When Creating VAR Content for Them

### 8.1. Ageing of Societies

Among the documents, dealing with the rights of older people there is "The Charter of Fundamental Rights of the European Union". In article 25, it is stated that the Union "recognises and respects the rights of the elderly to lead a life of dignity and independence and to participate in social and cultural life". The situation of older people is an important topic and it will increasingly appear in discussions, publications, and activities of individual countries and the entire EU. It is related to the aging of societies. The population of old people in the EU is constantly increasing. Comparing the EU countries, one can see that the trend is similar. The differences relate to the pace of change. (Gostomski, 2013; Kubiak, 2013). This is shown in the statistics in Table 1.

Table 1. Elderly Population Age Structure by Major Age Groups, 2009 and 2019 (% of the total population)

| | 0–14 years old | | 15–64 years old | | 65 years old or over | |
|---|---|---|---|---|---|---|
| | 2009 | 2019 | 2009 | 2019 | 2009 | 2019 |
| EU-27 (') | 15.4 | *15.2* | 67.0 | *64.6* | 17.4 | *20.3* |
| Belgium (') | 16.9 | 16.9 | 66.0 | 64.2 | 17.1 | 18.9 |
| Bulgaria | 13.1 | 14.4 | 68.9 | 64.3 | 18.0 | 21.3 |
| Czechia | 14.2 | 15.9 | 71.0 | 64.6 | 14.9 | 19.6 |
| Denmark | 18.3 | 16.5 | 65.9 | 63.9 | 15.9 | 19.6 |
| Germany (') | 13.6 | 13.6 | 66.0 | 64.9 | 20.4 | 21.5 |
| Estonia (') | 14.9 | 16.4 | 67.6 | 63.8 | 17.4 | 19.8 |
| Ireland | 20.6 | 20.5 | 68.5 | 65.4 | 10.9 | 14.1 |
| Greece | 14.6 | 14.3 | 66.6 | 63.6 | 18.8 | 22.0 |
| Spain | 14.8 | 14.8 | 68.6 | 65.8 | 16.6 | 19.4 |
| France (') | 18.5 | *18.0* | 64.9 | *61.9* | 16.5 | *20.1* |
| Croatia | 15.4 | 14.4 | 66.7 | 65.0 | 17.9 | 20.6 |
| Italy | 14.1 | 13.2 | 65.6 | 64.1 | 20.3 | 22.8 |
| Cyprus | 17.7 | 16.1 | 69.9 | 67.8 | 12.5 | 16.1 |
| Latvia | 14.1 | 15.9 | 68.2 | 63.9 | 17.8 | 20.3 |
| Lithuania | 15.1 | 15.1 | 67.8 | 65.1 | 17.2 | 19.8 |
| Luxembourg (') | 18.0 | 16.1 | 68.1 | 69.6 | 14.0 | 14.4 |
| Hungary (') | 14.9 | 14.5 | 68.8 | 66.0 | 16.4 | 19.3 |
| Malta | 15.6 | 13.7 | 70.1 | 67.6 | 14.2 | 18.7 |
| Netherlands | 17.7 | 15.9 | 67.3 | 64.9 | 15.0 | 19.2 |
| Austria | 15.1 | 14.4 | 67.5 | 66.7 | 17.4 | 18.8 |
| Poland (') | 15.3 | 15.4 | 71.1 | 67.0 | 13.5 | 17.7 |
| Portugal | 15.4 | 13.7 | 66.5 | 64.4 | 18.0 | 21.8 |
| Romania | 15.8 | 15.7 | 68.1 | 65.8 | 16.1 | 18.5 |
| Slovenia (') | 14.0 | 15.1 | 69.7 | 65.2 | 16.4 | 19.8 |
| Slovakia | 15.6 | 15.7 | 72.1 | 68.2 | 12.2 | 16.0 |
| Finland | 16.7 | 16.0 | 66.5 | 62.2 | 16.7 | 21.8 |
| Sweden | 16.7 | 17.8 | 65.6 | 62.3 | 17.8 | 19.9 |
| United Kingdom | 17.7 | 17.9 | 66.2 | 63.7 | 16.1 | 18.4 |
| Iceland | 20.8 | 19.0 | 67.5 | 66.8 | 11.6 | 14.2 |
| Liechtenstein | 16.4 | 14.7 | 70.7 | 67.3 | 12.9 | 17.9 |
| Norway | 19.0 | 17.5 | 66.3 | 65.2 | 14.7 | 17.2 |
| Switzerland (') | 15.3 | 15.0 | 68.1 | 66.5 | 16.6 | 18.5 |
| Montenegro | 19.6 | 18.0 | 67.4 | 67.0 | 12.9 | 15.2 |
| North Macedonia | 18.1 | 16.4 | 70.4 | 69.6 | 11.5 | 14.1 |
| Albania | 23.3 | 17.2 | 66.3 | 68.7 | 10.4 | 14.1 |
| Serbia (') | 15.3 | 14.3 | 67.6 | 65.2 | 17.1 | 20.4 |
| Turkey | 26.3 | 23.4 | 66.9 | 67.8 | 6.8 | 8.8 |

(Source:https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=Population_structure_and_ageing)

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There will be more and more elderly people. Their percentage in the total population will be increasing. This applies to the whole world, but in Europe to almost all countries. It is predicted that in 2050, there will be over 30% of people aged over 60 in Europe. It can be seen in Figure 1.

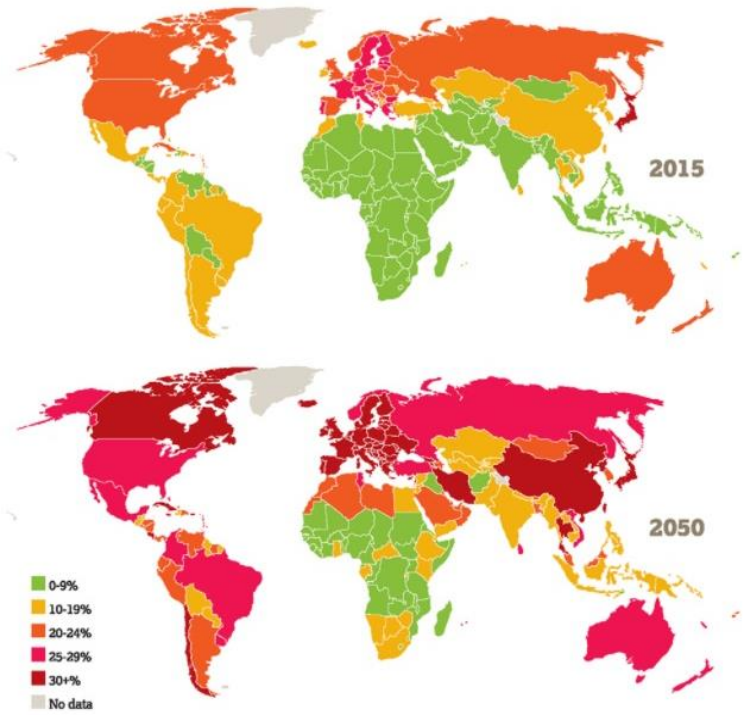


Figure 1. The Estimated Elderly Population Ratio in Europe in 2050 (Source: UN DESA Report, World Population Prospects: The 2015 Revision).

Therefore, the attention of researchers, politicians, and governments is increasingly focused on demographic problems. The prognosis for the future of Europe is worrying. The percentage of young people is falling, and the percentage of people 60+ is growing. It has to do with increasing life expectancy. Another factor is the decline in birthdays. Another factor is the number of children in the family. The age of women who become mothers for the first time also influences this situation. The situation of old people differs from country to country. It is influenced by legal regulations, the economic situation, traditions, and customs as well as the attitude towards the elderly people. Many countries have extended their expenses for the elderly, but it will continue to grow (Bounding, 2013).

The situation of some elderly is such that their pensions and other incomes are sufficient for living, purchasing medical services, and employing personal assistants. However

there is also a group of people who need the help of children and relatives and a group that has a low income, who has no close relatives, and are dependent on social care (Bledowski, Pedich,& Bien, 2006).

Research on the situation of elderly people includes various aspects: social, medical, and health. The conclusions drawn from the research require appropriate preparation of the society - people and institutions. There is a need to develop a strategy that takes into account the social and economic aspects of the changes (Stan obecny i przyszłość opieki długoterminowej w starzejącej się Polsce, 2015).

The conditions in which the elderly live can be described in relation to individual European countries or to the places where they live: alone, in multi-generational families, in social care homes. The European Union is taking various actions to introduce common standards and regulations (Badania i raporty, 2017; Gostomski, 2013; European Commission, 2018).

In most countries, local authorities are responsible for the care of the elderly. For example, in Sweden, the 1992 "Ędel reform" (Ędelreformen) introduced the rule that municipalities are responsible for the care of the elderly and disabled. The competent municipality must pay if the patient stays in the hospital longer than necessary (Skubiszewska, 2011).

The general tendency is integration, creating friendly environments for older people. Active ageing has a positive effect on physical and mental health, and thus reduces state spending on caring for the elderly (Bounding, 2013). These expenses will increase as a percentage, and this is influenced not only by the ageing of the population but also crises such as the covid-19 pandemic. A decline in the state's income may limit social spending. This may lead to a reduction in financial resources to support the elderly. Therefore, intergenerational integration and active ageing can help maintain the health, fitness, and standard of living of older people (European Social Network, 2017). For more informaton on social services providing care for older people, scan QR Code 1.

QR Code 1: "Investing in later life. A toolkit for social services providing care for older people" by European Social Network.

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## 8.2. The Housing Situation of Elderly People

The housing situation of older people varies. In the Polish study done by Błędowski, Szatur-Jaworska, Szweda-Lewandowska, and Kubicki, (2012), it was found that: people living alone - 22%; marriages - 32.2%; married couples living with children14 - 8.5%; families consisting of an elderly person and their children - 8.6%; married couples living with children and grandchildren - 9.9%; families consisting of an elderly person, her children, and grandchildren - 10.1%. Moreover, it was found in the same study that the number of elderly people living alone increases with age.

### *8.2.1. Elderly Living Alone*

Many reasons cause such a situation:

- These are people whose spouse has died (widows and widowers). Sometimes they decide to live with another family member (child, grandson), but most prefer to live alone.
- Another group consists of childless people. After the spouse's death, they usually do not enter into other marriages. They rarely benefit from the care of their extended family (nephews, nephews).
- Older people who have children also often live alone. Due to the large migration of people (study and work mobility), parents are left alone in their family homes. Adult children away from their homeland are unable to take care of their old parents, and the elderly do not want to change their place of residence (Badania i raporty., 2017)

Elderly lonely people often need social assistance (paid from various sources: private and state). Most often it takes the form of assistants who come and perform specific work, provide help with household chores). They are often looked after by neighbours and volunteers from non-governmental organizations (Nowak-Kapusta, Franek, Leszczyńska, & Ćmiel-Giergielewicz, 2017).

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### *8.2.2. Elderly Living In Multigenerational Families*

There are fewer and fewer multigenerational families. It largely depends on traditions and customs, but the tendency to reduce them is visible in all countries. Today, multigenerational families are usually limited to two generations (Badora et al., 2001).

The reasons for this vary. Researchers point out that the change of the traditional family pattern (short marriages, divorces, greater popularity of informal relationships) results in the fact that extended families are less and less frequent (Holzer et al., 2003).

## 8.3.Types of Care

There are broadly three types of long term care:

- Institutional care may relate to nursing homes and care homes run by public, private, or not-for-profit providers.
- Home care covers both nursing care and basic living services delivered at home.
- Informal or no specific formal care covers care that is provided by family or friends or a situation where an older person does not receive any care from formal providers of care (Degavre & Nyssens, 2012; Bettio & Verashchagina, 2012).

Nursing homes are most often intended for people who need institutional support. One of the types of these institutions is homes for the elderly. Based on research and observations (Kubiak et al., 2012), it is concluded that people should stay in their environment as long as possible. They should go to nursing homes when it is necessary for their health and safety.

Social Welfare Homes is run by state and private institutions and non-governmental organizations. Staying in them may be free, partially paid, and fully paid. They can be divided into two groups:

- Homes where there are able-bodied elderly. They stay in them due to the lack of their apartment, poverty, and lack of a family;
- Homes with medical care for elderly people who need professional help, but who do not have to stay in a hospital. (Szatur-Jaworska, Błędowski, & Zubrzycka-

Czarnecka, 2016). The rules of staying in such homes depend on the legal regulations in individual countries.

### 8.4. Pensions

The age at which a person can retire varies across the EU. In some, it is different for women (lower) and men (higher). The amount of the old-age pension depends on the length of service and earnings. All countries strive to extend working hours (Dziubińska-Michalewicz & Kłos, 2020). The statutory retirement age, early retirement schemes decided about the numbers of pensioners.

In most countries, the pension system is based on contributions on earnings. Contributions may vary depending on the profession. In several EU countries, for example, Ireland, Greece, Malta, the Netherlands, and the United Kingdom, the public pension system provides a flat-rate pension, which may be supplemented by a professional or private contribution. Some countries (Poland, Slovakia, and Hungary) have recently decided to transfer funds from segregated private accounts back to the system (European Commision, 2018; Global AgeWatch Index, 2015; Bledowski, Pedich & Bien, 2006).

Regardless of the pension system, pensions are lower than earnings. The elderly need money mainly for medicines and medical care. Living costs vary, but one can see that prices are rising faster than pensions. The costs of housing, food, and transport can be a heavy burden for the elderly people. The price comparison taken from Eurostat (2016) is presented in Figure 2.

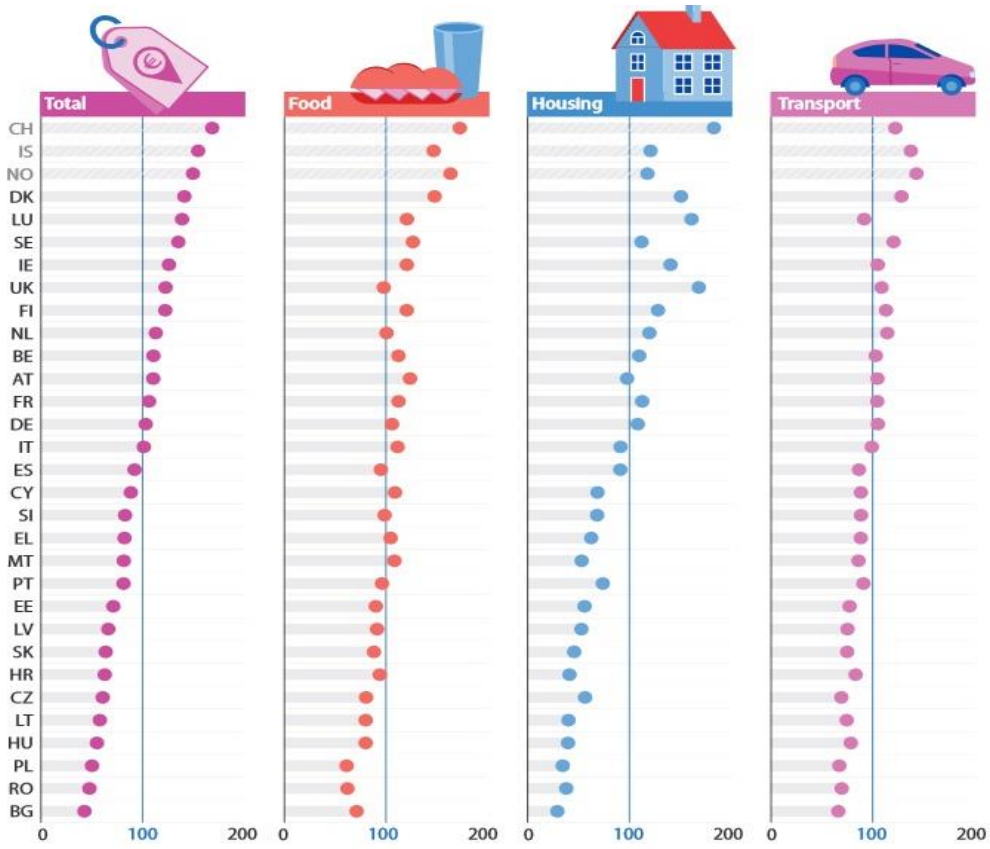


Figure 2. Comparative Price Levels (EU-28, 2016)

The year 2020 has brought everyone's attention to the elderly, who are particularly vulnerable to COVID-19. States have undertaken various forms of protection and support for this group. It can be seen in Table 2.

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Table 2. Government Social Protection Responses to COVID-19 Targeting Older People (September 2020)

| *Higher pensions (permanent ones in bold)* | *Expansion of pension coverage* | *Advance of pensions* | *Access to pension savings* | *Safe pension delivery* | *In-kind support to older people* | *Cash transfers to older people* |
|---|---|---|---|---|---|---|
| **Albania**, Argentina, Australia, Brazil, Bahrain **Cameroon**, Colombia, Cook Islands, **Egypt**, Hong Kong, **Hungary**, India, Kenya, Kosovo, Malaysia, Montenegro, Mongolia, Myanmar, Russia, Samoa, Sao Tome and Principe, Serbia, Singapore, Slovenia, South Africa, Suriname, **Tanzania (Zanzibar)**, Tonga, Tunisia, **Turkey**, Turkmenistan, Thailand, **Ukraine**, Zambia, Zimbabwe | Bangladesh, Brazil, Cost Rica, Guatemala, Mongolia, Sri Lanka, Kenya | Barbados, Brazil, Belize, Cost Rica, Guyana, Jamaica, Kosovo, Kyrgyzstan, Mexico, Paraguay, Peru, Saint Vincent and the Grenadines, South Africa | Australia, Brazil, Fiji, Iceland, India, Malaysia, Samoa, USA | Algeria, Armenia, Belarus, Egypt, Italy, Kosovo, Montenegro, Russia, Serbia, Trinidad and Tobago, Turkey | Albania, Antigua and Barbuda, Armenia, Bosnia and Herzegovina, Bulgaria, Congo, Jamaica, Jordan, Malaysia, Nepal, Russia, Sint Maarten, Spain, Uzbekistan | Mauretania, Nepal, Philippines, Russia, South Sudan, Tunisia, Ukraine |

Source: https://socialprotection.org/discover/publications/responding-covid-19-improved-social-protection-older-people-december-2020

The pandemic reduces interpersonal contacts. It is especially difficult for the elderly if they cannot meet their children, grandchildren, or peers. Even though the COVID-19 crisis brought many impacts, it highlighted that the generations need each other, not only for the economic situation but also for life balance. All these factors should be taken into account when planning activities for the elderly. The differences will relate to the needs, material conditions, and place of residence of the elderly, family situation.

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