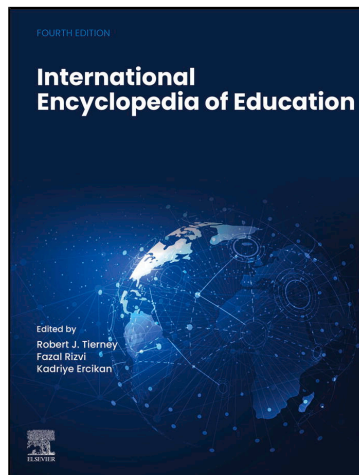


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## Older adults' development, learning, and education

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The world's population is aging. Globally, there are "727 million persons aged 65 years or over in 2020" ([United Nations Department of Economic and Social Affairs, Population Division, 2020](#), p. 1). In 2020, 9.3% of the population was over age 65 (p. 1). By 2050, the "number of older persons worldwide is projected to be more than double, reaching over 1.5 billion" (p. 1).

Because the older adult population is increasing, and learning is a lifelong endeavor, it is important to understand older learners and their learning. In this chapter, I discuss the definitions of "older adult." I touch on physical changes, namely differences in sight and hearing because these changes can profoundly affect learning. Additionally, I explore brain changes and the effects of exercise and cognitive training on the brain. Next, I investigate older adults' informal learning in daily activities and nonformal settings. Last, I conclude with observations about the literature on older adults in these areas.

The minimum age used to define an older adult varies. The age of 65 is typically chosen as a minimum age for later adulthood because "In 1889, the German Chancellor Otto von Bismark decided to set this as the age when people could receive social insurance payments" ([Whitbourne and Whitbourne, 2014](#), p. 8). Gerontologists divide older adults into three groups. Individuals ages 65–74 are "young-old," while those 75–84 are "middle-old" with age 85 and older considered "old-old" (p. 8). Some scholars use ages 50 or 60 as minimum ages to define "older adults." Most of the information presented in this chapter will concern adults aged 50 or older.

### Physical changes

Individuals' appearances change in the skin, hair, body build, mobility, changes in vital functions, and diminishment in senses, including sight, hearing, taste, touch, and smell. Information about vision and hearing will be featured as a diminishment in these senses may significantly affect learning.

### Vision

Although vision loss can occur at any age, most individuals with vision impairments are age 50 or older ([WHO, 2021](#)). Worldwide, in 2020, people aged 50 or older accounted for 78% of those who were blind (33.6 million of 43.3 million) and 70% of those with "moderate or severe vision impairment" (143 million of 265 million) (e133). Declining vision affects how people access and process information. The primary causes for vision loss in older adults include cataracts, glaucoma, macular degeneration, and diabetes-related vision complications ([Pelletier et al., 2016](#)). Cataracts occur when the eye lens becomes clouded ([Tyler, 2020](#)). Glaucoma causes irreversible damage to the optic nerve, which can result in blindness ([Pelletier et al., 2016](#)). Symptoms for age-related macular degeneration can include difficulties adapting to the dark as this disease affects the retina ([Pelletier et al., 2016](#)).

Fortunately, those with access to treatment for eye conditions can regain or maintain some sight. Researchers have shown that vitamin supplements may slow the progression of macular degeneration while eye drops and laser surgery can treat the progression of vision loss due to glaucoma (Pelletier et al., 2016). Cataract surgery does not require hospitalization, and the procedure takes less than an hour (Whitbourne and Whitbourne, 2014).

## Hearing

In addition to having vision impairments, many older adults have hearing loss. Approximately 25% of those aged 60 or over experience “disabling” hearing loss worldwide (WHO, 2021, paragraph 6). Disabling hearing loss “refers to hearing loss greater than 35 dB (dB) in the better hearing ear” (WHO, 2021, paragraph 6). For comparison, bird calls are typically about 40 dB, and rustling leaves are about 20 dB (IAC Acoustics, 2021, Table 1). Common conditions related to hearing loss include age-related hearing loss (presbycusis) and tinnitus or ringing in the ears (Whitbourne and Whitbourne, 2014). Hearing aids can ameliorate some hearing issues and those who are hard of hearing use techniques such as looking directly at the person and turning down background noise (Whitbourne and Whitebourne, 2014).

## Brain changes

In addition to changes in the senses, age-related brain changes affect memory, planning, learning, and decision-making. Older adults may have difficulty recalling names, find multitasking more challenging, and experience an inability to pay attention (National Institute on Aging, 2020). Brain changes include the shrinkage of the hippocampus, which affects one's memory (Tyler, 2020). In addition, complex tasks take longer with age because there is a loss of myelin which connects brain areas (Tyler, 2020). However, new neurons continue to form brain-training exercises that help older adults “compensate for any age-related changes” (Erber and Szuchman, 2015, cited in Tyler, 2020, p. 1165). Following are studies on physical and cognitive training effects on the brain.

## Studies on the effect of physical training on cognition

In general, physical training improves scores on tests measuring cognition. Data from two extensive studies have been analyzed: The Mexican Health and Aging Study (MHAS) ( $n = 5853$ ) and the Korean Longitudinal Study of Aging (KLoSA) ( $n = 5188$ ) to understand “the aging process in community-dwelling adults” aged 50 and older (Aarsland et al., 2020). Researchers conducted three (Mexico) and four-year (Korea) follow-up studies. In the MHAS, researchers asked people if they engaged in “vigorous exercise” 3 or more times a week, such as “heavy housework or sports” (p. 2). Participants in the MHAS were considered physically active if they participated in 150 min of this type of activity a week, and KLoSA participants were asked to report their physical activities. They were coded as “physically active” if they reported 150 or more minutes of exercise a week and “inactive” if they did less than 150 min a week. Cognitive functioning was assessed using the Cross-Cultural Cognitive Examination test (CCCE) for the MHAS and the Mini-mental state examination (MMSE) for the KLoSA. Physically active Korean participants scored better on these cognitive exams than their inactive peers. However, physically active Mexican participants did not score higher than their inactive peers. Researchers cited Mexicans' poorer diet and lower average education level (less than six years) for lower cognitive test scores.

Scholars conducted a meta-analysis of 39 studies that had randomized controlled trials of physical exercise interventions in community-dwelling adults with an outcome measure of cognitive function (Northey et al., 2018). Participants were aged 50 or older. Thirty-six studies demonstrated that physical exercise, including “aerobic exercise, resistance training, multicomponent training, and tai chi” improved cognition (p. 154). Based on the findings, moderate aerobic and resistance training exercise is recommended for 45 min a day.

Similarly, Netz (2019) conducted a historical review of highly cited research studies on the effect of exercise on cognition. He found physical training, such as aerobic and strength training, improved brain blood flow, which improved cognition, while motor training, such as balance and coordination activities, directly affected cognition. The intensity of the physical exercise enhances the brain's ability to adapt to change by forming more neural connections and ultimately improves cognition, whereas, with motor training, the complexity of the exercise improves cognition. Dual-task training that included cognitive demands in addition to physical or motor activity was more effective in preserving or improving cognitive functioning than a single task.

Kramer and Colcombe (2018) revisited their meta-analytic study of fitness effects on cognitive function. The original study (Colcombe and Kramer, 2003) reviewed 18 studies published from 1966 to 2001 that examined exercise effects on cognition in randomized controlled human trials with adults aged 55 or older. Exercise had the most significant impact on “executive control functions such as planning, scheduling, dealing with ambiguity, working memory, and multitasking” (p. 214). Since their review, more studies have examined how exercise results in brain changes. These studies have found that cardio fitness increases hippocampal

volume (Erickson et al., 2011, cited in Kramer and Colcombe, 2018, p. 214). In addition, aerobic training has improved parietal regions of an attention network that corresponded to improved performance on a selective attention task (Colcombe et al., 2004, cited in Kramer and Colcombe, 2018, p. 214). The authors note that most studies of change in brain structure are cross-sectional and observational, and there is a need for studies that establish causality between brain health and fitness.

### Studies on cognitive training and improved cognition

Like physical training, some studies have shown brain training improves cognitive scores. For example, a 12-week chess training improved older adults' cognitive state, mood, and quality of life (Cibeira et al., 2021). Researchers recruited participants from day-care centers and nursing homes. Twenty-two participants over age 60 completed the study. Eleven participants spent 2 hours a week in a chess-training program, and the 11 participants in the control group had no intervention. Results showed "improved general cognitive status, attention processing speed, executive functions and QoL (quality of life)" for those trained in chess (p. 899).

Nguyen et al. (2019) conducted a meta-analysis of articles that examined the immediate and long-term effects of cognitive training on cognitive flexibility, inhibition, or working memory. Qualifying studies included a pretest and post-test and involved participants aged 60 or older with no neurological impairments, mild cognitive impairment, or diagnoses of dementia. Cognitive training occurred on a technological device, including a computer, gaming device, or mobile device. Researchers measured changes in attention, fluid intelligence, global executive function, language, memory, processing speed, and visuospatial ability. Sixty-one of the studies examined the immediate effect of training. Sixteen studies focused on the long-term effects of cognitive training (from three weeks to eighteen months). Cognitive training gains were significant in executive functioning, memory, and visuospatial ability from pretest to posttest.

Another meta-analysis of experimental studies on cognitive training showed mixed results (Sala and Gobet, 2019). Training improved working memory but did not improve other outcomes, such as verbal and non-verbal intelligence (Sala and Gobet, 2019) or enhance generalized cognitive function (Guye and von Bastian, 2017). The authors of the meta-analysis cautioned that many of the studies involved poor study designs and analysis and that placebo effects may have been responsible for some of the positive effects of brain training. They concluded that, at best, training on a particular task (working memory) may improve performance on that task but does not improve general intelligence (Sala and Gobet, 2019).

### Studies on the effects of cognitive and physical training on the brain

Researchers have examined the effects of physical and cognitive training on the brain. Chapman et al. (2016) studied the differential effects of cognitive and physical training on the brain and behavior. Respondents completed cognitive training ( $n = 18$ ) or physical training ( $n = 18$ ) for 12 weeks. Participants learned strategies to improve their attention, reasoning abilities, and innovative thinking skills. The physical training program consisted of aerobic activity for 150 min a week. Exercise increased performance on memory tasks, whereas cognitive training enhanced executive function. Likewise, in a review of 19 articles on the effects of physical and cognitive training, researchers found that dual exercise training (e.g., aerobic training and weight training) interventions or physical-cognitive training interventions improved physical and cognitive test scores and that this type of training was the best intervention strategy (Levin et al., 2017). The authors noted that because the exercise interventions and test protocols were so diverse, it was impossible to see how these types of training affected individuals' performances.

In summary, physical training, including aerobic and resistance training and motor activities, has improved cognitive function (Aarsland et al., 2020; Netz, 2019; Northey et al., 2018). Cognitive training enhances attention processing and executive functions (Cibeira et al., 2021; Nguyen et al., 2019) and learning and memory. Researchers have found that cognitive training improves working memory but not other areas such as verbal or non-verbal intelligence (Guye and von Bastian, 2017) or general cognition (Sala and Gobet, 2019). Last, physical-cognitive training appears to produce the best results, but there needs to be improved testing protocols and interventions to understand better the associations between training and performance.

Cognitive changes affect learning, but how and where does adult learning occur? In the next section, I review the different types of learning and settings in which this learning occurs for older adults.

### Older adult learning and education

Learning occurs in different settings. Formal education "refers to educational institutions including all levels of schools both private and public as well as specialized programs offering technical and professional training" (Merriam and Brockett, 2011, p. 15). Nonformal education is "any organized educational activity outside the established formal system ... that is intended to serve identifiable learning clientele and learning objectives" (Coombs, 1989, p. 11, cited in Merriam and Brockett, 2011, p. 15). Finally, informal learning is "generally unplanned, experience-based, incidental learning that occurs in the process of people's daily lives" (Merriam and Brockett, 2011, p. 14). Examples of this type of learning include reading a blog, viewing a TikTok video, or conversing with a friend. Since most older adults' learning experiences occur in nonformal settings and informal learning, I focus on these areas.

## Informal learning

Informal learning occurs as adults navigate daily life. Examples of informal learning of older adults could include internet searches on leisure activities such as pickleball, crafts, or conducting genealogical research. In addition, informal learning includes self-directed learning. Individuals decide what they want to learn, which materials they want to use, how they want to engage in learning, and their self-evaluation (Knowles, 1975). An example of a self-directed learning project may be learning how to build a birdhouse. The learner decides whether to consult others on how to build a birdhouse. They may view YouTube videos, read books, or use any other methods they choose. The final product is a functional birdhouse. This section on informal learning discusses older adults' interaction with technology in their informal learning as technology is part of everyday life. Next, I focus on research on "Men's Sheds," which provide a casual learning environment for men, who typically come from a background in the trades, to gather and exchange information and work on projects informally. Last, I conclude the section with a discussion on older adult learning through volunteering and play.

## Informal learning and technology

Technology permeates daily life. Its adoption for older adults' learning purposes is an area of research interest (Barrantes-Caceres and Cozzubo-Chaparro, 2019; Lai, 2020). Lai (2020) surveyed 238 older adult students, 55 and older, from 11 computer classes in central Taiwan. All participants used a smartphone or tablet for at least 30 min a day. Social influence (e.g., the opinions of their children and grandchildren), facilitating conditions (environmental factors that made use of technology easier), and performance expectancy (how the technology will help people achieve their goals), affected older adults' adoption of smartphones and tablets for learning. Older adults living with children were more likely to access the internet as the younger people can provide computer support and instruction (Barrantes-Caceres and Chaparro-Cozzubo, 2019). In addition, having a spouse or partner increases the amount of time older people spend on the internet (Barrantes-Caceres and Chapparo-Cozzubo, 2019).

Several studies concerned older adults' use of technology in their informal learning. Morrison and McCutcheon (2019) investigated older Canadians' online personal learning networks (oPLNs). oPLNs are "a collection of individuals and/or groups with whom you communicate, via the Internet, to engage in discussion, exchange information, and/or share resources to learn more about a hobby or interest" (Morrison and McCutcheon, 2019, p. 4). These researchers wanted to know who engages in online self-directed learning? What do oPLNs "look" like for these individuals (e.g., access, type, purpose)? How do these individuals use their oPLNs for informal self-directed learning? What is the perceived value of self-directed learning in their oPLNs? They surveyed 385 retired older adults who had oPLNs, and were 55 or older. The sample demographics included 57% male, most lived in Ontario, Canada, and had a household income of \$60,000 or more. Most respondents had used the internet for more than 15 years, with no significant difference in age and internet use.

Participants reported communicating with their oPLNs via email, Facebook, blogs, Google plus, and video conferencing, with email being the most common way to communicate (Morrison and McCutcheon, 2019). The purposes for using oPLNs included wanting to learn new things (90.9%), learning from others (73%), sharing knowledge (28.8%), "to learn by interacting with others" (45.7%), (p. 8), and "talking with others about interests or hobbies" (39.5%). (p. 8). Respondents were most likely to access and share websites for information. Nearly 73% strongly agreed or agreed that they "felt a sense of community with other learners in their oPLN" (p. 9). In addition, 86% said that members of their oPLNs provided expert knowledge. Younger participants (age 55–64) were more likely than the older participants (age 75 and above) to seek information online actively.

Older adults may also access the internet via a mobile device. In a literature review that examined the informal learning of older adults using mobile devices, Jin et al. (2019) reviewed 28 studies that met the following criteria: (a) appeared in a peer-reviewed journal, (b) written in English, and (c) published between 2005 and 2017. The 2005 date was chosen because wireless mobile communication became more prevalent, and data speeds increased. Several themes emerged. People engaged in health-related self-directed learning on their mobile devices. Individuals shared information about their health concerns and used mobile applications to monitor their fluid intake, weight, exercise, memory improvement and meditation. Respondents generally had positive attitudes toward using technology, and they saw the benefits of using mobile educational applications. However, they wanted to be assured of privacy, needed help setting up the devices, and wanted "easy access to continuous tutoring and instructional manuals" (p. 130). Older adults use mobile devices to communicate with others, including intergenerational communication. Studies showed the potential for collaborative learning by seniors using mobile devices. Participants shared information and commented on video content. The authors encouraged more research on specific cohorts of older adults (e.g., young-old (65–74), middle old (75–84), and old-old (85 and up) (Jin et al., 2019).

Scholars have also studied the informal learning of older adults on social media. Ebardo et al., (2020), for example, wanted to know why older adults used Facebook. The researchers collected 1707 posts between February and June 2020 from a Facebook community of 71,133 Filipino older adults in the Philippines (Ebardo et al., 2020). The most prominent theme was staying healthy. People discussed their routines for staying healthy and solicited advice when they had a health crisis. Second, individuals discussed staying safe from weather-related events. Third, they discussed caring for family members and maintaining relationships through COVID-19.

Older adults also find health-related support groups online. Litchman et al. (2018) conducted in-depth interviews with 20 United States Baby Boomers from a diabetes online community (DOC). Nine participants were male, with 11 were female; 14 participants possessed a bachelor's degree or higher, and 19 of the 20 identified as White. Most participants had Type 1 diabetes.



Participants used the DOC to learn about and manage diabetes, obtained emotional support from DOC members, and DOC "elders" served as role models and resources for less experienced members. Older members enjoyed giving back to the community. In summary, the DOC filled knowledge gaps and helped with the day-to-day management of diabetes.

### Men's sheds

Men's Sheds originated in Australia in the late 1990s (Golding, 2015). These settings provide informal learning in a social, community setting for "older, typically retired, and sometimes isolated men" (Golding, 2011, p. 105). Activities at each Men's Shed vary according to men's interests, but generally there are places for hands-on activities and socialization (Carragher and Golding, 2015). Technology can be informal learning in Men's Sheds, although typical projects include woodworking and other trade-related activities. While Men's Sheds are open to all, this setting has been shown to appeal to older men with vocational schooling and less formal education (Golding et al., 2007). In this setting, men are not "treated by the organization, or by the women involved as customers, patients, students or clients from negative, deficit or ageist models" (Golding and Carragher, 2015, p. 104). Instead, they make friends and socialize, gain a sense of belonging (Carragher and Golding, 2015), feel increased self-worth, increased physical fitness (Crabtree et al., 2018) and feel less isolated (Nurmi et al., 2018). Attendees are both teachers and learners (Nurmi et al., 2018).

Recently, scholars have explored the effect of Men's Sheds on men's health and wellbeing. Kelly et al. (2019) provided a logic model of health and well-being outcomes of Men's Shed's activities. Their model had five components: interventions, mediating variables, intermediate outcomes, long-term outcomes, and results in physical health and well-being. They reported interventions found in studies, including providing skills and education, socialization, and the inclusivity of Men's Sheds spaces. A second model component, mediating variables, included increased skills, physical movement, improved social networks, improved health literacy, and decreased alcohol and drug use in favor of shed activities. Third, intermediate outcomes included increased fitness, motivation to leave the house, better social bonds, health-seeking behaviors, improved family relationships, and increased feelings of security and safety. Long-term outcomes were listed as increased confidence, decreased socialization, increased feelings of belonging, happiness, enjoyment, with less anxiety and feelings of depression. The last component of the model resulted from improved physical health, mental health, and social well-being. The authors provided an observed pathway to physical health: (1) The men's shed providing opportunities for physical activity increased physical movement—improved fitness—improved physical health. The authors developed "a logic model showing how Men's Sheds may influence health and well-being" but state, "There is a lack of reliable and systematic evidence of the health and well-being outcomes of shed activities" (p. 1155). Few studies included demographic information, and "Associative relationships between factors such as employment status of marital status and health and well-being outcomes are under-explored" (p. 1155). Areas of concern include a lack of exploration of contextual factors such as a rural location or levels of deprivation and subsequent links to health inequalities within communities.

Further, many studies were qualitative and had small sample sizes. The authors call for more quantitative and mixed-methods studies and longitudinal approaches. Subsequent studies have confirmed these health-related findings, such as increased mobility, decreased alcohol use, and improved health literacy (Kelly and Steiner, 2021). Some authors have answered the call for an expansion of research on the men's shed idea by detailing the development of women's sheds (e.g., Golding et al., 2021).

Intergenerational learning can also occur at Men's Sheds. Misan et al. (2018) examined the intergenerational learning between women college students majoring in Occupational Therapy and older men. College students conducted informal information sessions on cooking, exercise, and diet. Men participated in lawn bowling and a health check. The older men reciprocated by informally discussing the use of hand tools, portable power tools, and basic wood construction and finishing techniques. The men were happy to share their skills with the much younger women, building rapport.

In a study that examined how Men's Sheds could be marketed, researchers conducted focus groups with 64 men with 57 of them being 55 years or older (Nurmi et al., 2018). Twenty-two men previously had attended Men's Sheds. Additional participants were recruited from community organizations, coffee shops, and through a one-day advertisement in community newspapers. Researchers conducted four focus groups: two with non-Men's Shed members and two groups of Men's Shed members. Men's Shed's members discussed the activities men are interested in and how marketing is done. Non-members provided opinions about the branding images they saw about Men's Sheds. Men recommended advertisements be placed at men's places of employment, in newspapers, and in the community to attract new members. Another idea was having a Men's Shed member invite others to the Men's Shed. Creating a welcoming atmosphere would also attract members (Nurmi et al., 2018). Men mentioned barriers to attendance, including traveling outside their own neighborhood, not speaking English as a first language, and health issues.

### Older adults' informal learning through volunteering and play

Older adults also engage in informal learning in other venues. Researchers wanted to understand how older men learned through volunteer activities (Chen, 2016). Participants were retired men over sixty who volunteered for at least two years. The researcher reached out to the non-profit organization and used personal networks to gain participants. Seventeen participants between the ages of 63 and 93 were interviewed. Researchers used the constant comparative method to uncover themes.

The results indicated that volunteers became more knowledgeable, skilled, and wiser (Chen, 2016). The knowledge learned depended on the type of volunteering. A nursing home volunteer gained medical knowledge while a museum volunteer learned about local history, astronomy, and botany. Second, learners used their life experiences were a foundation for learning. They

learned new things or deepened learning from what they already knew. They learned by watching others, doing the activities, engaging in individual reflection, talking with other volunteers, and participating in formal training provided by the institution. For example, one man learned better interpersonal skills by reflecting on interactions with others. Individuals learned skills through formal courses or by sharing information with other volunteers. A third theme included participants believing that they learned differently through volunteering than in the classroom. They found the volunteer type of learning more practical than classroom learning.

Another area of interest was how older adult motorcyclists learned through play (Zacharakis, 2019). He used grounded theory to uncover themes. He interviewed six individuals over age 60 (5 men and a woman). Participants developed their motorcycle skills through reading magazines, participating in workshops and classes, and talking with other motorcyclists. A participant liked teaching his children and grandchildren to motorcycle. Another worked on his agility and balance in an obstacle course. He enjoyed competing on obstacle courses, socializing with others, and repairing bikes. Others looked at websites and read magazines to learn more about motorcycling. Zacharakis (2019) found that people seek additional information to improve their knowledge and skills about motorcycling. Learning through play was intrinsically motivated. In addition, the social nature of the hobby was essential to people. The author noted that this study confirmed Bandura's (1977) theory that people learn from observation and enjoy the social part of learning. Second, this is an example of informal learning where the learner oversees the teaching (Marsick and Watkins, 1990, cited in Zacharakis, 2019, p. 181).

In summary, informal learning occurs in our daily lives. First, an investigation of the benefits of informal learning in Men's Sheds shows men socialize, learn and exchange information, make friends, and feel valued (Carragher and Golding, 2015; Crabtree et al., 2018; Golding et al., 2007; Nurmi et al., 2018). Second, much informal learning involves technology. Older adults adapt to technology if they are encouraged by family members to do so, environmental factors are conducive to adapting technology, and if there is support for technical issues (Barrantes-Caceres and Chappro-Cozzubo, 2019). Third, the use of technology in informal learning shows that adults use a variety of technologies (e.g., Google, Email, blogs, videoconferencing) to share information to learn new things, learn from others, gain a sense of community, and share their hobbies (Morrison and McCutcheon, 2019). Last, older people learn information as volunteers at various organizations (Chen, 2016), and they learn specific skills and knowledge like how to motorcycle and the benefits of motorcycling.

### Nonformal learning settings: universities of the Third Age, Osher Lifelong Learning Institutes, and Road Scholar

Informal learning can occur in nonformal settings. Although nonformal settings can include book clubs, knitting groups, and sports clubs, I focus on centers where adults can engage in nonformal learning, as this has been an area of interest for researchers. For example, universities of the Third Age (U3As), primarily found in Europe and Asia, offer older adults the opportunity to engage in largely non-credit courses of their choosing. Individuals in North America have Osher Lifelong Learning Institutes (OLLIs) and Road Scholar (formerly Elderhostel) that provide similar programming (Formosa, 2019). The term "Third Age" refers to the third life stage where individuals are retired (Vellas, 2019, p. 19).

The first U3A program originated at the University of Toulouse, France, in 1968, and its curriculum initially focused on "gerontological subjects," later focusing on "humanities" (Formosa, 2019, p. 8). Teachers favored the lecture approach, although students also participated in debates, field trips, and recreational opportunities. Nowadays, lecture offerings are diverse and include Tai Chi, history, philosophy, art, religion, law, economics, and natural sciences (Vellas, 2019). The French model is linked with universities, and experts make programming decisions rather than class participants (Vellas, 2019).

The U3A in the United Kingdom (UK) was founded in 1981 (Percey, 2019) and has approximately 450,000 members with 1057 U3As (U3Aa, 2021, paragraph 2). Unlike the top-down French model, the UK model has local groups engage in peer learning (non-credit). There is a myriad of courses. Subjects include astronomy, boating, chess, etymology, learning to be retired, mindfulness and meditation, and sociology, among others (U3Ab, 2021, paragraph 5). U3As around the world use some variation of the French and British models. Countries with U3As include Iceland, Italy, Germany, Malta, Poland, the Russian Federation, Spain, Sweden, Australia, China, Lebanon, Malaysia, New Zealand, South Korea, Taiwan, and Thailand (Formosa, 2019).

In the United States, Osher Lifelong Learning Institutes and Road Scholar provide nonformal education for older adults. Osher Lifelong Institutes are associated with colleges and universities offering non-credit courses to adults aged 50 or older (Bernard Osher Foundation, 2005, paragraph 2). There are 124 OLLIs in the US (Bernard Osher Foundation, 2005 paragraph 2). Course offerings vary by Institute and include lectures by faculty, community experts, and OLLI members (University of Oregon, 2021). [https://osher.uoregon.edu/about/types\\_of\\_courses.php](https://osher.uoregon.edu/about/types_of_courses.php) (paragraph 2).

In the United States, Road Scholar (formerly Elderhostel) was founded in 1975 as a "not for profit education organization" (Road Scholar, 2021a, paragraph 1), with the first programs occurring at college campuses in New Hampshire (Road Scholar, 2021a, paragraph 2). Initially, the Elderhostel program offered courses to people aged 60 or older at colleges in New England. Road Scholar, 2021c, paragraph 4). By 1980, all 50 US States had programs, and by 1981 the organization had its first programs outside the United States (Road Scholar, 2021a paragraph 4). Currently, Road Scholar offers "5500 learning adventures in 150 countries and all 50 [US] states, serving more than 100,000 participants per year," and the program is not tied to college campuses (Road Scholar, 2021b, para. 5). Programs are open to all ages but typically attended by those aged 50 and older.

### Demographics, participation and participants' interests at OLLIs and U3As

Researchers investigated various aspects of OLLIs, Road Scholar programs, and other Learning in Retirement centers. An area of focus has been on member profile differences (Lee et al., 2018), participation patterns (Truluck et al., 2010), members' experiences at OLLIs (Talmadge et al., 2019), barriers to age-friendly universities (Hansen et al., 2019), and membership characteristics (Hansen et al., 2016). Membership characteristics remain similar across studies. The typical OLLI or Learning in Retirement Center participant is a highly educated White woman. At least two-thirds of participants are women (Hansen et al., 2019; Truluck et al., 2010). At least 79% possess a bachelor's degree or higher (Hansen et al., 2019; Truluck et al., 2010). Those aged 60–74 comprise the most significant membership (Lee et al., 2018). Liberal arts, public policy, and current affairs courses are popular (Hansen et al., 2016; Lee et al., 2018; Truluck et al., 2010). Barriers to full participation in OLLI programs related to time, cost, transportation, and issues related to health, hearing, and physical mobility (Hansen et al., 2019). Racially, only 5.24% of OLLI participants identify as “non-White,” with “2.66% identifying as African American” (Hansen et al., 2019, p. 233). Race and the percentage of individuals with college or graduate degrees in these programs may be barriers to less-educated people and people of color. The authors recommend having OLLIs reach out to those who may not come to OLLIs because of unpleasant educational experiences (Hansen et al., 2019).

Some of the research and scholarship on U3As concerning older adult learning and education focuses on programmatic issues and/or benefits of U3As (de Maio Nascimento and Giannouli, 2019; Hachem and Vulopala, 2016; Ricardo and Porcarelli, 2019) and identity issues such as participants' concepts of old age (Camargo et al., 2018). Scholars analyzed U3A program models in various countries. For example, Brazil blends the French and British U3A models and offers formal courses through universities and extension courses on art, literature, health education, tourism and leisure, general knowledge, and foreign languages (de Maio Nascimento and Giannouli, 2019). Given Brazil's “intense body culture,” the U3A's focus on physical activities for older adults stands out. These courses benefit older adult participants and contribute to older adults' physical activity knowledge. In addition, older adults are part of university-conducted research studies that focus on action research and empowerment.

Hachem and Vuopala (2016) surveyed 461 older adults at a University of the Third Age in Lebanon to uncover the benefits and challenges faced by participants. Eighty-three percent were women, with 71.5% being between 50 and 69 years old. Cognitive benefits included gaining knowledge and intellectual stimulation. Social benefits included making friends, learning from each other, and belonging to a community. Psychological benefits included experiencing positive emotions. Participants' challenges included the use of lectures and the timing of sessions.

In summary, membership characteristics for OLLIs and Learning in Retirement centers tend to be middle-class, highly educated White women. There is a plethora of course offerings and adventures in these settings. Barriers to participation in classes include time (Hansen et al., 2019), and fewer people of color or those without a college education attend courses at these institutions (Lee et al., 2018; Truluck et al., 2010).

### Summary and conclusions

Physical changes in older adults may affect how they process information. Changes to vision and hearing may be especially challenging. Glaucoma, presbyopia, and cataracts are common eye diseases that affect adults worldwide (WHO, 2021). However, treatments for glaucoma, including eye drops and laser surgery, may be options for those with glaucoma and, similarly, hearing loss is common in older adults, including presbycusis and tinnitus (Whitbourne and Whitbourne, 2014). Hearing aids can help with hearing loss.

In addition to vision and hearing changes, brain changes also occur. Multitasking becomes more challenging, and brain areas, including the hippocampus, may shrink (Tyler, 2020). However, physical training has improved cognitive function (Aarsland et al., 2020). Mental training has been shown to improve executive functioning, memory, and visuospatial ability (Nguyen et al., 2019). Cognitive training improves attention processing and executive functions (Nguyen et al., 2019) but not other areas such as verbal or non-verbal intelligence (Guye and von Bastian, 2017) or general cognition (Sala and Gobet, 2019).

There will be advancements in medical science. More will be discovered about the older adults' brain and maintaining and improving cognition through physical and cognitive exercises and diet. Additionally, scientific advancements in treating eye diseases and hearing loss may allow older adults to participate in learning activities more fully in the future.

Most adults engage in informal learning. This learning can occur in everyday life or nonformal settings such as knitting groups or organizations like Universities of the Third Age. (U3As). Recently, scholarship has focused on participation in OLLIs or U3As or Learning in Retirement Centers (Truluck et al., 2010), membership profiles (Hansen et al., 2016; Lee et al., 2018), and demographics of organizations (Lee et al., 2018; Truluck et al., 2010) that cater to older adults such as U3As, Road Scholar and Osher Lifelong Learning Institutes. People of color and individuals with lower levels of education are less likely to attend these learning opportunities. However, the older, less educated man may be interested in the informal learning opportunities in Men's Sheds (Carragher and Golding, 2015), where men informally gather to work on hands-on projects and exchange information about various concerns.

In addition to continuing research on the informal learning of older adults in nonformal settings, researchers should focus on more clearly defining the term “older adult” in their research. They should also seek to understand the learning experiences of older adults marginalized by gender, sexual orientation, ability status, class, and race/ethnicity. Finally, taking a more critical look at the influence of social capital on the learning experiences of older adults may be in order. Learning is lifelong, and as the population of older adults increases worldwide, more researchers need to be interested in various aspects of this population.



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