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Living Longer, Working Longer, Learning Longer

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Abstract

In this chapter, we discuss changes in the age structure of the labor force, the need for continued skill upgrading over the life course to remain employable, patterns of participation in adult learning and development activities, and the role community colleges play in providing education and training to middle-aged and older adults. In an increasingly global and technology-based economy, it is relevant to compare the U.S. to other developed countries.

Life Expectancy and Extended Work Life

Slowing population growth over the past decade, largely due to declining birth rates,[1] will require increased labor force participation for all age groups in the coming decades if the United States (U.S.) is to remain competitive in the global economy. Countries throughout the world have implemented policies to encourage increased participation in the labor force at older ages. Pension reforms, such as linking the retirement age to increases in life expectancy, have been implemented in some countries, and early retirement programs are being eliminated. A retirement age of sixty-seven is now quite common.[2]

Older adults, those ages fifty-five and older, represent an increasingly important segment of the U.S. workforce. Individuals are continuing to work at older ages for many reasons, including shifts from defined benefit to defined contribution retirement plans, increases in Social Security's full retirement age, improved health,[3] and low returns on investments in recent years

which have slowed the growth of retirement accounts.[4] Increased life expectancy has also been a factor in longer working lives. Between 1959 and 2016, life expectancy in the U.S. increased by nine years to seventy-nine years.[5]

The Future of the U.S. Labor Force

The age structure of the labor force in the U.S. has changed in recent decades, with older age groups representing a greater proportion of the labor force. By 2028, the fifty-five and older age group is projected to represent over 25 percent of the civilian labor force compared to 12 percent in 1998.[6] Between 1998 and 2028, the overall labor force participation rate (LFPR) is projected to decline from 67 percent to 61 percent, but participation rates are projected to increase for both the fifty-five to sixty-four (increasing from 59 percent in 1998 to 68 percent in 2028) and the sixty-five to seventy-four (increasing from 18 percent in 1998 to 33 percent) age groups.[7]

There are substantial differences in LFPR between males and females. Participation rates for males aged fifty-five to sixty-four have remained relatively stable for the past two decades at about 70 percent and are expected to remain stable through 2050. Participation rates for females ages fifty-five to sixty-four are projected to continue increasing for the next several decades growing from 59 percent in 2018 to about 65 percent in 2050.[8, 9] LFPR in 2018 varied by both sex and country. In Figures 1 and 2, we compare LFPR for males and females in the U.S. with several geographically diverse, developed nations. The average LFPR for member countries of the Organization for Economic Cooperation and Development (OECD) for males aged fifty-five to sixty-four was 73 percent, while it was 51 percent for females in the same age group.[10] At 71 percent, males aged fifty-five to sixty-four in the U.S. have a lower participation rate as compared to the OECD average and also lower than any of the comparison countries. By

contrast, with a 24 percent participation rate, males aged sixty-five and older in the U.S. have a higher participation rate than the OECD average and all comparison countries except Japan. Participation rates for older females are higher than the OECD average for both the fifty-five to sixty-four and the sixty-five plus age groups.[11, 12] Encouraging continued work at older ages has many benefits, both to the individual through increased financial security[13] and to society by maintaining or increasing economic growth.[14]

INSERT FIGURES 1 AND 2 ABOUT HERE

Physically Demanding Work

Workers in physically demanding jobs are sometimes unable to continue working at older ages and often are faced with an early exit from the labor market. In 2014, over 8 million older adults reported working in physically demanding jobs, and, due to the aging of the baby boomer cohort, that number is likely to continue increasing.[15] Unlike individuals holding jobs that are less physically demanding, older adults in physically demanding jobs often are forced into early retirement despite the desire and need to remain in the workforce.[16] In addition, many physically demanding jobs are under the threat of being replaced with automation. As a result, a significant number of older adults are at risk of unemployment, presenting a conflict between the ability to work and having the skills necessary for a job that is less physically demanding.[17] Generally, older adults in physically demanding jobs are less likely to be working in skilled occupations or to be college educated.[18] These concerns elevate the importance of identifying new ways of adapting the workplace for older adult workers and providing reskilling opportunities. There is a great need for education and training that equips older adults to enter new career paths that are stable and less physically demanding.

Alternative Work Arrangements

Alternative work arrangements are becoming more common among middle-aged and older adults, placing them at increased risk of financial insecurity as they age. Those employed in non-traditional work arrangements, sometimes referred to as "informal workers," are especially at risk for inadequate retirement savings. Definitions of non-traditional work arrangements vary widely, as do the proportions of workers with these employment characteristics, all depending on the definition utilized. Using a definition for non-traditional employment that includes individuals who do not receive health insurance from their employer or participate in a pension plan, in 2019 Munnell, Sansenbacher, and Walter found that nearly half of adults in their fifties and early sixties fall into that category. As compared to those with traditional work arrangements, non-traditional workers had lower levels of education, were more likely to be female, had more chronic health conditions, less wealth, and lower levels of income.[19]

Rather than define alternative work arrangements by receipt of benefits, Katz and Krueger included temporary agency workers, on-call workers, contract workers, and independent contractors or freelancers.[19] They found that, in 2015, 26 percent of workers ages fifty-five to seventy-five met one of those criteria as compared to 14 percent in 2005, representing the largest increase of all age groups. This increase may be due to job loss during the Great Recession which resulted in workers seeking alternative work arrangements due to the unavailability of traditional work.[20]

Regardless of the definition used, however, it is clear that a substantial portion of adults over age fifty are employed in alternative work arrangements and that the proportion has grown in recent years. Reskilling, a process that allows adults an opportunity to gain or update skills

and education that can be used to prepare for new occupations and provides middle-aged and older adults with qualifications sought by employers might provide them with more leverage in employment arrangements.

Educational Attainment and the Workforce

Recognizing the need for increased educational attainment in the U.S., the Lumina Foundation established a goal that 60 percent of adults ages twenty-five to sixty-four have a postsecondary degree, such as an associate's degree or professional certificate by 2025. As of 2017, less than 48 percent had such a credential. Thus far, over forty states have established attainment goals in general alignment with Lumina's goals for postsecondary education.[21] Older adults are a heterogeneous group who may require different types of recruiting methods, support systems, and program structures than do younger students, which will necessitate postsecondary institutions changing to meet the needs of students rather than expecting students to adapt to existing processes and structures.

Adults generally recognize the importance of credential attainment and ongoing skill upgrading. Nearly 90 percent of adults currently in the labor force believe it will be either important or essential for them to participate in training and acquire new skills over their career to remain employable.[22] Despite this recognition, low-skilled and older workers may be reluctant to participate in learning activities due to a lack of understanding of the financial benefits, limited availability of programs to meet their needs, or a fear of returning to the classroom.[23, 24]

Digital Skills in Technology Advanced Economies

Rapid technological advances in a global economy have increased the importance of continuous skill upgrading and development over the life course. Participation in learning

activities reduces the risk of low-skilled workers being limited to poor-quality jobs or unemployment,[25] and it allows workers to remain in the labor force at older ages.[26] Digital skills have become essential in both blue-collar and white-collar jobs, but many low-skill older workers lack the computer, problem solving and teamwork skills required by today's employers.[27] In recent years, the proportion of jobs requiring minimal digital skills has declined, while jobs requiring medium- and high-level digital skills continue to increase—of new jobs created between 2010 and 2016, almost two-thirds required advanced digital skills. In addition, earnings are higher for occupations requiring high and medium skill levels.[28]

The term "digital natives"[29] has been used to describe individuals who grew up using computers and are assumed to be more technologically adept. In contrast, the term "digital immigrants" refers to those who entered adulthood before the use of digital technologies became widespread. As "digital immigrants," older adults would be expected to face additional obstacles to using technology.[30] However, existing evidence belies the existence of a simple dichotomy between older and traditional-age students, and students who did not grow up using computers can acquire digital skills later in life. Wang and colleagues propose the concept of "digital fluency" as an alternative to the immigrant/native metaphor.[31] Longitudinal data suggest that older adults become successful technology learners over time,[32] but they often learn at a slower rate and may be initially intimidated by new technologies.[33]

How Will Older Workers be Impacted by Automation?

While job automation and possible impacts of aging populations are often discussed, the potential magnitude of the impacts across age groups is still unclear.[34] As such, we provide here the estimated numbers and proportions of jobs at the risk of automation by age groups for the U.S. workforce.

Methods

Data for 2019 were obtained from the U.S. Bureau of Labor Statistics (BLS), Current Population Survey (CPS),[35] the primary data source for national labor statistics in the United States. We also adopted the published risks of automation. Frey and Osborne[36] used the standard occupational classification system codes and various data sources, to estimate the risk of automation for six major and twenty-two sub-categories of 702 occupations. Although the estimated risk is not associated with a specific time period, Frey and Osborne[37] suggest that it will take place over a ten- to twenty-year time period. Per the occupational classification in the BLS, seventeen occupations were excluded due to the unavailability of the estimated risks. The CPS 2019 data show that there are 157.5 million employed persons. In this study, we focus on 156.0 million (99.0 percent) of them after excluding the aforementioned seventeen occupations. The risks of each occupation were manually matched to the CPS data, and jobs-at-risk of automation was individually computed. The estimated numbers of jobs-at-risk were aggregated by the six major- and twenty-two sub-industries. It should be noted that the margin of estimation errors could not be estimated with available information, and, therefore, interpretation requires caution.

Results

Overall, nearly half (48 percent) of the jobs were classified as at risk of automation for the next ten to twenty years, which is equivalent to approximately 75 million jobs. Four major industries including "service," "sales and office," "natural resources, construction and maintenance," and "production, transportation, and material moving" had greater risks at 60-75 percent compared to "management, business, and financial operations" and "professional and related" occupations (14-27 percent). Given the size differences of industries at higher risk,

"service," "sales and office" and "production, transportation, and material moving" seem to have more significant impacts (when combined, over 53 million jobs at risk) on the job market than others. The proportions of jobs at risk were fairly equally distributed across age groups, which is consistent with the findings of Belbase and Eschtruth.[38] Future older workers (age fifty-five and older in ten to twenty years, or those ages thirty-five to fifty-four in 2019) may face roughly 29 million jobs being replaced by automation. Given potentially large estimation errors, 75 million jobs may not be actually replaced. However, even if just half of them (38 million, or roughly one in four jobs) were automated, the impacts on the job market and workforce would be enormous. Adults with lower levels of education are most at risk for job loss due to automation[39] and may require reskilling to remain in the labor force.

Lifelong Learning and Adult Education

In previous sections of this chapter, we discussed the importance of continuous learning over the life course to ensure that individuals have skills required by employers so that they can remain in the labor force at older ages if they desire or need to do so. Hijzen, Alexander, and Schwellnus identified two main functions of adult learning: "equipping workers with job-related skills that match employers' needs and raise workers' productivity, employability and earnings; and helping people acquire foundation skills (for example in literacy and numeracy) which are essential to support lifelong learning, even if they may have less immediate returns."[40]

Lifelong learning, sometimes referred to as adult education and training, can take many forms. Consistent with the Commission on European Communities, we define lifelong learning as "all purposeful learning activity, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence."[41] There are three categories of learning activities: formal (learning that takes place in education and training institutions and leads to recognized

credentials and diplomas), non-formal (learning that takes place in educational and training settings, including the workplace, but does not typically lead to a formalized credential), and informal (learning that takes place in everyday life and is not necessarily intentional and may not even be recognized by the individuals themselves as contributing to their knowledge and skills; it can include reading a book or a newspaper).[42] It is more common for middle-aged and older adults to participate in non-formal and informal learning activities as compared to formal activities.

Participation in Adult Education and Training

The Program for the International Assessment of Adult Competencies (PIAAC) is a skills assessment survey organized by the OECD and implemented by each participating country. PIAAC's goal is to assess and compare basic skills, including literacy, numeracy, and problem-solving skills in technology rich environments. Assessment focused on "cognitive and workplace skills necessary for successful participation in the 21st-century society and the global economy."[43] Approximately forty countries have participated in the PIAAC skills assessments with data collection taking place in most countries between 2011 and 2014.[44] A complex sampling method provided nationally representative data. In addition to the skills assessment, the survey included an extensive background questionnaire addressing basic demographic information along with information regarding the development and maintenance of skills, such as participation in various types of adult education and training programs, employment status, and income.[45]

In this section, we descriptively compare associations among literacy proficiency levels, employment, and participation in adult education and training of adults in the United States with adults in Australia, Canada, Germany, Japan, Sweden and the United Kingdom. These countries

were selected based on their geographic diversity, level of economic development, and availability of PIAAC data. The adult education and training (AET) measure we used for these descriptive analyses includes formal and non-formal education, both job-related and non-job related. We also examine participation in AET-based employment status and high versus low literacy skills. For the data analysis, we used the OECD PIAAC Data Explorer[46] and the National Center for Education Statistics PIAAC Data Explorer.[47]

PIAAC defines literacy as "understanding, evaluating, using and engaging with written text to participate in society, to achieve one's goals and to develop one's knowledge and potential."[48] Literacy scores range from zero to 500 and have been divided into proficiency levels ranging from below level 1 to level 5.[49] Lower skill proficiency levels are associated with lower levels of earnings and education[50] and with poorer health.[51]

We compared literacy proficiency levels by country for the fifty-five to sixty-five age group (see Figure 3). Japan has the lowest proportion (12 percent) of respondents scoring at or below level 1 whereas Germany had the greatest proportion (24 percent), followed closely by the U.S. and Canada (both 23 percent). As compared to the average of all jurisdictions that participated in PIAAC, all of the countries we analyzed had lower proportions scoring at or below level 1. In terms of higher skill-levels, Japan had the greatest proportion scoring in the three highest skill levels (50 percent), which was substantially more than any of the comparison countries. In the United States, 43 percent scored in the three highest literacy proficiency levels.

<INSERT FIGURE 3 ABOUT HERE>

While older adults in the U.S. had smaller percentages than the average of all jurisdictions scoring at or below level one in literacy, there are still a meaningful number of individuals in those categories which raises concern about older adults' preparedness for

increasingly complex and technologically advanced workplaces. To some extent, this is confirmed by examining the proportion of employed older adults by skill level. In all of the countries analyzed, there were meaningful differences in employment for low- versus high-skilled adults. To illustrate, for adults ages fifty-five to sixty-five in the U.S., 75 percent of those who had literacy proficiency scores at levels 4 and 5 were employed as compared to 50 percent of those with literacy proficiency scores at and below level 1. The comparison countries had similar patterns.

Figure 4 provides data on AET participation by age group. In most of the comparison countries, AET participation declined with age, and, in all countries, the fifty-five to sixty-five age group had the lowest participation rate. Of the countries examined, the U.S. had the highest participation rate (50 percent) for the fifty-five to sixty-five age group while Sweden had the highest participation rate for all other age groups. Adults in the fifty-five to sixty-five age group for all comparison countries had AET participation rates equal to or higher than the OECD average.

<INSERT FIGURE 4 ABOUT HERE>

Next, we examined AET participation comparing the highest (levels 4 and 5) with the lowest (below level 1 and level 1) proficiency skill levels for ages fifty-five to sixty-five. In all countries, there were substantial differences in AET participation based on skill proficiency. For example, in the U.S., 72 percent of those who had the highest skill levels participated in AET whereas only 33 percent in the lowest skill proficiency levels participated.

Finally, we compared AET participation by employment status for the fifty-five to sixty-five age group. Due to sample size limitations for the unemployed group, we were limited to comparing the U.S. with Canada and all participating jurisdictions. In all cases, the employed

group had the highest rates of AET participation, followed by the unemployed. The U.S. had the highest participation rates for all three groups (64 percent employed, 47 percent unemployed, and 22 percent for not in the labor force). Without an employer to provide opportunities for AET, the unemployed must rely on their own funds, on publicly sponsored employment programs, or on programs funded by non-profit organizations. The same is true for those not in the labor force. Providing AET opportunities for the unemployed and those not in the labor force could expedite re-employment and result in some returning to the labor force.

In summary, the 23 percent of older adults in the U.S. with low literacy skills are more likely than the high-skilled to be at risk of either being unemployed or out of the labor force, which can result in heightened risk of income insecurity in retirement years. Increased AET participation by low-skilled adults could give them skills desired by employers and improve their economic outlook. Lack of participation in AET occurs for multiple reasons, including fear of returning to the classroom, exam anxiety, and lack of funding.[52] Projected increases in job loss due to automation, which will be especially consequential for low-skilled adults,[53] necessitates policy changes in the provision of adult training opportunities. The Nordic countries are recognized for providing educational opportunities to adults of all ages and serve as a model for other countries.[54] Future research that identifies creative and successful models of adult education are needed to support policy changes.

The Role of Community Colleges in Adult Education

Although community colleges have been an important part of U.S. economic and workforce development for decades, more recently they have become a key source for employee re-skilling and skill upgrading to provide employers with a globally competitive workforce.[55, 56] Most community colleges have open admissions policies, comparatively low tuition, convenient

geographic location, and a focus on community needs, which make them the preferred choice for older adults.[57] Another advantage of community colleges over four-year public institutions is shorter-term credentialing options, such as occupational certificates. Because older adults are likely to work full time and have family obligations, shorter programs of study with fewer interruptions are more feasible;[58] optimally they result in upgraded skills and career advancement. Research has consistently confirmed earnings gains from obtaining a community college certificate especially in STEM, nursing, and construction.[59, 60] Community college programs increasingly include a work-experience component (e.g., internship, co-op, clinical, or apprenticeship)[61] which allows students to see what an actual job involves while, at the same time, improving the likelihood of immediate job placement upon graduation.

Workers with a high school education or less are most at risk of job loss due to technology advances.[62] Most good jobs (i.e., jobs that pay self-sustaining wages), which Carnevale, Cheah, Ridley and Strohl define as $35,000 or more per year for those up to age 45, and $45,000 or more per year for workers ages 45 and older, require education beyond high school, such as a postsecondary certificate or an associate's degree.[63] Since 1991, good jobs requiring only a high school diploma have declined by 1 million, whereas good jobs for associate degree-holders increased by 3.2 million over the same period.[64] In coming years, continued technological advances and automation will require workers of all ages to critically assess their own skills and credentials to ensure that they remain employable.

The majority of middle-aged and older adults who return to college enroll at a community college rather than a baccalaureate institution, and most enroll on a part-time basis.[65] In this section we draw on key findings from a research project undertaken by Drs. Cummins and Bahr and funded by the Institute of Education Sciences (grant # R305A160156). The research took

place between July 2016 and June 2020. Using administrative data on all public postsecondary institutions in Ohio from the Ohio Longitudinal Data Archive (OLDA), maintained by the Ohio Educational Research Center (OERC),[66] and qualitative data from focus groups and key informant interviews at three case study colleges, our mixed-methods project focused on adults ages forty to sixty-four who enrolled in a community college in Ohio. The investigation is unique in focusing on this older age group. Prior research has typically lumped into a single group of adult learners all students who are twenty-five years of age and older, not differentiating the needs, experiences, and barriers to education among older students.

Why do Mid- and Later Life Students Return to College?

We identified multiple reasons why mid- and later-life students (MLLs) enroll at a community college. We categorize them as *reactive*, *proactive*, and *beyond reactive or proactive*. Reactive reasons can be described as freeing (they finally can) or compelling (they suddenly must). Family status changes can be either freeing or compelling and were a common reason mentioned by focus group participants. A newly empty nest or the end of caregiving responsibilities for an aging parent were "freeing" reasons discussed by several MLLs as the motivation for returning to school. Examples of compelling changes include divorce and death or illness of a spouse or partner, which often result in the need for new or additional sources of income and acquisition of new skills.

Not all enrollments take place in reaction to changes or immediate financial pressures. Many students enroll proactively, perhaps in anticipation of an impending challenge, sometimes age-associated, such as declining health and the need for less physically demanding work. Students also reported job precarity due to changing technologies and concern for job loss.

Rather than enrolling for reactive or proactive reasons, some wanted to serve as a role model for their grandchildren, while others sought to learn for personal interest or development, or to aid entrepreneurial ambitions. Understanding reasons why students enroll can inform marketing and recruiting efforts to ensure that this segment of the potential student population is aware of educational opportunities.

Similarities and Differences between Younger Adult Students and MLLs

As noted previously, most research lumps adult students into a single group aged twenty-five and older. Educational goals and challenges may differ for a thirty-year-old and a fifty-year old student. For example, a fifty-year-old is more likely to enroll for personal interest reasons, and the thirty-year-old is more likely to seek an associate's degree.

Younger students and MLLs may share some challenges to enrolling or staying in college, such as balancing classroom demands with other life interests and responsibilities. However, MLLs face unique challenges, like gap years between previous education and current learning endeavors so that changes in classroom/learning technology can leave them at a disadvantage. Another concern is academic readiness and the ability to succeed in the classroom. Many MLLs experience greater family demands than their younger peers, and working full time and attending classes in the evening often limits access to student support services and academic advising, typically available only during normal business hours. Lastly, a common concern of focus group participants was their remaining time in the labor force. An MLL might have only ten or fifteen years, or even less time, until expected retirement. As they reinvent themselves, they want a new occupation that will be long lasting and enjoyable, with minimal risk of skill obsolescence. To increase the likelihood of success, it is important that

community college faculty and staff understand the differences between young and older adult students and offer supportive services to meet the needs of all students.

Are Older Learners Aiming to Complete Postsecondary Credentials?

Using OLDA data, we found that the fraction of newly enrolled community college students between Fall 2007 and Winter 2011 who reported that they were pursuing job-related goals, particularly job-related goals that do not result in a postsecondary credential, rose rapidly with students' age at college entry.[67] About one in thirteen students (8 percent) who were seventeen to nineteen years old when they entered community college were taking a few courses to upgrade work-related skills or train for a new job, as opposed to seeking a postsecondary degree or certificate. Among students 20 to 29 years of age, it was about one in seven (14 percent). Approximately one in four students (23 percent) who were 30 to 49 years of age were seeking a non-credential, job-related goal, as were almost one in three students (31 percent) who were 50 to 64 years old.

Still, a large percentage of students of all ages, including older students, were aiming for a postsecondary credential, whether a certificate, associate degree, or baccalaureate degree. This included the vast majority of students seventeen to nineteen years of age (87 percent) and in their twenties (80 percent). In addition, more than two-thirds (70 percent) of students in their thirties and forties were seeking a postsecondary credential, and more than half (55 percent) of students in their fifties and early sixties.

Is There a Disparity in Graduation Rates between Older and Younger Learners?

Given the differences in goals across age groups, one would expect that older students would be somewhat less likely to complete postsecondary credentials than their younger peers, but the achievement gaps were greater than anticipated. Students in their thirties and forties were

19 percent less likely to complete a postsecondary credential within six years than were students seventeen to nineteen years of age, while students in their fifties and sixties were 24 percent less likely to graduate than were students in the seventeen to nineteen age group.

To examine this finding more closely, we estimated a series of multilevel regression models analyzing the association between age, gender, and the likelihood of graduating from college within six years, while controlling for differences by age and gender in the distribution of self-reported academic goals, previous college experience in a four-year postsecondary institution, first-year financial aid, and race/ethnicity. The purpose was to assess the magnitude of the gaps in attainment between older and younger learners after accounting for other potentially relevant correlated differences between them, especially differences in academic goal. Said another way, we asked how large are the expected differences in graduation rates between students of different ages who are otherwise similar in their goals and other characteristics. We distinguished between three types of postsecondary credentials that students might earn, namely a postsecondary certificate or an associate degree from an Ohio public community college, or a baccalaureate degree from an Ohio public four-year institution.

We found that, even after accounting for differences in goals and other factors, older students—especially older males—faced a marked disadvantage relative to younger peers in the likelihood of completing a baccalaureate degree within six years, and increasingly so with greater age at community college entry. Moreover, the gaps in the likelihood of completing a baccalaureate degree between older and younger students likely were even larger than they appeared because the data included only baccalaureate degrees awarded by Ohio's public four-year institutions. Younger students transferring to out-of-state four-year institutions at a higher rate than older students likely undercounted baccalaureate degree completion by younger

students, making the gap in baccalaureate attainment between older and younger students appear smaller than it is in reality.

With respect to the likelihood of completing a postsecondary certificate, older students had a modest edge over younger students, and this advantage increased with age but was more evident among older females than among older males. Older females, but not older males, had a stronger likelihood of completing an associate degree than did their younger peers, though this advantage peaked among women in their 40s and declined thereafter.

What is the Role of Academic Momentum in College Completion among Older Learners?

One potential avenue for improving the likelihood of graduating for older students, which, in light of the findings discussed above, may be especially important for older males, is strengthening their early academic progress, sometimes referred to as momentum. Evidence indicates that students who make early academic progress, building momentum toward a postsecondary credential, are more likely to graduate.[68] In short, getting students started off strong increases their chances of persisting and completing college.

That said, momentum may look differently for older students than for younger students.[69] Taking a heavier first-year course credit load, which is associated with better outcomes among younger students, might be deleterious to older students' efforts to balance work, family, and school, and hurt their chances of staying in college to complete a credential.[70] Alternatively, early progress in the form of completing key milestones, such as college math or college English, might be especially important for older students as a hedge against changes (specifically increases) in work or family demands that impede academic progress later on. It also may reinforce adult students' academic self-efficacy, their belief that they can succeed in college.

To investigate how momentum differs for older versus younger students, we used multilevel regression analysis to examine how the relationships between five measures of early academic progress and the three aforementioned indicators of college completion measured over six years (earning a postsecondary certificate or associate degree from an Ohio public community college or a baccalaureate degree from an Ohio public four-year institution) differ depending on a student's age.[71] The five measures of momentum, all assessed in students' first year in community college, were: cumulative number of credits earned in Ohio community colleges (a measure of the intensity of enrollment); number of days enrolled in Ohio community colleges (a measure of the continuity of enrollment); the proportion of credits attempted that were completed with a passing grade (i.e., credit success rate); whether or not a student completed a college-level math course successfully; and whether or not a student completed a college-level English course successfully.

We found that the number of days that students enrolled in community college in the first year was a moderately stronger predictor of completing a postsecondary certificate among older students than it was among their younger peers, and more so for adult women than adult men. In other words, with respect to certificates, older students appear to benefit somewhat more from continuous enrollment than do younger students. However, the relationships between the other four aspects of momentum and the likelihood of certificate completion did not differ significantly with age.

Completing college math in the first year was a stronger predictor of associate degree completion for older students than for younger students, and to a greater degree for adult men than for adult women. Achieving this particular milestone early appears to be an especially important step toward an associate degree for older learners. Relative to students in their late

teens or early twenties, number of days enrolled also was a stronger predictor of associate degree completion for adult students into their forties, with an especially pronounced relationship among adult women.

Completing college math in the first year was a strong predictor of baccalaureate degree completion, but the relationship declined in magnitude with age rather than increasing, in contrast to what was observed with associate degree completion. Our findings suggested that the other aspects of momentum played relatively smaller roles in the likelihood of baccalaureate degree completion, and the relationships did not vary greatly across the spectrum of ages found in community colleges.

Collectively, the evidence suggests that adult students do build momentum differently than their younger peers in some respects. In particular, early completion of college math and continuity of enrollment in the first year seem to be especially important for older students' chances of completing a certificate or associate degree.

In other respects, older learners and younger learners are more alike than different. For example, the number of credits completed in the first year in community college was a positive predictor of all three outcomes—certificate, associate degree, and baccalaureate degree—but the differences between older and younger students in these relationships were modest, indicating that this aspect of momentum is important for students of all ages. As stakeholders aim to narrow the completion gap between older and younger students, understanding differences in how older and younger students build momentum toward a postsecondary credential will be key to developing effective strategies.

Conclusion

Older adults will be an increasingly important component of the American labor force. For the nation to remain competitive in a technologically advanced global economy, continuous skill upgrades of its workforce will be critical. Some level of digital skills will continue to be necessary for most jobs, and jobs requiring medium to high digital skills will continue to increase. Adult with lower levels of education and skills will be at a particular disadvantage as an increasing number of jobs are automated. Nearly half of all jobs are at risk for automation over the next two to three decades.

Participation in adult education and training is lower for older age groups than younger. In addition, older adults with lower levels of literacy skills are less likely to participate in adult education and training as compared to those with higher levels of literacy skills. Because older adults with low skills are at risk for job loss in times of economic downturns, access to reskilling will be necessary for them to remain employable. Community colleges provide middle-aged and older adults with opportunities for reskilling, but historically they have focused on traditional-age students, under age twenty-five.

MLLs tend to hold different academic goals than their younger counterparts. They are more likely to enroll to upgrade skills and less likely to seek a credential. Community colleges are known to have low attainment rates for all age groups. One potential way to improve completion rates for MLLs is to provide academic support and advising that increases their momentum toward postsecondary credentials, including helping them maintain continuous enrollment and complete college-level coursework in foundational subjects, such as math.

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Notes

[1] William H. Frey, "The 2010s May Have Seen the Slowest Population Growth in U.S. History, Census Data Show: A 2020 Census Preview of Population and Congressional Reappointment." Washington, D.C.: Brookings (2020).

[2] Organization for Economic Cooperation and Development (OECD), *Pensions at a Glance 2017*. Paris, France: OECD (2017): 21-22.

[3] Courtney Coile, "Working Longer in the U.S.: Trends and Explanations," NBER Working Paper No. 24576. Cambridge, MA: National Bureau of Economic Research (2018): 1, 13.

[4] Vanya Horneff, Raimond Maurer and Olivia S. Mitchell, "How Persistent Low Expected Returns Alter Optimal Life Cycle Saving, Investment, and Retirement Behavior." Cambridge, MA: National Bureau of Economic Research (2018): 2.

[5] Steven H. Woolf and Heidi Schoomaker, "Life Expectancy and Mortality Rates in the United States, 1959-2017," *JAMA 322*, 20 (2019): 1996.

[6] U.S. Bureau of Labor Statistics, "Employment Projections: Civilian Labor Force, by Age, Sex, Race, and Ethnicity." https://www.bls.gov/emp/tables/civilian-labor-force-summary.htm.

[7] Ibid.

[8] Ibid.

[9] Mitra Toossi, "A Look at the Future of the U.S. Labor Force to 2050," *Monthly Labor Review* (2016). Unpublished detailed tables were provided to P. Cummins by M. Toossi through a personal communication.

[10] OECD Statistics. (2018). https://stats.oecd.org/

[11] Ibid.

[12] International Labour Organization. "Labor Force Participation Rate by Sex and Age— ILO Modeled Estimates." (July 2019). https://www.ilo.org/shinyapps/bulkexplorer13/?lang=en&segment=indicator&id=EAP_2WAP_SEX_AGE_RT_A.

[13] Alicia H. Munnell, "Falling Short: The Coming Retirement Crisis and What to Do About It," *Issues in Brief* (2015): 5.

[14] Nicole Maestas, Kathleen J. Mullen and David Powell, "The Effect of Population Aging on Economic Growth, the Labor Force and Productivity." Cambridge, MA: National Bureau of Economic Research (2016): 31-32.

[15] Cherrie Bucknor and Dean Baker, "Still Working Hard: An Update on the Share of Older Workers in Physically Demanding Jobs." No. 2016-04. Center for Economic and Policy Research, Washington, D.C. (March 2016): 1, 7.

[16] David Neumark and Joanne Song, "Barriers to Later Retirement: Increases in the Full Retirement Age, Age Discrimination, and the Physical Challenges of Work." (2012): 3.

[17] Anek Belbase and Andrew D. Eschtruth, "How Will Emerging Computers Affect Older Workers by 2040?" (2020): 4.

[18] David M. Cutler, Ellen Meara and Seth Richards-Shubik, “Health and Work Capacity of Older Adults: Estimates and Implications for Social Security Policy.” (2013): 16. http://dx.doi.org/10.2139/ssrn.2577858.

[19] Alicia H. Munnell, Geoffrey T. Sanzenbacher and Abigail N Walters, "How Do Older Workers Use Nontraditional Jobs." Working Paper #2019-12. Center for Retirement Research, Boston College, Chestnut Hill, MA (2019): 1-2.

[20] Lawrence F. Katz and Alan B. Krueger, "The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015," *ILR Review, 72*, no. 2 (2019): 396, 399.

[21] Lumina Foundation, "A Stronger Nation: Learning Beyond High School Builds American Talent." Indianapolis, IN (2019): 3, 5.

[22] Pew Research Center, "The State of American Jobs," Washington, D.C.: Pew Research Center (2016): 4.

[23] Didier Fouarge, Trudie Schils and Andries De Grip, "Why Do Low-Educated Workers Invest Less in Further Training?" *Applied Economics, 45*, no. 18 (2013): 2595.

[24] Thomas Zwick, "Why Training Older Employees Is Less Effective." Mannheim (2011): 11. doi: 10.2139/ssrn.1886428.

[25] Alexander Hijzen and Cyrille Schwellnus, *Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy*. Paris, France: OECD (2018): 1.

[26] Mark Keese, *Live Longer, Work Longer*. Paris, France: OECD (2006): 1-2.

[27] Paul Osterman, "Employment and Training for Mature Adults: The Current System and Moving Forward." Washington, D.C. (2019): 409.

[28] Mark Muro et al., "Digitalization and the American Workforce," Metropolitan Policy Program. Washington, D.C.: Brookings (2017): 15, 21.

[29] Marc Prensky, "Digital Natives, Digital Immigrants," *On the Horizon* 9, no. 5 (2001): 1.

[30] Ibid, 1-2.

[31] Emily Wang, Michael D. Myers and David Sundaram, "Digital Natives and Digital Immigrants: Towards a Model of Digital Fluency," *Business & Information Systems Engineering 5*, no. 6 (2013): 409.

[32] Sergio Sayago, Paula Forbes and Josep Blat, "Older People Becoming Successful ICT Learners over Time: Challenges and Strategies through an Ethnographical Lens," *Educational Gerontology, 39*, no. 7 (2013): 543.

[33] Neil Charness, "Work, Older Workers, and Technology," *Generations 30*, no. 2 (2006): 28.

[34] Philip Taylor and Warwick Smith, "What's Age Got to Do with It? Towards a New Advocacy on Ageing and Work." Melbourne, Australia (2017): 19.

[35] U.S. Bureau of Labor Statistics, "Labor Force Statistics from the Current Population Survey," (2019).

[36] Carl Benedikt Frey and Michael Osborne, "The Future of Employment." Oxford, UK (2013): 31.

[37] Ibid.

[38] Anek Belbase and Andrew D. Eschtruth, “Emerging Computers,” 4.

[39] Frey and Osborne, "The Future of Employment," 48.

[40] Hijzen and Schwellnus, *Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy*, 252

[41] Commission of the European Communities, "A Memorandum on Lifelong Learning," Lisbon, Portugal: European Commission (2000): 3.

[42] Ibid.

[43] Goodman, Madeline, Robert Finnegan, Leyla Mohadjer, Tom Krenzke and Jacquie Hogan. "Literacy, Numeracy, and Problem Solving in Technology-Rich Environments Among U.S. Adults: Results from the Program for the International Assessment of Adult Competencies 2012. First Look." National Center for Education Statistics. Washington, D.C. (2013): 1.

[44] OECD, "OECD Skills Surveys: PIAAC 1st Cycle." https://www.oecd.org/skills/piaac/about/piaac1stcycle/.

[45] "PIAAC Background Questionnaire (Ms Version 2.1 D.D. 15-12-2010)," (2010): B-13.

[46] OECD. "OECD Skills Surveys: PIAAC Data Explorer." (2020). https://piaacdataexplorer.oecd.org/ide/idepiaac/dataset.aspx.

[47] National Center for Education Statistics, "PIAAC Data Explorer," https://nces.ed.gov/surveys/piaac/ideuspiaac/

[48] OECD, "Literacy, Numeracy and Problem Solving in Technology-Rich Environments: Framework for the OECD Survey of Adult Skills" OECD (2012), 3-3, 1.

[49] Goodman et al., "Literacy, Numeracy, and Problem Solving in Technology-Rich Environments among U.S. Adults: Results from the Program for the International Assessment of Adult Competencies 2012. First Look." Additional details for literacy tasks descriptions for each proficiency level are provided in Exhibit B-1, II-3. B-3.

[50] Eric A. Hanushek et al., "Returns to Skills around the World: Evidence from PIAAC," *European Economic Review, 73* (2015): 20.

[51] Sujay Kakarmath et al., "Association Between Literacy and Self-Rated Poor Health in 33 High-and Upper Middle-Income Countries," *International Journal of Public Health, 63*, no. 2 (2018): 218.

[52] Phyllis A. Cummins, Suzanne Kunkel and Ryan Michael Walker, "Adult Education and Training Programs for Older Adults in the US: National Results and Cross-National Comparisons Using PIAAC Data." (2015): 24, 25.

[53] Frey and Osborne, "The Future of Employment," 543.

[54] Kjell Rubenson and Richard Desjardins, "The Impact of Welfare State Regimes on Barriers to Participation in Adult Education: A Bounded Agency Model," *Adult Education Quarterly, 59,* no. 3. (2009): 654.

[55] Paul Osterman and Andrew Weaver, "Community Colleges and Employers: How Can We Understand Their Connection? " *Industrial Relations: A Journal of Economy and Society, 55,* no. 4 (2016): 523-45.

[56] Daniel C. Hickman and William W. Olney, "Globalization and Investment in Human Capital," *ILR Review, 64,* no. 4 (2011).

[57] David Baime and Sandy Baum, "Community Colleges: Multiple Missions, Diverse Student Bodies, and a Range of Policy Solutions," Washington, D.C.: Urban Institute (2016): 2.

[58] Thomas Bailey, "Responding to Divergent Trends: Vocational and Transfer Education at Community Colleges," *Change: The Magazine of Higher Learning, 50,* no. 3-4 (2018): 115.

[59] Clive Belfield and Thomas Bailey, "The Labor Market Returns to Sub-Baccalaureate College: A Review. A Capsee Working Paper," *Center for Analysis of Postsecondary Education and Employment* (2017): 13, 24.

[60] Eric Bettinger and Adela Soliz, "Returns to Vocational Credentials: Evidence from Ohio's Community and Technical Colleges. A Capsee Working Paper." New York, NY (2016): 15, 16.

[61] Rooney Columbus, "Nondegree Credentials, Work-Based Learning, and the American Working Class," Washington, D.C.: American Enterprise Institute (2019): 17.

[62]Frey and Osborne, "The Future of Employment," 15, 16.

[63] Anthony P. Carnevale et al., "Good Jobs That Pay Without a BA." Washington, D.C.: Georgetown University Center on Education and the Workforce (2018): 2.

[64] Ibid. 2.

[65] U.S. Department of Education and National Center for Education Statistics, "Table 303.30: Total Fall Enrollment in Degree-Granting Postsecondary Institutions, by Level and Control of Institution, Attendance Status, and Sex of Student: Selected Years, 1970 through 2027 " in *Digest of Education Statistics.* Washington, D.C. (2018).

[66] The Ohio Longitudinal Data Archive is a project of the Ohio Education Research Center (oerc.osu.edu) and provides researchers with centralized access to administrative data. The OLDA is managed by The Ohio State University's CHRR (chrr.osu.edu) in collaboration with Ohio's state workforce and education agencies (ohioanalytics.gov), with those agencies providing oversight and funding. For information on OLDA sponsors, see http://chrr.osu.edu/projects/ohio-longitudinal-data-archive.

[67] The sample discussed in this section was limited to students enrolling in community college as undergraduates, excluding dual-enrolled high school students. Students who had previously enrolled in a public four-year institution in Ohio were retained in (not excluded from) the sample, but students were excluded if, in their first year in community college, a majority of their credits were taken in a public four-year institution. We also excluded students who earned zero credits in their first year in community college.

[68] Xueli Wang, "Toward a Holistic Theoretical Model of Momentum for Community College Student Success." In *Higher Education: Handbook of Theory and Research,* ed. Michael B. Paulsen. Cham, Switzerland: Springer International Publishing (2017)

[69] Juan Carlos Calcagno, Peter Crosta, Thomas Bailey and Davis Jenkins. "Stepping Stones to a Degree: The Impact of Enrollment Pathways and Milestones on Older Community College Student Outcomes." (2007): 796-97.

[70] Peter Riley Bahr, Claire Boeck and Phyllis Cummins. "Strengthening Outcomes of Adult Students in Community Colleges." (n.d.).

[71] Peter Riley Bahr, Claire Boeck, Yiran Chen, Paula Clasing-Manquian and Phyllis Cummins. "Less is More, or Is It? Differences by Age in Relationships Between Academic Momentum and College Completion." (n.d.).

References

Administrations on Aging. “A Profile of Older Americans: 2017.” (2017). https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2018OlderAmericansProfile.pdf.

Bailey, Thomas. "Responding to Divergent Trends: Vocational and Transfer Education at Community Colleges." *Change: The Magazine of Higher Learning, 50*, no. 3-4 (2018): 113-16.

Baime, David and Sandy Baum. "Community Colleges: Multiple Missions, Diverse Student Bodies, and a Range of Policy Solutions." Urban Institute, Washington, D.C. (2016).

Bahr, Peter Riley, Claire Boeck, Yiran Chen, Paula Clasing-Manquian and Phyllis Cummins. “Less is More, or Is It? Differences by Age in Relationships between Academic Momentum and College Completion.” n.d.

Bahr, Peter Riley, Claire Boeck and Phyllis Cummins. “Strengthening Outcomes of Adult Students in Community Colleges.” Forthcoming in *Higher Education: Handbook of Theory and Research*. Springer. n.d.

Belbase, Anek and Andrew D. Eschtruth. "How Will Emerging Computers Affect Older Workers by 2040?" Center for Retirement Research at Boston College. No. 2020-1. 2020. https://crr.bc.edu/briefs/how-will-emerging-computers-affect-older-workers-by-2040/

Belfield, Clive and Thomas Bailey. "The Labor Market Returns to Sub-Baccalaureate College: A Review.” A Capsee Working Paper. Center for Analysis of Postsecondary Education and Employment (2017).

Bettinger, Eric, and Adela Soliz. "Returns to Vocational Credentials: Evidence from Ohio's Community and Technical Colleges. A Capsee Working Paper." New York, NY (2016).

Bucknor, Cherrie, and Dean Baker. “Still Working Hard: An Update on the Share of Older Workers in Physically Demanding Jobs.” No. 2016-04. Center for Economic and Policy Research, Washington, D.C. (2016).

Calcagno, Juan Carlos, Peter Crosta, Thomas Bailey and Davis Jenkins. “Stepping Stones to a Degree: The Impact of Enrollment Pathways and Milestones on Older Community College Student Outcomes.” *Research in Higher Education, 48* (7 (2007)): 775-801.

Carnevale, Anthony P., Ban Cheah, Neil Ridley and Jeff Strohl. "Good Jobs That Pay Without a BA." Washington, D.C.: Georgetown University Center on Education and the Workforce (2018).

Charness, Neil. "Work, Older Workers, and Technology." *Generations, 30*, no. 2 (2006): 25-30.

Coile, Courtney. "Working Longer in the U.S.: Trends and Explanations." NBER Working Paper No. 24576. National Bureau of Economic Research, Cambridge, MA (May 2018).

Columbus, Rooney. "Nondegree Credentials, Work-Based Learning, and the American Working Class." Washington, D.C.: American Enterprise Institute (January 2019).

Commission of the European Communities. "A Memorandum on Lifelong Learning." Lisbon, Portugal: European Commission (2000).

Cummins, Phyllis A., Suzanne Kunkel and Ryan Michael Walker. "Adult Education and Training Programs for Older Adults in the U.S.: National Results and Cross-National

Comparisons Using PIAAC Data." Paper Commissioned by American Institutes for Research (2015). http://static1.squarespace.com/static/51bb74b8e4b0139570ddf02054.

Cutler, David M., Ellen Meara, and Seth Richards-Shubik. “Health and Work Capacity of Older Adults: Estimates and Implications for Social Security Policy.” SSRN Electronic Journal, 2013. https://doi.org/10.2139/ssrn.2577858.

Fouarge, Didier, Trudie Schils, and Andries De Grip. "Why Do Low-Educated Workers Invest Less in Further Training?". *Applied Economics*, *45*, no. 18 (2013): 2587-601.

Frey, Carl Benedikt, and Michael Osborne. "The Future of Employment." Oxford, UK: Martin Programme on Technology and Employment. (2013).

Frey, William H. "The 2010s May Have Seen the Slowest Population Growth in U.S. History, Census Data Show: A 2020 Census Preview of Population and Congressional Reappointment." Washington, D.C.: Brookings (January 2020).

Goodman, Madeline, Robert Finnegan, Leyla Mohadjer, Tom Krenzke, and Jacquie Hogan. "Literacy, Numeracy, and Problem Solving in Technology-Rich Environments among U.S. Adults: Results from the Program for the International Assessment of Adult Competencies 2012. First Look." National Center for Education Statistics, Washington, D.C. (2013).

Hanushek, Eric A., Guido Schwerdt, Simon Wiederhold and Ludger Woessmann. "Returns to Skills around the World: Evidence from PIAAC." *European Economic Review*, *73* (2015): 103-30.

Hickman, Daniel C. and William W. Olney. "Globalization and Investment in Human Capital." *ILR Review* 64, no. 4 (2011): 654-72.

Hijzen, Alexander, and Cyrille Schwellnus. *Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy.* Paris, France: OECD (2018).

Horneff, Vanya, Raimond Maurer, and Olivia S Mitchell. "How Persistent Low Expected Returns Alter Optimal Life Cycle Saving, Investment, and Retirement Behavior." Cambridge, MA: National Bureau of Economic Research (2018).

International Labor Organization, Labour Force Participation Rate by Sex and Age - ILO Modelled Estimates (July 2019). Retrieved January 23, 2020 from https://www.ilo.org/shinyapps/bulkexplorer11/?lang=en&segment=indicator&id=EAP_2WAP_SEX_AGE_RT_A.

Kakarmath, Sujay, Vanessa Denis, Marta Encinas-Martin, Francesca Borgonovi and SV Subramanian. "Association between Literacy and Self-Rated Poor Health in 33 High- and Upper Middle-Income Countries." *International Journal of Public Health, 63,* no. 2 (2018): 213-22.

Katz, Lawrence F. and Alan B. Krueger. "The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015." *ILR Review, 72,* no. 2 (2019): 382-416.

Keese, Mark. *Live Longer, Work Longer.* Paris, France: OECD (2006).

Lumina Foundation. "A Stronger Nation: Learning Beyond High School Builds American Talent." Indianapolis, IN (2019).

Maestas, Nicole, Kathleen J. Mullen and David Powell. "The Effect of Population Aging on Economic Growth, the Labor Force and Productivity." Cambridge, MA: National Bureau of Economic Research (2016).

Munnell, Alicia H. "Falling Short: The Coming Retirement Crisis and What to Do About It." *Issues in Brief*. Chestnut Hill, MA: Center for Retirement Research, Boston College (2015): 15-7.

Munnell, Alicia H., Geoffrey T. Sanzenbacher and Abigail N Walters. "How Do Older Workers Use Nontraditional Jobs?" Working Paper #2019-12. Chestnut Hill, MA: Center for Retirement Research, Boston College (2019).

Muro, Mark, Sifan Liu, Jacob Whiton and Siddharth Kulkarni. "Digitalization and the American Workforce." Washington, DC: Brookings, 2017.

National Center for Education Statistics. "PIAAC Data Explorer." https://nces.ed.gov/surveys/piaac/ideuspiaac/.

Neumark, David, and Joanne Song. "Barriers to Later Retirement: Increases in the Full Retirement Age, Age Discrimination, and the Physical Challenges of Work." *SSRN Electronic Journal* (2012). https://doi.org/10.2139/ssrn.2188363.

Organization for Economic Co-operation and Development (OECD). "Literacy, Numeracy and Problem Solving in Technology-Rich Environments: Framework for the OECD Survey of Adult Skills." Paris, France: OECD (2012).

Organization for Economic Co-operation and Development (OECD). "OECD Skills Surveys: PIAAC 1st Cycle." https://www.oecd.org/skills/piaac/about/piaac1stcycle/.

Organization for Economic Co-operation and Development (OECD). *Pensions at a Glance 2017*. Paris, France: OECD (2017). doi: https://doi.org/10.1787/pension_glance-2017-en.

Organization for Economic Co-operation and Development (OECD). "PIAAC Background Questionnaire" (Ms Version 2.1 D.D. 15-12-2010). (2010).

Organization for Economic Co-operation and Development (OECD). "OECD Skills Surveys: PIAAC Data Explorer." https://piaacdataexplorer.oecd.org/ide/idepiaac/dataset.aspx.

Osterman, Paul. "Employment and Training for Mature Adults: The Current System and Moving Forward." Washington, D.C.: Brookings (2019).

Osterman, Paul and Andrew Weaver. "Community Colleges and Employers: How Can We Understand Their Connection?". *Industrial Relations: A Journal of Economy and Society 55*, no. 4 (2016): 523-45.

Pew Research Center. "The State of American Jobs." Washington, D.C.: Pew Research Center (2016).

Prensky, Marc. "Digital Natives, Digital Immigrants." *On the Horizon, 9*, no. 5 (2001).

Rubenson, Kjell and Richard Desjardins. "The Impact of Welfare State Regimes on Barriers to Participation in Adult Education: A Bounded Agency Model." *Adult Education Quarterly 59*, no. 3 (2009): 187-207.

Saetermoe, Carrie L., Gabriela Chavira, Crist S. Khachikian, David Boyns and Beverly Cabello. "Critical Race Theory as a Bridge in Science Training: The California State University, Northridge Build Poder Program." [In English]. *BMC Proceedings* 11, no. Suppl 12 (2017): 21.

Sayago, Sergio, Paula Forbes, and Josep Blat. "Older People Becoming Successful ICT Learners over Time: Challenges and Strategies through an Ethnographical Lens." *Educational Gerontology*, *39*, no. 7 (2013): 527-44.

Taylor, Philip, and Warwick Smith. "What's Age Got to Do with It? Towards a New Advocacy on Ageing and Work." Melbourne, Australia (2017).

Toossi, Mitra. "A Look at the Future of the U.S. Labor Force to 2050." *Monthly Labor Review*. Washington, D.C.: Bureau of Labor Statistics (2016): 19-39.

U.S. Bureau of Labor Statistics. "Employment Projections: Civilian Labor Force, by Age, Sex, Race, and Ethnicity." Labor Force Statistics from the Current Population Survey. Washington, D.C. (2019). https://www.bls.gov/emp/tables/civilian-labor-force-summary.htm.

U.S. Department of Education, and National Center for Education Statistics. "Table 303.30: Total Fall Enrollment in Degree-Granting Postsecondary Institutions, by Level and Control of Institution, Attendance Status, and Sex of Student: Selected Years, 1970 through 2027. " In *Digest of Education Statistics*. Washington, D.C. (2018).

Wang, Emily, Michael D. Myers and David Sundaram. "Digital Natives and Digital Immigrants: Towards a Model of Digital Fluency." *Business & Information Systems Engineering, 5*, no. 6 (2013): 409-19.

Wang, Xueli. "Toward a Holistic Theoretical Model of Momentum for Community College Student Success." In *Higher Education: Handbook of Theory and Research*, edited by Michael B. Paulsen. Cham, Switzerland: Springer International Publishing (2017): 259-308.

Woolf, Steven H. and Heidi Schoomaker. "Life Expectancy and Mortality Rates in the United States, 1959-2017." *JAMA, 322*, no. 20 (2019): 1996-2016.

Zwick, Thomas. "Why Training Older Employees Is Less Effective." Mannheim (2011). doi: 10.2139/ssrn.1886428.

Figures

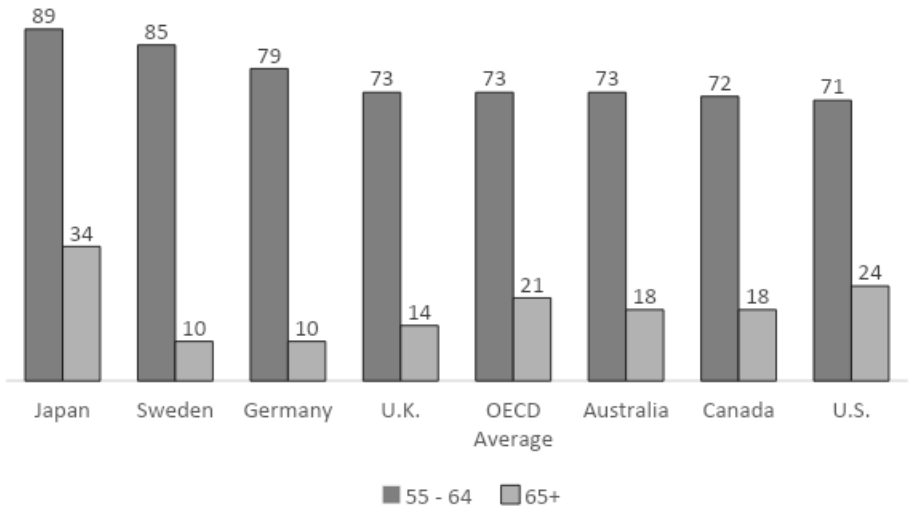

Figure 1.
Labor Force Participation Rates, Males Ages 55 – 64 and 65+
Source: International Labor Organization, Labour Force Participation Rate by Sex and Age - ILO Modelled Estimates, July 2019(%) – Annual. Retrieved January 23, 2020 from https://www.ilo.org/shinyapps/bulkexplorer11/?lang=en&segment=indicator&id=EAP_2WAP_SEX_AGE_RT_A

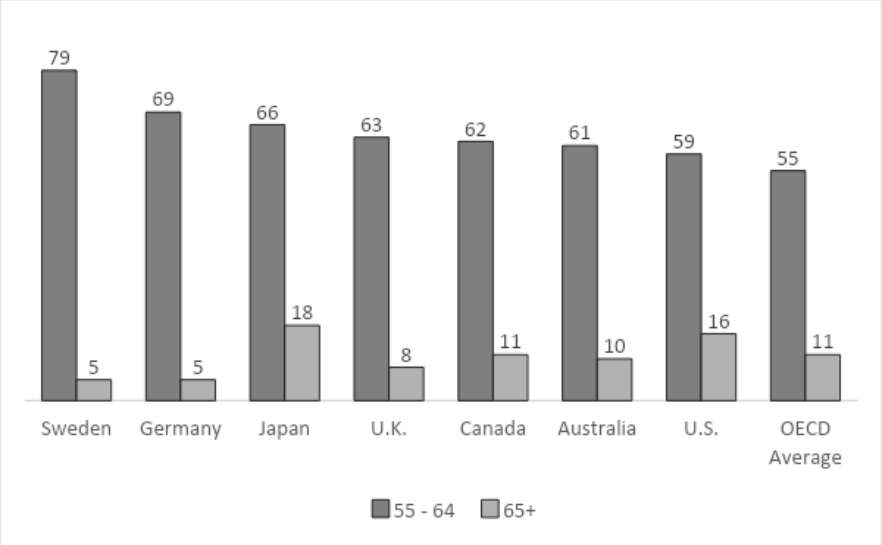

Figure 2.
Labor Force Participation Rates, Males Ages 55 – 64 and 65+
Source: International Labor Organization, Labour Force Participation Rate by Sex and Age - ILO Modelled Estimates, July 2019 – Annual. Retrieved January 23, 2020 from https://www.ilo.org/shinyapps/bulkexplorer11/?lang=en&segment=indicator&id=EAP_2WEX_AGE_RT_A

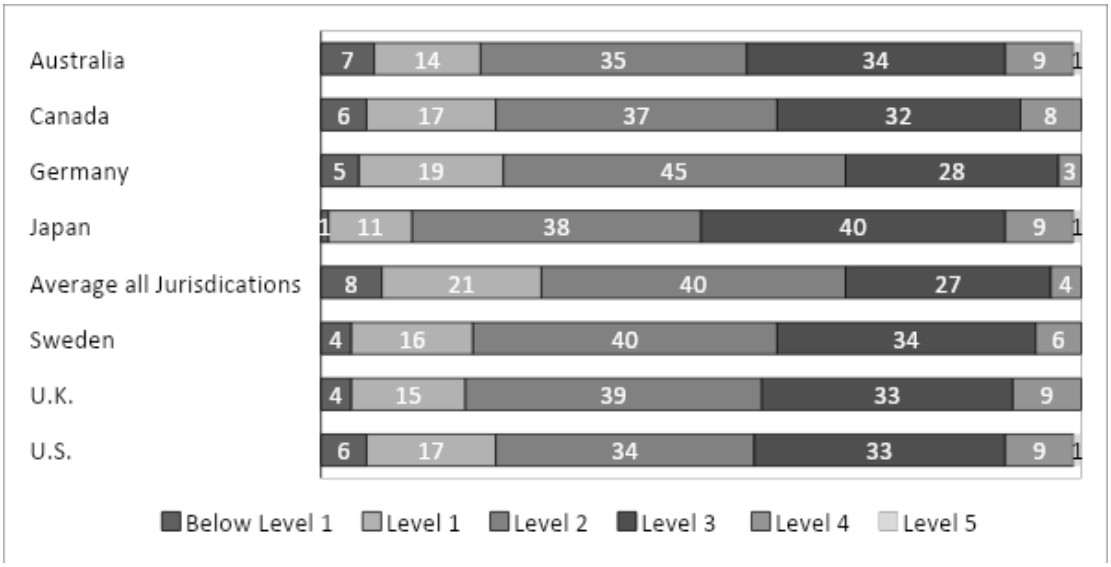

Figure 3.
Literacy Levels by Country, Ages 55 – 65 (percent).
Note: Canada, Germany, Average of all Jurisdictions, Sweden, and the U.K had <.5% at Level 5.
Source: OECD. "OECD Skills Surveys: PIAAC Data Explorer." https://piaacdataexplorer.oecd.org/ide/idepiaac/dataset.aspx., 2020); National Center for Education Statistics, "PIAAC Data Explorer."

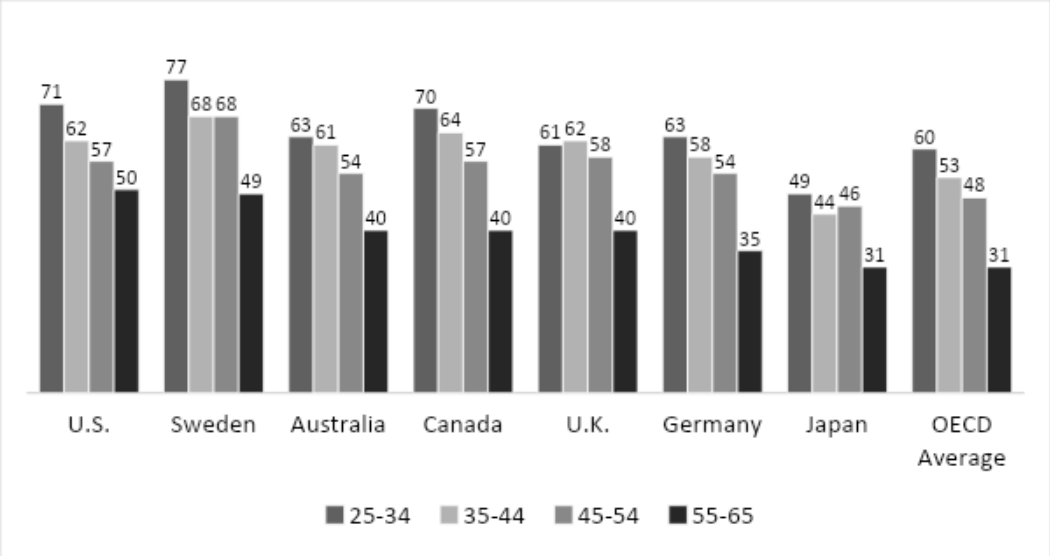

Figure 4.
Adult Education and Training Participation by Age Group and County (percent).
Source: OECD. "OECD Skills Surveys: PIAAC Data Explorer." https://piaacdataexplorer.oecd.org/ide/idepiaac/dataset.aspx., 2020); National Center for Education Statistics, "PIAAC Data Explorer."