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# The Impact of Lifelong Learning on Labor Market Outcomes Amid Population Aging: A Systematic Literature Review\*

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## Abstract

*Improving the position of older workers in the labor market is often linked to the importance of lifelong learning. This study aims to explore the outcomes of lifelong learning for older workers in the labor market by conducting a systematic literature review of articles based on the European Union countries, published between 2010 and 2024, and indexed in the WoS and Scopus databases. The influence of lifelong learning on labor market outcomes was grouped into five clusters: employability, exit from employment, earnings, job satisfaction, and job performance. Across all clusters, except job performance, the direction of the relationship between lifelong learning and labor market outcomes is not straightforward. Regarding employability, lifelong learning does not consistently increase it, but it often helps buffer the negative effects of aging. Results regarding exit from employment are also inconclusive, but the relationship tends to be more positive than negative. As for earnings, lifelong learning shows a positive effect, yet the effect may weaken with age or even turn negative. Job satisfaction appears to benefit from lifelong learning, but the effect is not always significant, and negative effects may occur, for example, when workers who do not want to pursue lifelong learning feel pressured, or when they perceive it as too late to gain meaningful benefits. In contrast, the evidence on job performance consistently indicates a positive relationship. While previous research on lifelong learning and the labor market starts with the premise that lifelong learning has a positive effect and tends to focus on factors influencing participation, this study contributes by synthesizing the evidence into five clusters, offering a clear overview of how lifelong learning impacts the labor market.*

**Keywords:** *lifelong learning, older workers, labor market outcomes, employability, population aging*

**JEL classification:** *I26, J14, J24*

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## 1. Introduction

Population aging is a widespread phenomenon driven by increasing life expectancy and declining fertility. This demographic trend is especially evident in developed societies, including European countries, where labor force is steadily aging. In Europe, the average age of workers aged 20 and over falls within the 40-45 age range, with Eastern and Southern EU countries generally experiencing the most rapid increases in the mean age of the labor force (Pinkus & Ruer, 2025). Based on the European Union (EU) Labour Force Survey (Eurostat, 2024), the European Centre for the Development of Vocational Training (Cedefop, 2025b) calculated that between 2013 and 2023, the share of workers aged 50-64 increased from 27.4% to 31.8%, while the share of workers aged 65 and older rose from 2.0% to 3.08% in the EU.

In today's world, with rapidly changing technology, lifelong learning – particularly for older workers – is considered essential (Baltic Sea Labour Forum for Sustainable Working Life, 2022; Bingham, 2019; Tikkanen & Nyhan, 2006; Walwei & Deller, 2021). As a key indicator of lifelong learning, Cedefop (2025a) calculated, using EU Labor Force Survey data (Eurostat, 2024), that participation in learning among the employed population in the EU aged 50-64 increased from 8.0% to 11.0% between 2013 and 2023.

Lifelong learning is “all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective” (Commission of the European Communities, 2001, p. 9). It includes formal, non-formal, and informal modalities (UNESCO Institute for Lifelong Learning, 2022). Its overarching aim is to improve the workers' positions in the labor market. However, when reviewing literature on lifelong learning and the labor market in the context of population aging, many studies begin with the assumption that lifelong learning is inherently beneficial for older people and therefore examine it primarily as a dependent variable. This approach leaves a gap in research on the actual usefulness of lifelong learning. This study addresses that gap by examining how lifelong learning influences labor market outcomes of older workers and by investigating the actual labor market outcomes of lifelong learning for this group. Thus, the guiding research question is: how does lifelong learning influence labor market outcomes in the context of population aging? The research focuses on the EU. When investigating older workers, it is important to note that there is no universally accepted definition of this group (Hardy, 2006; Pitt-Catsouphes & Smyer, 2006). The definition depends on the contextual factors such as retirement rules, age-discrimination protections, public perceptions of aging, subjective feelings of being old, and life expectancy. Some studies consider older workers as those aged 50 or 55 and above, while others use a lower threshold, such as 40 and above.

## 2. Methodology

The methodology used in this research is a systematic literature review. The review followed the PRISMA 2020 guidelines (Page et al., 2021a; Page et al., 2021b), which explain the process of literature exclusion and inclusion.

The first step involved the selection of databases. Two major databases widely used in business and economics research were chosen: Web of Science Core Collection and Scopus. To identify studies related to the research question, three groups of keywords were used.

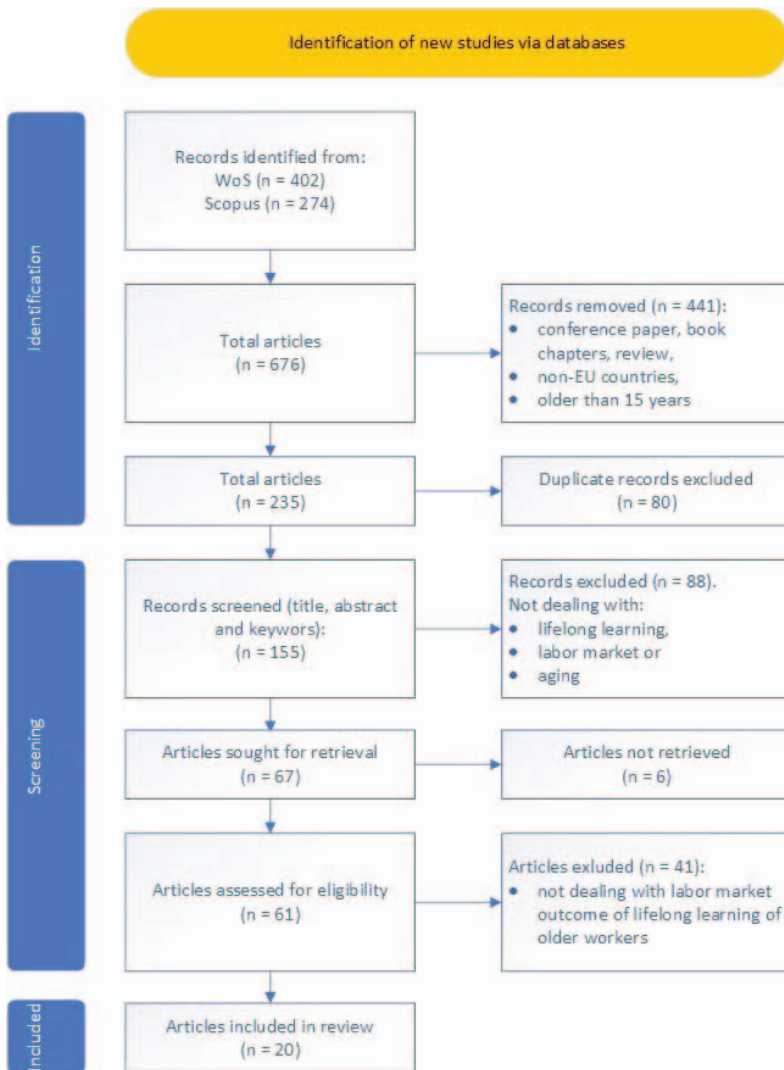
- Keywords for *lifelong learning*: *life-long learning* OR *lifelong learning* OR *lifelong training* OR *life-long training* OR *lifelong education* OR *life-long education* OR *continuous education* OR *continuous learning*;
- Keywords for *labor market*: *employability* OR *labour market* OR *labor market* OR *job market* OR *workforce* OR *labourforce* OR *laborforce* OR *labour force* OR *labor force* OR *employer* OR *worker* OR *employee* OR *manpower*;
- Keywords for *population aging*: *ageing* OR *aging* OR *older* OR *elderly*.

These were combined into complete Boolean search strings. For WoS: *life-long learning* OR *lifelong learning* OR *lifelong training* OR *life-long training* OR *lifelong education* OR *life-long education* OR *continuous education* OR *continuous learning* (Topic) and *employability* OR *labour market* OR *labor market* OR *job market* OR *workforce* OR *labourforce* OR *laborforce* OR *labour force* OR *labor force* OR *employer* OR *worker* OR *employee* OR *manpower* (Topic) and *ageing* OR *aging* OR *older* OR *elderly* (Topic). For Scopus, the complete search string was TITLE-ABS-KEY (*life-long learning* OR *lifelong learning* OR *lifelong training* OR *life-long training* OR *lifelong education* OR *life-long education* OR *continuous education* OR *continuous learning*) AND TITLE-ABS-KEY (*employability* OR *labour market* OR *labor market* OR *job market* OR *workforce* OR *labourforce* OR *laborforce* OR *labour force* OR *labor force* OR *employer* OR *worker* OR *employee* OR *manpower*) AND TITLE-ABS-KEY (*ageing* OR *aging* OR *older* OR *elderly*).

The search took place on October 24, 2024 and yielded 402 articles in WoS and 274 in Scopus, resulting in 676 articles. Inclusion criteria were applied to include relevance: studies had to focus on EU countries (the UK was included initially and could be excluded later), be published articles only, and fall within the period 2010-2024 to capture contemporary research while maintaining a sufficiently broad evidence base. The language of the publications was not restricted to maintain a broader base. After filtering by country/region and publication type, 441 studies that did not meet the inclusion criteria were excluded. Of the remaining 235 articles, 80 duplicates were removed. The titles, abstracts, and keywords of the remaining 155 articles were screened, leading to the exclusion of 88 additional studies. Of

the 67 articles that remained, six could not be retrieved. The final set consisted of 61 articles, including five non-English publications: three in Spanish, one in Dutch, and one in Polish. These were translated into English using Sider AI PDF translator. Ultimately, 20 articles met all eligibility criteria and were included in this systematic literature review. Three of these were translated: Corrales-Herrero and Rodríguez-Prado (2016), originally written in Spanish, Gigol and Pajewska-Kwaśny (2022), originally written in Polish and Van Vuuren et al. (2011), originally written in Dutch. The selection process is illustrated in the PRISMA flow diagram (Figure 1).

Figure 1: PRISMA flow diagram of selection and screening process



Source: Author's illustration, adapted from Page et al. (2021a) and Page et al. (2021b)

## 2.1. Methodological approaches in the literature

When assessing the eligibility of papers, the focus was on studies that used a labor market outcome (e.g. employability) as a dependent variable and examined lifelong learning as a factor influencing those outcomes. However, most studies treated lifelong learning as a dependent variable; these were excluded from this review. Additionally, many studies simply stated that lifelong learning is beneficial and necessary in the labor market, without examining its actual outcomes; these were also excluded. Only studies that addressed the impact of lifelong learning on older workers' labor market outcomes were included, although this relationship was not always the primary focus of the study. The included studies employed a range of methodological approaches, predominantly quantitative designs, such as regression multilevel models.

The studies drew on various data sources. Some included national and regional labor force surveys that provided comparable cross-national data. Others relied on longitudinal data such as the Survey of Health, Ageing and Retirement in Europe – SHARE (Börsch-Supan et al., 2013), which offered insights into the impact of lifelong learning on labor market outcomes over time. Several studies also used case-specific data, which provided perspectives at the organizational or individual level within specific industries. Although the review focused on EU countries, several studies examined a broader context and additionally included non-EU countries, such as Switzerland.

A methodological quality assessment was conducted for all included studies. Although most studies were quantitative, there were two studies with a mixed quantitative and qualitative approach and one qualitative study. Mixed-methods studies were evaluated separately for their quantitative and qualitative components. The methodological quality of quantitative studies was assessed using a modified version of the Newcastle-Ottawa Scale (NOS) (Wells et al., 2000). The adaptation was partially informed by previous applications and discussions of the NOS in the literature (Gualdi-Russo & Zaccagni, 2026). The assessment covered the domains of sample selection (including appropriateness, size, and exposure assessment), comparability, and outcome assessment (including measurement quality and statistical analysis). Each criterion was scored from 0 to 2 points according to predefined thresholds. The final instrument had a maximum score of 12 points. The quality of studies was classified as high (9-12 points), moderate (6-8 points), or low (0-5 points) based on proportional thresholds. Given the small number of qualitative studies, a simplified set of criteria was applied, focusing on data analysis and credibility or validity, each scored from 0 to 2 points (maximum 4 points). To ensure comparability with quantitative studies, scores were interpreted proportionally, with high quality defined as 3-4 points, moderate quality as 2 points, and low quality as 0-1 point.

A detailed description of the criteria and scoring procedures is provided in Appendix A, with results presented in Table A1 for quantitative studies and Table A2 for qualitative studies. Most studies were assessed as high quality, with a smaller number rated as moderate. The studies were clustered using an inductive, data-driven approach that did not rely on predefined themes. Instead, clusters were developed through iterative examination of the articles. This bottom-up process examines similarities in research and allows patterns and relationships to emerge from the included studies (Clarke & Braun, 2017; Popay et al., 2006).

A summary of included studies with their key characteristics is presented in Table 1.

Table 1: Summary of included studies

Author (year)	Country	Sample	Methodology	Main findings
Corrales-Herrero and Rodríguez-Prado (2016)	Spain	Data from Survey on Adult Participation in Learning Activities, 12905 participants selected	Propensity score matching, logistic regression	The impact of formal learning on employability is not significant for any age group. The effect of informal learning for the oldest groups is unclear; some models show a significant positive relationship, while others show no significant effect.
Dellve et al. (2025)	Sweden	Older assistance nurses, nurses, teachers, (female dominated public sector), 1342 participants	CFA, SEM	Participation in organizational learning programs positively influences the attractiveness of work, autonomy, and relatedness for older workers.
Gigol and Pajewska-Kwaśny (2022)	Poland	Survey of 157 employees of Dean's office of various universities in Poland.	EFA, Kolmogorov–Smirnov test, Student's t-test for independent samples, moderated mediation modeling. Bootstrapping to prevent significance bias.	Lifelong learning positively influences satisfaction with salary and job satisfaction, not only for younger but also for older employees.
Goštautaitė and Šerelytė (2024)	Lithuania, Latvia, and Estonia	Survey of an organization in financial sector, 2256 participants	Moderation regression models	The relationship between age and perceived employability is negative, but lifelong learner characteristics mitigate this negative relationship.
Hällsten (2012)	Sweden	Longitudinal data based on various annual population registers	Matching techniques are combined with individual-level fixed effects panel data methods	Lifelong learning at the tertiary level later in life positively affects employment, with a stronger impact for females and those with vocational education. Earnings increase slightly, particularly for females.
Hennekam (2015)	Netherlands	920 surveys and 11 semi-structured in-depth interviews. Subjects are working people registered at a job agency specialized for older employees.	Mixed methods: regression and content analysis	Continuous learning ability is positively related to salary. It also positively influences career satisfaction for older workers have a desire to develop themselves. Those who do not wish to continuously learn want to be valued as they already are and may feel pushed toward retirement.
Hüber et al. (2022)	Germany	Older working people, 633 participants, longitudinal data	Chi2-tests, independent samples t-tests, paired sample t-tests and mixed-design ANOVAs with repeated-measures factor time and between-subjects factor group, Cohen's d,	Multicomponent training as a form of lifelong learning leads to changes such as improved coping with work-related stress. It also increases the self-assessment of professional competence and self-efficacy.

Author (year)	Country	Sample	Methodology	Main findings
Korsakienė et al. (2017)	Lithuania	Older employees working in science, education and public organizations, 107 participants	EFA, correlation, regression	There is a positive correlation between the desire for learning and development and work engagement among older workers.
Lunau et al. (2015)	16 European countries	Data from Survey of Health, Aging and Retirement in Europe (SHARE) and English Longitudinal Study of Ageing	Regression, multilevel models	The association between lifelong learning and work stress is significantly negative. Lifelong learning significantly reduces work stress for workers with lower education. However, for those with higher education, the reduction is not significant.
Mäcken et al. (2022)	15 European countries	Data from longitudinal Survey of Health, Aging and Retirement in Europe (SHARE)	Discrete-time event-history analyses, two-step meta-analytic approach	Higher participation of older workers in lifelong learning is associated with a decrease in the social gradient in involuntary exit from employment, but the effect size is small.
Siivonen and Isopahkala-Bouret (2016)	Finland	Interviews with 24 adult graduates (upper secondary and university)	Analysis from a discursive-narrative point of view	Some graduates see ageing as an advantage, while others see it as a disadvantage. Advantages include a willingness to invest in development and continuous education, combined with work experience and current qualifications, which gives an edge in employability. This holds special meaning for both graduates and employers who value these qualities. Disadvantages include it being too late to prove employability, find employment, and benefit from it in their working lives, which can become a major disappointment.
Turek and Perek-Białas (2013)	Poland	Data from the representative Activating Senior Potential in Ageing Europe (ASPA) survey (2009) of 1037 employers who were interviewed by telephone (CATI)	Regression	Companies implementing training plans assessed the productivity of older workers as higher than companies that did not use those policies.
Urbaniaik and Wiktorowicz (2014)	Poland	Survey of 3200 older people (CAPI) and 1011 employers (CATI) and quality researchers including and a panel of experts.	Descriptive statistics, chi-square test and factor analysis; in-depth interviews, casual interviews	The most important factor for equal opportunities in the labor market for older workers is related to upskilling.

Author (year)	Country	Sample	Methodology	Main findings
Valente et al. (2023)	Spain	Survey of 1692 former students who had graduated from the Open University of Catalonia (Quota sampling); Data from the National Employment Survey	CFA, regression	Earning gains from obtaining a degree are higher for younger graduates than for older graduates. In the oldest groups, earning gains become insignificant or even negative.
Van der Heijden et al. (2015)	Netherlands	Survey of 182 primary school teachers from 9 schools	Hierarchical regression, CFA	Developmental opportunities are positively related to employability and work engagement. The positive effect on employability is stronger for older employees than for younger employees.
Van der Klink et al. (2014)	Netherlands	Survey among academic staff at the Open University, 139 responses	Hierarchical regression, one-way ANOVA	Age is related to informal learning elements, but not directly to employability. It is possible that informal learning mediates the relationship between age and employability, but this is not discussed in the research.
Van Vuuren et al. (2011)	Netherlands	Survey among employees of nine elementary school, 178 responses	MANOVA, moderation analysis	Older workers have lower employability than younger workers, but those who participate in lifelong learning have higher employability.
Węgrzyn and Salamağa (2023)	EU-27	Data from the Community Innovation Surveys (CIS), Labor Force Survey and data on job-to-job rotation.	Panel error correction models (ECM), panel causality tests	An increase in the population participating in lifelong learning may increase or decrease transitions from inactivity to employment, or from employment to inactivity or unemployment, depending on the level of innovation in the economy.
Wilckens et al. (2023)	Germany	Multilevel data of 556 older employees and 661 managers from 101 organizations.	linear mixed-effect models	Development practices moderate the influence of health on retirement intentions. A higher level of individual development is particularly associated with a higher preferred retirement age for employees in good health.
Žnidarič et al. (2021)	Slovenia	Survey in 3 companies, 259 responses	independent t-test; regression	After learning, older workers are better able to adapt to the changing work environment than younger workers.

Source: Author's compilation

The results of the reviewed studies were grouped into thematic clusters related to specific labor market outcomes identified in those studies: employability, exit from employment, earnings, job satisfaction, and job performance.

Due to labor market outcomes often being interrelated, some studies addressed more than one outcome. These studies were therefore assigned to all relevant clusters to ensure a comprehensive analysis and to enable a detailed synthesis of the thematic clusters.

### 3. Results

This section provides a further analysis of the thematic clusters identified in this systematic literature review: employability, exit from employment, earnings, job satisfaction, and job performance.

#### 3.1. Employability

Employability was the most frequently examined outcome, which is not surprising given its central role in the literature search. Across the reviewed studies, the results regarding the relationship between lifelong learning and the employability of aging workers are mixed, with evidence of positive, negative, and non-significant effects.

Węgrzyn and Salamaga (2023) distinguish between long-term and short-term effects of increasing participation in lifelong learning in countries with different levels of innovation (innovation leaders, strong innovators, moderate innovators and emerging innovators). In innovation leader countries, a higher share of the population participating in lifelong learning significantly reduces transitions from inactivity to employment long-term. In moderate-innovator countries, however, the long-term effect was the opposite, significantly increasing the transition from inactivity to employment. In innovation leader countries, the short-term effect is a significant reduction in the transition from inactivity to employment. In all other cases, transitions from inactivity or unemployment to employment were not significant.

Siivonen and Isopahkala-Bouret (2016) examined how adult graduates negotiate and interpret aging within the context of employability discourse. The researchers also explored the consequences of pursuing formal, academically-oriented education in adulthood rather than in youth. Some graduates viewed aging as an advantage, arguing that a willingness to invest in their own development and continuous education at any age strengthened their employability, due to the combination of extensive work experience and current qualifications. Others perceived aging as a disadvantage, noting that completing a degree later in life left to little time to demonstrate employability to potential employers and secure employment.

Hällsten (2012) examined economic returns to tertiary degrees earned later in life. The findings show that lifelong learning at the tertiary level has a major positive effect on employment. This effect varies by gender and birth cohorts: employment increases across all cohorts, except for men with academic education in the youngest birth cohort. In general, the effect is stronger for women and for individuals with vocational education, with the largest gains observed among women with vocational schooling.

Corrales-Herrero and Rodríguez-Prado (2016) analyzed the impact of formal and informal lifelong learning on employability. Among unemployed individuals of all ages, informal learning had a positive impact on employability, whereas formal learning showed inconsistent and non-significant results across all age groups. Although the results were not significant, they were negative, suggesting that unemployed individuals who participated in formal lifelong learning were less likely to be employed than those who did not participate in lifelong learning. When age was taken into account, the results for formal learning remained consistent with the overall findings and were not significant for any group. The effects of participation in informal learning were strongest among the youngest unemployed and decreased with age. For older unemployed individuals, who were the focus of this systematic literature review, participation in informal learning produced mixed outcomes: some models indicated significant positive effects on employment, while others showed no significant results.

Urbaniak and Wiktorowicz (2014) investigated factors contributing to equal opportunities in the labor market for older workers. The analysis showed that upskilling measures targeted at older workers were the most important factor for improving the equality of opportunities. Both older workers and employers identified identical tools as essential for achieving equal opportunities in the labor market. Additionally, one in ten employers considered improving the skills of older workers an important measure for increasing their employment.

Several studies examined interactions between lifelong learning and age. Van der Heijden et al. (2015) found that developmental opportunities are positively related to employability. There was a significant interaction effect between age and developmental opportunities on employability. The positive effects of developmental opportunities were stronger for older employees than for younger ones.

Goštautaitė and Šerelytė (2024) studied the perceived automation risk and the characteristics of lifelong learners as factors that may influence the negative relationship between age and employability. A significant negative relationship was found between age and perceived employability. The strongest predictor of perceived employability in the model was lifelong-learner characteristics, which were strongly positively associated with employability. The interaction between age

and lifelong-learner characteristics was also significantly associated with perceived employability. The negative relationship between age and perceived employability was stronger when lifelong-learner characteristics were lower, but when they were higher, the relationship was not significant. These results suggest that lifelong-learner characteristics buffer the negative relationship between age and perceived employability.

Van der Klink et al. (2014) investigated the contribution of formal and informal learning to employability. Age was a significant predictor for informal learning: it was negatively associated with networking both within and outside one's own organization. Although age was not significant in the employability models, networking within one's own organization had a significant positive impact on corporate sense, while networking outside one's own organization had a significant positive impact on anticipation, optimization, and personal flexibility. While not explicitly addressed in the study, these findings suggest that informal learning may mediate the relationship between age and employability.

Van Vuuren et al. (2011) examined how age influences the relationship between lifelong learning and sustainable employability. Sustainable employability consists of three elements: vitality, work ability, and employability (Sociaal-Economische Raad, 2009). The study found a statistically significant multivariate main effect for age and a significant univariate main effect for employability, but not for work ability or vitality. Aging is associated with a decrease in employability, but not with a decrease in work ability or vitality. Lifelong learning also showed a significant multivariate main effect. Univariate tests indicated that higher levels of lifelong learning are associated with significantly higher employability, work ability, and vitality compared to lower levels. Employees with more interest in and opportunities for lifelong learning are more employable, more able to work, and more vital than those with less interest and fewer opportunities. The interaction between age and lifelong learning on sustainable employability was also significant. Older workers have lower employability than younger workers, but those who participate in lifelong learning have higher employability. Older workers with limited interest in and opportunities for lifelong learning have lower employability than older workers with high interest and more opportunities. The differences in employability between age groups are smaller for those who participate in lifelong learning. Older employees with below-average participation in lifelong learning have low work ability, while older employees with above-average participation have high work ability.

To summarize this cluster, there is no clear answer as to whether lifelong learning improves the employability of older workers. However, it often buffers the negative effects of aging. Informal lifelong learning leads to better outcomes than formal learning. Longitudinal data on the sustainability of employability improvements through lifelong learning are scarce.

### 3.2. Exit from employment

In the study by Węgrzyn and Salamaga (2023), increases in the share of population participating in lifelong learning produced different long-term effects depending on countries' innovation levels. In innovation leader countries, the transition from employment to inactivity or unemployment is significantly reduced. In strong-innovator countries, the effect is reversed: increased lifelong learning leads to an increased transition from employment to inactivity or unemployment. In moderate-innovator countries, the transition from employment to inactivity increases significantly, while the transition from employment to unemployment decreases. The short-term effect of increased lifelong learning impacts only a small number of transition types. In innovation leader countries, the transition from employment to inactivity is significantly reduced, while in highly innovative and emerging countries, it significantly increases the transition from employment to unemployment. Other combinations of effect duration and innovation categorization did not result in a significant transition from employment to inactivity or unemployment.

Mäcken et al. (2022) examined country-specific differences in the relationship between education and voluntary or involuntary exit from the labor market, as well as whether these differences can be attributed to institutional characteristics of the countries. The results showed that there is a social gradient in exiting working life in most countries. Higher participation of older workers in lifelong learning was associated with a reduction in the social gradient in involuntary exit from employment, although the effect size was small.

Several studies in this cluster included moderation modeling. Wilckens et al. (2023) examined the role of human resource practices in relation to older workers' health and retirement intentions, including their preferred retirement age and their intention to work after reaching retirement age. Individual development practices were not significantly related to retirement intentions or later-life employment. However, when examining the moderation of individual development practices on the influence of health on retirement intentions, there was a significant interaction effect between health and individual development practices on employees' preferred retirement age, but not on their employment intentions in later life. Employees in good health who experienced higher levels of development practices preferred a later retirement age.

Hennekam (2015) researched the influence of social skills competence and continuous learning ability on career success and career satisfaction among older workers. The correlation between continuous learning ability and career satisfaction is somewhat contradictory. Some respondents valued their growth and self-development, which made them feel like valuable members of the organization and influenced their attitudes toward retirement and their willingness to remain

employed. However, others indicated that they were satisfied with their current status and wanted to be valued as they already are. They felt that expectations for further development could pressure them to leave the workforce. Since the section of the article addressing exit from employment is related to career satisfaction, the survey results concerning employee satisfaction are also discussed in the job satisfaction cluster.

Dellve et al. (2025) investigated whether participation in employer-provided skills and learning programs strengthens older employees' abilities to perform their work meaningfully, thereby increasing job attractiveness and willingness to remain in their current positions. The relationship between active participation in organizational learning programs and retirement preference was not significant. As in Hennekam (2015), exit from employment is linked to job satisfaction. This part will therefore also be discussed in the job satisfaction cluster.

To sum up, as in the employability cluster, findings on the influence of lifelong learning on exit from employment are contradictory. However, the correlation is more often positive than negative or insignificant. In several studies, exit from employment is associated with job satisfaction. For this reason, these analyses are also included in the job satisfaction cluster. It is important to note that countries have different policies regarding the statutory retirement age and different rules for early retirement and working after retirement age.

### **3.3. Earnings**

In Hennekam's (2015) study on the influence of social skills competence and continuous learning ability on career success, salary level was used as a measure of career success. Continuous learning ability was positively associated with salary (career success).

In addition to examining the effect of lifelong learning at the tertiary level on employability, Hällsten (2012) also investigated its impact on earnings. The results showed a weak increase in earnings. The opportunity costs of studying are foregone earnings, and individuals with low prior earnings have lower opportunity costs, making them more likely to enroll in tertiary education. As with employability, the increase in earnings was stronger for females than for males. Females with vocational upper-secondary schooling experienced the same increase in earnings while employed.

Valente et al. (2023) explored earning gains from obtaining a university degree, focusing on students at a virtual university who tend to be older. Overall, both undergraduate and graduate males experienced greater earning gains compared to females. However, when age was taken into account, earning gains were higher for younger graduates than for older ones. Among younger age groups, males

experienced greater earning gains than females, while in older age groups, females experienced greater gains than males. In the oldest groups, earning gains became insignificant or even negative. Male graduates aged 50-54 showed no significant earning benefits, and in the 60-64 age group, the gain was negative, but not significant. Female graduates still experienced earning benefits in the 50-54 age group, but in the 60-64 age group, they faced a significant negative gain.

Gigol and Pajewska-Kwaśny (2022) examined the influence of lifelong learning on job satisfaction, including satisfaction with salary in their modeling. For this reason, the study is included in both the earnings cluster and the job satisfaction cluster. Additionally, salary was a mediator in the relationship between lifelong learning and job satisfaction. The results show that lifelong learning had a positive effect on satisfaction with salary. Age was not a statistically significant mediator in this relationship: the positive influence of lifelong learning on satisfaction with salary was significant for both younger and older employees.

In summary, the findings indicate that the effect of lifelong learning on earnings is not straightforward. Lifelong learning generally has a positive effect on earnings, but for older workers, some studies show a positive effect, while others indicate that the effect diminishes with age or may even become negative.

### **3.4. Job satisfaction**

As mentioned in the exit from employment cluster, Hennekam (2015) examined the influence of continuous learning ability on career satisfaction. The results are contradictory. On the one hand, older workers who engage in continuous development are generally more satisfied with their careers, indicating a positive influence on career satisfaction. On the other hand, the need to constantly stay updated with new developments can sometimes feel like a threat, thus having a negative influence on career satisfaction. Overall, continuous learning ability positively influences career satisfaction when older workers have a genuine desire for self-development.

Dellve et al. (2025) investigated the relationship between employer-provided learning programs and various work-related outcomes. The influence of organizational learning programs is found to positively affect the attractiveness of work for older employees.

Lunau et al. (2015) explored the association between education and work stress among older workers in 16 European countries. They found that in each country, workers with lower educational levels experienced higher levels of work stress. When labor market policies were taken into account, lifelong learning was included in the model as one of the policy measures. A significant negative association between lifelong learning and work stress was found. Additionally, when policy

measures were interacted with educational level, lifelong learning significantly reduced work stress for workers with lower education, but the decrease in work stress for those with higher education was not significant.

Hüber et al. (2022) investigated how lifelong learning can support older workers. Multi-component training focused on competence expectations, stress management, and cognitive, metacognitive, and psychomotor training was conducted. The assessed outcomes of the training were changes in subjective health, self-efficacy, self-concept of professional competence, stress management, and cognitive abilities. For the purposes of this systematic literature review, it should be noted that the elements of coping with stress are strongly related to work (e.g. professional ambition, willingness to work to exhaustion), so they can be considered as work stress and are therefore included in this cluster.

Siivonen and Isopahkala-Bouret (2016), who examined adult graduates' perceptions of employability, also reported both positive and negative experiences relate to job satisfaction. Some participants felt that earning a degree in adulthood has a special meaning and is valued by employers who respect adult education and degrees earned later in life. Others, however, felt disappointed because they perceived it as too late in their careers to benefit from the qualification, which negatively affected their job satisfaction.

The research conducted by Gigol and Pajewska-Kwaśny (2022) is also included in this cluster. Their study found a statistically significant positive relationship between lifelong learning and job satisfaction, indicating that lifelong learning opportunities increase job satisfaction. As in the earnings cluster, age did not moderate this relationship: the positive effect of lifelong learning on job satisfaction was significant for both younger and older employees.

When summarizing the job satisfaction cluster, at first glance, the results appear more straightforward than in previous clusters. In general, lifelong learning positively affects job satisfaction among older workers, although the increase is not always statistically significant. However, there are instances where negative effects are present, particularly when workers do not wish to pursue lifelong learning and feel pressured, or when they believe it is too late in their careers to benefit from it.

### **3.5. Job performance**

Žnidaršič et al. (2021) compared older and younger workers in terms of their motivation to learn and the outcomes of learning. The research did not find significant differences in intrinsic learning motivation between older and younger workers, but there was a significant difference in extrinsic learning motivation. Older workers are less likely than younger workers to participate in learning to achieve career goals and more likely to do so to improve work efficiency and

promote knowledge transfer. The results also show that after learning, older workers adapt better to the changing work environments than younger workers.

Turek and Perek-Bialas (2013) examine how employers perceive the productivity of older workers compared to younger ones. Employers generally rate older workers lower in productivity and hard skills, but higher in soft skills compared to younger workers. However, when measures to increase the productivity of older workers, including training plans, were included in the modeling, companies implementing these policies assessed productivity higher than companies that did not use such policies.

Van der Heijden et al. (2015) also investigated the relationship between developmental opportunities and work engagement. They found the relationship to be positive. It was not influenced by age, so the relationship was positive for both older and younger workers.

Dellve et al. (2025) further examined how participation in employer-provided learning programs influences autonomy, competence, and relatedness among older workers. All these relationships were found to be positive.

Korsakienė et al. (2017) analyzed employee-related and work-related factors affecting the work engagement of older workers. There was a positive correlation between the desire for learning and development and work engagement.

The study conducted by Hüber et al. (2022) also contributed to this cluster. Their training program for older workers resulted in increased self-assessment of professional competence and self-efficacy.

The job performance cluster provides the most consistent findings in the entire review. Across all studies, the relationship between lifelong learning and job performance of older workers is positive, with no evidence of negative effects.

## 4. Conclusion

There is a substantial body of literature on lifelong learning, but most studies examine it as an outcome, rather than as a factor influencing labor market outcomes for older workers. This systematic literature review analyzed 20 studies focusing on the effects of lifelong learning on the labor market. The outcomes are grouped into five clusters: employability, exit from employment, earnings, job satisfaction, and job performance.

Across all clusters except job performance, the direction of the relationship between lifelong learning and labor market outcomes is not straightforward. It is not clear whether lifelong learning increases the employability of older workers, although

it frequently buffers the negative effects of aging. Informal learning tends to yield better results than formal learning. Results in the exit from employment cluster are also mixed, though the relationship tends to be more positive than negative. When investigating exit from employment, it is important to consider differences in statutory retirement ages and policies regarding (early) retirement and working after retirement age. In the earnings cluster, lifelong learning generally has a positive effect, but some studies reveal that this effect diminishes with age or can even become negative. Although lifelong learning initially appears to have a positive effect on job satisfaction for older workers, this effect is not always significant. Negative effects occur when workers feel pressured to pursue lifelong learning, or when they are disappointed because they perceive that it is too late in their careers to benefit from it. In contrast to the other clusters, the job performance cluster shows a positive relationship between lifelong learning and job performance. During the analysis, strong connections emerged between the exit from employment and job satisfaction clusters, as well as between the job satisfaction and job performance clusters.

The studies included in this review were conducted in diverse contexts and used different measures of lifelong learning and labor market outcomes. Some variability in results can therefore be attributed to methodological and contextual differences. However, this does not fully explain the inconsistencies. Even under similar conditions, outcomes differ, which is most clearly illustrated in qualitative studies including in-depth interviews with individuals who participated in lifelong learning. Additionally, differences in older workers' willingness to participate in lifelong learning also contribute to divergent outcomes. Furthermore, the relatively small number of longitudinal studies may contribute to mixed findings, highlighting the need for further longitudinal research.

Overall, this review provides insights into the effects that older workers can expect from lifelong learning and clarifies that these effects do not always align with the common claim that lifelong learning *solves problems* for older workers. Nevertheless, across all clusters, positive outcomes occur more often than negative ones, even if the patterns are not uniform.

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## Utjecaj cjeloživotnog učenja na ishode na tržištu rada u uvjetima starenja stanovništva: sustavni pregled literature

Ana Štambuk<sup>1</sup> 

### Sažetak

*Poboljšanje položaja starijih radnika na tržištu rada često se povezuje s važnošću cjeloživotnog učenja. Cilj je ovog istraživanja ispitati ishode cjeloživotnog učenja za starije radnike na tržištu rada putem sustavnog pregleda literature koji obuhvaća članke temeljene na zemljama Europske unije, objavljene između 2010. i 2024. godine, a indeksirane u bazama WoS i Scopus. Utjecaj cjeloživotnog učenja na ishode na tržištu rada podijeljen je u pet kategorija: zapošljivost, izlazak iz zaposlenja, zarada, zadovoljstvo poslom i radna uspješnost. U svim kategorijama osim radne uspješnosti, smjer odnosa između cjeloživotnog učenja i ishoda na tržištu rada nije jednoznačan. Kada je riječ o zapošljivosti, cjeloživotno učenje ne povećava je uvijek, ali često ublažava negativne učinke starenja. Rezultati vezani uz izlazak iz zaposlenja ishodi također su nejasni, iako odnos češće pokazuje pozitivan nego negativan smjer. Što se tiče zarade, cjeloživotno učenje pokazuje pozitivan učinak, no taj učinak može slabiti s dobi ili čak postati negativan. Čini se da cjeloživotno učenje pozitivno utječe na zadovoljstvo poslom, ali učinak nije uvijek statistički značajan, a mogu se javiti i negativni učinci, primjerice kada se radnici koji ne žele sudjelovati u cjeloživotnom učenju osjećaju ugroženo ili kada smatraju da je prekasno da bi od toga imali stvarne koristi. Suprotno tome, kategorija radne uspješnosti dosljedno ukazuje na pozitivan odnos između cjeloživotnog učenja i radne uspješnosti. Dok se prethodna istraživanja o cjeloživotnom učenju i tržištu rada često temelje na pretpostavci da cjeloživotno učenje ima pozitivan učinak te se uglavnom usredotočuju na čimbenike koji utječe na sudjelovanje, ovo istraživanje doprinosi sintetiziranjem dokaza u pet kategorija, pružajući jasan pregled načina na koji cjeloživotno učenje utječe na tržište rada.*

**Ključne riječi:** cjeloživotno učenje, stariji radnici, ishodi na tržištu rada, zapošljivost, starenje stanovništva

**JEL klasifikacija:** I26, J14, J24

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## Appendix

### *Quality assessment framework for quantitative studies*

Sample selection (sample appropriateness and representativeness, sample size, exposure assessment)

#### Sample appropriateness and representativeness

2 points: The sampling strategy is appropriate and well-justified for the research objective, providing a sample that is either broadly representative of the target population or highly relevant and well-defined for the specific study context (e.g. institutional datasets or specialized populations).

1 point: The sampling strategy is described and partially justified, but the sample is limited in scope or representativeness.

0 points: The sampling method is not described or is clearly inappropriate for the research objective.

#### Sample size

2 points: Sample size meets the recommended criteria for statistical analysis (i.e.,  $\geq 100$  observations and  $\geq 10$  observations per predictor variable), or is otherwise justified through a reported power analysis.

1 point: Sample size is acceptable but below ideal thresholds (i.e. it meets only one of the following:  $\geq 100$  observations or  $\geq 8$  observations per predictor variable).

0 points: Sample size is insufficient ( $< 8$  observations per predictor variable) and no justification is provided.

#### Exposure assessment

##### Exposure to lifelong learning (participation, willingness to participate, etc.)

2 points: Exposure variables are measured using validated or well-established instruments, objective data (e.g. administrative records), or verifiable self-report (i.e. data that can be confirmed from external sources, whether or not it was checked, e.g. participation in a lifelong learning program in the last 12 months), or measures that are clearly defined and widely used in the literature.

1 point: Exposure variables are based on non-validated measures, including non-verifiable self-report, but are clearly described in sufficient detail to allow replication.

0 points: Exposure variables are poorly described and lack sufficient detail.

*Comparability (control of confounding factors)*

2 points: The study applies multivariate statistical analysis, controlling for three or more relevant confounding variables, or uses advanced analytical methods (e.g. multiple regression, fixed-effects models, matching techniques, or structural equation modeling).

1 point: The study includes statistical control for one or two confounding variables.

0 points: No control for confounding factors is applied (e.g. descriptive analysis or bivariate analysis only).

Outcome (assessment of outcome, statistical analysis quality)

Assessment of outcome: labor market outcome

Outcome measurement is assessed using the same criteria as exposure measurement, with emphasis on the validity, clarity, and replicability of the measures.

Statistical analysis quality

2 points: Statistical analysis meets all three of the following criteria: 1) appropriate methods are used for the research question and data; 2) the analysis is described in sufficient detail to allow replication; 3) effect sizes or measures of association are reported (e.g. coefficients, odds ratios)

1 point: Two of the above criteria are met.

0 points: One or none of the criteria are met.

*Quality assessment framework for qualitative studies*

Data analysis

2 points: The analytical approach is clearly described and systematically applied (e.g. discursive, narrative).

1 point: The analytical approach is mentioned but only briefly described, with limited detail on how the analysis was conducted.

0 points: The analysis is unclear, poorly described, or not explained.

Credibility / validity

2 points: The study addresses credibility using recognized qualitative techniques (e.g. transparent interpretation process, use of quotations, reflexivity, or consistency in analysis).

1 point: Some consideration of credibility is present, but limited or implicit.

0 points: No discussion of credibility or validity is provided.

Table A 1: Quality assessment of quantitative studies

Author (year)	Sample selection		Comparability Control of confounding factors (0-2)	Outcome		Total (0-12)	Quality
	Sample appropriateness and representativeness (0-2)	Sample size (0-2)		Exposure elements (0-2)	Assessment of outcome (0-2)		
Corrales-Herrero & Rodríguez-Prado (2016)	2	2	2	2	2	12	High
Dellve et al. (2025)	1	2	2	1	2	10	High
Gigol & Pajewska-Kwaśny (2022)	1	2	2	2	2	10	High
Goštautaitė & Šerelytė (2024)	1	2	2	2	2	11	High
Hällsten (2012)	2	2	2	2	2	12	High
Hennekam (2015)	2	2	2	2	2	12	High
Hüber et al. (2022)	2	2	1	2	2	11	High
Korsakienė et al. (2017)	1	2	0	2	2	8	Moderate
Lunau et al. (2015)	2	2	2	1	2	11	High
Mäcken et al. (2022)	2	2	2	2	2	12	High
Turek & Perek-Białas (2013)	2	2	2	1	2	11	High
Urbaniak & Wiktorowicz (2014)	2	2	0	1	2	9	High
Valente et al. (2023)	2	2	2	2	2	12	High
Van der Heijden et al. (2015)	1	2	2	2	2	11	High
Van der Klink et al. (2014)	2	2	2	2	2	12	High
Van Vuuren et al. (2011)	1	2	1	2	2	10	High
Węgrzyn & Salamaga (2023)	2	2	2	2	2	12	High
Wilckens et al. (2023)	2	2	2	2	2	12	High
Žnidaršič et al. (2021)	1	2	1	2	2	10	High

Source: Author's compilation

Table A2: Quality assessment of qualitative studies

Author (year)	Data analysis (0-2)	Credibility (0-2)	Total (0-4)	Quality
Urbaniak & Wiktorowicz (2014)	1	1	2	Moderate
Siivonen & Isopahkala-Bouret (2016)	2	2	4	High
Hennekam (2015)	2	2	4	High

Source: Author's compilation