

Picchio, Matteo

Article

Is training effective for older workers?

IZA World of Labor

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Picchio, Matteo (2021) : Is training effective for older workers?, IZA World of Labor, ISSN 2054-9571, Institute of Labor Economics (IZA), Bonn, <https://doi.org/10.15185/izawol.121.v2>

This Version is available at:

<https://hdl.handle.net/10419/260678>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Is training effective for older workers?

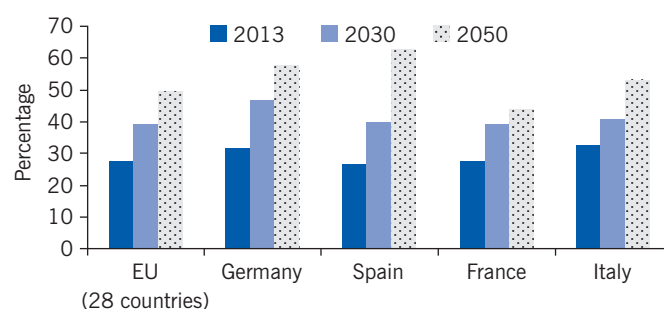
Training programs that meet the learning needs of older workers can improve their employability

Keywords: older workers, training, human capital, employability

ELEVATOR PITCH

The labor market position of older workers is cause for concern in many industrialized countries. Rapid population aging is challenging pension systems. The recent economic crisis has forced many older adults out of the workforce, into either pre-retirement or non-employment. Encouraging people to work longer and fostering the employability of older workers have become priorities for policymakers. Training specifically designed for older workers might help attain these goals, since it may refresh human capital and reduce the pay-productivity gap. Training older workers might also benefit employers and society as a whole.

The ratio of people age 65 or older to people 15–64 (old-age dependency) will continue to rise



Source: Author's analysis based on data from Eurostat European Union Labour Force Survey. Online at: <http://ec.europa.eu/eurostat/help/new-eurostat-website>

IZA
World of Labor

KEY FINDINGS

Pros

- + Training older workers might benefit individuals, employers, and society as a whole.
- + Research on learning in older adults indicates that they are able to acquire new skills.
- + Studies on the effectiveness of training on the employability and productivity of older workers find positive effects.
- + Training can avoid skill obsolescence and respond to the growing importance of technology-based occupations.
- + Subsidies for training of older workers might be a tool for increasing participation in training programs.

Cons

- Older adults are slower, less effective, and more heterogeneous than younger people in learning new skills.
- Training older adults might be ineffective if it does not meet their specific learning needs.
- Older workers are less likely to participate in training and might thereby lose the opportunity to boost their employability.
- Firms might fear low returns from training older workers, because of age-related stereotypes and shorter time to retirement.
- Estimates of the relations between age and productivity, age and learning, and training and employability might be biased because they are based on non-experimental studies.

AUTHOR'S MAIN MESSAGE

There are some concerns about the effectiveness of training in improving older workers' employment prospects. Because of the inevitable decline in cognitive skills that accompanies aging, older adults take longer to acquire new skills and their training performance is worse than that of younger adults. Policies aimed at retaining older workers need to define training programs to meet the specific learning needs of older workers. Shown to be effective are learning activities that are self-paced, job-related, and work-integrated.

MOTIVATION

In many European countries, the population is aging rapidly as fertility rates drop and life expectancy rises. This rapid population aging is challenging the sustainability of pension systems and modifying the age structure of the workforce. Furthermore, the recent economic crisis has forced many older workers out of the labor market. Once older workers lose their job, it is very difficult for them to find a new one, mainly because of the gap between their pay and productivity that results from seniority rules and employment protection legislation.

Older workers

Social science research has no standard definition of what constitutes an older worker. Empirical economics refers mostly to adults close to retirement and, therefore, between their early 50s and, at most, their late 60s.

For these reasons, the labor market position of older workers has become an important policy issue. Encouraging people to work longer and fostering the employability of older workers are nowadays priorities for policymakers. Training might be a tool to improve the productivity and employability of older workers, since it might refresh human capital and reduce the pay-productivity gap. There are however doubts about older workers' learning capabilities and the extent to which training of older workers matters for firm results.

DISCUSSION OF PROS AND CONS

Demographic trends, reinforced by policies aimed at delaying retirement, are leading to an increase in the average age of the workforce. The stock of human capital in the labor market is therefore becoming more dependent on skill upgrading of the current workforce than on the up-to-date skills of new labor market entrants.

There are two main reasons to believe that skill upgrading can mitigate some of the negative consequences of workforce aging on productivity and growth. First, developed countries have experienced a steady shift in the economy toward knowledge-intensive services. Forecasts suggest that this trend will continue in the near future: in 2025 three-quarters of the jobs in the EU-27 plus the UK are predicted to be in the service sector and the trend toward the fourth industrial revolution and automation is expected to have major and lasting effects on job contents and tasks [1]. The demand for service-oriented and knowledge-intensive skills is thus very likely to continue to rise. Skill upgrading might therefore enable the aging workforce to adapt to rapid technological and organizational changes, avoid skill obsolescence, and help shape a workforce that is responsive to increasing skill demand and international trade.

Second, several cognitive studies find that many cognitive skills decline with age, along with physical strength and health. If cognitive decline threatens the productivity of older workers, then as the average age of the workforce increases, it might be expected to see a decline in the competitiveness of the economy at the macroeconomic level and a negative impact on older workers' employability at the individual level. Training and re-training

could thus be effective tools to slow or even reverse the decline in older workers' cognitive abilities, under the assumption that older workers can acquire new skills.

This article looks first at the relation between age and skills, then at older workers' capability to learn new skills and their participation in training. Then, it focuses on policy instruments to promote training of older workers.

Age, productivity, and skill deterioration

Economic studies using employer–employee cross-sectional data sets to analyze the impact of firms' employee age structure on productivity often find an inverted U-shaped productivity profile, with the peak occurring before 55 years of age. However, the conclusions drawn from the findings are not always clear-cut. Many confounding factors can result in misinterpretation of the empirical findings. For example, it is not easy to aggregate individual age–productivity profiles since skill demand and workers' characteristics change across generations. Moreover, there are important unobserved determinants of both a firm's employee age structure and its productivity.

Studies using panel data overcome some of these problems by controlling for firm fixed effects. These studies usually find a flatter age–productivity profile, peaking in the late 40s and early 50s and then remaining stable or declining slightly thereafter. Workers' productivity is determined by several factors, including experience, physical abilities, cognitive skills, and firm characteristics. Today, as technological change increases the weight of cognitive abilities in determining individual work performance, a possible reason for a productivity decline with age is a decline in cognitive skills with age.

The evolution of cognitive skills over the lifecycle has received considerable attention by researchers, especially in the neuropsychological and medical literature. Although the process is not yet well understood, a consistent finding is that several cognitive skills deteriorate with age, at an increasing rate. However, not all cognitive skills display the same age pattern. Psychological studies often distinguish between two types of cognitive abilities:

Cognition and its components

Cognition is a broad set of mental abilities for processing the data received by the senses and memory. It is the ability to accumulate new information, process it, connect it to existing information, and exploit it to solve problems and confront new situations. A useful classification of cognitive skills distinguishes between fluid intelligence and crystallized intelligence (Cattell, 1963).

Fluid intelligence refers to the ability to solve problems in novel situations, independent of acquired knowledge: processing speed, problem solving, abstract reasoning, spatial ability, and so on.

Crystallized intelligence is the automatic ability to use pre-existing knowledge by accessing long-term memory, and it includes vocabulary size, semantic meaning, and general information.

Source: Cattell, R. B. "Theory of fluid and crystallized intelligence: A critical experiment." *Journal of Educational Psychology* 54:1 (1963): 1–22.

fluid and crystallized [2]. Aging generates early negative effects on fluid intelligence: speed, reasoning, spatial ability, and short-term memory start declining in young adulthood and the decline continues into the 60s [3]. Crystallized skills, such as verbal ability, are more stable until the late 70s, when they show a steeper decline [3]. This implies that older workers should remain productive if their job requires long experience and knowledge and is based on automatic tasks. However, if older workers have to move to new tasks, solve new problems, and perform unfamiliar work, which requires fluid cognitive skills, productivity might decline because fluid cognitive skills deteriorate most with age.

There is disagreement, however, about the age at which cognitive abilities peak and decline. This is an important issue for the design of effective interventions. It might be that interventions are unsuccessful if they are started after the age of 60 for skills that begin to deteriorate noticeably in people who are in their 30s. The discrepancy in the peak ages is related mainly to the type of data used in the empirical investigations. Research based on cross-sectional data sets finds that the decline usually starts when people are in their 20s and 30s [3]. Studies using longitudinal data sets find instead that many cognitive skills remain stable over time and start declining only after the age of 60 [3]. Thus, cross-sectional studies, based on comparisons between different people, are likely to overestimate the age that serious decline sets in because of confounding cohort effects. Changes in the social and cultural environment might influence cognitive functioning. On the other hand, longitudinal studies, based on comparisons of the same person over time, are likely to underestimate the age decline because of sample attrition (people who perform poorly are more likely to drop out of the study and so are not re-tested later) and re-test effects (people learn from previous tests how to do better on subsequent ones) [4].

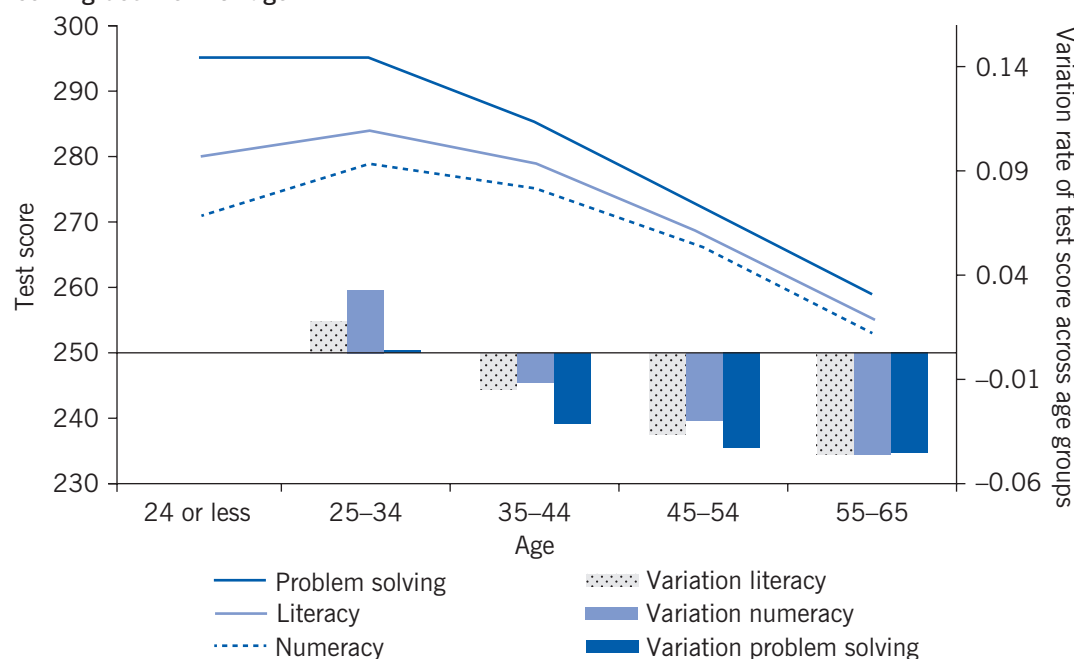
Figure 1 is an example of what cross-sectional studies often find when analyzing the age-cognitive profile: after peaking in people in their 30s, skills decline at an increasing pace.

Learning through training for older workers

The age decline in cognitive skills could be a threat to older workers' employability, especially in recent decades when technological change has increased the importance of cognitive abilities for work performance and accelerated the rate of obsolescence of human capital. That makes it important to understand whether the decline in cognitive skills can be slowed or even reversed, especially now that policymakers are encouraging people to work longer and as many older workers have been losing their jobs because of the recession.

Cognitive training studies suggest that the decline in cognitive functioning can be delayed. Older workers, including those with typical patterns of age-related decline in fluid intelligence, can learn new skills with long-lasting training effects [5], [6]. Nevertheless, because of age-related declines in fluid cognitive skills, older workers' learning processes may differ from those of younger workers. Experiments have revealed that when mixed groups of younger and older workers receive job-related training, older workers get lower test scores and take more time to complete training than younger workers [7]. Age differences in training performance are even more prominent when people are trained in novel tasks [8]. Older workers have lower training performance when training content requires more fluid intelligence; if training is abstract and formal; and if the training content is on information and communications technology [9]. These findings are consistent with a decline in fluid intelligence: the reduction in processing speed,

Figure 1. Cross-section data show that average skills in literacy, numeracy, and problem solving decline with age



Note: The variation rate is the change in the test score when moving from one age class to the next.

Source: Author's analysis of data from the OECD Program for the International Assessment of Adult Competencies (PIAAC) 2012. Online at: <http://piaacdataexplorer.oecd.org/ide/idepiaac/>

I Z A
World of Labor

working memory capacity, and problem solving could lead to poorer comprehension of the training material and of the novel situations faced during the training activities [7]. Finally, there is evidence that older adults differ more in training performance than younger workers, implying that predicting training performance becomes more uncertain with age [8].

This evidence calls for training methods that take into account learning differences between older and younger workers. In theory, job-related and work-integrated forms of training would be expected to be more effective for older workers, because they rely more on accumulated knowledge and experience and less on fluid abilities. For the same reason and because older workers are found to be slower in completing training, older learners should have ample time to process new knowledge. Empirical studies of the impact of different training characteristics on training effectiveness suggest that integrating multiple instructional methods—lecturing, modeling, active participation—can improve the performance of older workers [8]. Another positive determinant of older workers' training performance is self-pacing: plenty of time allows older training participants to compensate for the decline in fluid abilities, internalize the importance of training, and develop the comprehension to master the training content [6]. Finally, older adults perform better if the training activity requires more crystalized skills: if training is on-the-job, applied, and based on communication and management skills [9].

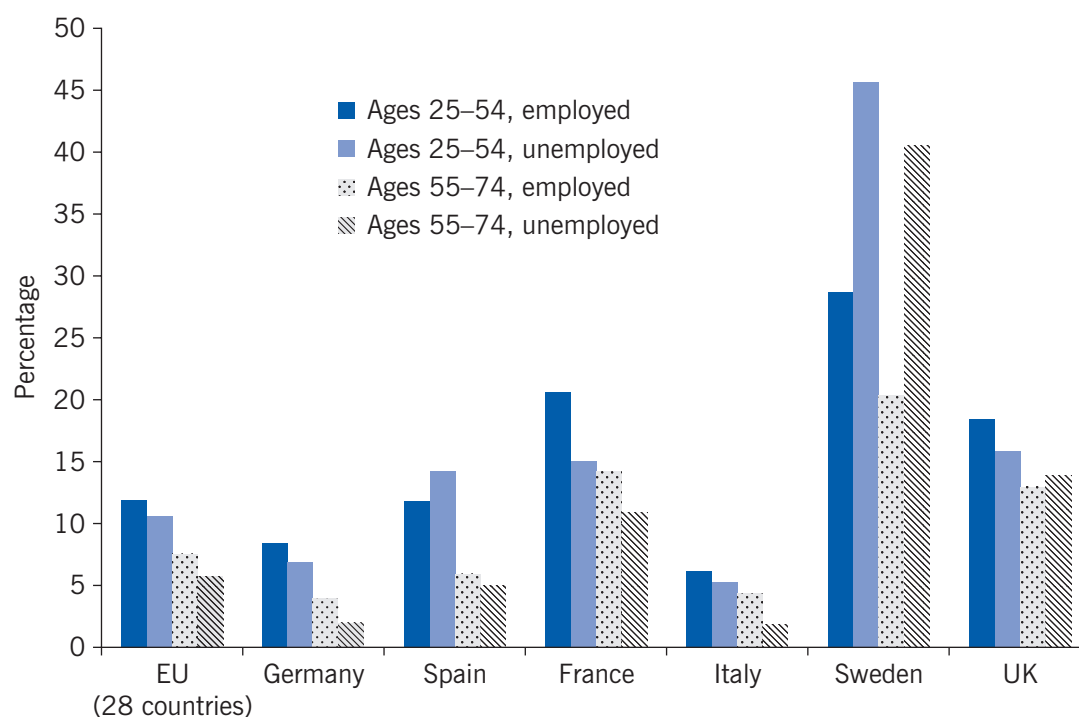
If older adults can learn from training activities, then the expected outcomes would be enhanced productivity and increased employability. Empirical research has shown that on-the-job training could be especially effective in boosting employment probabilities

for both younger and older workers. Training therefore would appear to be a useful tool for retaining older workers in the workforce [10]. However, this is not always the case. In Germany, firms training older workers show no gain in productivity [11]. This contrasting evidence might be due to training not taking into account the specific learning needs of older workers in Germany [11] and employers overlooking age-related changes in training preferences [9].

Training participation of older workers

While training might mitigate age-related declines in cognitive skills, especially if it is designed to match older adults' learning needs, there is still a need to convince older adults to participate in training activities. Participation rates in education and training by age in selected European countries show that training incidence declines with age in all countries for both employed and unemployed adults (Figure 2). Moreover, in most of the countries, unemployed adults are less likely to be involved in training activities than are working adults. In 2013, the best performing countries in terms of older adults' training were the Nordic countries, followed by the UK and France. Spain, Italy, and above all Germany were well below the EU-28 (members as of 2013) average.

Figure 2. Training declines with age and is mostly lower among the unemployed than employed, 2013



Note: Data are self-reported participation rates in education and training over the past four weeks.

Source: Author's analysis of Eurostat data from the European Union Labour Force Survey. Online at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=trng_lfs_03&lang=en.

Before policies can be designed to reduce training inequalities and motivate older workers to refresh and upgrade their skills, the reasons why older workers participate less in training need to be identified. Three major types of barriers seem to be responsible: economic, attitudinal, and institutional.

The Beckerian human capital theory provides an economic framework for understanding how economic agents decide whether to invest in knowledge by comparing expected returns and costs. Returns and costs include both monetary and non-monetary components, such as psychological costs and motivational returns. Human capital theory predicts that an individual will participate in training when the discounted returns to training are larger than the costs. Similar arguments apply to firms, which will invest in training if the discounted returns are larger than the discounted costs. Since older adults have on average fewer expected years left in the workforce, workers and employers will have less time to enjoy the returns to training, resulting in lower discounted training benefits. Training older workers therefore implies a higher probability of not recouping training costs. Moreover, from a firm's perspective, because training performance might be worse among older workers than among younger ones, firms could find it more profitable to invest in training younger workers, to the extent that different training performance translates into differences in productivity, and provide a suboptimal level of training to older workers for cautionary reasons. From a worker's perspective, older workers will be less motivated than younger workers to invest in training, unless the eventual productivity rise is followed by a more than proportional change in earnings.

Attitudinal barriers relate to age stereotypes and negative beliefs and expectations of employers about workers based only on their age. Employers commonly consider older workers to have lower learning potential, even though the gap in training performance with younger workers can be reduced by training interventions that are matched to the learning needs of older workers [8]. Furthermore, even though older workers are less likely to leave a firm than are younger workers, employers see older workers as having shorter job tenure and therefore view training of older workers as an investment with lower returns [12]. Some older workers are also affected by negative stereotypes about their own capabilities to learn new skills [12]. The most severe risk associated with age stereotypes, however, is the failure of management to adequately invest in older workers' training, rather than an unwillingness of older workers to profit from training [8].

Institutional barriers refer to training practices and procedures that are not aligned with older adults' learning needs, both pedagogically and organizationally, and are therefore a disincentive to participate in training. For example, public employment services might be targeted mainly to young workers and so might not meet the learning needs of older workers, or they might impose more lenient job-search requirements on older job seekers, thereby acting as a deterrent to participation in training activities. Another difference in preferences concerns the time horizon of training programs. Long training courses could be a deterrent for older workers because of their shorter expected remaining working life. Short or modular training courses would better suit older workers and likely increase their training participation.

Research studies empirically quantifying the importance of these barriers are scarce, although potentially relevant to designing effective interventions to reduce the age-related training gap. In line with the human capital theory, the time until retirement seems to be a major determinant of training participation. Investigations of the effects

of pension reforms on the labor market in the Netherlands and Italy find that an increase in the expected retirement age had a positive impact on the training participation of workers in their 50s [13], [14]. These findings might suggest that the age-related training gap reflects a purely economic evaluation of the opportunity to invest in older workers' training: older workers might be less likely to receive training because it is a less profitable investment. Once the employer and the employee have more time to reap the benefits of the investment because of a higher expected retirement age, training participation increases. In addition, the positive effect on training participation is found only for workers in larger organizations [13], which are more likely to have sophisticated human resources departments capable of understanding the change in the profitability of the training investment as a result of the longer expected payback period.

Policy instruments to promote firm-sponsored training

Government subsidies might be one way to improve firms' incentives to invest in older workers' human capital. An example of government subsidies often used in the EU is tax incentives, present in 15 European countries [15]. Other instances are government financial grants or vouchers.

Subsidies as instruments to promote firm-sponsored training could be problematic for several reasons. First, subsidies can generate windfall profits for firms and workers that would have invested in training even without the subsidy. Second, if firms are already optimally setting older workers' training investments to a lower level than that of younger workers because of decreasing returns to training with age, then subsidies could result in an inefficient training level. Third, subsidies lead to the reallocation of resources from younger to older workers, and in a period of tight national financial budgets, achieving that would require intergenerational solidarity.

A government program introduced in the Netherlands in 1998 which conferred fiscal advantages on firms that provided training to workers older than 40 was abolished in 2004, mainly because the program was unable to modify firms' behavior and because low-skill workers had trouble with the content and quality of the training activities. In Italy, temporary national tax deductions for employers providing training in 2001–2002 and training incentives to employers and employees in the period 1994–2004 were estimated to have no effect on training incidence for workers in their 50s [14]. Further empirical studies conclude that tax incentives are not an effective tool for stimulating training in general, with training of older workers being no exception [15].

The main problem with the reduction of the training costs of older workers via tax incentives is that tax incentives are very likely to generate deadweight loss and substitution effects. Interventions should instead be flexible enough to target the specific needs of particular groups of firms and workers. In particular, as the management and cognitive literature suggests, the policy intervention should address the characteristics of the training activities and promote a culture of life-long learning to counteract age-related stereotypes [6], [7]. Eligibility for direct subsidies, like financial grants or vouchers, could be conditional on training programs being certified to meet the specific learning needs of older adults, for instance by being job-related, work-specific, and self-paced. That could reduce the risk of supporting inefficient training programs that fail to compensate for the age-related decreasing productivity returns to training. As a matter of fact, the empirical

literature finds that direct subsidies, such as the German government subsidized job training program for workers older than 45 years, or training vouchers used in many European countries, like Belgium, Germany, France, Italy, and the Netherlands, have increased the training participation of older workers [15].

If age stereotypes are one of the main reasons for the low training participation of older workers, then age-specific taxes for laying off older workers might be enough to increase the propensity of firms to invest in training older workers without unduly burdening the national budget. By making it more costly for firms to fire older workers, such policies would make it more attractive for them to invest in refreshing older workers' skills. The rise in firing costs for older workers would, however, create a further deterrent to hiring older job seekers, increasing the duration of unemployment among them.

Another measure that might work well where firms are underinvesting in older workers' training because of age-related stereotypes is to establish training funds for older workers financed by a levy on firms. A training fund might provide grant funding for approved training plans that are oriented to the learning needs of older workers. However, it has been pointed out that, although training funds might be appealing as they can be easily designed to meet the required needs of the trainees, there is not enough rigorous causal evidence on their true effect on promoting training participation [15]. There are reasons to believe that in some cases training funds could have adverse effects, for example when the administrative costs of the fund are too high or the employers perceive the levy as an additional and unjustified tax.

A more direct way of intervening to counter age-related stereotypes is to disseminate better information to business management and human resources departments about the learning skills of older workers. This kind of initiative requires government to create communication and education strategies aimed at informing training firms what it takes to exploit fully older workers' human resources. There are examples of successful awareness-raising campaigns aimed at tackling employers' negative perceptions of older workers and at avoiding discrimination when decisions on recruitment, retention, and training are taken, as for instance in the UK Age Positive campaign [15].

LIMITATIONS AND GAPS

Workforce aging is reason for concern if, as studies show, productivity declines over the life cycle. Training could be an answer to the productivity decline if it has a positive impact on older workers' productivity and employability. Understanding the age evolution of skills, productivity, and learning capability is hard, however, because of confounding factors that can affect research findings, such as cohort effects, re-test effects, and unobserved individual differences that might wrongly be attributed to aging and training. These can bias causal findings and lead to the design of ineffective training interventions.

Moreover, although many quantitative studies have investigated the effect of particular training activities on specific cognitive skills of older adults, very little is known about the effect on their productivity and employability. The empirical evidence comes from non-experimental studies [10], [11], which are based on surveys, and participation in training is not random but is decided by individuals according to unknown rules. Experimental or quasi-experimental analyses, in which training participation is controlled by the

researcher, are needed to shed more light on cause-and-effect relationships and on how training translates into enhanced productivity and employability of older workers.

Management studies have pointed out that age stereotypes influence several dimensions of employment-related decisions, including performance assessment, employment retention, and promotions [12]. However, little is known about the magnitude of the impact of age stereotypes on the training participation of older workers.

Finally, empirical evidence is also scarce on the real impact of institutional barriers on older workers' training participation. Improving the quality of public employment services offered to older job seekers might be sensible, although whether the benefits are worth the costs is uncertain. Research has shown that training programs provided by public employment services to job seekers and welfare recipients have on average only modest positive effects on employability. Further investigation is therefore needed to understand what type of training intervention might be effective in shortening the duration of unemployment for older job seekers.

SUMMARY AND POLICY ADVICE

The workforce is aging in all industrialized countries because of demographic trends and policies aimed at postponing retirement. This is a cause for concern for both employers and older workers if skills, and therefore productivity and employability, deteriorate with age. There is, however, some consensus in the scientific literature on the ability of older workers to upgrade their skills if training takes into account their specific learning needs. Age-targeted training might therefore be a tool for improving the employment prospects of older workers.

To design effective policies to encourage training of older workers, governments should take into account some key findings. Economic evaluation of the profitability of an investment in older workers' training explains the age-related training gap. Financial incentives for older workers' training might reduce the gap but might not be enough to promote it among all older workers. And training should be age-specific, as learning in older adults benefits from self-paced, job-related, and work-integrated learning activities.

Acknowledgments

The author thanks one anonymous referee and the IZA World of Labor editors for many helpful suggestions on earlier drafts. Version 2 of the article adds information on tax incentives and campaigns to counter negative perceptions of older workers and includes new "Key references" [14], [15].

Competing interests

The IZA World of Labor project is committed to the IZA Code of Conduct. The author declares to have observed the principles outlined in the code.

© Matteo Picchio

REFERENCES

Further reading

OECD. *Live Longer, Work Longer*. Paris: OECD, 2006.

Skirbekk, V. "Age and individual productivity: A literature survey." In: Feichtinger, G. (ed.). *Vienna Yearbook of Population Research*. Vienna: Austrian Academy of Sciences Press, 2004.

Key references

- [1] Cedefop *Future Skill Needs in Europe: Critical Labour Force Trends*. Cedefop Research Paper No. 59, 2016.
- [2] Cattell, R. B. "Theory of fluid and crystallized intelligence: A critical experiment." *Journal of Educational Psychology* 54:1 (1963): 1–22.
- [3] Desjardins, R., and A. J. Warnke. *Ageing and Skills: A Review and Analysis of Skill Gain and Skill Loss Over the Lifespan and Over Time*. OECD Education Working Paper No. 72, 2012.
- [4] Salthouse, T. A. "When does age-related cognitive decline begin?" *Neurobiology of Aging* 30:4 (2009): 507–514.
- [5] Hertzog, C., A. F. Kramer, R. S. Wilson, and U. Lindenberger. "Enrichment effects on adult cognitive development: Can the functional capacity of older adults be preserved and enhanced?" *Psychological Science in the Public Interest* 9:1 (2009): 1–65.
- [6] Callahan, J. S., D. S. Kiker, and T. Cross. "Does method matter? A meta-analysis of the effects of training method on older learner training performance." *Journal of Management* 29:5 (2003): 663–680.
- [7] Kubeck, J. E., N. D. Delp, T. K. Haslett, and M. A. McDaniel. "Does job-related training performance decline with age?" *Psychology and Aging* 11:1 (1996): 92–107.
- [8] Charness, N., and S. J. Czaja. *Older Worker Training: What We Know and Don't Know*. Washington, DC: AARP, 2006.
- [9] Zwick, T. "Training effectiveness—Differences between younger and older employees." In: Cedefop (ed.). *Working and Ageing: The Benefits of Investing in an Ageing Workforce*. Luxembourg: Publications Office of the European Union, 2012.
- [10] Picchio, M., and J. C. van Ours. "Retaining through training even for older workers." *Economics of Education Review* 32:1 (2013): 29–48.
- [11] Göbel, C., and T. Zwick. "Are personnel measures effective in increasing productivity of old workers?" *Labour Economics* 22 (2013): 80–93.
- [12] Posthuma, R. A., and M. A. Campion. "Age stereotypes in the workplace: Common stereotypes, moderators, and future research directions." *Journal of Management* 35:1 (2009): 158–188.
- [13] Montizaan, R., F. Cörvers, and A. De Grip. "The effects of pension rights and retirement age on training participation: Evidence from a natural experiment." *Labour Economics* 17:1 (2010): 240–247.
- [14] Brunello, G., and S. Comi. "The side effect of pension reforms on the training of older workers. Evidence from Italy." *Journal of the Economics of Ageing* 6 (2015): 113–122.
- [15] Vodopivec, M., D. Finn, S. Laporšek, M. Vodopivec, and N. Cvörnjek. "Increasing employment of older workers: Addressing labour market obstacles." *Journal of Population Ageing* 12 (2019): 273–298.

Online extras

The **full reference list** for this article is available from:

<https://wol.iza.org/articles/is-training-effective-for-older-workers>

View the **evidence map** for this article:

<https://wol.iza.org/articles/is-training-effective-for-older-workers/map>