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Continuing Vocational Educational Training, Self-Directed Ageism, and Extending Working Lives: Evidence from the German Ageing Survey

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Abstract Continuing vocational education and training (CVET) is essential for prolonging working lives, as it improves the qualifications and skills of older workers, helps to prevent skill mismatches, and increases their employability. Research indicates that access to training throughout life is unequally distributed in society, with certain labour market groups, such as those with higher education and better working conditions, benefiting more. This disparity results in social inequality and long-term negative effects on the employment trajectories of disadvantaged older workers. The impact of internalised ageist stereotypes regarding older workers' ability to acquire knowledge later in life is underexplored but may significantly affect their motivation to participate in CVET and indirectly influence their labour market participation in later life.

Utilising data from three waves of the German Ageing Survey (DEAS) covering the years 2014 to 2021, descriptive statistics and mediation analyses are employed to investigate the unequal distribution of CVET participation among older workers and to examine how self-directed ageism—specifically, one's perceived ability

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to learn—affects the degree of CVET participation and subsequent employment trajectories in later life.

The findings reveal differences in the level of CVET participation among older workers and highlight the role of ageist self-stereotyping in CVET engagement and late working-life employment trajectories. To extend working lives, policymakers, trade unions, employers, and stakeholders must provide CVET opportunities for older workers while actively combating age stereotypes to encourage participation and maximise training benefits.

Keywords Participation in training · Older workers · Social inequality · Labour market exclusion · Internalized age stereotypes

Berufliche Weiterbildung, altersbezogene Selbststereotypisierung und verlängerte Erwerbsverläufe: Erkenntnisse aus dem Deutschen Alterssurvey

Zusammenfassung Kontinuierliche berufliche Weiterbildung (CVET) ist entscheidend für die Verlängerung der Erwerbskarrieren, da sie die Qualifikationen und Fähigkeiten älterer Arbeitnehmerinnen und Arbeitnehmer verbessert, die Passung zu sich wandelnden Kompetenzanforderungen erhöht und somit insgesamt die Beschäftigungsfähigkeit älterer Arbeitnehmender erhält. Forschungen zeigen, dass der Zugang zu Weiterbildung im Erwerbsverlauf ungleich verteilt ist, wobei bestimmte Arbeitsmarktgruppen, wie Personen mit höherer Bildung und besseren Arbeitsbedingungen, stärker profitieren. Diese Ungleichheit kann zu sozialer Benachteiligung und zu langfristigen negativen Auswirkungen auf die Erwerbskarrieren von älteren Arbeitnehmenden führen. In diesem Kontext sind die Auswirkungen negativer, internalisierter Stereotype auf die eigene Lernfähigkeit im höheren Alter wenig erforscht, obwohl Studien zeigen, dass sie die Motivation zur Teilnahme an CVET erheblich negativ beeinflussen und somit indirekt die Beschäftigungschancen im späteren Erwerbsleben beeinträchtigen.

Anhand von Daten aus drei Wellen der Deutschen Alterssurvey (DEAS) von 2014 bis 2021 verwenden wir deskriptive Statistiken und Mediationsanalysen, um die ungleiche Verteilung der CVET-Teilnahme unter älteren Arbeitnehmerinnen und Arbeitnehmern zu untersuchen. Wir analysieren, wie internalisierte Altersstereotype – konkret bezogen auf das eigene wahrgenommene Lernvermögen – die CVET-Teilnahme und den anschließenden späteren Beschäftigungsstatus beeinflussen.

Die Ergebnisse zeigen Unterschiede in Bezug auf die Teilnahme an CVET Maßnahmen zwischen verschiedenen Gruppen älterer Arbeitnehmenden. Darüber hinaus verdeutlichen sie, dass negative internalisierte Altersstereotypen die Teilnahme an CVET beeinträchtigen und dass diese Teilnahme wiederum einen Einfluss auf den Erwerbsstatus im späteren Erwerbsleben hat.

Um Erwerbskarrieren zu verlängern, sollten politische Entscheidungsträgerinnen und -träger, Gewerkschaften, Firmen und weitere Arbeitsmarktakteure CVET-Möglichkeiten auch für ältere Arbeitnehmende bereitstellen. Darüber hinaus sollte aktiv gegen Altersstereotype angekämpft werden, um die Teilnahme an Weiterbildung zu

fördern und die daraus resultierenden positiven Erwerbseffekte für ältere Arbeitnehmerinnen und -nehmer zu maximieren.

Schlüsselwörter Weiterbildungsbeteiligung · Ältere Arbeitnehmerinnen und Arbeitnehmer · Soziale Ungleichheit · Arbeitsmarktexklusion · Internalisierte Altersstereotype

1 Introduction

Demographic change and population ageing, caused by increasing life expectancies and decreasing fertility rates, are changing labour markets and the work courses of those in them (Dudel et al. 2023). Driven by growing concerns about the sustainability of welfare states, societal norms regarding retirement timing and the exit from the workforce for older individuals have undergone significant shifts compared to previous generations. Instead of early retirement and dismissal of older workers from the labour market, the focus now is on activation and extending working lives to address potential welfare shortages: “(T)he social security system now faces serious financing problems as the number of beneficiaries is increasing at a time when the working population is declining—a simultaneous increase in payments and decrease in revenues” (Harper 2015, p. 23). This seems to apply in particular to public pay-as-you-go pension systems, as the number of people working and paying contributions is shrinking while the number of people in retirement and receiving benefits is growing. Various reforms have been implemented to address this challenge, including cuts to pension benefits, increases in pension contributions, and strengthening of the second and third pillars of old-age security (Ebbinghaus and Hofäcker 2013). Further reforms included the increase in state pension ages, the abolition of early retirement options, and investment in the employability of older workers (Ebbinghaus and Hofäcker 2013; Hofäcker and Radl 2016; Komp-Leukkunen, this issue).

Because employment rates of older workers have been rising in most European countries over the past two decades (European Commission 2020), these policy reforms are frequently regarded as a notable success. Nevertheless, scholars have highlighted concerns that implementing these measures simultaneously has paved the way for (new) social inequalities. Working life is not only structured to reproduce earlier life-course disadvantages, but it can also have adverse effects on less privileged groups, such as those with low education or poor health (Turek et al. 2024; Schmitz et al. 2023; Krekula and Vickerstaff 2020). In this context, early retirement becomes a privilege: “This is especially true for low-income groups with limited pension prospects, leading to the precariatization of late-life employment and the rise of a working-poor class” (Turek et al. 2024, p. 117). The aforementioned policy shift is accompanied by efforts from employers who increasingly face a lack of skilled labour and see older workers as a pool of experienced and reliable employees (Peichl et al. 2022; Zika et al. 2023). Such investments in the employability of older workers include improving their physical and mental health, adapting workplaces to their needs, and implementing lifelong learning policies (Heß and Naegele 2021). The

argument for the latter is that *continuing vocational education and training (CVET)*¹ enhances the qualifications and skills of (older) workers, thereby preventing skill mismatches and improving their employability, self-esteem, and work motivation. Consequently, this renders these workers more appealing to employers and delays (early) labour market exits (Barslund 2015; Dieckhoff 2007; de Grip et al. 2020). Furthermore, workplaces are changing rapidly, and work itself is constantly being redefined, leading to continuous learning and skill development becoming increasingly important (Maurer et al. 2003b; Maurer 2001; Rohrbach-Schmidt and Tiemann 2013). Hence, today work courses have shifted from the idea that one's entire career is spent at the same organisation to career paths characterised by changes and ongoing adaptations to new competence requirements. As early as 1995, Hall and Mirvis noted that "learning how to learn and continuous learning have become core career competencies" (Hall and Mirvis 1995, p. 281). They highlighted that workers who fail to take the necessary steps to update their skills and knowledge may find themselves ending their careers prematurely as their abilities become outdated or irrelevant (Greller and Stroh 1995; de Grip et al. 2020). Thus, access to and successful participation in CVET is seen as an *important determinant and success factor for prolonging working life*. It should be noted, though, that the reasons for how, why, and when people retire—or stay in employment until a higher age—are complex and multifaceted. Typically divided into push (e.g. declining health or job strain) and pull factors (e.g. sufficient pension benefits or lifestyle aspirations; Ebbinghaus and Hofäcker 2013), recent scholarship has expanded this understanding by incorporating "softer factors" that connect labour market exit with external circumstances and opportunity structures as well as with norms and subjective perceptions of ageing (de Tavernier et al. 2019; Kunze et al. 2015; Fasbender et al. 2015). From a push perspective, retirement should not occur if individuals do not encounter external circumstances that force them to leave the labour market. In this context, training and participation in CVET can be viewed as measures that help prevent older workers from being pushed out of the labour market, consequently influencing the timing of retirement (Hofäcker and Radl 2016). Surprisingly, this argument has not been tested empirically in great detail: "[M]uch less is known about the relationship between participation in further education and employment" (Midsundstad and Nielsen 2019, p. 50).

Whether and to what extent a person participates in training later in life is strongly influenced by the learning opportunities presented and the person's individual educational history. However, research has shown that *participation in training over the life course is distributed unequally in society*, with certain labour market groups—e.g.

¹ Focusing on improving or updating skills (upskilling), acquiring new skills for career shifts (retraining/reskilling), and supporting ongoing professional growth, continuing vocational education and training (CVET) is a vital aspect of adult education and training. It is aimed at enhancing professional development and employability regardless of age, qualification, or job status, constituting a crucial part of life-long learning. Provided by various sources within and outside formal education, CVET often emphasises work-based learning and includes learning activities post-initial education, or entry into the workforce (UNESCO International Centre for Technical and Vocational Education and Training. Continuing vocational education and training (CVET): Glossary. <https://unevoc.unesco.org/home/TVETipedia+Glossary/show=term/term=Continuing+vocational+education+and+training>).

those with higher formal education and good working conditions—having more access to training than others (Leifels 2017; Lischewski et al. 2020). Consequently, access to CVET can be viewed as a *source of social inequality*, as specific groups of older workers are disproportionately disadvantaged, and the inability to participate in CVET can lead to long-term negative effects on their employment trajectories (Backhaus 2023).

Reasons for not engaging in training measurements over the life course are manifold and—in a simplified way—can be linked either to the supply (employer) or the demand (employee) side. If companies fail to invest in training or, based on stereotypical beliefs, provide it only to certain groups of employees, other groups (e.g. older workers) will be systematically underrepresented, and ageing workers may become unaccustomed to learning (Boeren et al. 2010). On the demand side, underestimating the need and importance of training and a person's belief in her or his ability to learn and develop competencies could deter individuals from seeking ongoing training (Leifels 2017; Maurer et al. 2003a). The latter is linked to socially embedded ageist beliefs regarding the capacity of older workers to be productive and to learn and develop their competencies. The relationship between age norms, ageist stereotypes, and the extension of working life has been extensively investigated (Bae and Choi 2023), demonstrating that negative assumptions about older workers can hinder employment in late working life, for example by pushing older workers out of the labour market (de Tavernier et al. 2019). As a consequence of age-based stereotypes, older workers often face higher risks of redundancy. Furthermore, once unemployed, ageism hinders the job search and thus labour market reintegration (Naegele et al. 2018; 2020). Beyond this, older workers frequently have less access to education and training, which can result in skill sets that are no longer aligned with the demands of the labour market, increasing their vulnerability to layoffs and making reemployment more challenging (Harris et al. 2018).

Moreover, if internalised (*self-directed ageism*), these stereotypes about one's ageing process can negatively affect how older workers perceive themselves and their abilities as they grow older. In contrast to being the subject of discriminatory behaviour from others (e.g. by employers or supervisors), *self-directed ageism* refers to older workers internalising stereotypes or beliefs about ageing (positive or negative), which can impact the timing of retirement. This may occur by affecting one's motivation to stay in employment (Fasbender et al. 2014; Kooij et al. 2008) or one's learning participation and outcomes (Vickerstaff and van der Horst 2022). Regarding the latter, older workers may underestimate their abilities to learn new things, or they may believe that they are too old to acquire new skills or knowledge at all (Wrenn and Maurer 2004; Maurer et al. 2003b). When people succumb to *self-directed ageism*, they may avoid challenging themselves, miss out on training opportunities, or even disengage from learning altogether (van Kampen et al. 2023; Köttl et al. 2021). Regarding participation in CVET and its effect on extending the working lives of older workers, the impact of self-directed ageism has not yet been thoroughly investigated. Hence, the article at hand seeks to shed light on the relationship between self-directed ageism, older workers' participation in CVET, and the extension of working lives. It will first provide a descriptive overview of who participates in CVET and then address two research questions: (1) Does participation

in CVET prolong working lives? and (2) What role does self-directed ageism play in this context? To answer these questions, the article describes the use of descriptive statistics and a mediation analysis that was conducted using data from three waves of the German Ageing Survey (DEAS).

The article presents three significant contributions to the existing body of literature. First, it advances prior research by incorporating the role of self-directed ageism into the analysis alongside CVET, thereby enhancing our understanding of how these factors influence delaying labour force exit in later stages of life. Second, it delves into the intricate relationships between *CVET participation*, the *extension of working lives*, and *self-directed ageism*. Through the utilisation of mediation analysis, it endeavours to untangle the mechanisms among these *three variables*, shedding light on their interplay and directionality. Third, it offers insights into the potential positive impacts of CVET and the negative implications of self-directed ageism on the extension of working lives from a longitudinal perspective. By examining a 13-year time frame in the analysis, the article provides a comprehensive understanding of how these factors unfold over time and their lasting effects on individuals' careers. The remainder of the article is structured as follows: First, it presents a series of theoretical arguments and existing empirical evidence, which are thematically organised according to the following key areas: the impact of CVET on extending working lives, participation in CVET across the work course, and the potential influence of age-based stereotypes and self-directed ageism on one's ability to learn. This is followed by the derivation of hypotheses from the outlined literature. Subsequently, the data and analytical strategy are described, and the results are presented. The article concludes with a discussion of the limitations and offers suggestions for policymakers and future research.

2 Evidence and Theoretical Framing

2.1 CVET and Extending Working Lives

As noted above, investing in older workers' employability by enabling them to participate in CVET is seen by many scientists, policymakers, employers, trade unions, and other stakeholders as a key means to delay retirement and extend working lives (Backhaus 2023; de Grip et al. 2020). Training updates and the enhancement of knowledge, skills, and abilities compensate for any skill depreciation that may occur with age. Research indicates that training programs benefit older workers, especially if tailored to their learning wishes and needs, leading to performance and productivity gains (Zwick 2015; Grip et al. 2002). Consequently, older workers not only remain valuable assets to their employers but also gain a sense of fulfilment and accomplishment from participating in CVET. This follows *human capital theory* (Becker 2009), which suggests that companies should aim to retain newly trained older workers to recover the time and resources invested in their CVET, thus discouraging early labour market exits. Moreover, older workers may opt to delay their labour force exit, partly to capitalise on their own (training) investment but also to reciprocate the investment made by their employers (Kristensen 2012; de Grip et al.

2020; Hofäcker and Radl 2016). Here, *social exchange theory* (Blau 1986) suggests that (older) workers, in exchange for the opportunity to participate in CVET, have a higher motivation to stay in employment (Chambel and Sobral 2011; de Grip and Montizaan 2024). Being able to participate in training is seen as a gesture of support by employers, and the *norm of reciprocity* (Gouldner 1960) would suggest that “older workers reciprocate the benevolent treatment through increased commitment, identification with organisational goals, and prolonged employment” (de Grip et al. 2020, p. 3). It should be noted, though, that in the wake of the rapid changes in workplaces and of work courses diversifying and work relationships becoming more dynamic, this reciprocity norm is increasingly questioned by scholars (Chernyak-Hai and Rabenu 2018).

When looking at research linking CVET participation and the extension of working lives, the results are inconclusive. Using register data from Sweden, Stenberg et al. (2012) found no positive effect of participating in training on the timing of retirement. Kristensen (2012) found a weak positive effect in Denmark but states that “on average one year of training only adds up to one month to the career length. This means that training in itself is not enough to substantially prolong careers and increase the workforce” (Kristensen 2012, p. 2). De Grip et al. (2020), using Dutch data, found a positive effect of training on the expected timing of retirement, whereas in contrast, Van Solinge and Henkens (2014), also using Dutch data, found no effect.

2.2 CVET Participation Across the Work Course and in Late Working Life

When participation rates in CVET are looked at, vast differences are noticeable regarding not only organisational and institutional factors (e.g. sector, company size, regional and country contexts) but also individual characteristics (e.g. gender, age, migration background, health, and qualification level of workers) (Siegfried and Berger 2020; Rubenson and Desjardins 2009; Autorengruppe Bildungsberichterstattung 2022). Representative data from Germany indicates that, on average, smaller businesses (1–9 and/or 10–49 employees) offer fewer CVET opportunities to their employees than companies with more employees. This pattern remained unchanged even during the COVID-19 pandemic. Whereas from 2011 to 2019 the proportion of companies in Germany that offered CVET in the first half of each year stood at around 50%, this dropped by more than 20% in 2021 (Autorengruppe Bildungsberichterstattung 2022; Bennewitz et al. 2022). Although companies of all sizes and industries restricted their training activities during the pandemic, larger companies with 250 or more employees remained the most active (78%), one explanation being that they had the resources and means to switch on a vast scale from in-person to online training (Kleinert et al. 2021).

Research on individual characteristics reveals that factors such as health, educational level, gender, and age impact participation in CVET. Employees in poor health are less inclined to actively pursue and participate in training initiatives (Bilger et al. 2017; Tchibozo 2015), as are those with low education (European Centre for the Development of Vocational Training 2023). Existing literature consistently indicates a positive correlation not only between engagement in CVET and edu-

cational qualifications but also between earlier experience with training (“learning biographies”) and training participation later on. In a comparative study of workers in the United Kingdom and Germany, dos Santos et al. (2024) found that “individuals who are initially on career paths that promote regular training participation are likely to keep and even enhance their advantage over time” (dos Santos et al. 2024, p. 1). This suggests that the group of low-skilled workers and those with little access to training, who could potentially benefit the most from participating in learning activities, actually participate the least (Kyndt et al. 2011; Kondrup 2015). While gender differences in CVET participation rates may not be immediately apparent (Lischewski et al. 2020), gendered employment trajectories, which lead to gendered labour participation rates (e.g. women working part-time more often than men), indirectly affect women’s and men’s ability to participate in CVET differently (Schneider and Proskunina 2020; Moen 2011). Interestingly, Kaufmann and Widany (2013) found a concave relationship between the extent of working hours and participation in CVET. As weekly working hours rise, participation chances initially increase but decline at very high levels, likely due to limited time available for further training. Consequently, as CVET emphasises work-based learning, people who are excluded from the labour market, e.g. due to unemployment or being inactive, are usually underrepresented regarding CVET participation rates (Kaufmann and Widany 2013). When looking at participation rates of older workers, Simonson and Kortmann (2022) found, based on data from the DEAS, that in 2020/2021 more than half of the workers aged 46 to 65 years had participated in CVET training within the previous 3 years. The authors further report a high willingness to participate in CVET amongst older workers, while a decrease with higher age was also noticeable: Among 46- to 55-year-olds, over two-thirds (69.3%) were eager for further education, while only about half (48%) of those aged 55 to 65 shared this willingness (Simonson and Kortmann 2022).

2.3 Age Norms, Ageism, and Lifelong Learning

From a sociological perspective, age serves both as a distinguishing category and as a point of reference. Sorting people by age sets them apart from other age brackets and comes with age-related roles and societal expectations (Amrhein, this issue; Barrett, this issue). This categorisation suggests certain expectations for each life stage, such as when to start a family, complete education, or end a career. These “age norms” are socially constructed, shaped by societal and cultural contexts, subject to change, and define what is considered “normal” behaviour or “milestones” at a certain age (Roselli 2018; Havighurst 2008; Krekula 2010). They also play a significant role in shaping societal attitudes and perceptions about age or specific groups of older people (e.g. older workers) and in return foster age-based stereotypes and prejudices (“ageism”) (Butler 1969). This might lead to discriminatory behaviour, e.g. if (negative) stereotypical assumptions are generalised—and interpersonal differences amongst members of the same age group are subsequently ignored—or if individuals behave contrary to these collective beliefs and expectations.

Ageism is particularly prevalent in the labour market and affects all aspects of ageing in the workplace (Naegele et al. 2020; 2018; European Commission 2015).

Among the most common stereotypes older workers are confronted with in the labour market are the assumptions that—in comparison to their younger colleagues—they are less motivated and more resistant to change. Furthermore, they are believed to be less healthy, more vulnerable to work–family conflicts, and less willing to participate in training and career development (Ng and Feldmann 2012; van Dalen et al. 2010; Rothermund and de Paula Couto 2024). Although these stereotypes are persistent, evidence suggests that most of them are not well-founded, as research has not conclusively confirmed an overall decline in the performance of older workers (Naegele et al. 2018). Some studies even find that older workers' competencies and productivity levels exceed those of younger workers in some areas (van Dalen and Henkens 2020; Bal et al. 2011). It is also important to acknowledge that ageist stereotypes about older workers may encompass positive generalisations. For example, older workers are often perceived as possessing more social competencies, being more loyal, or having a stronger work ethic (Dordoni and Argentero 2015; Naegele et al. 2018). Nevertheless, concerning lifelong learning, ageism can have severe consequences, both on the supply and the demand side (Wulff and Lassen 2024). If decision-makers on the supply side (e.g. employers, managers, or training personnel) possess ageist beliefs, older workers might not be considered, chosen, or informed about opportunities for training or career development. Being perceived by employers or supervisors as less willing or unwilling to train will result in fewer chances to participate in CVET and on-the-job training activities or to receive sufficient mentorship from their supervisors or peers (Wrenn and Maurer 2004; Maurer et al. 2003b). This issue might even intensify, as training opportunities are increasingly being moved into the digital realm, with older workers frequently facing the stereotype of being less technologically and digitally savvy (Naegele and Ertl 2023; Köttl et al. 2021). Furthermore, if internalised, these stereotypical ageist beliefs (*self-directed ageism*) can turn into a self-fulfilling prophecy, resulting in older workers doubting their ability to learn, resulting in avoiding or not seeking out CVET opportunities (demand side; Vickerstaff and van der Horst 2022).

2.4 Stereotype Embodiment, Self-Directed Ageism, and One's Ability to Learn

For some time now, scholars have shifted from looking only at targeters (e.g. suppliers for CVET) to looking at the targets (older workers/older learners) when analysing the effect of ageism on lifelong learning. Subsumed under the tags of “self-directed ageism” or “stereotype embodiment,” research has shown that not only is an individual's perception of their ageing process highly influential but that it also depends on which collective “age norms” they encounter and how these are embodied (Levy 2009; Ayalon and Tesch-Römer 2017; Rothermund and de Paula Couto 2024). First introduced by Becca Levy (2009), the *stereotype embodiment theory* (SET) proposes that (1) individuals internalise stereotypes and “age norms” throughout their life course and (2) unconsciously operate according to them. Furthermore, (3) aided by exposure to numerous “social cues”—suggesting one's advancement in age—these stereotypes gain more self-relevance in higher age. Finally, (4) age stereotypes exert influence in multiple ways, including psychological, behavioural, and physiological effects (Levy 2009; 2003; 2002). These effects can be multifaceted, multidirec-

tional, and interlinked with individual characteristics. In their analysis of the DEAS, Steverink et al. (2001) distinguish three key dimensions of personal ageing experiences: (1) physical decline, (2) continuous growth, and (3) social loss. Their findings suggest that ageing may be experienced and viewed in both positive (growth) and negative ways (decline and loss). Hence, an older adult may notice physical decline, such as reduced stamina or difficulty with tasks that were once easy, while at the same time they may experience growth in wisdom, emotional resilience, or personal fulfilment. In particular, the relationship between self-directed ageism and the first dimension—decline in health—has been widely discussed, with research suggesting a reciprocal or bidirectional relationship in which both sides can influence each other (Chang et al. 2020; Hu et al. 2021). The perception of ageing among older individuals may be shaped by their personal health experiences and limitations, which can lead to a dominant perception of the ageing process as a decline, overlooking the potential for growth (Warmoth et al. 2016). While acknowledging the multifaceted and multidirectional dimensions of an individual's ageing experiences, for this article the focus lies on the dimension of “continuous growth”, more specifically on a person's belief that knowledge gains in higher age are possible. It is argued that being exposed to and embodying socially shared ageist perceptions and stereotypes about older people's learning abilities leads to the incorporation of these perceptions into one's self-identity. Consequently, this can result in a lowering of an individual's self-esteem and belief in their ability to learn, which may then lead to avoidance and disengagement from domains and activities that are associated with these negative stereotypes, such as participation in CVET (Krekula 2010; Levy 2009).

To date, few studies have closely examined the relationship between self-directed ageism, CVET participation, and the extension of working lives, particularly concerning job-related learning, i.e. learning processes that take place in the context of the work course. In a qualitative study conducted in the United Kingdom, Vickerstaff and van der Horst (2022) identified evidence of ageist stereotyping among both employers/managers and older workers. In examining the perspective of older employees with regard to these ageist assumptions, the researchers concluded, “Some of the employees recognised the stereotypical attitudes of managers (and the wider society) and revealed the potential impact of ageism in that they assumed that others felt that they were too old to progress or make career changes; rather than risk failure, an older worker may simply avoid a training opportunity” (Vickerstaff and van der Horst 2022, p. 6). In an intervention study, Gaillard and Desmette (2010) found that older workers who were exposed to positive stereotypical information were less inclined to retire early and exhibited greater motivation for learning and development compared to those exposed to negative stereotypical information. The results indicate that communicating positively about older workers' ability to gain knowledge may enhance their motivation to participate in training programmes (Gaillard and Desmette 2010). In an overview article, Mauer (2001) summarises that being exposed to negative stereotypes, which portray older employees as lacking the capacity to learn, may reduce their self-efficacy and self-confidence for learning, subsequently lowering participation in work-related training activities.

In conclusion, and in reference to the research questions, it can be stated that the available previous research indicates that participation in CVET is socially un-

equally distributed across the life course, with the risk of social inequality becoming particularly evident in late working life. Consequently, this results in certain groups of (older) workers having more access to CVET, which may affect their retirement timing, ultimately resulting in a higher probability of being employed at a higher age (research question 1). Furthermore, although individual and organisational factors also play a role, self-directed ageism regarding one's own learning abilities can lead to lowering the probability of older workers' participation in CVET and thus in turn indirectly decreasing the likelihood of staying in employment later on (research question 2). In light of the aforementioned research questions and the literature reviewed, we propose the following hypotheses:

- H 1* Participation in CVET leads to a higher probability of staying in employment in later life.
- H 2* Individuals who report high levels of self-directed ageism are less likely to participate in CVET.
- H 3* Self-directed ageism is indirectly related to the probability of staying in employment in later life via participation in CVET.

3 Methods and Measurement

3.1 Data and Analytical Strategy

This study used the fifth (2014), sixth (2017), and eighth (2021) waves of the DEAS (Klaus et al. 2017). The DEAS is a longitudinal study supported by the German Federal Ministry for Family Affairs, Senior Citizens, Women and Youth and conducted by the German Centre for Gerontology (DZA). The survey represents the nationwide German population of middle-aged and older adults aged 40 years and older and examines the evolving life circumstances and ageing processes of individuals in their later stages of life. The sample retrieval process is illustrated in a flowchart (Fig. 2) located in the appendix. Additionally, changes in the key demographic variables during sample retrieval are documented in Table 2 of the appendix. We used the fifth wave (2014) as our baseline sample ($n=6001$) and kept only those respondents in our sample who also participated in the sixth (2017) and eighth (2021) waves ($n=2257$). We included only respondents from the new cross-sectional sample 2014, who were asked about their CVET participation over the previous 10 years. In 2017, they were further asked about the number of courses they had taken in the preceding 3 years, allowing us to cover a total period of 13 years. In our analysis, we exclusively incorporated respondents who engaged in CVET while employed in both 2014 and 2017, as the dataset lacks information on CVET participation among those who are unemployed or inactive. Therefore, the analysis at hand is specifically focused on vocationally relevant occupational training of employed individuals—a rather privileged group. Consequently, we excluded those respondents who were unemployed or inactive in 2014 and 2017 (58.09%; $n=$

1311). However, we did keep observations in our analysis of those who reported being either unemployed or inactive in 2021 in order to assess employment status in 2021. Overall in 2021, 78.24% of the respondents remained employed, while 17.76% retired, 3.44% became unemployed, and 0.57% became inactive as homemakers. In our sample, 87.17% of employed respondents participated in CVET in both 2014 and 2017, while 12.83% did not participate in CVET at all. Thus, we were able to examine whether past participation in CVET during employment in 2014 and 2017 was related to employment participation in 2021. As a consequence, we did not use information on CVET in 2021. We furthermore did not exclude respondents from our sample based on any characteristics (e.g. age) other than those mentioned here. In the last step, we dropped cases with incomplete information on the other variables from our analysis (7.72%; $n=73$). Self-directed ageism comprised the highest share of missing values (6.39%; $n=61$). Our final sample of analysis encompassed $n=873$ observations. The data are not weighted.

The analytical strategy of this article consists of two steps. First, in our descriptive approach, we used one-way analysis of variance analyses to describe how participation in CVET varied by education, gender, self-directed ageism, subjective health, and employment participation. Second, we employed mediation analyses using the Lavaan package in *R* to investigate the associations between self-directed ageism, participation in CVET, and employment—applying dampened weighted least squares estimation for our endogenous binary outcome, which resulted in probit estimates for our models. We specifically tested whether participation in CVET mediated the link between self-directed ageism and employment participation.

3.2 Measurements

We used *employment status* in 2021 as the outcome of our analysis. When respondents indicated unemployment or inactivity (e.g. inactive as homemakers or retired), the variable was coded as 0; conversely, it was coded as 1 for those who were in employment. Moreover, this study employed the *number of CVET courses participated in* and *self-directed ageism* as the primary explanatory variable. Participants were asked to report the number of courses or programs for occupational training they had attended within the previous 10 respectively 3 years. We calculated the total number of reported courses that respondents participated in and mentioned in 2014 and 2017. Moreover, we coded the variable as 0 if respondents reported earlier in the interview that they did not engage in any CVET (“Did you attend any training, courses, seminars, or events to provide occupational training or vocational retraining?” Yes/No). In order to ascertain the extent of *self-directed ageism*, respondents were asked to indicate whether they associated ageing with the ability to learn new things: “Ageing means to me that I can still learn new things”. It was measured on a scale from 1 (strongly agree) to 5 (strongly disagree). Higher values indicated higher self-directed ageism. For our analysis, we used the average value of self-directed ageism that respondents reported in 2014 and 2017. The item is derived from a broader scale of views of ageing, initially developed by Dittmann-Kohli et al. (1997), which encompasses three subscales: physical decline, social loss, and ongoing development. These subscales reflect the multidimensional and

multidirectional (subjective) experiences of ageing, acknowledging both negative and positive aspects (Steverink et al. 2001; Dittmann-Kohli et al. 1997). Because of its specificity and close alignment with our research interest (effect of internalised stereotypes about one's learning abilities in later life on CVET participation and extended working lives), we focused exclusively on this single item from the "ongoing development subscale". Hence, when we refer to self-directed ageism, we are solely discussing the facet that views ageing in regard to learning abilities. *Number of CVET participated in* served as a mediator in our investigation. Last, this study controlled for respondents' age, gender, education, and subjective health. Previous research has shown that employment participation over the work course is gendered, the pattern being that men participate more and longer in the workforce than women (Moen 2011). Moreover, those in poorer health, of older age, and with a lower educational level are less likely to be employed and participate in CVET (Kyndt et al. 2011; Grund and Martin 2012). In our mediation analysis, we used *respondents' age* in 2021. Furthermore, *education* was categorised into three levels: Level 1 encompasses primary or lower secondary education, while level 2 includes upper secondary or postsecondary nontertiary education. Level 3 pertains to individuals holding a bachelor's, master's, or doctoral degree, or an equivalent qualification. We used levels 2 and 3 as the reference category, as the level of education did not change from 2014 to 2021. *Subjective health* was measured by asking respondents to rate their perceived state of health ("How do you rate your present state of health?") on a scale from 1 (very good) to 5 (very bad). Higher values indicate poorer health. For our mediation analyses, we used the average subjective health of respondents in 2014 and 2017. Last, for the descriptive analyses, we categorised self-directed ageism and subjective health according to their distribution (Table 1).

4 Results

4.1 Participation in CVET

Table 1 shows the mean number of training courses and programs that respondents attended over a life span of 13 years. The first column displays the mean number of training courses by our explanatory variables. The central column presents the F-statistics, which tested the differences in the mean number of CVET courses by age, education, gender, self-directed ageism, subjective health, and employment status. The final column illustrates the distribution of respondents across these variables in percentage terms. The results reveal that respondents with higher levels of education were more inclined to engage in greater numbers of further training measurements in the past compared to those with lower educational attainment ($\omega^2=0.06$). In particular, those individuals who reported higher levels of self-directed ageism were less likely to engage in a higher number of CVET offerings ($\omega^2=0.04$). Additionally, respondents with better subjective health participated in a greater number of training courses and programmes ($\omega^2=0.03$). We found no differences by age, gender, or employment status (Table 1).

Table 1 Description of participation in continuing vocational education and training ($n = 873$)

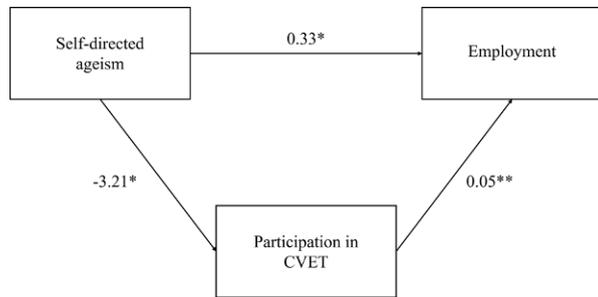
	Number of training courses, mean (SD)	F-statistic	%
<i>Age-group (2021)</i>		0.83	–
46–55 years	15.37 (18.61)	–	37.00
56–65 years	15.24 (20.20)	–	56.13
66–75 years	12.95 (12.88)	–	6.87
<i>Education</i>		1.76**	–
Low	9.8 (14.18)	–	1.15
Medium	11.2 (15.91)	–	45.82
High	18.64 (21.13)	–	53.04
<i>Gender</i>		0.95	–
Women	14.12 (15.83)	–	49.71
Men	16.16 (22.06)	–	50.29
<i>Self-directed ageism (1–5)</i>		1.44*	–
Low (<2)	17.85 (20.39)	–	40.78
Medium (≥ 2 and <3)	13.37 (18.39)	–	55.33
High (≥ 3)	11.62 (13.58)	–	3.89
<i>Subjective health (1–5)</i>		1.37*	–
Low (≥ 3)	13.68 (20.52)	–	21.53
High (<3)	15.53 (18.81)	–	78.47
<i>Employment (2021)</i>			
Employed	15.71 (20.13)	0.86	78.24
Unemployed or inactive	13.06 (15.21)	–	21.76

* $p < 0.05$; ** $p < 0.01$

4.2 Association Between CVET, Self-Directed Ageism, and Employment Participation

Figure 1 depicts the mediation analysis of self-directed ageism, participation in CVET, and employment. Our $H1$ states that those who participated in more CVET courses in the past are more likely to be employed in later life. Overall, our results support this hypothesis. High past engagement in CVET is linked to employment in later life. Second, $H2$ states that respondents who have internalised negative stereotypes regarding their ability to learn in higher age are less likely to participate in more CVET courses. Our results are in line with this assumption. We found that higher values of negative self-directed ageism were strongly linked to participation in increased CVET participation. Third, $H3$ assumes that self-directed ageism is indirectly linked to employment through participation in further training. This hypothesis is partly supported by our findings. We observed both an indirect (-0.17 ; $p < 0.050$) and a direct relationship (0.33 ; $p < 0.050$) between self-directed ageism and employment. We found that the proportion of mediation was -1061 , showing that the indirect effect of self-directed ageism through the mediator (participation in CVET courses) exceeds the direct effect in magnitude and acts in the opposite direction. This underscores the significant role of participation in CVET in shaping the relationship between self-directed ageism and employment (Fig. 1).

Fig. 1 Mediation analysis of self-directed ageism, continuing vocational education and training (CVET), and employment ($n = 873$). The model controls for age, gender, education, and subjective health. It is estimated using dampened weighted least squares, yielding probit estimates. TLI 1.00, CFI 1.01, RMSEA 0.03, SRMR 0.00; ** $p < 0.001$; * $p < 0.050$



Concerning our control variables, the results show that respondents in higher age groups were less likely to be in employment (-0.22 ; $p < 0.000$). Moreover, those with poorer subjective health in the past were less likely to be employed in later life (-0.24 ; $p < 0.050$) and to participate in a higher number of CVET courses (-0.33 ; $p < 0.050$). We did not find significant associations between gender, education, and further training or employment. The full results can be viewed in Table 3 in the appendix.

5 Conclusion

This present study examined the mechanisms between self-directed ageism, participation in CVET, and employment. At the bivariate level, we employed analysis of variance analyses to ascertain that those with higher levels of self-directed ageism participate less in CVET, which underlines the impact of age stereotypes and ageism on the individual level for lifelong learning. In addition, we found that those with poor health and lower levels of education also reported lower levels of CVET participation. These findings align with existing arguments stating that access to CVET is unequally distributed, thereby reproducing and solidifying social inequalities that can cause long-term negative effects on the career paths of older individuals (Hansen 1997; Leifels 2017; Lischewski et al. 2020).

Conducting a mediation analysis, we observed that higher levels of self-directed ageism play an obstructive role regarding the extent of respondents' participation in CVET over a 13-year period. Furthermore, it was found that self-directed ageism indirectly shapes employment in later life through participation in CVET. Self-directed ageism also has a direct positive effect on employment, as demonstrated by the mediation analysis, which controlled for the indirect effect via participation in CVET. This underlines that one important channel through which self-directed ageism operates regarding the ability to learn is participation in CVET. These findings are consistent with previous research indicating that ageist stereotypes have a detrimental influence on older individuals, impairing their self-efficacy and, consequently, their motivation to learn (Chiaburu and Lindsay 2008; Groeppel-Klein et al. 2017; Robertson 2017). Simultaneously, previous research has yielded inconclusive results regarding the impact of participation in CVET on the extension of working lives (de Grip et al. 2020; Kristensen 2012; Stenberg et al. 2012; van Solinge and Henkens

2014). However, our findings find a positive coherence. These mixed results may be explained by variations in sample size, composition, research design, and time frames, as well as by the inconsistent use of the term “training” employed by scholars, which can range in meaning from a person’s chance to participate up to actual participation. Moreover, these inconsistencies also suggest the presence of other factors that influence participation in training and hence the relationship between training and retirement timing.

There are four limitations to the interpretation of the results. *First*, no information about the type of CVET was available regarding the topic, duration, or mode (e.g. in-person vs. online) or whether the CVET was voluntary or mandatory. The type of CVET and the content it covers should be important for its influence on extending working lives, as a distinction must be made between a mandatory brief safety course that merely serves to maintain existing knowledge and a longer-term continuing education programme aimed at significant skill development. Furthermore, researchers have found that training formats and didactics offered are often not suitable for older workers, who seem to benefit more from informal, directly relevant learning content and measurements (Zwick 2011; 2015; Bögel and Frerichs 2011; Schmidt 2006). An issue, if not properly addressed, could intensify as training opportunities increasingly shift into the digital realm. *Second*, the present study solely considers the effect of self-directed ageism with regard to one’s learning ability on the number of CVET offerings participated in and consequent employment status in late working life. This has several disadvantages: On the one hand, this singular perspective may not sufficiently take into account the multifaceted and multidirectional experience that is the ageing process (Steuerink et al. 2001). This holds especially true regarding the often tangled relationship between an individual’s perception of their own ageing process and declining health with higher age (Warmoth et al. 2016). In addition, it could also be assumed that not only does self-directed ageism affect one’s willingness to engage in CVET measurements but that the directionality could also go the other way. This means that older workers who participate in high numbers of CVET courses might have a better view of their ability to gain knowledge in higher age than those less accustomed to learning. Moreover, there was no information available regarding the (potentially ageist) attitudes and behaviours of employers and direct supervisors towards older workers. However, it seems reasonable to posit that these factors also have a bearing on the research question addressed in the present study, given that supervisors and employers are crucial in facilitating access to CVET for older workers (Wilson et al. 2020; Naegele et al. 2018). Furthermore, negative attitudes from employers and managers may contribute to higher levels of internalised ageism amongst older workers, as they are more exposed to these biases. Age-discriminatory norms within the organisation are perpetuated and reinforced by supervisors’ ageist perceptions. *Third*, our sample is comparatively small, as it only includes respondents who were employed in 2014 and 2017, reflecting the fact that the data do not have information on participation in CVET among older unemployed and inactive individuals. Thus, our results are limited to those already employed, and caution should be exercised when considering the generalisability of the findings. It could be argued that the workers we examined in this study were already a privileged group, as they were employed in the first two waves and were therefore

not affected by, among other things, unemployment or disability pensions. It could be hypothesised that those older workers who are threatened by unemployment also have less access to CVET, as an investment in their skills might be perceived as less valuable (van den Broeck et al. 2010; K apflinger et al. 2013). The small sample size also does not permit further differentiation of the dependent variable and, for example, exploration of whether participation in CVET protects against unemployment. *Finally*, the last wave included in the analysis was collected during the COVID-19 pandemic, which might blur the results. During the COVID-19 pandemic, the disruptions in global supply chains and shutdown measures to fight the spread of the disease had an impact on the labour markets and those who worked in them (Bertogg and Brandt, this issue). For example, the production sector was particularly affected (Nicola et al. 2020). In many countries, including Germany, this led to an increase in unemployment (Bauer and Weber 2021) and also to a reduction of CVET measurements offered to employees (Avis et al. 2021). However, it should be noted that in Germany, the generous availability of short-time work and short-time working allowance (*Kurzarbeitergeld*) did cushion the impact of the COVID-19 pandemic on the labour market (Christl et al. 2022). In addition, by switching CVET measurements into the digital realm, employers were able to compensate for the cancelled CVET measurements and establish new formats for training (Kleinert et al. 2021). Unfortunately, we are uncertain whether using data collected during the pandemic for our dependent variable biases our results.

Notwithstanding the aforementioned constraints, the study makes three key contributions to the existing literature. *First*, it has a long-term perspective when exploring the mechanisms between CVET, self-directed ageism, and extending working lives because it includes participation in CVET for up to 13 years before measurement of the employment status. Therefore, the article builds upon previous research that has typically examined CVET participation among older workers at a single point in time. *Second*, it investigates the complex relationships between self-directed ageism, participation in CVET, and extension of working lives. The article underlines the importance of age norms and age stereotypes when investigating CVET participation among older workers. It also highlights the limitations of human capital theory—which tends to view economic factors as the primary driver of such participation—and suggests that a more comprehensive approach is necessary. *Third*, the study's results underline the importance of self-directed ageism for the policy of extending working lives as it affects older workers' employment status via their participation in CVET.

Hence, a number of recommendations for practitioners can be derived from the previously mentioned results. It should be recognised that older workers are affected by age discrimination in multiple ways. On one hand, they face discrimination from others (e.g. supervisors or employers), and on the other hand, they experience the internalisation of stereotypes, which can significantly influence their own behaviours. Consequently, in order to avoid the exclusion of any individual on the basis of age, CVET opportunities should be made available to all, and older workers should be encouraged to participate in them. Moreover, it is important to implement age-inclusive measures that align with the learning needs of older workers and to implement measurements that tackle the internalisation of negative stereotypes. An age-friendly

climate, the use of antidiscriminatory language, an age-inclusive corporate identity, and a life course-oriented human resource policy are conducive to the reduction of perceived and internalised ageism. In addition, managers and supervisors should prioritise regular dialogue and empathetic feedback to provide tailored CVET opportunities for older workers. Moreover, human resource measures should be critically assessed to ensure that they align with objectives aimed at preventing the exclusion of older workers (Naegele et al. 2018; Naegele and Ertl 2023).

Furthermore, several suggestions for future research can be made in light of the limitations and contributions. For example, the type and format of CVET should be explored in more detail. Are certain CVETs better suited to extending working lives than others, and what effect does the widespread introduction of digital learning settings have on the learning outcomes of older individuals? In addition, potential ageist attitudes and behaviours of employers, supervisors, and co-workers should be included in the analysis, as they frame and determine the learning environment in which older workers find themselves. Building on the argument of social inequality, further investigation is required to examine the relationship between social inequality and equal access to CVET, as well as the long-term effects of unequal access on those who are denied such opportunities. In particular, vulnerable labour market groups—such as older workers, the unemployed, low-skilled individuals, those in poor health, and workers with care responsibilities (King and Deindl, this issue)—should be a primary focus for researchers. Research has shown that, in addition to employers and employees, other labour market actors—including staff at unemployment agencies, CVET trainers, and colleagues—may also hold ageist perceptions, which in turn can negatively shape the learning biographies of older workers. Finally, future research should also employ qualitative methods to explore in more detail the connections and mechanisms between CVET, self-directed ageism, and the extension of working lives.

6 Appendix

Fig. 2 Flow chart of the sample retrieval

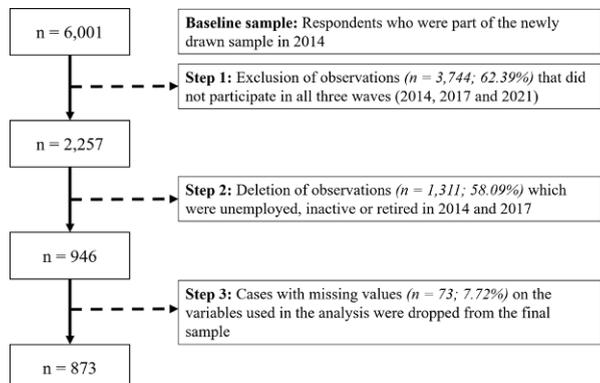


Table 2 Sample retrieval: overview of study variables

	Baseline sample <i>n</i> = 6001 <i>n</i> (%)	Step 1 <i>n</i> = 2257 <i>n</i> (%)	Step 2 <i>n</i> = 946 <i>n</i> (%)	Step 3 <i>n</i> = 873 <i>n</i> (%)
Gender (reference: male)	2936 (48.93)	1086 (48.12)	471 (49.79)	434 (49.71)
Low education (reference: high education)	3635 (60.58)	1124 (49.80)	438 (46.30)	410 (46.96)
<i>Age (2021)</i>				
46–55 years	–	407 (18.03)	350 (37.00)	323 (37.00)
56–65 years	–	670 (29.69)	530 (56.03)	490 (56.13)
66–75 years	–	612 (27.12)	66 (6.98)	60 (6.87)
76+	–	568 (25.17)	0 (0)	0 (0)

Table 3 Mediation analysis of self-directed ageism, continuing vocational education and training (CVET), and employment (*n* = 873)

	Employment	Participation in CVET
<i>Self-directed ageism</i>		
Direct effect	0.33* (0.14)	–3.21* (1.47)
Indirect effect	–0.17* (0.08)	–
Participation in CVET	0.05** (0.00)	–
<i>Controls</i>		
Gender (reference: male)	–0.08 (0.14)	2.16 (1.47)
Subjective health	–0.24* (0.10)	–0.33* (0.14)
Low education (reference: high education)	–0.96 (0.62)	–6.65 (8.47)
Age	–0.22** (0.01)	0.05 (0.13)

** $p < 0.001$. * $p < 0.050$

The model controls for age, gender, education, and subjective health. It is estimated using dampened weighted least squares, yielding probit estimates. Standard errors are in parentheses

TLI 1.00, CFI 1.01, RMSEA 0.03, SRMR 0.00

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Author Contribution Laura Naegele, Selina Staniczek, and Moritz Heß developed and wrote the paper’s introduction, theory, and discussion sections. Wiebke Schmitz conceived the research design, conducted the statistical analyses, and authored the paper’s methods and results sections. Moritz Heß supervised the preparation of the research design and the analysis. All authors participated in the revisions of the paper.

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