Netspar

Network for Studies on Pensions, Aging and Retirement

NETSPAR INDUSTRY SERIES

Personal and work-related predictors of early exit from paid work among older workers with health limitations

Nils Plomp
Sascha de Breij
Dorly Deeg

DESIGN PAPER 124

DESIGN PAPERS are part of the **refereed Industry Paper Series**, which are refereed by the Netspar Editorial Board. Design Papers discuss the design of a component of a pension system or product. A Netspar Design Paper analyzes the objective of a component and the possibilities for improving its efficacy. These papers are easily accessible for industry specialists who are responsible for designing the component being discussed. Authors are allowed to give their personal opinion in a separate section. Design Papers are presented for discussion at Netspar events. Representatives of academic and private sector partners, are invited to these events. Design Papers are published at the Netspar website.

Colophon
Netspar Design Paper 124, June 2019

Design
B-more Design

Lay-out
Bladvulling, Tilburg

Editors
Frans Kooymans, Frans Kooymans-Text and Translation
Netspar

CONTENTS

Affiliations
Nils Plomp – Amsterdam University Medical Centers, location VU University medical center
Sascha de Breij – Amsterdam University Medical Centers, location VU University medical center
Dorly Deeg – Amsterdam University Medical Centers, location VU University medical center

Abstract

Personal and work-related predictors of early exit from paid work among older workers with health limitations

Due to the current strict retirement regulations, workers are expected to continue working to increasingly older ages, regardless of their health status. To achieve extension of working lives, insight into both personal and work-related predictors of early exit from paid work (EEPW) is needed. So far, research on predictors has addressed on the overall working population and has not specifically focused on the group of older workers with health limitations. Our study is intended to address this gap.

Using data from the 2013 cohort of the Dutch population-based Longitudinal Aging Study Amsterdam (ages 55-64, n=1,023), we selected workers with at least one chronic disease and/or a physical performance test score below the median. Among those who had not reached the statutory retirement age at the time of follow-up three years later (n=297), we first examined the bivariate association between independent variables and EEPW using logistic regression adjusted for age. Second, we constructed a multivariable prediction model.

By the time of the follow-up, 22.9% had exited from work. Informal caregiving, a larger social network, low self-esteem, and a low educational level were predictors of EEPW. Persistence in the face of adversity (a component of self-ef-ficacy), repetitive movements at work, and variation of activities at work were not selected into the final prediction model, but they showed bivariate associations with EEPW.

Our findings suggest that EEPW in older workers with health limitations may be prevented by enhancing the self-esteem and self-efficacy of workers, adapting the work environment of informal caregivers, increasing social contacts at work, providing higher variation in activities, and ensuring less repetitive movements at work.

Samenvatting

Persoonlijke en werkgerelateerde voorspellers van vervroegde uittreding uit de arbeidsmarkt bij ouderen met gezondheidsbeperkingen

Het huidige pensioenbeleid verwacht van werknemers dat zij tot op hogere leeftijd doorwerken, ongeacht hun gezondheidstoestand. Om te kunnen beoordelen of langer doorwerken mogelijk is, is inzicht nodig in zowel individuele als werkgerelateerde voorspellers ("predictoren") van vervroegde uittreding uit de arbeidsmarkt (VUAM). Het bestaande onderzoek naar predictoren is gericht op oudere werknemers in het algemeen, maar niet specifiek op oudere werknemers met gezondheidsbeperkingen. Het doel van ons onderzoek is deze lacune op te vullen.

Onze gegevens komen van het cohort dat is gestart in 2013 in de context van de landelijk representatieve Longitudinal Aging Study Amsterdam (leeftijden 55-64, n-1023), met vervolgmeting in 2016. Wij hebben deelnemers met betaald werk geselecteerd die ten minste één chronische ziekte en/of een score onder de mediaan op een lichamelijke prestatietest hadden, en die bij de vervolgmeting nog niet de AOW-leeftijd hadden bereikt (n=297).

Na drie jaar was 22,9% gestopt met betaald werk. Het verlenen van mantelzorg, een groot sociaal netwerk, een lage zelfwaardering en een laag opleidingsniveau waren voorspellers van VUAM. Doorzettingsvermogen (een aspect van eigen-effectiviteit), herhalende bewegingen en variatie in activiteiten tijdens het werk toonden een (bivariate) samenhang met VUAM maar werden niet in het multivariate predictie-model geselecteerd.

Onze resultaten suggereren dat VUAM bij oudere werknemers met gezondheidsproblemen voorkomen zou kunnen worden door hun zelfwaardering en eigen-effectiviteit te versterken, voor mantelzorgers de arbeidsvoorwaarden aan te passen, sociale contacten op het werk te bevorderen, de variatie in werkactiviteiten te vergroten, en herhalende bewegingen tijdens het werk te minimaliseren.

Executive summary and recommendations

Study aims

Due to current strict retirement regulations, older workers are expected to work up to an older age than in the past, also in the Netherlands. This applies equally for workers who are healthy and for workers with health limitations. Our earlier research has shown that in the 2010s, older workers with health limitations continue to work up to an older age than their counterparts in the 1990s and 2000s. One reason is that, in the past, workers could exit from the workforce with a disability pension, but the criteria for such pension have been made stricter. The changes in policies and regulations were enacted to keep up with the longer life expectancy of the general population.

So far, some research has been done on the question what motivates older workers to continue working. This revealed a range of factors that impact the continuation of paid work and/or early exit from paid work, including personal factors as well as work-related characteristics. Most studies, however, focused on older workers in general or reported on differences between workers with and without health limitations. Little is known about the variations within the group of older workers with health limitations and the factors that might predict early work exit among this group. In other words: the question "What makes one person with health limitations exit from work and another continue?" remains unanswered. This study aims to address the question: *What personal and work-related factors predict an early exit from paid work (EEPW) in older workers with health limitations?*

Using prospective data from the nationally representative Longitudinal Aging Study Amsterdam (2013-2016), we selected older workers aged 55 and over with health limitations who had a paid job at baseline and had not reached the statutory retirement age at the time of follow-up. We addressed potential predictors both at the personal and at the work level. These factors are based on the aforementioned studies; they include education, lifestyle, psychological factors, and social environment on the one hand, and income, work conditions, and working hours on the other hand. Insight into such factors will provide direction for workplace policies to overcome early work exit of older workers with health limitations.

Summary of findings

At the time of follow-up, 22.9% of the selected workers had exited from work. Informal caregiving, a larger social network, low self-esteem, and a low educational level were predictors of EEPW. Persistence when facing adversity (a

component of self-efficacy), repetitive movements at work, and variation of activities at work were not selected into the final prediction model, but they showed bivariate associations with EEPW.

Policy recommendations

This study provides new insights into factors that predict and are associated with EEPW in older workers with health limitations. To overcome EEPW in older workers with health limitations, it seems important to adapt work policies and the work environment in several regards. Enhancing the self-esteem and self-efficacy of workers may lead to a smaller number of older workers with health limitations exiting the workforce early. For those who provide informal care it is important that they receive support at work and gain more job control; this may help to overcome EEPW. Also, employers are advised to strengthen the social coherence and to stimulate the social contacts between employees at work. A higher variation in work activities and less repetitive movements during work might decrease the number of older workers with health limitations who exit early from the workforce. Further research should examine whether these proposed changes in policy and work environment will help to overcome EEPW in older workers with health limitations in practice.

1. Introduction

1.1 Background

Worldwide, average life expectancy is rising [1]. In the Netherlands, average life expectancy increased from 75.2 years in 1980 to 81.3 years in 2015 and is expected to increase further, to 86.2 years by 2040 [2]. Furthermore, the percentage of the population older than 65 is rising and the percentage of people of working age is decreasing. Considering these trends, it is expected that in the European Union by the year 2060 there will be only two people of working age for every person aged 65 and over, whereas this ratio was four to one in 2013 [3]. A similar trend can be seen in the Netherlands, where the percentage of people of working age (15–64) decreased from 68.6% in 1985 to 65.3% in 2015, and this is expected to decline further to 57.1% by 2040 [2, 4]. The aging of the population and the reduction of the working age population put pressure on pension schemes and put the sustainability of financing systems at risk.

In response to the aging of the population and its effects on the economy, policies regarding pension and statutory retirement age are changing in most European countries. Due to these reforms, older workers in Europe are nowadays compelled to work up to an older age than in the past [5]. This is also the case in the Netherlands [6], where in 2006 early retirement schemes were discontinued. After this reform a gradual rise in the actual retirement age to over 64 years has been observed [7]. Furthermore, the statutory retirement age was reformed in 2012 with the enactment of the Raising of the State Pension Age and Standard Pension Retirement Age Act (*Wet verhoging AOW- en pensioenrichtleeftijd*). Because of this new law, the statutory retirement age will gradually increase from 65 in 2013 to 66 in 2018 and 67 in 2021. After 2021, the statutory retirement age will increase in line with average life expectancy [8]. In addition to the changes in the statutory retirement age, the criteria for receiving a disability pension have been tightened over the past several decades [9]. One of the results of this change in policy is that older workers with health limitations in the 2010s are continuing to work up to an older age than their age peers in the two prior decades [10].

The stated policy interventions, the rise in the actual retirement age, and the growth of the number of older workers are likely to lead to a further rise in the number of employees with health limitations. In the "new" older working population, aged 65–68, the proportion of workers with chronic diseases is expected to rise from 63% in 2011 to 69% in 2030 [11]. The effect of health limitations on work and work exit has been the subject of extensive study. Studies have shown that chronic diseases

and poor self-perceived health are associated with early exit from paid work [12–14]. Chronic diseases and disorders have also been associated with lower work ability and less productivity at work [15]. Studies conducted by Boot et al. [16] and Sewdas et al. [17] have shown that several factors associated with early work exit differ between older workers with a chronic disease and older workers without a chronic disease. Boot et al. [16] investigated differences and similarities in predictors of having paid work at 3-year follow-up in Dutch workers aged 55–62 years at baseline, with and without a chronic disease, in the period 2003–2006. They found that a younger age, more working hours, absence of functional limitations, less neuroticism, higher sense of mastery, and fewer depressive symptoms were associated with having paid work at the time of follow-up, regardless of the presence of a chronic disease. Additionally, they found some differences in predictors between those with and without a chronic disease. Having low psychosocial work resources and high physical work demands were associated with exit from paid work for workers with a chronic disease but not for workers without a chronic disease. Boot et al. suggest that this difference may be due to the fact that having a chronic disease triggers the imbalance between work demands and resources and thus results in a higher job strain, which in turn is a predictor of early work exit. Sewdas et al. [17] investigated determinants of early retirement in Dutch workers aged 57–62 years with and without chronic diseases. They concluded that the majority of determinants appeared similar for workers with and without chronic diseases. Poor physical and mental health and more depressive symptoms were significant predictors of early retirement in both groups. However, two factors were associated with early retirement in workers with chronic diseases only: a low sense of mastery and low levels of autonomy at work. The results from these studies suggest that a distinction should be made between workers with and without health limitations when examining predictors of early work exit.

Workers with health limitations are thus an important target group for research. Chronic diseases are an important characteristic of this target group because of the stated increase of the percentage of older workers with chronic diseases. Functional limitations are also an important characteristic of this group. These are restrictions in basic functions such as walking or stooping [18]. Disability arises when a person experiences difficulty or needs help in performing an activity [18]. Because functional limitations may eventually lead to disability, health limitations can be captured in an earlier stage than disability by identifying functional limitations.

1.2 Earlier research on factors associated with early work exit among workers in general

Previous studies have identified several socio-demographic, lifestyle-related, social, emotional, work-related, and physical health factors associated with early exit from paid work among general older working populations. Socio-demographic factors that are positively associated with early exit from paid work in older workers are: higher age, having a partner, having a retired partner, being female, and a lower educational level [13, 16, 19-21]. Smoking, high alcohol intake, lack of physical activity, and obesity are lifestyle factors that are associated with early exit from paid work [13, 19, 20, 22, 23].

From a social perspective, it has been shown that some workers stop working in order to provide informal care [20]. Elovainio et al. [24] assessed the effect of social support on early retirement. In their study, social support was measured by the size of the social network and the heterogeneity of the network. They showed that a small social network size was associated with early retirement among women.

From an emotional perspective, fewer depressive symptoms and a higher sense of mastery are associated with continuation of work among older workers [16, 17, 19]. Firth et al. [25] showed that higher levels of stress contribute to the intention to quit work and that higher levels of self-esteem contribute to less intention to quit. Higher self-efficacy in older workers is related to higher job satisfaction and higher job motivation and might therefore lead to more work continuation among this group [26].

Also, several work-related factors are associated with work exit and work continuation among older workers. The financial aspects of work, the social contacts, more weekly working hours, and being challenged at work are important factors for work continuation [16, 21]. Low job control and low job rewards [13, 23], high psychological demands, high physical demands, lower autonomy at work, and low support at work are associated with early exit from paid work [12, 27]. Fleischmann et al. [28] showed that favorable psychosocial working conditions may reduce the risk of early work exit among workers with a chronic disease.

1.3 Aim of this study

So far, most studies have focused on the differences between workers with and without chronic diseases, the influence of health limitations on doing paid work, and the factors that predict work continuation among older workers in general. Little is known about the differences within the group of older workers with health limitations and the factors that predict early work exit in this group. In other words, the question is: what makes one person with health limitations exit work early and another continue?

Insight into factors predicting early exit from work can provide direction for workplace policies to overcome early work exit of older workers with health limitations. Therefore, this study aims to address the following research questions: (1) Which personal and work-related factors are associated with early exit from paid work (EEPW) among older workers with health limitations? (2) What personal and work-related factors predict EEPW among older workers with health limitations?

2. Methods

2.1 Sample

We used data from the Longitudinal Aging Study Amsterdam (LASA) [29, 30]. LASA is an ongoing, prospective cohort-sequential study, which examines the effects and consequences of aging in society at large in different domains: physical, emotional, cognitive, and social functioning. Older adults, aged 55-85 years, were selected in three different regions in the Netherlands, thus ensuring a nationally representative sample. The participants were randomly selected from the municipal registries. Since the start in 1992, measurement waves have been repeated every three years. In 2002/2003 and in 2012/2013, new cohorts of participants aged 55-64 years were recruited, using the same sampling frame. More detailed information on the sampling and data collection has been described elsewhere [29, 30]. The data used in this study are from the third cohort at baseline (2012/2013) and follow-up (2015/2016).

2.1.1 Inclusion and exclusion criteria

The baseline cohort consisted of 1,023 participants. To be included in the study, participants had to meet four criteria. First, they needed to have a paid job at baseline (n=627). Second, they should not have reached the statutory retirement age at follow-up, which was 65 years and 3 months in 2015 and 65 years and 6 months in 2016 (n=520) [31]. Third, they had to have at least one chronic disease and/or a score below the median on a set of physical performance tests (n=422). Fourth, respondents had to have valid data on work status at follow-up (n=297). See appendix A for the flowchart of the inclusion procedure. When comparing the differences in baseline characteristics of the workers with follow-up data with the workers without follow-up data (n=125), four of the 36 variables used in this study showed significant differences. Participants without follow-up data had on average a lower educational level, provided less informal care, had a smaller social network, and smoked more often.

2.2 Measures

2.2.1 Outcome variable

The dependent variable, *paid work for one hour or more per week (yes/no)*, was measured at three-year follow-up. This variable is the dependent variable, with the response 'no' indicating EEPW and 'yes' indicating continuation of work. The variable is based upon self-reported information, obtained during the interview.

2.2.2 Health

Chronic disease was defined as the presence of one or more chronic diseases. During the interview, respondents were asked if they had diabetes mellitus, cardiac disease, chronic non-specific lung disease (asthma or chronic obstructive pulmonary disease), peripheral arterial disease, cerebrovascular accident or stroke, osteoarthritis, rheumatoid arthritis, cancer, or a maximum of two other chronic diseases. According to the inclusion criteria for our study, participants with one self-reported disease were included. To serve as an independent variable in the analysis, the dichotomous variable *multimorbidity (yes/no)* was created. People were categorized as having multimorbidity if they had two or more chronic diseases [32].

The *physical performance* tests are characterized by high sensitivity in the higher ability range. For this reason this test was chosen to use in this study as it might enable detection of functional limitations before respondents notice them themselves [33]. Physical performance was measured with a set of four individual tests: (1) walk 3 meters, turn around, and walk 3 meters back as quickly as possible, (2) crossing the arms across the chest, rise 5 times from a chair and sit back down at usual pace, (3) put on and take off a cardigan, and (4) maintain a tandem stand, i.e., placing one foot before the other, for 10 seconds. For the first three tests the time was recorded and categorized into four categories, based on quartiles: (1) low to (4) high performance. If a participant was not able to perform a test, he/she received a score of 0 on that test. In the fourth test, most participants were able to keep their balance during the entire 10 seconds. Therefore, three categories were used instead of four: (0) unable to perform, (2) able to hold balance up to 9 seconds, and (4) able to hold balance for 10 seconds. The sum score of these four tests was calculated, with scores ranging from 0 (poor performance) to 16 (good performance).

According to the inclusion criteria for our study, respondents were included when having a sum score below the median (<13) or when they were unable to perform in one of the performance tests due to health problems.

2.2.3 Potential predictor variables

The potential predictor variables consisted of personal and work characteristics. They were chosen based on the literature on the general older population and on consultation with professionals in the research field of aging. The variables were measured at baseline, in 2012/2013.

Socio-demographics

Socio-demographic predictors were *age*, *gender*, *having children* (yes/no), *children living in house* (yes/no), *partner* (yes/no), *partner has a paid job* (yes/no), *educational level* (low/intermediate/high), *homeownership* (homeowner without mortgage/ homeowner with mortgage/ renter) and *income*.

Age and gender were derived from the population registry.

In the interviews, respondents were asked to indicate their highest level of education attained. Education was categorized according to the ISCED guidelines: (1) low (elementary not completed, elementary, lower vocational, general intermediate), (2) intermediate (intermediate vocational, general secondary), and (3) high (higher vocational, college, and university) [34, 35].

To assess the *income* of the household, respondents were asked to indicate their monthly income level, including the income of the partner. They could choose from 24 categories, with the lowest category being €454-€567 and the highest category being €5,446 or more. To ensure comparability of income between persons with and without a partner, the variable was adjusted by multiplying an income that was shared with a partner by 0.7. The resulting amounts were categorized into three commonly used income categories, namely (1) low, (2) middle, and (3) high. Low income was defined as an income of €1,569 or less, which was equal to the minimum wage + €100 on January 1, 2013 [36]. The upper 20% of the income range is often used as a cut-off for high income [37]. In 2013, income amounts above €2,608 per month represented this upper 20% in the Netherlands [38]. Respondents were categorized as having a middle income if they earned more than €1,569 and equal to or less than €2,608, and respondents who earned more than €2,608 were categorized as having a high income.

Lifestyle

Physical activity (kcal p/day) was measured during the interview using the LASA Physical Activity Questionnaire (LAPAQ). This measure was shown to have good concurrent and test-retest validity [39]. The questionnaire gathered information on which activities the respondents engaged in during the past two weeks. The activities assessed in the questionnaire were household activities, walking outdoors, biking, gardening, and two sports activities. Respondents were asked how long and how often they engaged in these activities. For every activity and sport the time spent in minutes per day was calculated. To obtain intensity levels, MET scores were assigned to every activity based on previously published MET scores lists [40, 41]. In this study, total activity in kcal per day was used. This was calculated by multiplying the assigned

MET score of an activity with the weight of the respondent, and then multiplying it by the duration (in hours) of the activity. The kcal of all activities were added up and divided by 14 to yield daily energy expenditure.

Alcohol use (no/moderate/heavy) was added as a categorical variable based on an index created by the Netherlands Economic Institute [42]. The categories were (1) no use (0 glasses per day), (2) moderate use (men 1–3 and women 1–2 glasses per day), and (3) heavy use (men >3 and women >2 glasses per day).

For *smoking* a dichotomous variable was created (smoker/non-smoker). Respondents who had never smoked or had stopped smoking more than 15 years ago were categorized as non-smokers. Respondents who currently smoked or who had stopped smoking less than 15 years before the main interview were categorized as smokers. This cut-off was chosen because earlier research has shown that, after 10 to 20 years, the mortality rates of smokers and non-smokers are almost equal [43].

Social

Informal caregiving (yes/no) was based on two questions: ''Did you provide help with household tasks recently?'' (yes/no) and ''Did you provide help with personal care recently?" (yes/no). Respondents were coded as informal caregiver if they answered yes to one or both questions.

Loneliness was measured using the "De Jong-Gierveld loneliness scale'', which assesses social loneliness and emotional loneliness [44, 45]. The scale consisted of 11 items, positive and negative. The number of answers that are indicative of loneliness were counted and a total score, combining social and emotional loneliness, was calculated. Scores could range from 0 (no loneliness) to 11 (severe loneliness).

Network size was determined by asking respondents to name the persons they were in frequent contact with and who were also important to them [46]. By adding up all persons named, the size of the personal network was determined. A priori the network size was maximized at 80 persons; none of the respondents reached this limit. During the interview, further information on the nine persons in the network with the most frequent contacts was gathered. The interviewer asked how much emotional and instrumental support respondents received from each of these network members. Response options were (1) never, (2) seldom, (3) sometimes, and (4) often. This information was used to construct the variables *emotional support received* and *instrumental support received*. A sum score (0–36) was calculated, with higher scores indicating higher overall support.

Emotional

The Center for Epidemiological Studies Depression scale (CES-D) was used to measure *depressive symptoms*. This scale consists of twenty items that assess symptoms of depression experienced in the past week. Every item could be answered on a 4-point scale ranging from (0) 'rarely or never' to (4) mostly or always. The scale score is the sum of the answers and varies from 0-60, with higher scores indicating more symptoms of depression. Earlier research showed the CES-D to have good criterion validity in an older population [47].

Sense of mastery was measured using the Pearlin Mastery Scale [48]. This scale consists of seven questions: five negative items and two positive items, with answer categories ranging from (1) strongly disagree to (5) strongly agree. Sum scores ranged from 7 to 35, with higher scores reflecting a higher sense of mastery.

For the measurement of *self-esteem*, a customized version of the Rosenberg Self-esteem Scale [49] was used. In LASA, the scale consists of four items instead of the usual ten. Every statement has five response categories varying from (1) strongly disagree to (5) strongly agree. The scale score is the sum of the answers and varies from 4 to 20, with higher scores indicating higher self-esteem.

Self-efficacy was measured using an adapted version of the General Self-Efficacy Scale (GSES) [50]. It consists of twelve items and was validated among Dutch older people [51]. The twelve items cover three aspects: persistence when facing adversity, effort to complete behavior, and willingness to initiate behavior. Respondents could answer each item on a five-point scale ranging from (1) strongly disagree to (5) strongly agree. In our study the three aspects were analyzed separately. *Persistence when facing adversity* consisted of four of the twelve items, and scores could range from 4-20, with higher scores indicating higher levels of persistence. *Effort to complete behavior* consisted of five of the twelve items, and scores could range from 5-25, with higher scores indicating higher levels of effort. *Willingness to initiate behavior* consisted of three of the twelve items, and scores could range from 3-15, with higher scores indicating higher levels of willingness.

Perceived stress was measured using the perceived stress scale (PSS) [52]. Van Eck et al. [53] showed that the PSS is applicable for the Dutch population. The scale consisted of ten items that could be answered on a Likert scale from (0) never to (4) very often. Higher scores indicated higher levels of stress.

Work

In earlier LASA research a general population job-exposure matrix (GPJEM), applicable to older and retired workers, was developed and validated [54]. In LASA the jobs of

respondents were linked to the Netherlands Standard Classification of Occupations 1992 (NSCO92). Using the Netherlands Working Conditions Survey, physical and psychosocial work exposures were linked to NSCO92. The predictive validity of the GPJEM was shown to be good, as associations with health outcomes were in accordance with the literature. Further information on the GPJEM and its development and validation has been described elsewhere [54]. In this study, eight of the ten exposures are used as independent variables: *use of force* (low/moderate), *work in uncomfortable positions* (low/moderate), *repetitive movements* (low/moderate/high), *time pressure* (low/moderate/high), *task requirements* (low/moderate/high), *cognitive demands* (low/high), *autonomy at work* (low/high), and *variation in activities* (low/high).

Two self-reported work variables were also used in this study, the first variable being *regularity of working hours (regular/irregular)*. The category regular working hours consisted of regular working hours (9 to 5) and regular working hours including night/weekend shifts. The category irregular working hours consisted of shift work without weekend shifts, shift work including weekend shifts, irregular working hours without weekend shifts, and irregular working hours including weekend shifts. The second variable used was *number of working hours per week*. This variable was assessed by asking respondents how many hours per week they worked. This variable was categorized into four categories: (1) ≥32 & ≤40, (2) <16, (3) ≥16 & ≤31, and (4) >40. The category ≥32 & ≤40 was chosen as the reference group, as this approximates fulltime work in the Netherlands.

2.3 Statistical analyses

All statistical analyses were performed in SPSS version 22.0 (SPSS Inc., Chicago, IL). To overcome biased results due to missing data, multiple imputation (MI) was used to create a complete data set [55]. Predictive mean matching was applied during MI, and fifteen imputed datasets were created. Before imputation 1.2% of the values were missing, among 23.2% of the respondents. We reported pooled results.
All continuous variables were checked for linearity of their association with the outcome. Only one of the variables had a linear association with the outcome: persistence when facing adversity. All other continuous variables were added to the model as categorical variables. The variables age, network size, emotional support received, instrumental support received, depressive symptoms, mastery, effort to complete behavior, willingness to initiate behavior, perceived stress, and physical performance were categorized based on their quartiles. Loneliness and self-esteem were heavily skewed and categorized into tertiles.

2.3.1 Association model

First, bivariate associations of each of the potential predictors and EEPW were examined using logistic regression analyses, adjusted for age. Associations were considered statistically significant when $p \leq 0.05$.

2.3.2 Prediction model

Second, a prediction model was formed in three steps, again using logistic regression analysis. Step one involved a univariate pre-selection. Potential predictors were selected for further analysis when they met the criterion of $p \leq 0.2$ [55]. Step two involved a backward selection of predictors within the personal and work domains separately. Potential predictors were excluded stepwise from the model based on their p-value. In each step the variable with the highest p-value was excluded from the model until only variables with $p \leq 0.1$ were left. Step three consisted of a backward selection of all remaining predictors of the two domains combined. Stepwise exclusion was performed again in the same way as in step two, until only significant predictors were left in the model.

Before performing step two, the inter-correlation of all remaining variables was checked using the Spearman correlation test to avoid multicollinearity. If the correlation coefficient exceeded 0.6, one of the correlated variables was excluded. In step two, which involved backward selection, the likelihood-ratio test was performed to check whether exclusion was appropriate, after the exclusion of each variable [56]. This test compares the -2 log likelihood of the old and the new model; the likelihood-ratio was considered appropriate when $p > 0.1$.

2.3.3 Validation of the prediction model

The performance of the final model was assessed using so-called apparent validation methods, i.e., the performance of the model is tested in the same sample. The area under the ROC curve (AUC) was calculated [56], and the Hosmer-Lemeshow test was applied. The AUC is used to show the ability of the model to distinguish between the respondents with and without the outcome; an AUC >0.7 is commonly regarded as good [55]. The Hosmer-Lemeshow test is used to assess the agreement between the observed probabilities of the outcome and the probabilities predicted by the model; this test should not be significant ($p > 0.05$) [57].

3. Results

3.1 Descriptive statistics

Table 1 shows the descriptive statistics of the sample. In total, 297 respondents were included in this study, of whom 68 (22.9%) exited work early.

Table 1. Descriptive data for all potential predictors, by work status at follow-up

Variable	Categories	Paid work at follow-up (N=229) (%)	Early exit from paid work (N=68) (%)	Total (N=297) (%)
Sociodemographic				
Age	Years (M(sd))	58.3 (1.86)	59.5 (1.93)	58.5 (1.94)
Gender	Male	58.5	47.1	55.9
Has children	Yes	82.1	82.4	82.2
Children living at home	Yes	31.2	23.5	29.5
Partner	Yes	83.8	80.9	83.2
Partner has a paid job	Yes	79.2	72.2	77.5
Educational level (ISCED)	Low (ISCED 0-2) Middle (ISCED 3-4) High (ISCED 5-8)	31.0 29.3 39.7	39.7 38.2 22.1	33.0 31.3 35.7
Homeownership	No mortgage Mortgage Renter	9.3 69.4 21.3	15.4 62.1 22.5	10.7 67.7 21.6
Income	Low (≤€1569) Moderate (>€1569-≤€2608) High (>€2608)	21.5 39.3 39.2	26.3 41.3 32.4	22.6 39.8 37.6
Lifestyle				
Physical activity	Q1 (0-201 Kcal p/day) Q2 (204-405 Kcal p/day) Q3 (409-674 Kcal p/day) Q4 (676-2942 Kcal p/day)	21.9 27.4 25.2 25.0	19.3 21.6 21.8 30.3	21.3 26.1 26.1 26.6
Smoker	Yes	32.9	27.6	31.7
Alcohol use	None Moderate Heavy	11.6 71.2 17.2	15.0 73.1 11.9	12.4 71.6 16.0
Social				
Informal caregiving	Yes	21.8	29.4	23.6
Loneliness	No loneliness (0) Moderate loneliness (1-2) High loneliness (>2)	54.6 25.3 20.1	54.4 29.4 16.2	54.5 26.3 19.2
Network size	Q1 (2-12) Q2 (13-19) Q3 (25-28) Q4 (29-76)	22.3 25.8 25.3 26.6	11.8 22.1 29.4 26.8	19.9 24.9 26.3 29.0
Emotional support received	Q1 (1-20) Q2 (21-24) Q3 (25-28) Q4 (29-36)	26.2 21.8 29.3 22.7	20.6 25.0 25.0 29.4	24.9 22.6 28.3 24.2
Instrumental support received	Q1 (2-11) Q2 (12-15) Q3 (16-20) Q4 (21-32)	25.8 24.5 26.6 23.1	26.5 25.0 23.5 25.0	25.9 24.6 25.9 23.6

Variable	Categories	Paid work at follow-up (N=229) (%)	Early exit from paid work (N=68) (%)	Total (N=297) (%)
Emotional				
Depressive symptoms	Q1 (0-2)	28.4	26.5	27.9
	Q2 (3-5)	24.9	20.9	26.3
	Q3 (6-9)	19.7	23.5	20.5
	Q4 (10-34)	27.1	19.1	25.3
Mastery	Q1 (9-16)	23.1	19.1	22.2
	Q2 (17-19)	29.3	33.8	30.3
	Q3 (20)	24.5	25.0	24.6
	Q4 (21-35)	23.1	22.1	22.9
Perceived self-esteem	Low (<16)	27.9	41.2	31.0
	Moderate (16)	36.7	29.4	35.0
	High (>16)	35.4	29.4	34.0
Persistence when facing adversity	M (sd)	15.5 (2.3)	15.0 (2.2)	15.4 (2.3)
Willingness to initiate behavior	Q1 (3-8)	24.5	29.4	25.6
	Q2 (9-10)	24.9	23.5	24.6
	Q3 (11-12)	34.1	35.3	34.3
	Q4 (13-15)	16.6	11.8	15.5
Effort to complete behavior	Q1 (13-18)	24.9	22.1	24.2
	Q2 (19)	17.5	17.6	17.5
	Q3 (20)	30.1	22.1	28.3
	Q4 (21-25)	27.5	38.2	30.0
Perceived stress	Q1 (0-7)	23.7	28.1	24.7
	Q2 (8-10)	30.0	26.3	29.1
	Q3 (11-13)	20.8	21.6	21.0
	Q4 (14-29)	25.5	24.0	25.2
Work				
Use of force	Low	62.0	55.9	60.6
	Medium	38.0	44.1	39.4
Work in uncomfortable position	Low	62.4	55.9	60.9
	Medium	37.6	44.1	39.1
Repetitive movements	Low	54.6	36.8	50.5
	Medium	29.7	42.6	32.7
	High	15.7	20.6	16.8
Work with task requirements	Low	50.2	57.4	51.9
	Medium	40.2	35.3	39.1
	High	9.6	7.4	9.1
Time pressure	Low	49.8	57.4	51.1
	Medium	42.8	35.3	41.1
	High	7.4	7.4	7.4
Cognitive demands	Low	55.9	66.2	58.2
	High	44.1	33.8	41.8
Autonomy	Low	48.0	54.4	49.5
	High	52.0	45.6	50.5
Variation in activities	Low	58.5	66.2	60.3
	Medium	2.6	8.8	4.0
	High	38.9	25.0	35.7
Regularity of working hours	Regular hours	72.8	80.9	74.6
Working hours per week	0-15 hours per week	12.7	25.0	15.5
	16-31 hours per week	26.2	22.1	25.3
	32-40 hours per week	49.3	45.6	48.5
	>40 hours per week	11.8	7.4	10.8

Variable	Categories	Paid work at follow-up (N=229) (%)	Early exit from paid work (N=68) (%)	Total (N=297) (%)
Health				
Multimorbidity	Yes	49.8	47.1	49.2
Physical performance	Q1 (4-10)	22.4	26.3	23.3
	Q2 (11-12)	25.6	22.8	25.0
	Q3 (13-14)	29.2	33.1	30.1
	Q4 (15-16)	22.8	17.9	21.6

3.2 Association model

Table 2 shows the results of the bivariate association analyses, adjusted for age. Women had 2.00 times higher odds of EEPW than men (p=0.02). Those with a high educational level had lower odds of early work exit compared to those with a low educational level (OR=0.39, p=0.01). The odds of EEPW were 2.10 times higher for workers who provided informal care than for workers who did not provide informal care (p=0.03). The odds of EEPW were 2.77 times higher for workers with a large

Table 2. Association model of single predictors with work status at follow-up: logistic regression adjusted for age

Variable	Categories	β	OR	P value
Sociodemographic				
Gender	Male	R	R	
	Female	0.691	1.996	**0.020***
Has children	Yes	R	R	
	No	-0.660	0.847	0.663
Children living at home	Yes	R	R	
	No	-0.160	0.852	0.634
Partner	Yes	R	R	
	No	0.085	1.088	0.821
Partner has a paid job	No	R	R	
	Yes	-0.380	0.684	0.259
Education level (ISCED)	Low (ISCED 0-2)	R	R	
	Middle (ISCED 3-4)	-0.031	0.969	0.927
	High (ISCED 5-8)	-0.954	0.385	**0.011***
Homeownership	No mortgage	R	R	
	Mortgage	-0.643	0.526	0.141
	Renter	-0.530	0.588	0.293
Income	Low (≤€1569)	R	R	
	Moderate (>€1569-€2608)	-0.132	0.877	0.732
	High (>€2608)	-0.308	0.735	0.419
Lifestyle				
Physical activity	Q1 (0-201 Kcal p/day)	R	R	
	Q2 (204-405 Kcal p/day)	0.128	1.137	0.779
	Q3 (409-674 Kcal p/day)	0.487	1.627	0.270
	Q4 (676-2942 Kcal p/day)	0.669	1.952	0.135
Smoker	No	R	R	
	Yes	-0.384	0.681	0.264
Alcohol use	None	R	R	
	Moderate	-0.494	0.610	0.266
	Heavy	-0.940	0.391	0.116

Variable	Categories	β	OR	P value
Social				
Informal caregiving	No	R	R	
	Yes	0.740	2.097	**0.028***
Loneliness	No loneliness (0)	R	R	
	Moderate loneliness (1–2)	0.184	1.201	0.582
	High loneliness (>2)	−0.261	0.770	0.515
Network size	Q1 (2–12)	R	R	
	Q2 (13–19)	0.418	1.519	0.398
	Q3 (25–28)	0.800	2.226	0.095
	Q4 (29–76)	1.017	2.765	**0.029***
Emotional support received	Q1 (1–20)	R	R	
	Q2 (21–24)	0.444	1.559	0.299
	Q3 (25–28)	0.163	1.177	0.697
	Q4 (29–36)	0.741	2.099	0.078
Instrumental support received	Q1 (2–11)	R	R	
	Q2 (12–15)	0.133	1.142	0.743
	Q3 (16–20)	−0.199	0.888	0.769
	Q4 (21–32)	0.269	1.309	0.510
Emotional				
Depressive symptoms	Q1 (0–2)	R	R	
	Q2 (3–5)	0.334	1.397	0.383
	Q3 (6–9)	0.185	1.204	0.652
	Q4 (10–34)	−0.158	0.854	0.706
Mastery	Q1 (9–16)	R	R	
	Q2 (17–19)	0.291	1.338	0.477
	Q3 (20)	0.176	1.192	0.675
	Q4 (21–35)	0.160	1.173	0.711
Perceived self-esteem	Low (<16)	R	R	
	Moderate (16)	−0.727	0.484	**0.039***
	High (>16)	−0.629	0.533	0.074
Persistence when facing adversity	Scale score	−0.136	0.873	**0.034***
Willingness to initiate behavior	Q1 (3–8)	R	R	
	Q2 (9–10)	−0.261	0.770	0.518
	Q3 (11–12)	−0.108	0.897	0.766
	Q4 (13–15)	−0.515	0.598	0.289
Effort to complete behavior	Q1 (13–18)	R	R	
	Q2 (19)	0.132	1.141	0.773
	Q3 (20)	−0.182	0.834	0.667
	Q4 (21–25)	0.486	1.625	0.210
Perceived stress	Q1 (0–7)	R	R	
	Q2 (8–10)	−0.318	0.727	0.496
	Q3 (11–13)	−0.093	0.911	0.831
	Q4 (14–29)	−0.092	0.912	0.830
Work				
Use of force	Low	R	R	
	Medium	0.176	1.192	0.548
Work in uncomfortable position	Low	R	R	
	Medium	0.193	1.213	0.509
Repetitive movements	Low	R	R	
	Medium	0.728	2.071	**0.025***
	High	0.693	2.000	0.083
Work with task requirements	Low	R	R	
	Medium	−0.354	0.702	0.250
	High	−0.494	0.610	0.369

Variable	Categories	β	OR	P value
Time pressure	Low	R	R	
	Medium	-0.427	0.653	0.164
	High	-0.230	0.795	0.685
Cognitive demands	Low	R	R	
	High	-0.688	0.503	**0.026***
Autonomy	Low	R	R	
	High	-0.284	0.752	0.324
Variation in activities	Low	R	R	
	Medium	0.891	2.437	0.161
	High	-0.702	0.495	**0.033***
Regularity of working hours	Regular hours	R	R	
	Non-regular hours	-0.578	0.561	0.106
Working hours per week	0-15 hours per week	0.865	2.375	**0.026***
	16-31 hours per week	-0.011	0.989	0.976
	32-40 hours per week	R	R	
	>40 hours per week	-0.260	0.711	0.632
Health	No	R	R	
Multimorbidity	Yes	-0.047	0.954	0.870
Physical performance	Q1 (4-10)	R	R	
	Q2 (11-12)	-0.410	0.662	0.333
	Q3 (13-14)	-0.018	0.982	0.964
	Q4 (15-16)	-0.384	0.706	0.432

* p≤0.05; Q = quartile; R = reference category

network (Q4) than for workers with a small network (p=0.03). Workers with moderate self-esteem (OR=0.48, p=0.04) and workers with high self-esteem (OR=0.53, p=0.07) had lower odds of early work exit than workers with a low self-esteem. Every point higher on the "persistence when facing adversity" scale was associated with 0.88 times lower odds of EEPW. Those with medium repetitive movements at work (OR=2.07, p=0.03) or with high repetitive movements at work (OR=2.00, p=0.08) had higher odds of early work exit than those with low repetitive movements at work. Workers with high variation of activity at work had lower odds of early work exit than workers with low variation in activities at work (OR=0.50, p=0.03). Workers with high cognitive demands at work had lower odds of early work exit than workers with low cognitive demands at work (OR=0.50, p=0.03). Workers who worked 0-15 hours per week had higher odds of EEPW than workers who worked 32-40 hours per week (OR=2.38, p=0.03). High repetitive movements at work, a moderately-large network size (Q3), high self-esteem, and high emotional support received (Q4) all had a p-value lower than 0.1 but higher than 0.05.

3.3 Prediction model

Step one of building the prediction model involved examination of univariate associations between predictors and early work exit (Table 3). Thirteen predictors

Table 3. Association of single predictors with work status at follow-up: unadjusted logistic regression

Variable	Categories	β	OR	P value
Sociodemographic				
Age	Q1 (55.0-56.8)	R	R	
	Q2 (56.8-58.4)	0.431	1.539	0.358
	Q3 (58.4-60.1)	0.591	1.806	**0.197†**
	Q4 (60.2-62.4)	1.650	5.207	**0.000†**
Gender	Male	R	R	
	Female	0.462	1.587	**0.096†**
Has children	Yes	R	R	
	No	-0.018	0.983	0.961
Children living at home	Yes	R	R	
	No	-0.390	0.677	0.223
Partner	Yes	R	R	
	No	0.204	1.227	0.567
Partner has a paid job	No	R	R	
	Yes	-0.382	0.683	0.238
Education level (ISCED)	Low (ISCED 0-2)	R	R	
	Middle (ISCED 3-4)	0.020	1.020	0.950
	High (ISCED 5-8)	-0.836	0.433	**0.020†**
Homeownership	No mortgage	R	R	
	Mortgage	-0.610	0.544	**0.145†**
	Renter	-0.441	0.644	0.363
Income	Low (≤€1569)	R	R	
	Moderate (>€1569-€2608)	-0.151	0.860	0.670
	High (>€2608)	-0.393	0.675	0.283
Lifestyle				
Physical activity	Q1 (0-201 Kcal p/day)	R	R	
	Q2 (204-405 Kcal p/day)	-0.155	0.891	0.790
	Q3 (409-674 Kcal p/day)	0.257	1.293	0.533
	Q4 (676-2942 Kcal p/day)	0.296	1.344	0.472
Smoker	No	R	R	
	Yes	-0.250	0.779	0.443
Alcohol use	None	R	R	
	Moderate	-0.229	0.795	0.586
	Heavy	-0.623	0.537	0.271
Social				
Informal caregiving	No	R	R	
	Yes	0.400	1.492	**0.198†**
Loneliness	No loneliness (0)	R	R	
	Moderate loneliness (1-2)	0.153	1.165	0.633
	High loneliness (>2)	-0.213	0.808	0.579
Network size	Q1 (2-12)	R	R	
	Q2 (13-19)	0.483	1.621	0.312
	Q3 (25-28)	0.788	2.198	**0.087†**
	Q4 (29-76)	0.960	2.613	**0.032†**
Emotional support received	Q1 (1-20)	R	R	
	Q2 (21-24)	0.376	1.457	0.357
	Q3 (25-28)	0.084	1.087	0.835
	Q4 (29-36)	0.500	1.684	0.208
Instrumental support received	Q1 (2-11)	R	R	
	Q2 (12-15)	-0.005	0.995	0.990
	Q3 (16-20)	-0.151	0.860	0.698
	Q4 (21-32)	0.050	1.051	0.897

Variable	Categories	β	OR	P value
Emotional				
Depressive symptoms	Q1 (0–2)	R	R	
	Q2 (3–5)	0.285	1.330	0.439
	Q3 (6–9)	0.250	1.284	0.526
	Q4 (10–34)	−0.278	0.757	0.492
Mastery	Q1 (9–16)	R	R	
	Q2 (17–19)	0.341	1.406	0.379
	Q3 (20)	0.197	1.218	0.624
	Q4 (21–35)	0.127	1.136	0.758
Perceived self-esteem	Low (<16)	R	R	
	Moderate (16)	−0.608	0.544	**0.071†**
	High (>16)	−0.572	0.564	**0.090†**
Persistence when facing adversity	Scale score	−0.095	0.910	**0.115†**
Willingness to initiate behavior	Q1 (3–8)	R	R	
	Q2 (9–10)	−0.241	0.786	0.531
	Q3 (11–12)	−0.149	0.862	0.670
	Q4 (13–15)	−0.529	0.289	0.259
Effort to complete behavior	Q1 (13–18)	R	R	
	Q2 (19)	0.131	1.140	0.765
	Q3 (20)	−0.191	0.826	0.638
	Q4 (21–25)	0.450	1.568	0.227
Perceived stress	Q1 (0–7)	R	R	
	Q2 (8–10)	−0.314	0.731	0.448
	Q3 (11–13)	−0.133	0.875	0.748
	Q4 (14–29)	−0.235	0.791	0.558
Work				
Use of force	Low	R	R	
	Medium	0.254	1.289	0.365
Work in uncomfortable position	Low	R	R	
	Medium	0.272	1.313	0.331
Repetitive movements	Low	R	R	
	Medium	0.757	2.132	**0.015†**
	High	0.665	1.944	**0.083†**
Work with task requirements	Low	R	R	
	Medium	−0.262	0.769	0.373
	High	−0.400	0.670	0.449
Time pressure	Low	R	R	
	Medium	−0.334	0.716	0.255
	High	−0.151	0.860	0.780
Cognitive demands	Low	R	R	
	High	−0.434	0.648	**0.133†**
Autonomy	Low	R	R	
	High	−0.256	0.774	0.356
Variation in activities	Low	R	R	
	Medium	1.091	2.978	**0.070†**
	High	−0.564	0.569	**0.074†**
Regularity of working hours	Regular hours	R	R	
	Non-regular hours	−0.459	0.632	**0.180†**
Working hours per week	0–15 hours per week	0.797	2.218	**0.031†**
	16–31 hours per week	−0.094	0.911	0.791
	32–40 hours per week	R	R	
	>40 hours per week	−0.391	0.677	0.459

Variable	Categories	β	OR	P value
Health	No	R	R	
Multimorbidity	Yes	−0.109	0.897	0.693
Physical performance	Q1 (4–10)	R	R	
	Q2 (11–12)	−0.279	0.757	0.490
	Q3 (13–14)	−0.034	0.967	0.928
	Q4 (15–16)	−0.397	0.673	0.352

† p≤0.20; Q = quartile; R = reference category

met the criterion of p≤0.2: age, gender, educational level, homeownership, informal caregiving, network size, persistence when facing adversity, self-esteem, repetitive movements at work, cognitive demands at work, variation of activities at work, working hours per week, and regularity of working hours. Before further modeling, the inter-correlation of all remaining variables was checked to avoid multicollinearity (Table 4). Variation in activities at work correlated highly (≥0.6) with repetitive movements at work (−0.68) and with cognitive demands at work (0.79). Therefore, variation in activities was excluded from further analysis.

Table 4. Correlations between predictors that were bivariately significant for work status at follow-up

	Age	Gender	Education level	Homeownership	Informal caregiving	Network size	Perceived self-esteem	Persistence when facing adversity	Repetitive movements	Cognitive demands	Variation in activities	Working hours	Regularity of working hours
Age	1.000												
Gender	−0.156	1.000											
Education level	0.029	−0.041	1.000										
Homeownership	0.030	−0.028	−0.006	1.000									
Informal caregiving	−0.122	0.223	0.012	−0.021	1.000								
Network size	0.033	0.164	−0.051	−0.184	0.148	1.000							
Perceived self-esteem	0.009	−0.163	0.044	0.048	−0.083	0.018	1.000						
Persistence when facing adversity	0.116	−0.214	0.225	0.008	−0.111	0.006	0.539	1.000					
Repetitive movements	0.037	0.029	−0.561	0.081	−0.011	0.010	−0.036	−0.205	1.000				
Cognitive demands	0.127	−0.092	0.424	−0.065	−0.046	−0.066	0.010	0.143	−0.400	1.000			
Variation in activities	0.069	−0.110	0.563	−0.057	−0.022	−0.060	−0.002	0.199	**−0.681***	**0.785***	1.000		
Working hours	−0.090	0.232	−0.036	−0.127	0.067	0.068	−0.002	0.078	0.009	−0.052	−0.027	1.000	
Regularity of working hours	0.055	0.011	−0.124	0.033	−0.124	−0.034	−0.010	0.004	0.029	0.058	−0.039	0.059	1.000

In step two (Table 5), the remaining predictors were divided into two domains: the personal domain and the work domain. The personal domain consisted of age, gender, education, homeownership, informal care, network size, persistence when facing adversity, and self-esteem. The work domain consisted of repetitive movements at work, cognitive demands at work, number of working hours per week, and regularity of working hours. In the personal domain three of the eight variables were excluded from the starting model. First, persistence when facing adversity (p=0.47)

Table 5. Predictors remaining in multivariable analyses: personal characteristics, work characteristics, and both

Predictor	Categories	β	OR	P value
Personal domain		-2.082		
Constant				
Age	Q1 (55.0-56.8)	R	R	
	Q2 (56.8-58.4)	0.309	1.362	0.534
	Q3 (58.4-60.1)	0.667	1.948	0.167
	Q4 (60.2-62.4)	**1.943**	**6.979**	**<0.001†**
Education level (ISCED)	Low (ISCED 0-2)	R	R	
	Middle (ISCED 3-4)	-0.075	0.928	0.833
	High (ISCED 5-8)	**-0.971**	**0.397**	**0.013†**
Informal caregiving	No	R	R	
	Yes	**0.644**	**1.904**	**0.070†**
Network size	Q1 (2-12)	R	R	
	Q2 (13-19)	0.495	1.640	0.333
	Q3 (20-28)	**0.826**	**2.285**	**0.096†**
	Q4 (29-76)	**0.959**	**2.609**	**0.049†**
Perceived self-esteem	Low (<16)	R	R	
	Moderate (16)	**-0.811**	**0.444**	**0.027†**
	High (>16)	**-0.674**	**0.510**	**0.066†**
Work domain		-1.609		
Constant				
Repetitive movements	Low	R	R	
	Medium	**0.757**	**2.132**	**0.015†**
	High	**0.665**	**1.944**	**0.083†**
Final model		-2.082		
Constant				
Age	Q1 (55.0-56.8)	R	R	
	Q2 (56.8-58.4)	0.309	1.362	0.534
	Q3 (58.4-60.1)	0.667	1.948	0.167
	Q4 (60.2-62.4)	**1.943**	**6.979**	**<0.001†**
Education level (ISCED)	Low (ISCED 0-2)	R	R	
	Middle (ISCED 3-4)	-0.075	0.928	0.833
	High (ISCED 5-8)	**-0.971**	**0.397**	**0.013†**
Informal caregiving	No	R	R	
	Yes	**0.644**	**1.904**	**0.070†**
Network size	Q1 (2-12)	R	R	
	Q2 (13-19)	0.495	1.640	0.333
	Q3 (20-28)	**0.826**	**2.285**	**0.096†**
	Q4 (29-76)	**0.959**	**2.609**	**0.049†**
Perceived self-esteem	Low (<16)	R	R	
	Moderate (16)	**-0.811**	**0.444**	**0.027†**
	High (>16)	**-0.674**	**0.510**	**0.066†**

† p ≤ 0.1; Q = quartile; R = reference category

was excluded, then gender (p=0.29), and lastly homeownership (p=0.20). The likelihood-ratio test showed that all exclusions were appropriate (p>0.1). The predictors remaining in the personal domain and included in the final model were age, education, network size, self-esteem, and informal care. In the work domain, three of the four predictors were excluded from the starting model: first, cognitive demands at work (p=0.89), then regularity of working hours (p=0.16), and, finally, number of working hours per week (p=0.10). The only predictor remaining in the work model was repetitive movements at work.

Step three involved construction of the final prediction model. Of the six predictors in the starting model, only one was excluded during the analysis: repetitive movements at work (p=0.25). The final prediction model is shown in Table 6. It consists of seven significantly associated predictors. Workers aged between 60.2 years and 62.4 years had 1.94 times higher odds of EEPW than workers aged between 55.0 years and 56.8 years (p<0.001). Workers with a high educational level had lower odds of EEPW than those with a low educational level (OR=0.40, p=0.01). Those who provided informal care had 1.90 times higher odds of EEPW than those who did not provide informal care (p=0.07). Workers with a larger network, i.e., the third and the fourth quartiles of network size, had higher odds of EEPW than workers with a small network (Q3; OR=2.29, p=0.10, and Q4; OR=2.61, p=0.05). Workers with moderate and high self-esteem had lower odds of EEPW compared to workers with low self-esteem (moderate; OR=0.44, p=0.03, and high; OR=0.51, p=0.07).

The performance of the final model was good, with an area below the ROC curve of 0.74 and a p-value of the Hosmer-Lemeshow test of 0.11.

In an additional analysis, to test whether the exclusion of the variable variation in activities at work was of influence on the final model, variation in activities at work was added to the work domain instead of repetitive movements at work and cognitive demands at work. In this additional analysis, variation in activities was again the last variable left in the work domain, but it was excluded from the final model. The final model did not differ in either analysis.

4. Discussion

So far research on predictors of early exit from paid work (EEPW) has mainly focused on the general working population and overlooked the growing group of older workers with health limitations. Therefore, the purpose of this study was to examine which personal and work-related factors are associated with and predictive of EEPW in older workers with health limitations. Results from our logistic regression analyses show that several personal and work-related factors are associated with and predictive of EEPW in older workers with health limitations.

4.1 Personal domain

This study showed that women are more likely to exit early from paid work than men, a finding that is consistent with the literature. Rice et al. [20] showed that among older workers, women had a higher risk of early exit from employment than men. It has been reported that gender differences in retirement decisions may be caused by factors such as partner retirement and health of the partner [58, 59]. To assess whether the association found with gender might be attributed to other variables, additional analyses were performed, in which we adjusted for covariates; see Appendix B for the tables of these additional analyses. The assessed covariates were informal caregiving, partner with no job, education, network size, and self-esteem. The explanatory effect of a partner with no job and self-esteem were negligible. When including informal caregiving, education, or network size, the coefficient of female gender changed by slightly over 10%, but the odds ratios still pointed in the same direction, and the effect of gender was still significant for education and network size and close to significance for informal care ($p=0.058$). When including informal caregiving, education, and network size at the same time, the coefficient of gender changed by 35% and was no longer significant ($p=0.16$). Thus, consistent with the earlier studies, the differences in EEPW between men and women can be explained by factors other than gender alone, such as educational level, informal caregiving, and network size.

Older workers with health limitations, with a high educational level, had lower odds of EEPW compared to those with a low educational level. This effect of education is in line with the literature (e.g., [13]). A low educational level is often associated with jobs with unfavorable working conditions, and often such jobs can be burdensome for older workers. This might especially be the case for those with health limitations.

Regarding informal caregiving, the literature is not consistent as to its effect on paid work. Several studies have shown that informal caregiving is associated with exit from paid work [20, 60, 61], while others show a positive effect of informal caregiving on continuation of paid work [62, 63]. All previously mentioned studies were conducted in the general working population, while this study specifically focused on older workers with health limitations. This study shows that for older workers with health limitations, informal caregiving is positively associated with and an important predictor of EEPW. Possibly, the combination of paid work with informal caregiving is too burdensome for older workers with health limitations, and it may be that they exit early from paid work because of this.

Another important predictor according to our study is network size: a larger network is positively associated with EEPW in older workers with health limitations. This result is contrary to what we expected a priori, based on the study of Elovainio et al. [24].Their expectation was that workers with a smaller network would have higher odds of EEPW. An explanation for the difference in results is possibly found in the fact that the above study was cross-sectional, which makes it hard to draw any causal conclusions. It is not possible to assess whether the participants in that particular study had a small network because of retirement or that they had retired because of the small size of their network. Our study clearly shows that, for older workers with health limitations, having a larger network raises the likelihood of EEPW when compared to older workers with health limitations with a small network. Studies conducted by Boot et al. [19] and by Proper et al. [21] have shown that older workers with health limitations continue to work in order to maintain their social contacts; our study shows that this might especially be the case for those with a small network.

Firth et al. [25] showed that higher levels of self-esteem have a small negative effect on the intention to quit work. Our study, however, showed a strong effect of self-esteem. In the bivariate analysis, moderate self-esteem was associated with lower odds of EEPW when compared to low self-esteem. In the final prediction model, moderate self-esteem and high self-esteem were both found to be important predictors of EEPW. In the past, very few studies reported on the relationship between self-esteem and work exit. Maybe this was overlooked in earlier studies, but possibly it is a factor that is relevant only for workers with health limitations. Our study shows that, for older worker with health limitations, higher levels of self-esteem were negatively associated with EEPW. Thus, low self-esteem can be seen as a risk factor for early work exit in older workers with health limitations. Possibly, workers with health limitations and low self-esteem are not convinced that they can continue in their job in combination with their health limitations and thus exit early from employment.

In our study the three components of self-efficacy were analyzed separately. Only persistence when facing adversity was statistically significantly associated with EEPW. For older workers with health limitations, higher scores on the scale of persistence when facing adversity were associated with lower odds of EEPW when compared to lower scores. This is in line with the findings reported by Paggi & Jopp [26], who stated that higher self-efficacy in older workers is related to higher job satisfaction and job motivation and might therefore lead to more work continuation among this group [26].

4.2 Work domain

Among physical work demands, medium and high levels of repetitive movements at work were associated with higher odds of EEPW when compared to a low level of repetitive movements at work. The evidence for the relation between physical work demands, such as repetitive movements, and early work exit is mixed. The systematic review by Van den Berg et al. [27] showed that high physical work demands are among the most important factors associated with EEPW, while several other studies did not find a relation between physical demands and early work exit [13, 23, 64]. Our study corresponds with the systematic review by Van den Berg et al. [27] as it shows that there is a positive relation between physical work demands and EEPW. Specifically, for older workers with health limitations, medium and high levels of repetitive movements at work are a risk factor for EEPW. Possibly, the work environment of older workers with health limitations has already been adapted as to physical demands that are quite obvious, such as the use of force at work and working in an uncomfortable position. At the same time, it may be that working conditions policies have overlooked the negative influence of repetitive movements at work and that they still need to improve on this factor to prevent early work exit in older workers with health limitations.

Among psychosocial work resources, a high variation of activities at work proved to be significantly associated with lower odds of EEPW among older workers with health limitations, compared to those with little variation of activities at work. This supports the finding by Fleischmann et al. [28] that higher psychosocial work resources may directly reduce the risk of early work exit. They also reported that, contrary to intuition, high psychosocial work demands are related to lower risks of work exit, which is something that was found in our study as well: for older workers with health limitations, high cognitive demands are associated with lower odds of EEPW when compared to low cognitive demands. High cognitive demands are more likely to reflect a characteristic of workers who continue to work until retirement than that

they are a factor that would make them exit early from work. Workers with low cognitive demands probably have a low educational level and are faced with less favorable working conditions, for instance highly repetitive movements at work. Therefore, it might be better to focus on improving the working conditions than on enhancing the cognitive demands at work.

Working 0–15 hours per week was positively associated with EEPW. This association is hard to interpret, because only information on the job held last was available. We did not inquire whether respondents had recently, before the start of our study, started working fewer hours per week.

4.3 Methodological considerations

Four of the 36 variables in this study showed significant differences between participants with follow-up data and those without follow-up data. On average, those without follow-up data were lower educated, provided less informal care, had a smaller social network, and smoked more often. This may have led to an underestimation of the effects found for educational level, informal caregiving, and network size.

The final prediction model included five events per variable, while it is generally advised to have at least ten events per variable in a logistic regression [55]. Therefore, the coefficients of the model should be interpreted with caution as the small number of events per variable might lead to biased results [55]. Even though this rule of ten events per variable is usually advised, some studies suggest that bias mainly arises in models with 2–4 events per variable and that models with 5–9 events per variable should not be systematically discounted [65, 66]. The performance of the final prediction model was assessed by using apparent validation methods. The performance of the model was good with an AUC of 0.74, and the p-value of the Hosmer-Lemeshow test was 0.11 (criteria: AUC > 0.70 and p > 0.05, respectively).

Despite the satisfactory characteristics of our prediction model, we acknowledge that it is an associational model and that no causal relations can be derived. It is possible that the associations found may be driven by other factors that we did not study. For example, a large social network may be a proxy for unmeasured conditions such as commitment to social activities.

Strengths and limitations

The first strength of our study is that it focuses on older workers with health limitations. By selecting people based on the presence of functional limitations instead of disability, people with health limitations are included in an early stage of the

disease process. The second strength is the use of a physical performance test instead of a self-reported questionnaire; a performance test enables detection of functional limitations before respondents might have noticed these themselves [32]. The third strength of our study is that it includes a broad spectrum of variables associated with EEPW. Most previous studies focused on specific domains, such as work or health, related to work exit or continuation. By including a broad spectrum of factors based on the literature, our study gives an overview of many factors associated with EEPW within the group of older workers with health limitations. The fourth and final strength of our study is the fact that it makes use of data from a representative sample of the Dutch population [30].

The first limitation of our study is the small sample size. This caused some of the analyses to have a low number of events per variable. Moreover, the number of healthy workers in our sample was even substantially smaller (n=68). This impeded a comparison of the strength of predictors between workers with health limitations and healthy workers. The second limitation is the self-reporting nature, where participants were asked to report whether they did or did not work for one hour per week or more, the dependent variable. We were unable to compare this information with, for example, registry data. However, we prefer our definition of work exit over reports of being retired or not, because there are many pathways to retirement, including partial retirement and bridge jobs. The third limitation is that we used only apparent validation methods, by which the performance of the model is tested in the same sample. In this study the area below the ROC curve and the Hosmer-Lemeshow test were used [55]. Such apparent validation methods lead to optimistic estimates of performance, as predictive models perform better in the original dataset than in other datasets [67]. Other commonly used internal validation methods such as cross-validation, split-sample validation, and bootstrap validation were not applied in our study due to the small sample size, while bootstrap validation was not used as it is not possible to bootstrap in a multiple imputed dataset [68]. To overcome this limitation, we recommend that the performance of the prediction model be examined in another dataset in the future.

The fourth limitation is that a univariate selection of predictors and a stepwise selection procedure may lead to biased coefficients and an overly optimistic model fit [55, 69]. Therefore, the coefficients and odds ratios in the prediction model of this study should be interpreted with caution. In future research this might be overcome by using advanced selection techniques such as Bayesian Model Averaging or the 'Lasso' technique [55].

4.4 Recommendations for research and practice

Earlier studies have stressed that it is important to address older workers with and without health limitations separately [16, 17]. Our study reveals important personal and work-related factors associated with and predictive of early exit from paid work in older workers with health limitations. Policymakers and researchers can use these findings when designing new policies that aim to overcome EEPW in older workers with health limitations. We describe some promising pathways. Our study shows that women are more likely to exit work early than men, and that this might be caused by other factors than strictly gender, such as informal caregiving. In our study, informal caregiving itself was also found to be predictive of EEPW for both men and women. Therefore, it seems important to change the work environment of workers who provide informal care such that they can combine paid work with informal care tasks. Earlier research has shown that support from colleagues and supervisors has a positive influence on informal caregivers at work [70]. It has also been shown that it is important to give individual attention to workers who provide informal care, and to increase their job control and/or create flexible working arrangements [60]. Alternatively, their caregiving burden may be alleviated outside the workplace, by extending their eligibility for formal care to the household. All of this might help to prevent EEPW among older workers with health limitations who provide informal care.

Older workers with health limitations and a large network were more likely to exit early from paid work than workers with a small network. As stated before, it might be that workers with a small network continue to work so as to maintain their social contacts. Therefore, it seems important that employers increase the social contact and social coherence among all employees. It may be that, if social contacts between workers become more frequent and more important, this would help prevent EEPW among workers with larger networks as well. This may be achieved in several ways, for instance by organizing workshops, team building activities, and other social events for all employees.

Low self-esteem and low persistence when facing adversity, a component of self-efficacy, have been found to be risk factors for EEPW among older workers with health limitations. Therefore, employers are advised to initiate interventions that aim at enhancing the self-esteem and self-efficacy of older workers with health limitations. This might be achieved by organizing workshops and by implementing training programs that enhance the self-efficacy and/or self-esteem of older workers.

Two work-related factors were found to be risk factors for EEPW in older workers with health limitations, i.e., repetitive movements at work and a low variation in activities at work. Therefore, work policies are advised to improve these work-related

factors for older workers with health limitations by introducing higher variation in activities and reducing repetitive movements at work.

For future research, it is necessary to externally validate the final prediction model in a different, preferably larger study sample. Moreover, the predictors found in this sample of workers with health limitations should be examined in a sample of healthy workers. For predictors that do not differ between these two groups, more general policies may apply. Instead, for predictors that are relevant for workers with health limitations only, more targeted policies need to be designed. A third recommendation for further research is to assess the influence of the job held longest instead of the job held last. It now remains unknown whether respondents recently, before work exit, started working less or experienced changes in working conditions.

A final recommendation for further research is to assess whether the recommended changes in policy and work environment will help to overcome early work exit in older workers with health limitations. Especially for personality traits such as self-efficacy and self-esteem, it is important to investigate to what extent interventions will lead to improvements, as these are known to be relatively stable traits. However, in our earlier research, we did find change over time. In the case of neuroticism [71], we found an autocorrelation of 0.75 and observed some longitudinal change, in particular in the age group of this study, those 55-65 years old. In the same age group, sense of mastery had an autocorrelation of 0.60 and showed relevant longitudinal change [72]. Furthermore, an intervention study among frail older people showed that even at ages around 80 years, sense of mastery improved [73]. Thus, we consider intervention studies among older workers as a promising line of action.

Regarding earlier intervention studies, a recent review by the Netherlands Health Council [74] concluded that very few such studies have been performed among older workers, and even fewer among older workers with health problems. Only two of the latter studies showed some effect on work ability, and none showed effects on sickness absence. It should be noted that no intervention studies addressed the factors that proved promising in our study.

4.5 Conclusion

This study provides new insights into factors that predict and are associated with EEPW in older workers with health limitations. To overcome EEPW among older workers with health limitations, it seems important to adapt work policies and the work environment in several regards. Enhancing the self-esteem and self-efficacy of workers may lead to fewer older workers with health limitations exiting the

workforce early. For those who provide informal care it is important that they receive support at work and gain more job control; this may help to overcome EEPW. Also, employers are advised to strengthen the social coherence of their employees and to acknowledge the importance of the social contacts between employees at work. A higher variation in work activities and fewer repetitive movements at work might also lead to fewer older workers with health limitations exiting early from the workforce. Further research should examine whether these proposed changes in policy and work environment help overcome EEPW among older workers with health limitations in practice.

References

1. World Health Organization. World health statistics 2015: World Health Organization; 2015.
2. United Nations. World Population Prospects: The 2017 Revision. 2017 [Available from: https://esa.un.org/unpd/wpp/DataQuery/
3. European Commission. The 2015 Ageing Report. Brussels; 2016.
4. The World Bank. Population ages 15-64 (% of total). 2016 [cited 2018 08 Feb]. Available from: https://data.worldbank.org/indicator/SP.POP.1564.TO.ZS?end=2016&locations=NL&start=1960.
5. European Commission. WHITE PAPER; An Agenda for Adequate, Safe and Sustainable Pensions. Brussels. 2012.
6. OECD. Ageing and Employment Policies: Netherlands 2014: Working Better with Age. Paris: OECD Publishing; 2014.
7. Deeg DJH, van der Noordt M, Hoogendijk EO, Comijs HC, Huisman M. Employability after age 65? Trends over 23 years in life expectancy in good and in poor physical and cognitive health of 65-74-year-olds in the Netherlands. Netspar Design Paper no. 96, 2018.
8. Ministry of Social Affairs and Labor. Raising of the State Pension Age and Standard Pension Retirement Age Act [Wet verhoging AOW- en pensioenrichtleeftijd]. The Hague, the Netherlands; 2012.
9. OECD. Sickness and disability schemes in the Netherlands. Country memo as a background paper for the OECD Disability Review. Paris: OECD Publishing; 2007.
10. van der Noordt M, van der Pas S, van Tilburg TG, van den Hout A, Jonker MA, Deeg DJH. Healthy and unhealthy work life expectancy: Changes over 20 years. Scand J Work Environ Health. 2019; 45(1): 73-80.
11. RIVM. Trends in de volksgezondheid. 2014 [Available from: http://eengezondernederland.nl/Een_gezonder_Nederland/Highlights/Trends_in_de_volksgezondheid
12. Leijten FR, de Wind A, van den Heuvel SG, Ybema JF, van der Beek AJ, Robroek SJ, et al. The influence of chronic health problems and work-related factors on loss of paid employment among older workers. J Epidemiol Community Health. 2015; 69(11): 1058-65.
13. van den Berg T, Schuring M, Avendano M, Mackenbach J, Burdorf A. The impact of ill health on exit from paid employment in Europe among older workers. Occupational and Environmental Medicine. 2010; 67(12): 845-52.
14. Kooij D, de Lange A, Jansen P, Dikkers J. Older workers' motivation to continue to work: five meanings of age. Journal of Managerial Psychology. 2008;23 (4):364-94.
15. Leijten FR, van den Heuvel SG, Ybema JF, van der Beek AJ, Robroek SJ, Burdorf A. The influence of chronic health problems on work ability and productivity at work: a longitudinal study among older employees. Scand J Work Environ Health. 2014;40(5):473-82.
16. Boot CR, Deeg DJ, Abma T, Rijs KJ, van der Pas S, van Tilburg TG, et al. Predictors of having paid work in older workers with and without chronic disease: a 3-year prospective cohort study. Journal of Occupational Rehabilitation. 2014;24(3):563-72.
17. Sewdas R, Van der Beek AJ, De Wind A, Van der Zwaan LGL, Boot CRL. Determinants of working until retirement compared to a transition to early retirement among older workers with and without chronic diseases: Results from a Dutch prospective cohort study. Scandinavian Journal of Public Health. 2017.
18. Verbrugge LM, Jette AM. The disablement process. Soc Sci Med. 1994;38(1):1-14.
19. Boot CR, de Kruif AT, Shaw WS, van der Beek AJ, Deeg DJ, Abma T. Factors Important for Work Participation Among Older Workers with Depression, Cardiovascular Disease, and Osteoarthritis: A Mixed Method Study. Journal of Occupational Rehabilitation. 2016;26(2):160-72.

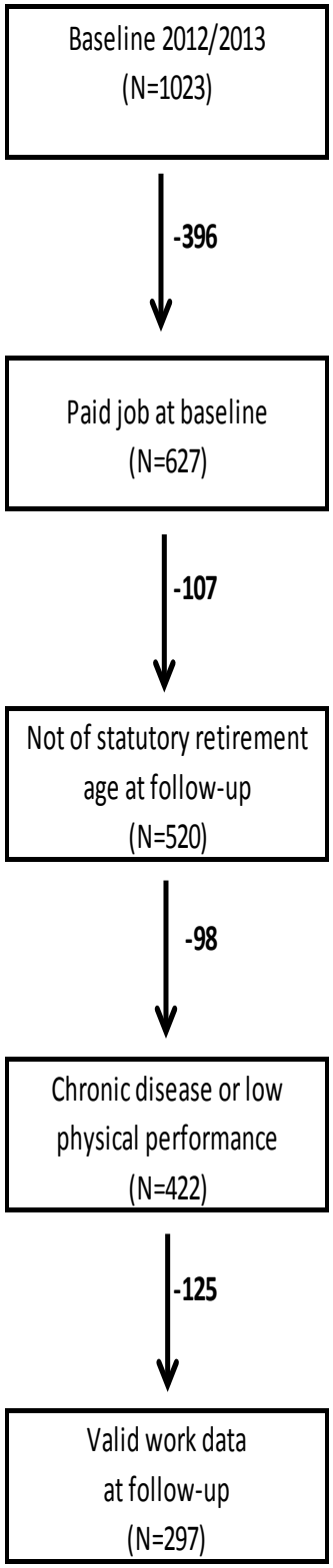
20. Rice NE, Lang IA, Henley W, Melzer D. Common health predictors of early retirement: findings from the English Longitudinal Study of Ageing. Age Ageing. 2011;40(1):54-61.
21. Proper KI, Deeg DJ, van der Beek AJ. Challenges at work and financial rewards to stimulate longer workforce participation. Human Resources for Health. 2009;7(1):70.
22. Korhonen T, Smeds E, Silventoinen K, Heikkila K, Kaprio J. Cigarette smoking and alcohol use as predictors of disability retirement: A population-based cohort study. Drug Alcohol Depend. 2015;155:260-6.
23. Robroek SJ, Schuring M, Croezen S, Stattin M, Burdorf A. Poor health, unhealthy behaviors, and unfavorable work characteristics influence pathways of exit from paid employment among older workers in Europe: a four year follow-up study. Scand J Work Environ Health. 2013;39(2):125-33.
24. Elovainio M, Kivimaki M, Vahtera J, Ojanlatva A, Korkeila K, Suominen S, et al. Social support, early retirement, and a retirement preference: a study of 10,489 Finnish adults. J Occup Environ Med. 2003;45(4):433-9.
25. Firth L, Mellor DJ, Moore KA, Loquet C. How can managers reduce employee intention to quit? Journal of Managerial Psychology. 2004;19(2):170-87.
26. Paggi ME, Jopp DS. Outcomes of Occupational Self-Efficacy in Older Workers. Int J Aging Hum Dev. 2015;80(4):357-78.
27. van den Berg TI, Elders LA, Burdorf A. Influence of health and work on early retirement. J Occup Environ Med. 2010;52(6):576-83.
28. Fleischmann M, Carr E, Stansfeld SA, Xue B, Head J. Can favourable psychosocial working conditions in midlife moderate the risk of work exit for chronically ill workers? A 20-year follow-up of the Whitehall II study. Occup Environ Med. 2018;75(3):183-90.
29. Hoogendijk EO, Deeg DJ, Poppelaars J, van der Horst M, Broese van Groenou MI, Comijs HC, et al. The Longitudinal Aging Study Amsterdam: cohort update 2016 and major findings. Eur J Epidemiol. 2016;31(9):927-45.
30. Huisman M, Poppelaars J, van der Horst M, Beekman AT, Brug J, van Tilburg TG, et al. Cohort profile: the Longitudinal Aging Study Amsterdam. Int J Epidemiol. 2011;40(4):868-76.
31. Belastingdienst. When do you reach the statutory retirement age? [Wanneer bereikt u de AOW-leeftijd?] 2012. [Available from: https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/prive/werk_en_inkomen/pensioen_en_andere_uitkeringen/wanneer_bereikt_u_de_aow_leeftijd/wanneer_bereikt_u_de_aow_leeftijd.
32. Marengoni A, Angleman S, Melis R, Mangialasche F, Karp A, Garmen A, et al. Aging with multimorbidity: a systematic review of the literature. Ageing Res Rev. 2011;10(4):430-9.
33. Guralnik JM, Branch LG, Cummings SR, Curb JD. Physical performance measures in aging research. J Gerontol. 1989;44(5):M141-6.
34. Eurostat. Correspondence between ISCED 2011 and ISCED 1997 levels. 2014 [Available from: http://ec.europa.eu/eurostat/documents/1978984/6037342/Comparability_ISCED_2011_ISCED_1997.pdf
35. UNESCO. International Standard Classification of Education ISCED 2011. Montreal: UNESCO Institute for Statistics; 2012.
36. de Krom P. Regulation of the State Secretary of Social Affairs and Labor of October 12, 2012, to adapt the lawful minimum income as of January 1, 2013 [Regeling van de Staatssecretaris van Sociale Zaken en Werkgelegenheid van 12 oktober 2012, ASEA/SAS/2012/14610, tot aanpassing van het wettelijk minimumloon per 1 januari 2013]. 21293 ed. The Hague: Rijksoverheid; 2012. p. 1-2.
37. Van den Brakel M, Ament P. Income differences among and within municipalities [Inkomens-verschillen tussen en binnen gemeenten]. The Hague: Statistics Netherlands (CBS); 2010

38. Statistics Netherlands (CBS). Household incomes; income classes, household characteristics [Inkomen van huishoudens; inkomensklassen, huishoudenskenmerken. 2018] [Available from: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83932NED/table?ts=1523967460337
39. Stel VS, Smit JH, Pluijm SM, Visser M, Deeg DJ, Lips P. Comparison of the LASA Physical Activity Questionnaire with a 7-day diary and pedometer. J Clin Epidemiol. 2004;57(3):252-8.
40. Caspersen CJ, Bloemberg BP, Saris WH, Merritt RK, Kromhout D. The prevalence of selected physical activities and their relation with coronary heart disease risk factors in elderly men: the Zutphen Study, 1985. Am J Epidemiol. 1991;133(11):1078-92.
41. Ainsworth BE, Haskell WL, Leon AS, Jacobs DR, Jr., Montoye HJ, Sallis JF, et al. Compendium of physical activities: classification of energy costs of human physical activities. Med Sci Sports Exerc. 1993;25(1):71-80.
42. Reinhard OPM, Rood-Bakker DS. Alcoholgebruik in beeld. Standaardmeetlat. Nederlands Economisch Instituut, Rotterdam; 1998.
43. Paganini-Hill A, Hsu G. Smoking and mortality among residents of a California retirement community. Am J Public Health. 1994;84(6):992-5.
44. de Jong-Gierveld J, Kamphuls F. The development of a Rasch-type loneliness scale. Applied Psychological Measurement. 1985;9(3):289-99.
45. de Jong-Gierveld J, Van Tilburg T. Manual of the Loneliness Scale. Vrije Universiteit Amsterdam. 1999.
46. Van Tilburg T. Losing and gaining in old age: Changes in personal network size and social support in a four-year longitudinal study. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences. 1998; 53: S313-S323.
47. Beekman ATF, Deeg DJH, Van Limbeek J, Braam AW, De Vries MZ, VanTilburg W. Criterion validity of the Center for Epidemiologic Studies Depression scale (CES-D): Results from a community-based sample of older subjects in the Netherlands. Psychol Med. 1997;27(1):231-5.
48. Pearlin LI, Schooler C. The structure of coping. J Health Soc Behav. 1978;19(1):2-21.
49. Rosenberg M. Society and the adolescent self-image. Princeton, N.J.: Princeton University Press; 1965. Available from: https://vu.on.worldcat.org/oclc/927444180.
50. Sherer M, Maddux JE, Mercandante B, Prentice-dunn S, Jacobs B, Rogers RW. The Self-efficacy Scale: Construction and validation. Psychological Reports. 1982;51(2):663-71.
51. Bosscher RJ, Smit JH. Confirmatory factor analysis of the General Self-Efficacy Scale. Behav Res Ther. 1998;36(3):339-43.
52. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983;24(4):385-96.
53. van Eck M, Berkhof H, Nicolson N, Sulon J. The effects of perceived stress, traits, mood states, and stressful daily events on salivary cortisol. Psychosom Med. 1996;58(5):447-58.
54. Rijs KJ, van der Pas S, Geuskens GA, Cozijnsen R, Koppes LLJ, van der Beek AJ, et al. Development and Validation of a Physical and Psychosocial Job-Exposure Matrix in Older and Retired Workers. The Annals of Occupational Hygiene. 2014;58(2):152-70.
55. Steyerberg EW. Clinical prediction models : a practical approach to development, validation, and updating. New York: Springer; 2009.
56. Twisk JWR. Introduction to applied biostatistics [Inleiding in de toegepaste biostatistiek]. Amsterdam: Reed Business Education; 2014.
57. EMGO. Prognostic and diagnostic models 2015 [Available from: http://www.emgo.nl/kc/prognostic-models/].
58. Talaga JA, Beehr TA. Are there gender differences in predicting retirement decisions? Journal of Applied Psychology. 1995;80(1):16-28.

59. Pienta AM, Hayward MD. Who Expects to Continue Working After Age 62? The Retirement Plans of Couples. The Journals of Gerontology: Series B. 2002;57(4):S199-S208.
60. Carr E, Murray ET, Zaninotto P, Cadar D, Head J, Stansfeld S, et al. The Association Between Informal Caregiving and Exit From Employment Among Older Workers: Prospective Findings From the UK Household Longitudinal Study. The Journals of Gerontology: Series B. 2016:156
61. Van Houtven CH, Coe NB, Skira MM. The effect of informal care on work and wages. Journal of Health Economics. 2013;32(1):240-52.
62. Derek K, Linda P. When is a carer's employment at risk? Longitudinal analysis of unpaid care and employment in midlife in England. Health & Social Care in the Community. 2013;21(3):303-14.
63. Kubicek B, Korunka C, Hoonakker P, Raymo JM. Work and Family Characteristics as Predictors of Early Retirement in Married Men and Women. Research on Aging. 2010;32(4):467-98.
64. Carr E, Hagger-Johnson G, Head J, Shelton N, Stafford M, Stansfeld S, et al. Working conditions as predictors of retirement intentions and exit from paid employment: a 10-year follow-up of the English Longitudinal Study of Ageing. Eur J Ageing. 2016;13:39-48.
65. van Smeden M, de Groot JAH, Moons KGM, Collins GS, Altman DG, Eijkemans MJC, et al. No rationale for 1 variable per 10 events criterion for binary logistic regression analysis. BMC Medical Research Methodology. 2016;16(1):163.
66. Vittinghoff E, McCulloch CE. Relaxing the Rule of Ten Events per Variable in Logistic and Cox Regression. American Journal of Epidemiology. 2007;165(6):710-8.
67. Steyerberg EW, Harrell FE, Borsboom GJJM, Eijkemans MJC, Vergouwe Y, Habbema JDF. Internal validation of predictive models: Efficiency of some procedures for logistic regression analysis. Journal of Clinical Epidemiology. 2001;54(8):774-81.
68. IBM. Overview (BOOTSTRAP command) 2018 [Available from: https://www.ibm.com/support/knowledgecenter/en/SSLVMB_24.0.0/spss/bootstrapping/syn_bootstrap_overview.html
69. Heymans MW, van Buuren S, Knol DL, van Mechelen W, de Vet HC. Variable selection under multiple imputation using the bootstrap in a prognostic study. BMC Medical Research Methodology. 2007;7(1):33.
70. Plaisier I, Broese van Groenou MI, Keuzenkamp S. Combining work and informal care: the importance of caring organisations. Human Resource Management Journal. 2015;25(2):267-80.
71. Steunenberg B, Twisk JWR, Beekman ATF, Deeg DJH, Kerkhof AJFM. Stability and change of neuroticism in aging. Journal of Gerontology: Psychological Sciences 2005; 60B: P27-P33.
72. Deeg DJH, Huisman M. Cohort differences in 3-year adaptation to health problems among Dutch middle-aged, 1992-1995 and 2002-2005. Eur J Ageing 2010, 7(3): 157-165.
73. Jonker AA, Comijs HC, Knipscheer KC, Deeg DJ. Benefits for elders with vulnerable health from the Chronic Disease Self-management Program (CDSMP) at short and longer term. BMC Geriatr 2015 Aug 15; 15: 101.
74. Netherlands Health Council. Health and extending working life [Gezondheid en langer doorwerken]. The Hague: Health Council, June 26, 2018.

Appendix A

Figure 1. Flowchart of inclusion procedure



Appendix B

Figure 2 Additional analyses

Gender adjusted for age				
Gender	Male	R	R	
	Female	0.691	1.996	**0.020**
Gender adjusted for age + partner has a job				
Gender	Male	R	R	
	Female	0.719	2.053	**0.016**
Gender corrected for age + self-esteem				
Gender	Male	R	R	
	Female	0.636	1.888	**0.038**
Gender adjusted for age + Informal care				
Gender	Male	R	R	
	Female	0.581	1.788	0.058
Gender adjusted for age + education				
Gender	Male	R	R	
	Female	0.614	1.848	**0.043**
Gender adjusted for age + network size				
Gender	Male	R	R	
	Female	0.614	1.849	**0.047**
Gender adjusted for age+education+Informal care + network size				
Gender	Male	R	R	
	Female	0.452	1.571	0.161

OVERZICHT UITGAVEN IN DE DESIGN PAPER SERIE

1 Naar een nieuw pensioencontract (2011)
Lans Bovenberg en Casper van Ewijk

2 Langlevenrisico in collectieve pensioencontracten (2011)
Anja De Waegenaere, Alexander Paulis en Job Stigter

3 Bouwstenen voor nieuwe pensioencontracten en uitdagingen voor het toezicht daarop (2011)
Theo Nijman en Lans Bovenberg

4 European supervision of pension funds: purpose, scope and design (2011)
Niels Kortleve, Wilfried Mulder and Antoon Pelsser

5 Regulating pensions: Why the European Union matters (2011)
Ton van den Brink, Hans van Meerten and Sybe de Vries

6 The design of European supervision of pension funds (2012)
Dirk Broeders, Niels Kortleve, Antoon Pelsser and Jan-Willem Wijckmans

7 Hoe gevoelig is de uittredeleeftijd voor veranderingen in het pensioenstelsel? (2012)
Didier Fouarge, Andries de Grip en Raymond Montizaan

8 De inkomensverdeling en levensverwachting van ouderen (2012)
Marike Knoef, Rob Alessie en Adriaan Kalwij

9 Marktconsistente waardering van zachte pensioenrechten (2012)
Theo Nijman en Bas Werker

10 De RAM in het nieuwe pensioenakkoord (2012)
Frank de Jong en Peter Schotman

11 The longevity risk of the Dutch Actuarial Association's projection model (2012)
Frederik Peters, Wilma Nusselder and Johan Mackenbach

12 Het koppelen van pensioenleeftijd en pensioenaanspraken aan de levensverwachting (2012)
Anja De Waegenaere, Bertrand Melenberg en Tim Boonen

13 Impliciete en expliciete leeftijdsdifferentiatie in pensioencontracten (2013)
Roel Mehlkopf, Jan Bonenkamp, Casper van Ewijk, Harry ter Rele en Ed Westerhout

14 Hoofdlijnen Pensioenakkoord, juridisch begrepen (2013)
Mark Heemskerk, Bas de Jong en René Maatman

15 Different people, different choices: The influence of visual stimuli in communication on pension choice (2013)
Elisabeth Brüggen, Ingrid Rohde and Mijke van den Broeke

16 Herverdeling door pensioenregelingen (2013)
Jan Bonenkamp, Wilma Nusselder, Johan Mackenbach, Frederik Peters en Harry ter Rele

17 Guarantees and habit formation in pension schemes: A critical analysis of the floor-leverage rule (2013)
Frank de Jong and Yang Zhou

18 The holistic balance sheet as a building block in pension fund supervision (2013)
Erwin Fransen, Niels Kortleve, Hans Schumacher, Hans Staring and Jan-Willem Wijckmans

19 Collective pension schemes and individual choice (2013)
Jules van Binsbergen, Dirk Broeders, Myrthe de Jong and Ralph Koijen

20 Building a distribution builder: Design considerations for financial investment and pension decisions (2013)
Bas Donkers, Carlos Lourenço, Daniel Goldstein and Benedict Dellaert

21 Escalerende garantietoezeggingen: een alternatief voor het StAr RAM-contract (2013)
Servaas van Bilsen, Roger Laeven en Theo Nijman
22 A reporting standard for defined contribution pension plans (2013)
Kees de Vaan, Daniele Fano, Herialt Mens and Giovanna Nicodano
23 Op naar actieve pensioenconsumenten: Inhoudelijke kenmerken en randvoorwaarden van effectieve pensioencommunicatie (2013)
Niels Kortleve, Guido Verbaal en Charlotte Kuiper
24 Naar een nieuw deelnemergericht UPO (2013)
Charlotte Kuiper, Arthur van Soest en Cees Dert
25 Measuring retirement savings adequacy; developing a multi-pillar approach in the Netherlands (2013)
Marike Knoef, Jim Been, Rob Alessie, Koen Caminada, Kees Goudswaard, and Adriaan Kalwij
26 Illiquiditeit voor pensioenfondsen en verzekeraars: Rendement versus risico (2014)
Joost Driessen
27 De doorsneesystematiek in aanvullende pensioenregelingen: effecten, alternatieven en transitiepaden (2014)
Jan Bonenkamp, Ryanne Cox en Marcel Lever
28 EIOPA: bevoegdheden en rechtsbescherming (2014)
Ivor Witte
29 Een institutionele beleggersblik op de Nederlandse woningmarkt (2013)
Dirk Brounen en Ronald Mahieu
30 Verzekeraar en het reële pensioencontract (2014)
Jolanda van den Brink, Erik Lutjens en Ivor Witte
31 Pensioen, consumptiebehoeften en ouderenzorg (2014)
Marike Knoef, Arjen Hussem, Arjan Soede en Jochem de Bresser
32 Habit formation: implications for pension plans (2014)
Frank de Jong and Yang Zhou
33 Het Algemeen pensioenfonds en de taakafbakening (2014)
Ivor Witte
34 Intergenerational Risk Trading (2014)
Jiajia Cui and Eduard Ponds
35 Beëindiging van de doorsneesystematiek: juridisch navigeren naar alternatieven (2015)
Dick Boeijen, Mark Heemskerk en René Maatman
36 Purchasing an annuity: now or later? The role of interest rates (2015)
Thijs Markwat, Roderick Molenaar and Juan Carlos Rodriguez
37 Entrepreneurs without wealth? An overview of their portfolio using different data sources for the Netherlands (2015)
Mauro Mastrogiacomo, Yue Li and Rik Dillingh
38 The psychology and economics of reverse mortgage attitudes. Evidence from the Netherlands (2015)
Rik Dillingh, Henriëtte Prast, Mariacristina Rossi and Cesira Urzì Brancati
39 Keuzevrijheid in de uittreedleeftijd (2015)
Arthur van Soest
40 Afschaffing doorsneesystematiek: verkenning van varianten (2015)
Jan Bonenkamp en Marcel Lever
41 Nederlandse pensioenopbouw in internationaal perspectief (2015)
Marike Knoef, Kees Goudswaard, Jim Been en Koen Caminada
42 Intergenerationele risicodeling in collectieve en individuele pensioencontracten (2015)
Jan Bonenkamp, Peter Broer en Ed Westerhout
43 Inflation Experiences of Retirees (2015)
Adriaan Kalwij, Rob Alessie, Jonathan Gardner and Ashik Anwar Ali
44 Financial fairness and conditional indexation (2015)
Torsten Kleinow and Hans Schumacher
45 Lessons from the Swedish occupational pension system (2015)
Lans Bovenberg, Ryanne Cox and Stefan Lundbergh

46 Heldere en harde pensioenrechten onder een PPR (2016)
Mark Heemskerk, René Maatman en Bas Werker

47 Segmentation of pension plan participants: Identifying dimensions of heterogeneity (2016)
Wiebke Eberhardt, Elisabeth Brüggen, Thomas Post and Chantal Hoet

48 How do people spend their time before and after retirement? (2016)
Johannes Binswanger

49 Naar een nieuwe aanpak voor risicoprofielmeting voor deelnemers in pensioenregelingen (2016)
Benedict Dellaert, Bas Donkers, Marc Turlings, Tom Steenkamp en Ed Vermeulen

50 Individueel defined contribution in de uitkeringsfase (2016)
Tom Steenkamp

51 Wat vinden en verwachten Nederlanders van het pensioen? (2016)
Arthur van Soest

52 Do life expectancy projections need to account for the impact of smoking? (2016)
Frederik Peters, Johan Mackenbach en Wilma Nusselder

53 Effecten van gelaagdheid in pensioendocumenten: een gebruikersstudie (2016)
Louise Nell, Leo Lentz en Henk Pander Maat

54 Term Structures with Converging Forward Rates (2016)
Michel Vellekoop and Jan de Kort

55 Participation and choice in funded pension plans (2016)
Manuel García-Huitrón and Eduard Ponds

56 Interest rate models for pension and insurance regulation (2016)
Dirk Broeders, Frank de Jong and Peter Schotman

57 An evaluation of the nFTK (2016)
Lei Shu, Bertrand Melenberg and Hans Schumacher

58 Pensioenen en inkomensongelijkheid onder ouderen in Europa (2016)
Koen Caminada, Kees Goudswaard, Jim Been en Marike Knoef

59 Towards a practical and scientifically sound tool for measuring time and risk preferences in pension savings decisions (2016)
Jan Potters, Arno Riedl and Paul Smeets

60 Save more or retire later? Retirement planning heterogeneity and perceptions of savings adequacy and income constraints (2016)
Ron van Schie, Benedict Dellaert and Bas Donkers

61 Uitstroom van oudere werknemers bij overheid en onderwijs. Selectie uit de poort (2016)
Frank Cörvers en Janneke Wilschut

62 Pension risk preferences. A personalized elicitation method and its impact on asset allocation (2016)
Gosse Alserda, Benedict Dellaert, Laurens Swinkels and Fieke van der Lecq

63 Market-consistent valuation of pension liabilities (2016)
Antoon Pelsser, Ahmad Salahnejhad and Ramon van den Akker

64 Will we repay our debts before retirement? Or did we already, but nobody noticed? (2016)
Mauro Mastrogiacomo

65 Effectieve ondersteuning van zelfmanagement voor de consument (2016)
Peter Lapperre, Alwin Oerlemans en Benedict Dellaert

66 Risk sharing rules for longevity risk: impact and wealth transfers (2017)
Anja De Waegenaere, Bertrand Melenberg and Thijs Markwat

67 Heterogeniteit in doorsneeproblematiek. Hoe pakt de transitie naar degressieve opbouw uit voor verschillende pensioenfondsen? (2017)
Loes Frehen, Wouter van Wel, Casper van Ewijk, Johan Bonekamp, Joost van Valkengoed en Dick Boeijen

68 De toereikendheid van pensioenopbouw na de crisis en pensioenhervormingen (2017)
Marike Knoef, Jim Been, Koen Caminada, Kees Goudswaard en Jason Rhuggenaath

69 De combinatie van betaald en onbetaald werk in de jaren voor pensioen (2017)
Marleen Damman en Hanna van Solinge

70 Default life-cycles for retirement savings (2017)
Anna Grebenchtchikova, Roderick Molenaar, Peter Schotman en Bas Werker

71 Welke keuzemogelijkheden zijn wenselijk vanuit het perspectief van de deelnemer? (2017)
Casper van Ewijk, Roel Mehlkopf, Sara van den Bleeken en Chantal Hoet

72 Activating pension plan participants: investment and assurance frames (2017)
Wiebke Eberhardt, Elisabeth Brüggen, Thomas Post en Chantal Hoet

73 Zerotopia – bounded and unbounded pension adventures (2017)
Samuel Sender

74 Keuzemogelijkheden en maatwerk binnen pensioenregelingen (2017)
Saskia Bakels, Agnes Joseph, Niels Kortleve en Theo Nijman

75 Polderen over het pensioenstelsel. Het debat tussen de sociale partners en de overheid over de oudedagvoorzieningen in Nederland, 1945-2000 (2017)
Paul Brusse

76 Van uitkeringsovereenkomst naar PPR (2017)
Mark Heemskerk, Kees Kamminga, René Maatman en Bas Werker

77 Pensioenresultaat bij degressieve opbouw en progressieve premie (2017)
Marcel Lever en Sander Muns

78 Bestedingsbehoeften bij een afnemende gezondheid na pensionering (2017)
Lieke Kools en Marike Knoef

79 Model Risk in the Pricing of Reverse Mortgage Products (2017)
Anja De Waegenaere, Bertrand Melenberg, Hans Schumacher, Lei Shu and Lieke Werner

80 Expected Shortfall voor toezicht op verzekeraars: is het relevant? (2017)
Tim Boonen

81 The Effect of the Assumed Interest Rate and Smoothing on Variable Annuities (2017)
Anne G. Balter and Bas J.M. Werker

82 Consumer acceptance of online pension investment advice (2017)
Benedict Dellaert, Bas Donkers and Carlos Lourenço

83 Individualized life-cycle investing (2017)
Gréta Oleár, Frank de Jong and Ingmar Minderhoud

84 The value and risk of intergenerational risk sharing (2017)
Bas Werker

85 Pensioenwensen voor en na de crisis (2017)
Jochem de Bresser, Marike Knoef en Lieke Kools

86 Welke vaste dalingen en welk beleggingsbeleid passen bij gewenste uitkeringsprofielen in verbeterde premieregelingen? (2017)
Johan Bonekamp, Lans Bovenberg, Theo Nijman en Bas Werker

87 Inkomens- en vermogensafhankelijke eigen bijdragen in de langdurige ouderenzorg: een levensloopperspectief (2017)
Arjen Hussem, Harry ter Rele en Bram Wouterse

88 Creating good choice environments – Insights from research and industry practice (2017)
Elisabeth Brüggen, Thomas Post and Kimberley van der Heijden

89 Two decades of working beyond age 65 in the Netherlands. Health trends and changes in socio-economic and work factors to determine the feasibility of extending working lives beyond age 65 (2017)
Dorly Deeg, Maaike van der Noordt and Suzan van der Pas

90 Cardiovascular disease in older workers. How can workforce participation be maintained in light of changes over time in determinants of cardiovascular disease? (2017)
Dorly Deeg, E. Burgers and Maaike van der Noordt

91 Zicht op zzp-pensioen (2017)
Wim Zwinkels, Marike Knoef, Jim Been, Koen Caminada en Kees Goudswaard

92 Return, risk, and the preferred mix of PAYG and funded pensions (2017)
Marcel Lever, Thomas Michielsen and Sander Muns

93 Life events and participant engagement in pension plans (2017)
Matthew Blakstad, Elisabeth Brüggen and Thomas Post

94 Parttime pensioneren en de arbeidsparticipatie (2017)
Raymond Montizaan

95 Keuzevrijheid in pensioen: ons brein wil niet kiezen, maar wel gekozen hebben (2018)
Walter Limpens en Joyce Vonken

96 Employability after age 65? Trends over 23 years in life expectancy in good and in poor physical and cognitive health of 65-74-year-olds in the Netherlands (2018)
Dorly Deeg, Maaike van der Noordt, Emiel Hoogendijk, Hannie Comijs and Martijn Huisman

97 Loslaten van de verplichte pensioenleeftijd en het organisatieklimaat rondom langer doorwerken (2018)
Jaap Oude Mulders, Kène Henkens en Harry van Dalen

98 Overgangseffecten bij introductie degressieve opbouw (2018)
Bas Werker

99 You're invited – RSVP! The role of tailoring in incentivising people to delve into their pension situation (2018)
Milena Dinkova, Sanne Elling, Adriaan Kalwij en Leo Lentz

100 Geleidelijke uittreding en de rol van deeltijdpensioen (2018)
Jonneke Bolhaar en Daniël van Vuuren

101 Naar een model voor pensioencommunicatie (2018)
Leo Lentz, Louise Nell en Henk Pander Maat

102 Tien jaar UPO. Een terugblik en vooruitblik op inhoud, doelen en effectiviteit (2018)
Sanne Elling en Leo Lentz

103 Health and household expenditures (2018)
Raun van Ooijen, Jochem de Bresser en Marike Knoef

104 Keuzevrijheid in de uitkeringsfase: internationale ervaringen (2018)
Marcel Lever, Eduard Ponds, Rik Dillingh en Ralph Stevens

105 The move towards riskier pension products in the world's best pension systems (2018)
Anne G. Balter, Malene Kallestrup-Lamb and Jesper Rangvid

106 Life Cycle Option Value: The value of consumer flexibility in planning for retirement (2018)
Sonja Wendel, Benedict Dellaert and Bas Donkers

107 Naar een duidelijk eigendomsbegrip (2018)
Jop Tangelder

108 Effect van stijging AOW-leeftijd op arbeidsongeschiktheid (2018)
Rik Dillingh, Jonneke Bolhaar, Marcel Lever, Harry ter Rele, Lisette Swart en Koen van der Ven

109 Is de toekomst gearriveerd? Data science en individuele keuzemogelijkheden in pensioen (2018)
Wesley Kaufmann, Bastiaan Starink en Bas Werker

110 De woontevredenheid van ouderen in Nederland (2018)
Jan Rouwendal

111 Towards better prediction of individual longevity (2018)
Dorly Deeg, Jan Kardaun, Maaike van der Noordt, Emiel Hoogendijk en Natasja van Schoor

112 Framing in pensioenkeuzes. Het effect van framing in de keuze voor beleggingsprofiel in DC-plannen naar aanleiding van de Wet verbeterde premieregeling (2018)
Marijke van Putten, Rogier Potter van Loon, Marc Turlings en Eric van Dijk

113 Working life expectancy in good and poor self-perceived health among Dutch workers aged 55–65 years with a chronic disease over the period 1992–2016 (2019)
Astrid de Wind, Maaike van der Noordt, Dorly Deeg and Cécile Boot

114 Working conditions in post-retirement jobs: A European comparison (2019)
Ellen Dingemans and Kène Henkens

115 Is additional indebtedness the way to increase mortgage-default insurance coverage? (2019)
Yeorim Kim, Mauro Mastrogiacomo, Stefan Hochguertel and Hans Bloemen

116 Appreciated but complicated pension Choices? Insights from the Swedish Premium Pension System (2019)
Monika Böhnke, Elisabeth Brüggen and Thomas Post

117 Towards integrated personal financial planning. Information barriers and design propositions (2019)
Nitesh Bharosa and Marijn Janssen

118 The effect of tailoring pension information on navigation behavior (2019)
Milena Dinkova, Sanne Elling, Adriaan Kalwij and Leo Lentz

119 Opleiding, levensverwachting en pensioenleeftijd: een vergelijking van Nederland met andere Europese landen (2019)
Johan Mackenbach, José Rubio Valverde en Wilma Nusselder

120 Giving with a warm hand: Evidence on estate planning and bequests (2019)
Eduard Suari-Andreu, Raun van Ooijen, Rob J.M. Alessie and Viola Angelini

121 Investeren in menselijk kapitaal: een gecombineerd werknemers- en werkgeversperspectief (2019)
Raymond Montizaan, Merlin Nieste en Davey Poulissen

122 The rise in life expectancy – corresponding rise in subjective life expectancy? Changes over the period 1999-2016 (2019)
Dorly Deeg, Maaike van der Noordt, Noëlle Sant, Henrike Galenkamp, Fanny Janssen and Martijn Huisman

123 Pensioenaanvullingen uit het eigen woningbezit (2019)
Dirk Brounen, Niels Kortleve en Eduard Ponds

124 Personal and work-related predictors of early exit from paid work among older workers with health limitations (2019)
Nils Plomp, Sascha de Breij and Dorly Deeg

Netspar

Network for Studies on Pensions, Aging and Retirement

This is a publication of:
Netspar
Phone +31 13 466 2109
E-mail info@netspar.nl
www.netspar.nl

June 2019