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Nilsson, Kerstin

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PO Box 117
221 00 Lund
+46 46-222 00 00

Title: Conceptualization of ageing in relation to factors of importance for extending working life – a review

Running head: Ageing, older workers and extended working life

Author:

- Kerstin Nilsson,
- MPH; PhD; PhD:
- Division of Occupational and Environmental Medicine, Lund University, Sweden; Department of Work Science, Economic & Environmental Psychology, Swedish University of Agricultural Sciences, Sweden

Correspondence to: Kerstin Nilsson, Division of Occupational and Environmental Medicine, Lund University, 221 85 Lund, Sweden [E-mail: kerstin.nilsson@med.lu.se]

Conceptualization of ageing in relation to factors of importance for extending working life – a review

Aim: The aim of this study was to explore and understand the complexity of ageing in relation to factors of importance for extending working life. *Method:* Discourse analysis of documents was used in an integrative review including 128 articles. *Result:* Four different conceptualization of ageing are shown affect older workers' ability to extend their working life: i) Biological ageing people's health in relation to their physical and mental work environment, their pace of work and recuperation needs; ii) chronological ageing statutory retirement age and policies and economic incentives devised for older workers by society, union and organisations/enterprises; iii) social ageing inclusion in different social groups, the attitude of managers, organisations and family members, the leisure activities and surrounding environment; and iv) mental/cognitive ageing self-crediting, motivating and meaningful activities, competence and skills in working life. ***Conclusion: Societies today focus mostly on chronological ageing and are looking to increase the retirement age with regard to statutory pension systems, e.g. beyond 65 years of age. The inter-relationships between chronological, mental, biological and social ageing and the nine areas identified as being important to older workers in these respects need to be considered when aiming to provide a sustainable working life for the increasing numbers of older workers in modern society. The theoretical model developed is a contribution to the critical debate that can be applied by societies, employers and managers in order to provide older workers with an inclusive and sustainable extended working life.***

Keywords:

Ageing, older workers, retirement, health, economic, physical and mental work environment, working hours and rest, age management, competence and skills, motivation and work satisfaction, family and leisure pursuits.

Introduction

The ageing population is an important public health area and is widely seen as one of the most significant threats to global wealth because of the potentially profound social, economic and political implications and the strains it imposes on the robustness of welfare systems [1, 2]. The number of people aged 60 and above is currently

increasing by more than two million per year in the Western world, roughly twice the rate observed until about four years ago. Life expectancy at birth today is over 80 years in 33 countries, up from 19 countries in 2005 [3]. The challenges and opportunities posed by this demographic shift are of special interest for sustainable societies and require the implementation of policies to help people stay healthy and active in ageing, as well as in working life.

Societies, organisations and businesses have to understand, manage and care for ageing workers in their extended working life. The main demographic factor that distinguishes older workers from other employees is obviously their age. Previous research has mostly focused on older workers retirement and exit from working life [4-24], with no regard to different meanings of ageing and conceptualizations of ageing. This study wants to take the analysis a step further to fill the knowledge gap and focus on the other side of the coin, i.e. employees' possibility to extend their working life out of different ageing concepts. Chronological age is the most common age definition in the extended working life debate, but it does not influence older workers' productivity as much as their subjective experienced age [10]. Ageing in association with working life has to be more elaborate in light of today's increasingly older workforce in order to maintain a sustainable extended working life [5-8]. Ageing is a complex factor and different conceptualizations of ageing therefore need to be considered in relation to extending working life [4]. To understand the complexity of ageing in working life, it is necessary to examine the connections between different conceptualizations of ageing, or age definitions, and factors of importance for continuing working life.

The overall objective of this study was to explore, explain and understand the complexity of ageing in relation to areas of importance for extending working life, i.e. people's possibility to work in old age. Specific questions were: What affects working life participation in old age? How are different conceptions of ageing connected to older employees' working life participation? A secondary objective was to develop a theoretical model based on the knowledge gained of conceptualizations of ageing, factors important for working life participation and the decision to extend working life. This theoretical model developed comprises a first attempt to organise the findings from interdisciplinary research into an understandable representation of the complexity of ageing and the effects on elderly workers contemplating extending their working life. The intention was to add to the important critical discussion on ageing and on factors important for working in older age. The intention was also that the model could put the agenda a step further to identify obstacles and possible strategies to maintain a sustainable extended working life.

Ageing

A review of the literature identified four specific conceptualizations of ageing that affect workers' possibility to extend their working life. These were: chronological ageing, mental ageing, biological ageing and social ageing [10, 25-35] (Figure 1). An individual is assumed to have several ages at the same time depending on different contexts [35]. Those ages are related, and not entirely distinct from each other. Chronological ageing describes the passage of time and thereby influences the other conceptualizations of ageing. In some of the literature, mental, biological and social ageing are clustered and described as 'functional' or 'subjective' ageing [33;34;10]. However, such clustering was not used in the present analysis.

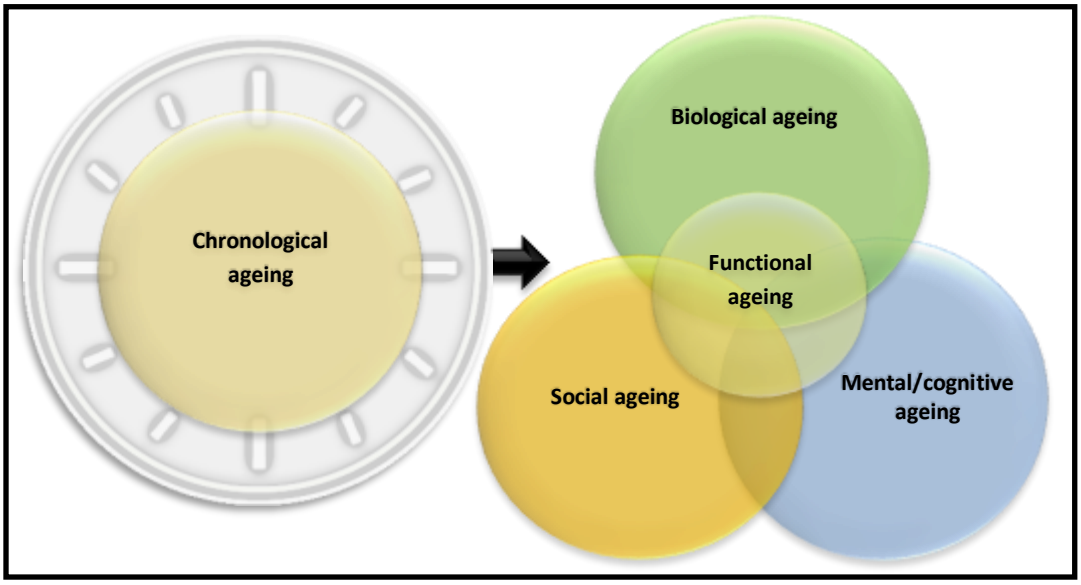

Figure 1. The four different conceptualizations of ageing identified in the literature.

The factors determining whether older workers are able to extend their working lives are complex and involve many different perspectives and research areas [14]. In a sustainable economic approach at the societal macro level, more people need to keep working in order to maintain the welfare system, but the challenge is how to enable and incentivise people to remain in working life until an older age [15, 16]. The productivity of individuals in old age is most important at the meso level, i.e. to organisations and businesses looking at employee retirement. Individuals generally have a different agenda than society and employers [16]. At the micro level, people make the decision to remain in working life or, alternatively, to retire early based on deliberation and weighting of their own situation with respect to four issues [17]: i) Their health and well-being in relation to their work situation, work environment and work pace/recovery time compared with their expected health if they retire; ii) their

personal economic situation in employment compared with in retirement; iii) the opportunities for social inclusion and participation in working life situations in employment, together with workmates, clients, patients, etc. compared with in retirement, where they will have more time together with family and for voluntary work and leisure; and iv) the opportunities for meaningful and self-crediting activities and tasks in working life in relation to their knowledge, experiences and skills compared with the opportunities for meaningful and self-crediting activities they expect in retirement, with more time for leisure and voluntary activities.

Method

The study comprised an integrative review, the broadest of the review methods, which permits inclusion of quantitative and qualitative studies and of theoretical and empirical literature. This type of review considers knowledge about a specific topic and seeks to identify, analyse and synthesise results of independent studies on the same subject [36,37]. An integrative review extracts the ideas and results in the research reviewed, without detailed descriptions of the experimental design, method, participants, etc. in the individual studies. It focuses on critically summarising the analytical results and creating a more complex abstract and theoretical results matrix. Integrative reviews often include creation of a new model or development of a framework for the topic of interest, and employ new ways of conceptualising the research field. The integrative review approach is mostly used in the development of policies and in critical assessment of practical demands and problems in everyday life.

The aim of the present review was not to examine all the many studies that exist on the subject ageing and older workers in extended working life. Rather, it was to identify different factors affecting people's possibility to work in old age and measures that societies and employers should take to understand, manage and support these older workers. The interdisciplinary research performed to date in this subject area includes qualitative, quantitative and intervention studies, which it was possible to combine within the integrative review design. The review was therefore selective rather than exhaustive in order to include studies on all the different aspects of ageing and older workers' possibilities to extend their working life. This approach matched the aims of the study, i.e. creation of a theoretical framework and model.

Literature search method

The literature search was performed in different steps and was carried out by a specialist librarian at Lund University library. In the first step, an electronic search was performed in the scientific databases Medline,

PubMed, Scopus, Science Direct, Web of Knowledge, Cochran Library and Google Scholar. In the second step, a search was performed in the Swedish library database LIBRIS and Lund University library database. In the third step, a special search was performed for reports published in 2003 and later by the Organisation for Economic Co-operation and Development (OECD), the World Health Organisation (WHO), the World Economic Forum (WEF) and the European Union (EU). Selection of papers for review was performed based on inclusion and exclusion criteria (Table 1). The study was restricted to older workers, worker ageing and factors affecting the possibility for workers to extend their working life. However, this research field is close to the retirement research field, and in order to capture the situation of older workers the search therefore also included studies and theories about retirement intentions, retirement decisions, bridge employment and the situation of the newly retired. The keywords used in various combination were: “age”, “ageing”, “work”, “older worker”, “older employees”, “retirement”, and “extended working life”. Different combinations of the keywords were used in the search, as well as truncation and search words such as “AND” and “OR”. Articles published in 2003 or later were preferred in the search, because socio-economic trends, labour force structure, population structure, social structure, forms and process of retirement, etc. change over time. Because of this the study is limited to sources from 2003 or later. However, some older publications that were frequently cited in the selected publications were included. The results of the search included reports, working papers, scientific publications, book chapters and internet publications. After reading titles and abstracts, many of these were rejected based on the inclusion criteria and because of duplication. The final sample consisted of 298 documents with a title and abstract of relevance to the research questions and which met the inclusion criteria. However, after reading the actual documents some were rejected based on the inclusion criteria, so the final sample consisted of 128 documents.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	**Exclusion criteria**
Papers including research, analysis or theoretical framework	Not a scientific paper or scientific report
Located in a search for the keywords: “age”, “ageing”, “old”, “older”, “work”, “worker”, “employees”, “employment”,	Studies, reports, analyses or theoretical frameworks that did not include an age perspective or mention older people’s work and

“retirement” and “extended working life”	employment situations, working life and work environment.
Studies with a quantitative, qualitative or intervention design	Small sample sizes, low response rates or weak design
Strategy document included the perspective on older workers at the macro, meso or micro level	
Publication in English or Nordic language	

Analysis methods

The selected papers were analysed in order to get a better understanding of the process of ageing, factors determining work life participation in old age and factors affecting decisions on extending working life. The discourse on ageing and factors affecting work life participation influence older people’s possibility to extend their working life. Discourse analysis was used to evaluate the results in the 128 documents analysed and to distinguish different types of discursive practice on ageing and on factors of importance for working in old age [38,39]. In the study ‘work’ refers to occupational work, while ‘retirement’ refers to the final ending of occupational work. Discourse analysis was used to research and understand how ageing in work is related to older workers and early retirees. The analysis was performed in different steps. In the first step the analysis evaluated different factors from the reviewed studies important to work life participation. The description of factors is important for working life participation. Those factors were sorted into different areas in the analysis. Finally, the factors associated with work life participation in the selected papers were sorted into nine areas.

In the second step of the analysis, these nine areas were analysed in regard to the different conceptualizations of ageing identified. The results of this analysis were used to construct a theoretical model of the connection between ageing and factors of importance for extending working life. This third step of the analysis also examined possible connections between different conceptualizations of ageing and related factors of importance for working in an older age and for older workers’ deliberations and decision to extend their working life. Therefore, in the fourth step the model was analysed together with findings from an earlier discourse analysis on older workers’ deliberations and their decision to extend their working life or retire [17]. That analysis stated that older workers rational consideration and weighting in their decision to work, or not to work, in an extended working life. Four

themes appeared in that analysis: (i) personal health and well-being; (ii) personal finances; (iii) possibilities for social inclusion; and (iv) possibilities for self-crediting by meaningful activities. One or all four themes were described as the final reason for remaining in working life or retiring from occupational work.

The final analysis result organise a theoretical model of the relationship between the different conceptualizations of ageing and the nine factors identified as important in the decision to participate in working life and extend working life.

Results

A close scrutiny of the selected literature identified factors and sorted those into nine specific areas that are central to older workers' participation in working life. These were: Health (26); economic incentives (22); family, leisure and surrounding society (16); physical work environment (26); mental work environment (16); work pace and working hours (19); competence and skills (16); motivation and work satisfaction (28); and the attitude of managers and organisation to older workers (25) (Figure 2). The number of papers that described these factors is given in brackets above to each of the identified areas. Some of the papers described more than one of the areas and is therefore included in more than one area.

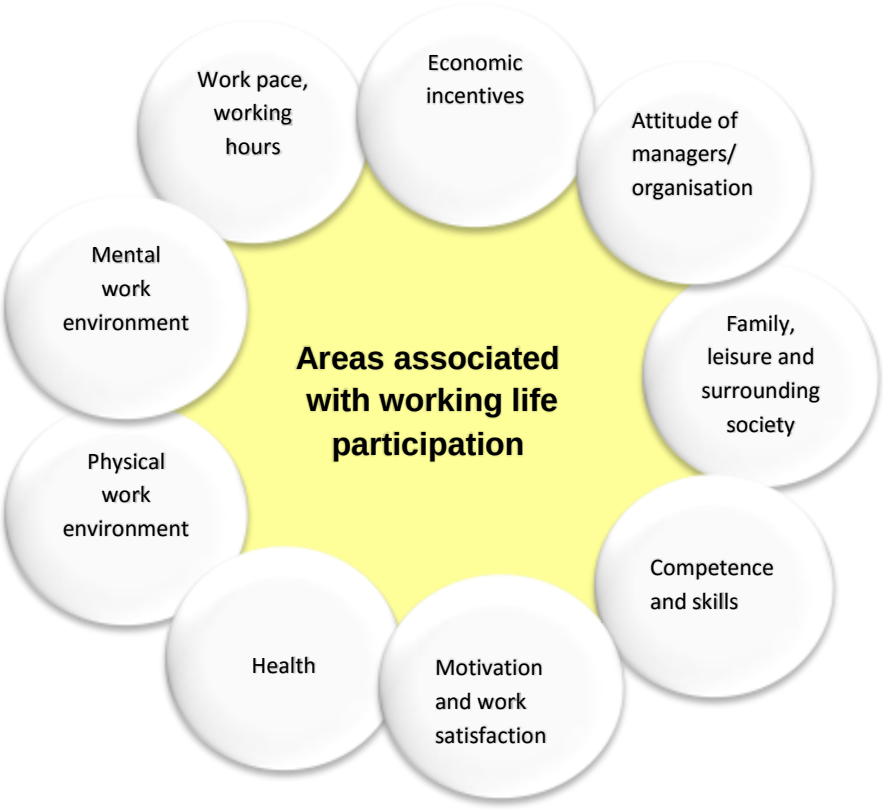

Figure 2. The nine areas identified as being central to older workers' participation in working life.

The relative influence of these nine areas relating to older workers and to extending working life for the four different conceptualizations of ageing (biological, chronological, social, and mental/cognitive) was then analysed. The findings are presented below.

Biological ageing and areas important for extending working life participation

Four of the nine areas were identified as being important for biological ageing. These were: health; physical work environment; mental work environment; and work pace and working hours.

Health

Health is a major factor for the ability of older people to participate in working life and is a key determinant of extended working life [18-24, 40-46]. Although health deteriorates and illnesses increase as people get older, the variation between individuals is enormous [28, 47, 48]. Biological ageing affects anatomy and physiology in different ways, but the interaction between the brain, sensory organs, locomotive organs and circulatory organs decreases in all people from 40 years of age. In addition, physiological degeneration contributes to decreases in hearing and eyesight and increases in reaction times. The prevalence of chronic pain also seems to increase with age [49]. One reason for older people being more likely to suffer decreased health is their longer exposure to the work environment and the impact of lifestyle choices over time. It has also been suggested that work-related exhaustion is associated with an accelerated rate of biological ageing and a shortening of telomere length [50]. However, other research shows that mortality rates are not affected by early or later retirement from working life when adjustments are made for diagnoses [51]. One study found it difficult to confirm whether it was the change in activity following retirement that increased mortality rates, or whether it was a health-associated selection bias of the early retired [52]. In another study, physical functioning was seen to decline to some extent regardless of whether older civil servants continued working or retired [53].

Disease and current ill health, as well as a desire for better health, can be arguments to retire early or go on working [54]. However, retirement can be both beneficial and detrimental to the individual's health. For some, it improves health; for others, health deteriorates after retirement [55]. Ill health gives both the individual and the

organisation an accepted way out from work and can also be a way to rest, so that the individual does not become worn out prematurely. However, people who enjoy their work seem to play down their health problems and work longer, whereas those who dislike their work exaggerate their health problems and retire earlier [17, 56]. Health is not a common predictor of early retirement in countries with in average earlier statutory retirement age [20].

Better environmental circumstances, e.g. lifestyle factors, training and an improved (work) environment, could improve health and delay biological ageing. In all older individuals, but especially those with chronic diseases, a healthy lifestyle incorporating physical, mental and social activities prevents further declines in health capacity and work ability [23, 24]. High levels of wellbeing, gratification and quality of life also seem to promote the experience of better health, i.e. self-rated health, among older people.

Physical work environment

Remaining in work in old age does not appear to be problematic in itself if the circumstances are good. Productivity is reported to increase until people reach 50-55 years of age and in general declines very slightly thereafter [9]. However, injury and musculoskeletal disorders increase biological ageing and are predictors of if people could go on working. Improvements in physical working conditions could significantly facilitate and prolong working life [57]. Poor physical work environments or badly-designed and demanding work conditions leave people worn out; as a result, they retire earlier [4;11;12;23;40-44;47;50;51;55;56;58-63]. Work capacity decreases with increased age among individuals in physically demanding work environments and among those with little control over their work [61]. Ageing workers seem to be at a higher risk of injuries in demanding work environments than younger workers due to their tendency to use older equipment, together with decreased hearing, longer reaction times and problems adapting to new situations [62]. In addition, any injuries incurred by older workers appear to be much more severe due to the longer recovery time [64-66]. However, it has been found that, although older workers have more serious workplace injuries, they have fewer injuries and less sickness than younger workers [67].

The variation in the most common types of occupations in a particular country partly explains the variation in general retirement age between countries, as well as different work circumstances given the same occupations in different countries [59]. Health problems also appear to vary systematically according to type of occupation and accumulate over the individual's lifetime [68]. Blue-collar workers with decreased work ability in middle life tend to experience an accelerated decline in health and functioning which remains evident in old age [57]. In addition, there is a tendency among those with only a basic education to remain in the same occupation throughout working life, despite demanding working conditions and the fact that their physical capacity decreases with age. In one

study, the difference in work-related health problems remained stable at older age after retirement [68]. However, another study reported that health among those who had experienced a poor work environment and multiple health complaints before retirement seemed to improve after retirement [69].

Mental work environment

Participation in work can significantly boost health in old age. One study reported that older participants with a happy working life often display better mental and physical health than pensioners of similar age [70]. Being happy with work and one's profession and being appreciated at work are very important to perceptions of good health and to actual long-term health [45]. That is also important for biological aging and in making people feel younger [10]. A good mental work environment, better control over life and higher education predict successful ageing at 70 years and beyond [71]. A sustainable working life is reported to be characterised by dialogue, communication, participation, a sense of coherence, clarity, confidence and control over one's work [72].

The mental work environment can, however, be demanding and increase early retirement. Work-related stress and mental disorders often push people into early retirement [17, 31, 73, 60, 62]. A poor mental work environment (including stress, unclear targets, absence of information, lack of inclusion in a working group, and bullying and scapegoating) is detrimental to health and increases the risk of early retirement [72, 74, 75]. Work-related stress, anxiety and pain are also independently associated with general sleep problems. In one Swedish study, nearly one-third of healthcare professionals and nearly half of psychiatric nursing assistants described their work as being too mentally demanding to continue beyond retirement age [76]. Self-perceived health seems to improve after retirement among those with high demands, low satisfaction, a poor mental work environment or a low occupational grade [55, 77, 78].

Working hours, work pace and rest

Many studies have shown that older workers appear to need more rest time, a moderate pace of work and limited working hours to maintain good health [19, 23, 46, 70, 79, 80]. Fatigue and the need for a decreased work pace and for rest increase in general with biological ageing and chronic health problems. In an intervention program increased the average retirement age then employees from the age of 58 could reduce their working time with 20 percent [13]. Other findings were that sick leave decreased for older workers, leading to an increase in productivity and profitability for the company. However, chronic health problems are not closely associated with decreased working hours among older workers who can adjust their own work [81]. Reducing working hours with increased

age and gradual retirement, rather than an abrupt end to working life, are also described as being better for health because this allows time for people to make changes to their lifestyle [82]. Having control over the timing and manner of retirement makes it easier to plan the life change. It also has a positive impact on mental and social wellbeing that persists after retirement [82, 83].

It has been reported that sleep becomes more fragmented with age and that shift work increases health problems and work-related accidents in old age [84]. Rest and sleep problems affect memory and cognitive functions [85]. Sleep deprivation and sleep disturbance can affect people's cognition and concentration and increase the risk of accidents, e.g. many work-related accidents and traffic accidents are caused by fatigue and sleep disturbance [86-88]. A study with 14,714 participants provided strong evidence that retirement causes a substantial and sustained decrease in sleep disturbance and concluded that this positive outcome results from the elimination of work-related stress [89]. Other studies have also found that mental fatigue and insomnia decrease after retirement [90-92].

Summary of biological ageing and areas important for extending working life participation

Biological ageing depends on genetic heritage, on the telomere length at the end of each chromosome in the cells of the body, but it is also affected by lifestyle, injuries and diseases and illnesses suffered during (working) life [25-27]. Summarising the results in the literature, it can be stated that biological ageing affects extended working life based on the individual's health, their physical and mental work environment and the pace and duration of their work. These four factors relation to biological ageing is the same as the first consideration of older workers in their decision to extend working life or retire. Biological ageing is on the individual micro level. However it is affected by environmental and health determinant factors on the societies macro level and organisations meso level.

Chronological ageing and factors important for extending working life participation

One of the nine areas was identified as being important for chronological ageing. This was: economic incentives.

Economic incentives

Social security and pension benefits, which affect personal finances, are determined by chronological age and are often used by society to regulate extended working life and retirement planning [21, 58, 95-99]. The social

insurance system and retirement system vary significantly between countries. Personal finances and retirement incentives can be used either to keep employees in the workforce through the threat of poverty or pull them into retirement by making it possible for them to stop working through economic wellbeing [18, 20, 22, 42, 56, 93-96]. The decision to extend working life is not always voluntary, as it may be affected by the individual's financial circumstances [17]. However, socio-economic status also affects the individual's odds of successful ageing [97]. Indeed, some studies show that financial hardship affects the risk of mortality among older adults [98]. On the other hand, personal economic stability gives better self-rated health; older people with low socio-economic status show an improvement in self-rated health when non-contributory pensions are increased [99].

Economic analysis often considers incentive/disincentive trade-offs such as pull factors at the individual level of the social insurance system. One study found that if the benefits programme is equal or more beneficial than work, the individual is voluntarily pulled out of working life [100]. Another study found that workers who disliked their work and were more optimistic in their expectations of enjoying future retirement made greater financial sacrifices to retire early [101]. Income and wealth seem to influence work and retirement decisions, mostly among men and unmarried women, but not as much among married women [73]. The self-employed have particular opportunities to adjust their tasks and productive activities to their functional age, which gives them the option to continue paid or unpaid work on their own terms [17]. The transfer of firms and properties to the next generation is another factor unique to the self-employed; they often adjust their retirement to the takeover needs of the next generation. Financial incentives are not the primary force motivating people to work. It is much better for older people's health if they continue working because they want to, and not because there is no economic alternative [102, 103].

Summary of chronological ageing and factors important for extending working life participation

Chronological ageing emerged as the mostly common conceptualization of ageing in a search using the words: "ageing", "older worker", "older employees", "retirement", and "extended working life". However, the present analysis revealed that only older workers' personal financial circumstances seems to relate to chronological ageing. Society's macro level view of ageing and the statutory retirement system and economic incentives are mostly based on chronological age. Other factors based on chronological age at the organisational meso level also affect the ability to work in old age, such as organisational policies and the occupational pension. Chronological ageing in terms of its effect on personal finances seems to be similar as the factors in the second consideration of older workers deciding whether to extend working life or retire.

Social ageing and factors important for extending working life

Two of the nine factors were identified as being important for social ageing. These were: attitude of managers and organisations and the experience of joining family, leisure and surrounding society.

Attitude of managers and organisations

Social ageing concerns the attitude in a culture and society to individuals in different phases and stages of life [34]. The attitude and support given by employers to ageing and elderly workers has been shown to be one of the most important factors in their ability to continue working [11-13]. Age is sometimes considered a legitimate reason to refuse to employ or to terminate employment [104]. A negative attitude to older workers and a stereotypical picture of older workers as e.g. stagnant and as an encumbrance pushes people out of working life early [22, 71, 76, 80, 98, 105]. Other forms of discrimination, based on gender, disability and ethnic differences, also affect the attitudes of managers and organisations to older workers. Employers' approach to retaining older workers determines whether older workers will have an opportunity to extend working life [17, 58, 105, 106]. Lack of interest in older workers on the part of the organisation and management can lead to increased bitterness with life and a desire for early retirement [107]. One study has shown that poor managerial support is associated with both lower work ability and greater reluctance to continue working until 65 years of age [108]. Due to professional status and occupational opportunities, different occupations seem to provide different degrees of incentive to continue working life [76, 109]. Older workers pushed into retirement as a result of market forces experience lower wellbeing than those who retire for other reasons [83, 110].

Where the employer has a positive attitude regarding older workers as wise elders and valuing their experience and knowledge, remaining in the workforce becomes more attractive [23, 71, 80, 111]. However, even though many employers and organisations agree that the growth in the number of older people and the decrease in the working age population create significant challenges, few organisations take any practical steps to increase the chances of older employees extending their working life [112]. In a study of municipal managers, only 41 per cent stated that it was important to retain employees until 65 years of age, and only 14 per cent thought it important to retain employees older than 66 years of age [105]. Managers' own senior career plans influence their attitudes towards extending the careers of their older workers, together with budgets and demands on efficiency [113].

Categorisations and discussions about homogeneous groups, e.g. a certain age range, can easily lead to generalisations and stereotyping [114]. Age discrimination has significant associations with early retirement,

especially for men [115]. However, age discrimination appears to be more common for women. For example, an English study found that managers described their female employees as older workers when they were 48 years of age, while male employees were not considered to be older workers until they were 51 [105].

Family, leisure and surrounding society

Work occupies a great part of people's waking time and affects their family life and leisure pursuits. Individuals' social ageing enters a different phase when individuals retire and leave working life. Retirement is described as a major turning point in life, which requires preparation by the individual and by their marital or civil partner [116]. Marital status influences individuals to extend working life or retire both in cases where the life partner continues to work and where the older partner wants to spend more time with relatives or in leisure pursuits [17, 21, 31, 106, 117, 118]. Many couples plan their retirement together; people are less likely to continue working if their partner has already retired and vice versa [119]. Being happily married has a strong positive influence on retirement, as couples look forward to spending more time together [120, 121]. However, couples individually and jointly reported to be most satisfied after retirement are those in which the female partner was not influenced by their male partner to retire [122]. Other studies have found that not having a partner can contribute to an extended working life, because leisure time is otherwise too long and sometimes the opportunities for social inclusion are better at work for those living alone [17]. On the other hand, not having a partner can contribute to a lower interest in economic incentives for extended working life, especially among men [95].

The normal age for retirement and the prevailing attitude to retirement in an individual's circle of friends affects their attitude to retirement and retirement planning [31, 117, 118]. Having dependents in the household, regardless of whether these are children, elderly parents or an ill partner, also influences retirement among women. Some people describe work as being antagonistic to leisure activities and this perceived obstacle is a reason for early retirement [17]. On the other hand, a study of 28,780 people in 18 occupations from 27 European countries showed that those aged 50 years and older found it easier to balance their working hours with family and social commitments than younger workers in all occupations surveyed [123]. If work interacts with leisure activities and family commitments, retirement may be delayed [106].

Voluntary work and activities are important for health and wellbeing and can prevent mental disorders [124]. A combination of paid work and volunteering reduced the rate of mental health decline in later life. Participation and personal development in leisure activities increase wellbeing for older people, while voluntary work can act as a substitute for previous paid employment to maintain feelings of meaningfulness, usefulness and productivity [17].

Unfortunately, those pushed into retirement do not appear to be as likely to take up a new activity as those who retire voluntarily [121].

Summary of social ageing and factors important for extending working life participation

Social ageing relates to social inclusion, expectations and a sense of identity within different social positions through the different phases and stages of life, e.g. childhood, teenage, working age, retirement age, old age. Older workers' social ageing affects their possibility of social inclusion in different groups in society. Social ageing, determined by the attitudes of managers and organisations and family, leisure and surrounding society, seems to be the same as the third consideration in older workers' decision to extend working life. The attitudes at the societal macro level and organisational meso level affect the older employees' experience of their social age and whether they feel included in the social group of workers, or in the social group of retired people.

Mental/cognitive ageing and factors important for extending working life participation

Two of the nine factors were identified as being important for mental/cognitive ageing. These were: competence and skills and motivation and work satisfaction.

Competence and skills

Mental/cognitive ageing affects how people learn and may also increase wisdom after a long life of experience. Level of education, competence and the opportunity to develop and use new skills are significant factors in older workers extending their working life [23, 125, 126]. Highly-educated workers have better self-rated health and their health does not decline as fast with increased age as that of the less well-educated worker [127]. Highly-educated men are more likely to continue working and to work part-time, even after 70 years of age [128]. On the other hand, older people with health problems, the "wrong" education and low competence and skills seem to be pushed out of the labour market due to technological developments, increased competition and organisational trends [100]. Health is affected negatively on retirement because an individual's skills are no longer required, especially among men [83].

The ability to detect emotional information quickly, general knowledge and unconscious learning ability decline only slightly or even improve with increasing age. The natural decrease in cognitive and physical capacity is often compensated for by increased experience, knowledge and wisdom in older workers [29]. Furthermore, if older

individuals receive new information connected to their former experience and knowledge, their capacity to use the new information is better than that of younger individuals. A study on judges found that older workers had better qualitative performance in their work, although poorer quantitative performance, than younger workers [30].

Old age in itself does not appear to lessen an individual's ability to learn new things and to perform working tasks. However, speed, reaction time, focusing on important information, ignoring irrelevant information and the cognitive procedure of information processing take longer as biological age increases [28, 29, 131]. Age-related declines in cognitive abilities such as memory and reasoning can be predicted by cardiovascular disease and physical abilities such as walking and balance [129]. It is not impossible to learn new skills in old age; the ability to do so is mostly determined by the individual's belief in his or her own potential to absorb new knowledge. Fear, stress and exhaustion about learning new things, e.g. computer techniques, are an acknowledged reason for early retirement or an extended working life. If information is presented in a new way, it takes a longer time for older individuals to cognitively structure and organise the information and therefore to learn and react [28, 30]. To make learning new information easier and stress-free for older individuals, it is important to develop learning methods that are appropriate and that connect with former life experience [30, 129]. Obstacles to new learning can be solved easily with continuing education, learning by doing and periodic breaks.

Motivation and work satisfaction

Cognitive activities with motivating and problem-solving tasks are important to mental/cognitive ageing. Being given the possibility for self-crediting and meaningful tasks and using experiences, knowledge and education in work increase work motivation and work satisfaction [20, 22, 31, 45 80]. Work satisfaction and receiving attention in the workplace are also important indicators for an extended working life. Purposeful activities and an engagement with life and society lead to feelings of being valued, which increases successful mental/cognitive ageing [107]. Individuals who are tired of work, who have no work motivation or ability to keep working, are more likely to retire early [17, 100, 102, 130]. The attitude of managers and organisations to older workers also has a significant impact on their motivation to extend working life [17, 31, 71, 105]. People are reported to continue working because they are committed to their organisation and attached to their work [131]. People in their sixties who see work as an important part of life are more willing to work beyond 65 years of age [17, 31, 102]. Individuals with high socio-economic status and high status at work who retire early show decreased mental health after retirement, especially men. This is probably because retirement decreases their status and life satisfaction [132, 133]. Furthermore, those who participate in working life at an older age often perceive themselves to have better

mental and physical health than those without meaningful tasks [70, 107]. Bridging employment, i.e. (part-time) employment after retirement from a full-time position, has been related to both retirement satisfaction and overall life satisfaction [134, 135]. One study indicated that older employees with longer time horizons and longer expectations of life have a preference to extend working life [136]. In addition, early dissatisfaction, been bought up in a problem family, dropping out of school or poor mental health earlier in life result in a greater risk for early retirement [132, 137].

The possibility for ongoing knowledge development and cognitive stimulation, e.g. by participating in new projects despite old age, increase the possibility to a successful mental/cognitive ageing [28, 29, 45, 75, 79]. That also increases the productivity among older workers [10].

Summary of mental/cognitive ageing and factors important for extending working life participation

Mental or cognitive ageing refers to individuals' mental/cognitive development throughout their life and includes cognitive aspects of learning, knowledge, knowhow and memory. Mental/cognitive ageing and the associated factors of competence and skills and the possibility of motivating and meaningful activities in work are the fourth consideration in older workers' decision to extend their working life. The individuals' mental/cognitive ageing is affected by their genes, lifestyle and diseases, i.e. at the individual micro level. However, it also affects the possibilities/facilities, stimulation, motivation and trust to learn new things that is performed at the organisational meso level and the societal macro level.

Discussion

The obvious factor that differentiates older workers from other employees is their chronological age. Most of the current initiatives to increase work life participation to a higher age are based on chronological ageing. However, research has shown that chronological ageing is not necessarily the most important factor for older workers deciding to retire/continue their working life [4-12, 31]. Older workers and extension of working life therefore need to be considered in terms of other conceptualizations of ageing to make it more sustainable. This study reviewed, analysed and categorised the relevant literature in order to understand the complexity of employee ageing in relation to factors affecting work participation, i.e. people's possibility to work in old age. The review identified four conceptualizations of ageing and nine areas of importance to work life participation in old age. In light of the increasing numbers of older workers and the need to create a more sustainable extended working life, it is essential to consider the associations between the nine areas identified and different conceptualizations of

ageing, in order to understand the unique situation of older workers and their desires and ability to extend their working life.

The analysis stated that biological ageing affects people's health in relation to their physical and mental work environment and their pace and duration of work. To make an extended working life more sustainable in regards to biological ageing the physically demanding work environment, such as risks of injuries and wearing out, and mental work environment demands, such as stress and threats, need to be considered. Additionally, the working time and working pace need to be adapted for the increased need of recovery and rest that is associated with increased biological aging. It was also found in the analysis that social ageing is affected by the attitude of managers and organisations, family members, leisure activities and the social environment. In order to make an extended working life more sustainable it is important that the organisation, managers and work mates do not exclude or discriminate the older employees due to their age. Instead, it is important to maintain social inclusion and support in the working group and from the colleagues. To take advantage of and pay attention to the older employees important human experience capital in the organisation affects the experience of being a part of the work force instead of being regarded as a person moving on to retirement. However, it is also important to make it possible for the older employees to develop their social life outside working life, and to make the extended working life possible to adapt to their social ageing situation in association to family, friends and leisure activities. Another factor found in the analysis was that mental/cognitive ageing is affected by self-crediting, motivating and meaningful activities, competences and skills. To make an extended working life more sustainable, the organisations and managers need to provide for employees ongoing competence development. The pedagogics need to be suited and adapted to older employees' changed manner to learn new things. A possibility is that tasks and work activities that are self-crediting and motivating make the extended working life a meaningful and important part of older individuals' existence. This also contributes to a positive effect in older employees' mental/cognitive ageing. Finally, the analysis stated that chronological ageing determines statutory retirement age and is affected by policies and economic incentives devised for older workers by society and organisations/enterprises. To make an extended working life more sustainable, the policy makers need to consider not only the chronological ageing and delay the retirement age, but also consider how to adapt strategies for the other ageing concepts as described above.

These results were organised in a theoretical model that includes: the four different conceptualizations of ageing; the nine factors of importance for working life; and their relation to older workers' decision to extend their working life or retire (Figure 3). Employees' biological ageing is important to consider because adequate

individual health and well-being in association with their work situation (work pace, time, and environment) are the most decisive factors for all work life participation and are older employees' first considerations when deciding whether to extend their working life or retire [17]. Employees' chronological ageing involves statutory retirement age, social insurance, policies and economic incentives in working life and society. Adequate personal finances, providing for a living, food and essential factors, are the second consideration for extended working life [17]. It therefore appears that biological and chronological ageing are the most important to work life participation in an older age. However, there are also important motivation factors in order to extend working life in the third and fourth considerations, based on the possibility for social inclusion/participation in an inspiring work situation and for motivating and stimulating activities and tasks based on the individuals' knowledge [17]. These further conceptualizations of ageing need to be carefully considered for a sustainable extended working life [4-8, 10-12, 14, 15, 31].

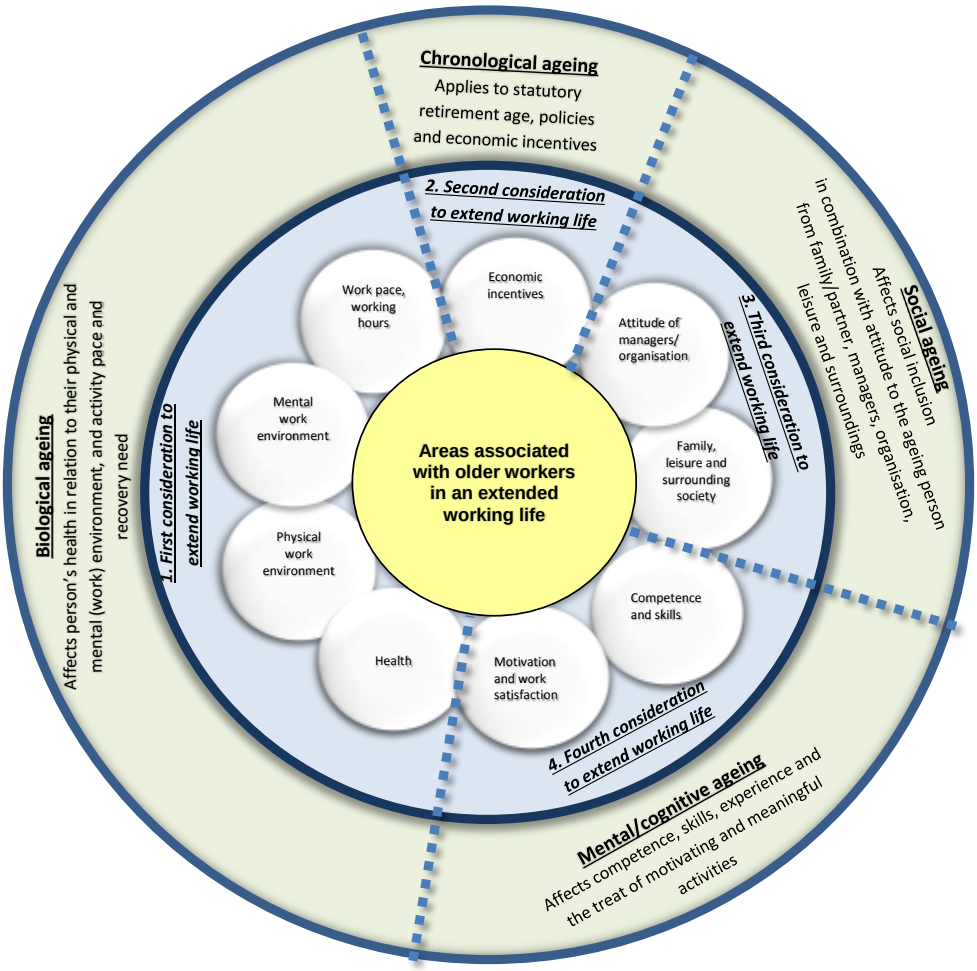

Figure 3. Theoretical model of the relationship between the different conceptualizations of ageing, the nine factors identified as important to participation in working life, and the four resulting considerations in the decision to extend working life or retire.

The aim to postpone retirement age and to motivate older workers to extend their working lives is on the agenda in many societies [1-3]. As shown in this review, research in this area is multidimensional, interdisciplinary and complex, and there are no watertight bulkheads between the four segments in the model. However, this theoretical model could be a desirable tool for e.g. managers, policy makers, occupational health care and HR-personnel when discussing the complexity of ageing in working life. The situation of older workers is unique in relation to that of other age groups, although ageing is individual and therefore also unique to each person. Explaining and understanding the complexity requires definitions of ageing that match areas in different contexts for older workers. Today, most initiatives to extend working life are based on chronological ageing and, as this review has shown, those initiatives mostly concern personal finances, i.e. only one of the four considerations in the decision to extend working life and only one of the nine factors of importance to work life participation. Each of the nine factors associated with different conceptualizations of ageing in the theoretical model needs to be taken into practical account when developing sustainable interventions to promote healthy extended working life. Further research is needed to test the robustness of the theoretical model and framework presented in this study, which are intended to aid a practical approach at the societal level and the employer level. More research is also needed in order to develop policies and sustainable interventions promoting older workers and extended working life. In ongoing and future research, this theoretical model is intended being used to design different research projects and intervention actions.

Limitations

This review aimed to explore, explain and understand the complexity of employee ageing in relation to making working life sustainable for the ageing population. However, there could be some limitations. Extending working life is a complex subject requiring multidisciplinary research techniques. This integrative review included quantitative, qualitative and intervention studies, as well as studies with various samples and degrees of evidence. That could have led to bias in the conclusions, because the relative significance of the selected documents was not compared. It is also possible that the review excluded some important studies in the search and selection process based on the inclusion and exclusion criteria set. Other authors might have included or excluded some other papers.

Some individuals with diseases and demanding accidents cannot work anymore and therefore leave working life, i.e. do not work until an older age, and this could give a selection problem in different studies. The included studies in this review had a study population of older employees, and they could be affected by the selection bias "healthy worker effect". However, all studies have older employees as study population, i.e. the same selection bias problem, and internal comparison is reported to be one of the most effective ways of reduce the healthy worker effect [138]. Furthermore, this review specified nine different areas affecting ongoing work life participation in an older age. The effect of those nine areas could therefore instead be an indication on the complexity of the "healthy worker effect" that needs to be analysed further in a new study.

Another factor that could have affected the results was the decision to use the concepts of chronological, biological, mental and social ageing. If the analysis had instead used the clustered ageing concept "functional ageing", which combines mental, biological and social ageing (see Figure 1), eight of the nine factors, i.e. except personal finances, would refers to functional ageing. Not using a clustered approach such as functional ageing or subjective ageing seemed therefore to give higher definition in the analysis and an improved theoretical model.

Gender is important for extended working life and statistics from most countries show that in general, more men than women extend their working life. Gender is only briefly mentioned in this review, regarding attitude of managers and organisations and disability and ethnicity effects on extended working life. Many of the nine factors are affected by gender differences, but not in relation to ageing. For example, the retirement system differs between men and women in some countries, men and women may have different occupations with different work environments and trade union conditions, and the family situation and cultural attitudes to working women may differ. However, this study focused on the dimensions of ageing and factors of importance to work life participation and extended working life, so a specific gender analysis was not performed.

Despite these limitations, the results presented and the theoretical model can hopefully contribute to a critical discussion and a better understanding of the complexity of employee ageing in relation to a sustainable extended working life for the ageing population.

Conclusions

Society's macro level view of ageing is mostly based on chronological age. The attitude at the society's macro level and organisational meso level affects the older employees' experience of their social age. Individuals' genes, lifestyle and diseases affect their biological and mental/cognitive ageing. However, those ageing conceptualizations are also affected by different health determinants, environment, the possibilities/ facilities,

attitudes and trust performed at the organisational meso level and the societal macro level. Therefore it is important to change attitudes on the macro and meso level and include more ageing concepts in working life in order to enable more individuals to extend their working life in the future.

The theoretical model in this study lists four conceptualizations of ageing and describes how these are connected with older workers' possibility to extend their working life. Ageing affects many aspects of people's lives and involves multidimensional contexts in relation to the possibility for extended working life. Societies today focus mostly on chronological ageing and are looking to increase the retirement age with regard to statutory pension systems, e.g. beyond 65 years of age. However, ageing is not solely a matter of chronological age, but also includes dimensions of mental/cognitive, biological and social ageing. Ageing in working life is determined by e.g. genetic heritage, damage incurred during life, lifestyle, diseases and illnesses, injuries, social and family circumstances, attitudes, possibility to develop, stimulating tasks, learning and cognition, etc. Thus if societies want people to work in older age, they must consider these factors.

This study developed a theoretical model on how conceptualizations of ageing relate to nine areas identified as important for work life participation and extended working life. This model could be a useful tool for e.g. managers, policy makers, occupational health care and HR-personals in the development of more age-aware management by employers, in the discussion on how ageing progresses in different occupations and in the individual's ability to work for longer. This in turn could advance interdisciplinary research and the ongoing debate on the subject and inspire future research. The overall intention of all such work is to make extended working life more sustainable for the ageing population.

Conflict of interest

None declared.

References (*paper included in the review)

[1] World Economic Forum. Global Population Ageing: Peril or Promise? Global Agenda Council on Ageing Society, Geneva: 2012.

[2] Rechel B. Grundy E. Robine J-M. et al. Ageing in the European Union. *Lancet* 2013;181:1312–1322.

[3] UNFPA & HelpAge International. Ageing in the Twenty-First Century: A Celebration and A Challenge. New York: United Nations Population Fund (UNFPA) & London: HelpAge International, 2012.

[4]* Lawrence, B. S. How old you are may depend on where you work. In D. Chowdhury (Ed.), Next generation business handbook: New strategies from tomorrow's thought leaders (pp. 986 –1006). Hoboken, NJ: Wiley, 2004.

[5]* Heckhausen, J., Wrosch, C., & Schulz, R. A motivational theory of life-span development. *Psychological Review* 2010;117,:32– 60.

[6]* Kooij D. T. de Lange, A. H. Jansen P. G. Dikkers J. S. Beyond chronological age. Examining perceived future time and subjective health as age-related mediators in relation to work-related motivations and well-being. *Work & Stress* 2013;27: 88 –105.

[7]* Peeters M. Groot L. Demographic change across the globe maintaining social security in ageing economies. *World Economy* 2012;13:75–97.

[8] Toossi, M. Labor force projections to 2020: A more slowly growing workforce. *Monthly Labor Review* 2012;135:34 – 64.

[9]* Göbel C. Zwick T. Which Personnel Measures are Effective in Increasing Productivity of Older Workers? Centre for European Economic Research. 2010: No. 10-069.

[10]* Kunze F. Reas AML. It Matter How Old You Feel: Antecedents and Performance Consequences of Average Relative Subjective Age in Organizations. *J. of Applied Psychology* 2015;100(5):1511-1526.

[11]* Tuomi K, llmarinen J, Martikainen R, Aalto L, Klockars M. Aging, work, life-style and work ability among Finnish municipal workers in 1981-1992. *Scand J Work Environ Health* 1997;23(1):58-65.

[12]* Krause N, Lynch J, Kaplan GA, Gohen RD, Goldberg DF, Salonen JT. Predictors of disability retirement. *Scand J Work Environ Health* 1997;23(6):403-413.

[13]* Mykletun R. Furunes T. The Ageing Workforce Management Programme in Vatenfall AB Nordic, Sweden. In Ennals R. Salomon RH. (eds.) Older Workers in a Sustainable Society. Labor, Education & Society: Frankfurt: Peter Lang Verlag, 2011: 93–106.

[14]* Feldman DC. Beehr TA. A Three-Phase Model of Retirement Decision Making. *American Psychologist* 2011, 66(3):193–203.

[15] European Commission. Demography Report 2010. Directorate-General for Employment, Social Affairs and Inclusion. Eurostat: the Statistical Office of the European Union, 2010.

[16]* Wang M. Shi J. Psychological research on retirement. *Annual Review of Psychology* 2014;65:209–233.

[17]* Nilsson K. Why work beyond 65? Discourse on the decision to continue working or retire early. *Nordic Journal of Working Life Studies* 2012; 2(3):7–28.

[18]* Anderson KH. Burkhauser RV. Quinn JF. Do retirement dreams come true? The effect of unanticipated events on retirement plans. *Industrial & Labor Relations Review* 1986; 39:518–526.

[19]* Beehr TA. The process of retirement: a review and recommendations for future investigation. *Personnel Psychology* 1986; 39:31–55.

[20]* Börsch-Supan A. Brugiavini A. Croda E. The role of institutions and health in European patterns of work and retirement. *Journal of European Social Policy* 2009; 19:341–358.

[21]* Cobb-Clark DA. Stillman S. The Retirement Expectations of Middle-aged Australians. *The Economic Record* 2009; 85(269):146–163.

[22]* Disney R. Tanner S. What can we learn from retirement expectations data? Working Paper Series No. W99/17. University of Nottingham: The Institute of Fiscal Studies, 1999.

[23]* Forma P. Tuominen E. Väänänen-Tomppo I. Who wants to continue at work? Finnish pension reform and the future plans of older workers. *European Journal of Social Security* 2005; 7:227–250.

[24]* Ilmarinen J. Promotion of Work Ability during Aging. In Kumashiro M. (ed.) Aging and Work. London: Taylor & Francis, 2003: 23–39.

[25]* Erber JT. Aging and Older Adulthood. Second ed. Chichester, John Wiley & Sons, 2010.

[26]* Tornstam L. Åldrandets socialpsykologi. [Social Psychology of Aging.] Stockholm: Nordstedts förlag, 2011. (In Swedish)

[27]* Hagberg B. Rennemark M. Den åldrande människans psykologi. Ett livsloppsperspektiv. [Psychology of human aging, A life perspective.] Lund: Studentlitteratur, 2004. (In Swedish)

[28]* Laslett P. A Fresh Map of Life: the Emergence of the Third Age. Cambridge Massachusetts: Harvard University Press, 1991.

[29] Khoo C.S.G. Na J-C. Jaidka K. Analysis of the macro-level discourse structure of literature reviews. *Online Information Review* 2011;35(2): 255–271.

[30] Torraco RJ.Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review* 2005;4(3):356-367.

[31] Fairclough N. Discourse and Social Change. Cambridge: Policy Press, 1992.

[32] Hall S. The Spectacle of the “Other”. In: Wetherell M., Taylor S., Yates S. J. (Eds.) Discourse Theory and Practice. London: Sage, 2001.

[33]* Nawrot TS. Staessen JA. Gardner JP. Abraham A. Telomere length and possible link to X chromosome. *Lancet* 2004; 363(14):507–510.

[34]* Nowak R. Siwicki JK. Chechlinska M. Markowicz S. Telomere shortening and atherosclerosis. *Lancet* 2002; 359:976.

[35]* Valdes AM. Andrew T. Gardner J P. et al. Obesity, cigarette smoking and telomere length in women. *Lancet* 2005; 366: 662–664.

[36]* Salthouse T. Aging and measures of processing speed. *Biological Psychology* 2000; 54: 35–54.

[37]* Salthouse T. The processing-speed theory of adult age differences in cognition. *Psychological Review* 1996; 103(3):403–428.

[38]* Backes-Gellner U. Schneider MR. Veen S. Effect of Workforce Age on Quantitative and Qualitative Organizational Performance: Conceptual Framework and Case Study Evidence. *Organization Studies* 2011; 32(8):1103–1121.

[39]* Nilsson K. Rignell-Hydbom A. Rylander L. Factors influencing the decision to extend working life or to retire. *Scandinavian Journal of Work, Environment and Health* 2011; 37(6):473–480.

[40]* Park J. Health factors and early retirement among older workers. *Statistics Canada* 2010; 75–001:5–13.

[41]* Park S. Cho S-I. Jang S-N. Health Conditions Sensitive to Retirement and Job Loss Among Korean Middle-Aged and Older Adults. *Journal of Preventive Medicine and Public Health* 2012. 45(3):188–195.

[42]* Pit SW. Shretha R. Schofield D. Passey M. Health problems and retirement due to ill-health among Australian retirees age 45–64 years. *Health Policy* 2010; 94:175–181.

[43]* Roberts J. Rice N. Jones AM. Early retirement and inequality in Britain and Germany: How important is health? Health, Econometrics and Data Group. HEDG Working Paper 08/27. The University of York, 2008.

[44]* Schuring M. Mackenbach J. Voorham T. Burdorf A. The effect of re-employment on perceived health. *Journal of Epidemiology & Community Health* 2011; 65:639–644.

[45]* Siegrist J. Wahrendorf M. Von dem Knesebeck O. et al. Quality of work, well-being and intended early retirement of older employees – baseline results from the SHARE Study. *European Journal of Public Health* 2007; 17(1):62–68.

[46]* Taylor MA. Shore L. Predictors of Planned Retirement Age: An Application of Beehr's Model. *Psychology & Aging* 1995; 10:76–83.

[47]* Holliday R. Ageing and the decline in health. *Health* 2010; 2(6):615–619.

[48]* Koolhaas W. van der Klink JJ. Groothoff JW. Brouwner S. Towards a sustainable healthy working life: association between chronological age, functional age and work outcomes. *European Journal of Public Health* 2012; 22(3):424–429.

[49]* Hunter J. Demographic variables and chronic pain. *Clin J Pain* 2001; 17:14–19.

[50]*Ahola K. Sirén I. Kivimäki M. et al. Work-Related Exhaustion and Telomere Length: A Population-Based Study. PLoS One 2012; 7 (7), Article e40186.

[51]* Hult C. Stattin M. Janlert U. Järvholm B. Timing of retirement and mortality – A cohort study of Swedish construction workers. *Social Science & Medicine* 2010; 70:1480–1486.

[52]* Quaade T. Engholm G. Johansen AM. Möller H. Mortality in relation to early retirement in Denmark: a population-based study. *Scandinavian Journal of Public Health*, 2002; 30:216–222.

[53]* Mein G. Martikainen P. Stansfeld S. Marmot M. Is retirement good or bad for mental and physical health functioning? Whitehall II longitudinal study of civil servants. *Journal of Epidemiol Community* Health 2003; 57:46–49.

[54]* Blakeley J. Ribeiro V. Are nurses prepared for retirement? *Journal of Nursing Management* 2008; 16:744–752.

[55]* Westerlund H. Kivimäki K. Sing-Manoux A. et al. Self-rated health before and after retirement in France (GAZEL): a cohort study. *Lancet* 2009; 374:1889–1896.

[56]* Dwyer DS. Mitchell OS. Health problems as determinants of retirement: Are self-rated measures endogenous? *Journal of Health Economics* 1999; 18:173–193.

[57]* Karlsson NE. Carstens JM. Gjesdal S. Alexandersson KAE. Work and Health. Risk factors for disability pension in a population-based cohort of men and women on long-term sick leave in Sweden. *European Journal of Public Health* 2008; 18(3):224–231.

[58]* OECD. Live longer, Work Longer. Paris. OECD, 2006.

[59]* Sauré P. Zoabi H. Retirement Age Across Countries: The Role of Occupations. Social Science Research Network, 2011.

[60]* Munnell AH. Triest RH. Jivan N. How do Pensions Affect Expected and Actual Retirement Ages, CRR WP 2004–27. Boston: Center for Retirement Research at Boston College, 2004.

[61]* Pohjonen T. Perceived work ability of home care workers in relation to individual and work-related factors in different age groups. *Occupational Medicine* 2001; 51(3):209–217.

[62]* McLaughlin AC. Sprufera JF. Aging Farmers Are at Risk for Injuries and Fatalities: How Human-Factors Research and Application Can Help. *North Carolina Medical Journal* 2011; 72(6):481–483.

[63]* von Bonsdorff ME. Kokko K, Seitsamo J. et al. Work strain in midlife and 28-year work ability trajectories. *Scandinavian Journal of Work, Environment & Health* 2011; 6:455–463.

[64]* Mitchell L. Hawranik P. Strain L. Age-related Physiological Changes: Considerations for Older Farmers' Performance of Agricultural Tasks. Canada Winnipeg: Centre of Aging, University of Manitoba, 2002.

[65]* Myers JR. Layne LA. Marsh SM. Injuries and Fatalities to U.S. Farmers and Farm Workers 55 Years and Older. *American Journal of Industrial Medicine* 2009; 52:185–194

[66]* Nilsson K. Pinzke S. Lundqvist P. Occupational Injuries to Senior Farmers in Sweden: *Journal of Agricultural Safety and Health* 2010; 16(1):19–29.

[67]* Silverstein M. Meeting the Challenges of an Aging Workforce. *American Journal of Industrial Medicine* 2008; 51:269–280.

[68]* Gueorguieva R. Sindelar JL. Falba TA. et al. The Impact of Occupation on Self-Rated Health: Cross-Sectional and Longitudinal Evidence from the Health and Retirement Survey. *Journal of Gerontology: Social Sciences* 2009; 64B(1):118–124.

[69]* Fochsen G. Sjögren K. Josephson M. Lagerström M. Factors contributing to the decision to leave nursing care: a study among Swedish nursing personnel. *Journal of Nursing Management* 2005; 13:338–344.

[70]* Beehr TA. Glazer S. Nielson NL. Farmer SJ. Work and Nonwork Predictors of Employees' Retirement Age. *Journal of Vocational Behavior* 2000; 57:206–225.

[71]* Ilmarinen J. Toward a longer working life: Aging and quality of working life in the European Union. Helsinki: Finnish Institute of Occupational Health, 2006.

[72] *Karasek R. Theorell T. Healthy work – stress, productivity, and the reconstruction of working life. New York: Basic Books, 1990.

[73]* Weaver DA. The work and retirement decision of older women: A literature review. *Social Security Bulletin* 1994; 57(1):1–40.

[74]* Canivet C. Choi BK. Karasek R. et al. Can high psychological job demands, low decision latitude, and high job strain predict disability pensions? A 12-year follow-up of middle-aged Swedish workers. *International Archive Occupational Environmental Health* 2012; 86(3):307–319.

[75]* Nilsson K. Äldre medarbetares attityder till ett långt arbetsliv. Skillnader mellan olika yrkesgrupper inom hälso- och sjukvården. [Older workers attitude to an extended working life. Differences between occupations

in health and medical care.] Arbetsliv i omvandling 2006:10. Stockholm: Swedish National Institute of Working life, 2006. (In Swedish)

[76]* Johnston DW. Wang-Sheng L. Retiring to the good life? The short-term effects of retirement on health. *Economic Letters* 2009; 103:8–11.

[77]* Sjösten N. Nabi H. Westerlund H. et al. Influence of retirement and work stress on headache prevalence: A longitudinal modelling study from GAZEL Cohort Study. *Cephalagia* 2010; 31(6):696–705.

[78]* Muto T. Sugisawa H. Kim H. et al. Health status and lifestyles of elderly Japanese workers: In Kumashiro M. (ed.) Aging and Work: 72–84. London: Taylor & Francis, 2003.

[79]* Vaillant GE. Mukamal K. Successful Aging. *American Journal of Psychiatry* 2001; 158(6):839–847.

[80]* Saurama L. Experience of early exit. A comparative study of the reasons for and consequences of early retirement in Finland and Denmark in 1999–2000. Helsinki: Finnish Centre for Pension Studies, 2004.

[81]* Marcum JL. Browning SR. Reed DB. Charing RJ. Determinants of Work Hours Among a Cohort of Male and Female Farmers 50 years and Older in Kentucky and South Carolina (2002–2005) *Journal of Agromedicine* 2011; 16:163–173.

[82]* De Vaus D. Wells Y. Kending H. Quine S. Does gradual retirement have better outcomes than abrupt retirement? Results from an Australian panel study. *Ageing & Society* 2007; 27:667–682.

[83]* Nordenmark M. Stattin M. Psychosocial wellbeing and reasons for retirement in Sweden. *Ageing & Society* 2009; 29:413–430.

[84]* Gander P. Signal L. Who is too old for shift work? Developing better criteria. *Chronobiology International* 2008; 25(23):199–213.

[85]* Hornung OP. Danker-Hopfe H. Heuser I. Age-related change in sleep and memory: Commonalities and interrelationships. *Experimental Gerontology* 2005; 40:279–285.

[86]* Carter N. Ulfberg J. Nyström B. Edling C. Sleep debt, sleepiness and accidents among males in general population and male professional drivers. *Accident Analysis & Prevention* 2003; 35:613–617.

[87]* Howard ME. Desai AV. Grunstein RR. et al. Sleepiness, Sleep-disordered Breathing, and Accident Risk Factors in Commercial Vehicle Drivers. *American Journal of Respiratory & Critical Care Medicine* 2004; 170:1014–1021.

[88]* Åkerstedt T. Kecklund G. Gillberg M. Sleep and sleepiness in relation to stress and displaced work hours. *Physiology & Behavior* 2007; 92:250–255.

[89]* Vahtera J. Westerlund H. Hall M. et al. Effect of Retirement on Sleep Disturbances: the GAZEL Prospective Cohort Study. *Sleep* 2009; 32(11):1459–1466.

[90]* Härmä M. Is retirement beneficial or harmful to mental health? *Scandinavian Journal of Work, Environment & Health* 2012; 38(5):391–392.

[91]* Laaksonen M. Metsä-Simola N. Martikainen P. et al. Trajectories of mental health before and after old-age and disability retirement: a register-based study on purchases of psychotropic drugs. *Scandinavian Journal of Work, Environment & Health* 2012; 38(5):409–417.

[92]* Westerlund H. Vahtera J. Ferrie JE. et al. Effect of retirement on major chronic conditions and fatigue: French GAZEL occupational cohort study. *British Medical Journal* 2010; 341:c6149.

[93]* Börsch-Supan A. Incentives effects of social security on labor force participation: Evidence in Germany and across Europe. *Journal of Public Economics* 2000; 78:25–49.

[94]* Coppola M. Benita Wilke C. How sensitive are subjective retirement expectations to increases in the statutory retirement age? The German case. Mannheim: Mannheim Research Institute for the Economics of Ageing, 207, 2010.

[95]* Diamond P. Behavioural economics. *Journal of Public Economics* 2008; 92:1858–1862.

[96]* Doerpinghaus HI. Feldman DC. Early Retirement Penalties in Defined Benefit Pension Plans. *Journal of Managerial Issues* 2001; 13(3):273–288.

[97]* Hank K. How "Successful" Do Older Europeans Age? Findings from SHARE. *Journal of Gerontology: Social Science*, 2011; 66B(2):230–236.

[98]* Tucker-Seeley RD. Li Y. Subramanian SV. Sorensen G. Financial Hardship and Mortality among Older Adults Using the 1996–2004 Health and Retirement Study. *Annals of Epidemiology* 2009; 19(12):850–857.

[99]* Brenes-Comacho G. Favourable changes in economic well-being and self-rated health among the elderly. *Social Science & Medicine* 2011; 72(8–10):1228–1235.

[100]* Stattin M. Retirement on grounds of ill health. *Occupational & Environmental Medicine* 2005; 62:134–139.

[101]* Bidewell J. Griffin B. Hesketh B. Timing of retirement: Including a delay discounting perspective in retirement models. *Journal of Vocational Behavior* 2006; 68:368–387.

[102]* Wang M. Shultz KS. Employee Retirement: A Review and Recommendations for Future Investigation. *Journal of Management* 2010; 36(1):172–206.

[103]* Hult C. Stattin M. Age, Policy Changes and Work Orientation: Comparing Changes in Commitment to Paid Work in Four European Countries. *Population Ageing* 2009; 2:101–120.

[104]* McGoldrick AE. Arrowsmith J. Discrimination by age: the organizational response. Glover I. & Branine M. (eds.) Ageism in Work and Employment. Stirling: Ashgate Publishing Ltd, 2001: 75–96.

[105]* Nilsson K. Attitudes of managers and older employees to each other and the effects on the decision to extended working life. In Ennals R. Salomon RH. (eds.) Older Workers in a Sustainable Society. Labor, Education & Society. Frankfurt: Peter Lang Verlag, 2011: 147–156.

[106]* Vercruyssen M. Lifespan Functional Fitness: Encouraging Human Struggle (Physical Activity) and Warning About the Cost of Technology. In Kumashiro M, (ed.) Aging and Work. London: Taylor & Francis, 2003: 62–71.

[107]* Mein G. Higgs P. Ferrie J. Stansfeld SA. Paradigms of retirement: the importance of health and ageing in the Whitehall II Study. *Social Science & Medicine* 1998; 47(4):535–545.

[108]* Oude Hengel K. Blatter BM. Geuskens GA. et al. Factors associated with the ability and willingness to continue working until the age of 65 in construction workers. *International Archives of Occupational & Environmental Health* 2011; 85(7):783–90.

[109]* Marmot M. Status syndrome: how your social standing directly affects your health and life expectancy. London: Bloomsbury, 2004.

[110]* Artazcoz L. Cortés I. Borrell C. et al. Gender and Social Class Differences in the Association between Early Retirement and Health in Spain. *Women´s Health Issues* 2010; 20(6):441–447.

[111]* Munnell AH. Sass SA. Soto M. Employer attitudes towards older workers: survey results. Work Opportunities for Older Americans. An Issue in brief: Series 3. Boston: Center for Retirement Research at Boston College, 2006.

[112]* Jensen PH. Juul Møberg R. Age Management in Danish Companies: What, How and How Much? *Nordic Journal of Working Life Studies* 2012; 2(3):49–65.

[113]* Mykletun R. Furunes T. Solem PE. Managers' Belief about Measures to Retain Senior Workforce. *Nordic Journal of Working Life Studies* 2012; 2(3):109–127.

[114]* Glover I. Branine M. Ageism in Work and Employment. Stirling: Ashgate Publishing Ltd. 2001.

[115]* Thorsen S. Rugulie R. Løngaard K. et al. The association between psychosocial work environment, attitudes towards older workers (ageism) and planned retirement. *International Archives of Occupational & Environmental Health* 2012; 85(4):437–45.

[116]* Kulik L. Marital relations in later adulthood, throughout the retirement process. *Ageing & Society* 2001; 21:447–469.

[117]* Friis K. Ekholm O. Hundrup YA. et al. Influence of health, lifestyle, working conditions, and sociodemography on early retirement among nurses: The Danish Nurse Cohort Study. *Scandinavian Journal of Public Health* 2007; 35:23–30.

[118]* Hanson Frieze I. Olson JE. Murrell AJ. Working Beyond 65: Predictors of Late Retirement for Women and Men MBAs. *Journal of Women & Aging* 2011; 23:40–57.

[119]* 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):467–498.

[120]* Dosman D. Fast J. Chapman SA. Keating N. Retirement and Productive Activity in Later Life. *Journal of Family and Economic Issues* 2006; 27:401–419.

[121]* Smith DB. Moen P. Retirement Satisfaction for Retirees and Their Spouses. Do Gender and the Retirement Decision-making Process Matter? *Journal of Family Issues* 2011; 25(2):262–285.

[122]* Vendramin P. Valenduc G. Occupation and ageing at work. An analysis of the findings of the Fifth European Working Conditions Survey. Working paper 2012.9. European Trade Union Institution, 2012.

[123]* Hao Y. Productive Activities and Psychological Well-Being Among Older Adults. *Journal of Gerontology* 2008; 63B(2):64–72.

[124]* Doyle YG. McKee M. Sherriff M. A model of successful ageing in British populations. *European Journal of Public Health* 2012; 22(1):77–76.

[125]* Järnfelt N. Education and Longer Working Lives: A longitudinal study on education differences in late exit from working life among older employees in Finland. Helsinki: Finnish Centre for Pension Studies, 2010.

[126]* Tuomi K. Huuntanen P. Nykyri E. Ilmarinen J. Promotion of work ability, the quality of work and retirement. *Occupational Medicine* 2001; 51(5):318–324.

[127]* Mirowsky J. Ross CE. Cumulative Advantage and its Rising Importance. *Research on Aging* 2008; 30(1):93–122.

[128]* Ozawa M. Lum TY. Men Who Work at Age 70 or Older. *Journal of Gerontological Social Work* 2005; 45(4):41–63.

[129]* Mather M. Aging and cognition. *Cognitive Science* 2010; 1:346–362.

[130]* Molinié A-F. Feeling capable of remaining in the same job until retirement? *International Congress Series* 2005;1280:112–117.

[131]* Higgs P. Mein G. Ferrie J. et al. Pathways to early retirement: structure and agency in decision-making among British civil servants. *Ageing & Society* 2003; 23:761–778.

[132]* Vaillant GE. DiRago AC. Mukamal K. Natural History of Male Psychological Health, XV: Retirement Satisfaction. *American Journal of Psychiatry* 2006; 163(4):682–688.

[133]* Jokela M. Ferrie JE. Gimeno D. et al. From Midlife to early Old Age. Health trajectories Associated With Retirement. *Epidemiology* 2010; 21(3):284–290.

[134]* Kim S. Feldman DC. Working in retirement: The antecedents of bridge employment and its consequences for quality of life in retirement. *Academy of Management Journal* 2000; 43(6):1195–1210.

[135]* Robinson O. Demetre JD. Corney R. Personality and retirement: Exploring the links between the Big Five personality traits, reasons for retirement and the experience of being retired. *Personality & Individual Differences* 2010; 48:792–797.

[136]* van Solinge H. Henkens K. Living longer, working longer? The impact of subjective life expectancy on retirement intentions and behaviour. *European Journal of Public Health* 2009; 20(1):47–51.

[137]* Harkonmäki K. Rahkonen O. Martikainen P. et al. Associations of SF-36 mental health functioning and work and family related factors with intentions to retire early among employees. *Occupational &Environmental Medicine* 2006; 63:558–563.

[138] Li C-Y. Sung F-C. *A review of the healthy worker effect in occupational epidemiology*. Occupational Medicine. 1999; 49:225-229.