*Conflicts of interest*: None declared.

## Key points

- Women aged >75 years are not invited to the European breast cancer service screening programmes.
- Due to the anticipated short life expectancy, many elderly breast cancer patients are expected to die of other causes.
- To describe the health problem caused by breast cancer among women aged >75 years, we estimated breast cancer incidence in this age group and the risk of breast cancer death in these incident cases.
- Our study demonstrates that in this age group, 3.3% of the women will be diagnosed with breast cancer, and that one in three of these incident cases die of this disease.
- These findings emphasize the importance of the health problem caused by breast cancer in elderly women and the potential relevance of continued screening after 75 years age.

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# Towards a sustainable healthy working life: associations between chronological age, functional age and work outcomes

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**Background:** The aims of this study were: (i) to determine the relation between chronological and functional age; (ii) to examine the association between chronological age and work outcomes; and (iii) to examine the association between functional age and work outcomes. An overview of the most reported work outcomes is outlined. **Methods:** Chronological age refers to the calendar age; functional age was measured with perceived health status (SF-36) and the presence of a chronic health condition. Perspectives on experienced problems, barriers, facilitators and support needs due to ageing and the Work Ability Index were gathered out as work outcomes. **Results:** The association of chronological and functional age of workers aged ≥45 years ($n = 2971$) on work outcomes were significant but small, except for the presence of a chronic health condition. The presence of a chronic health condition was not related to chronological age. Older workers (60–64 years) reported better scores on social functioning, mental health and vitality compared with workers aged 45–59 years. Most reported problems due to ageing were energy decline, muscle function decline, concentration lapses and memory deterioration. Experienced barriers were concentration, work pace problems and mobility; facilitators were support from colleagues, informal relations at work and supervisors. Individual agreement had to be met to continue working life. **Conclusions:** This study confirmed that both chronological and functional age were associated with a decrease in work outcomes. Workers >60 years did not experience more problems and barriers compared with workers between 45 and 49 years of age.

## Introduction

The growing proportion of older people in the labour force stresses the need to promote a healthy working life cycle.[1,2] Ageing is not simply an effect of time[3–5] but refers to many changes in biological, psychosocial and social functioning over time,[4–7] and therefore has an effect on the personal, organizational and societal levels. De Lange *et al.*[8] highlighted this complex operationalization of ageing in the workplace, and they referred to the approaches suggested by Sterns and Doverspike[9] to conceptualize age. Five different approaches to ageing were distinguished: chronological age, functional or performance-based age, psychosocial or subjective age, organizational age and the life span concept of age to conceptualize ageing at work. The authors emphasized the need to pay attention to these different types of ageing and their influence on work outcomes.

In this study, we focused on chronological age and functional age and their associations with work outcomes. Chronological age refers to one's calendar age, which is significantly associated with a decreased work ability,[10,11] and early discontinuation of working life.[12–14] Functional age refers to a worker's performance and recognizes that there is a variation in individual abilities and functioning through different ages.[7,8] In this study, we defined functional age by health status and the presence of a chronic health condition. Chronic health condition typically begin in middle age,[6,15,16] and have an adverse impact on the employability of workers.[17–19] Previous studies investigated the impact of functional age, measured with self-related health, on the motivation to continue to work of older workers. They found positive correlations between functional age and motivation in older people (>60 years).[7] Up to now, no studies are available which investigate both the impact of chronological and functional age on work outcome.

Therefore, the aim of this study is to examine the relationships between ageing and work outcomes. First, the relation between chronological and functional age was determined. Second, the association between chronological age and five work outcomes—work ability, reported problems, barriers, facilitators and support needs due to ageing—was examined. Finally, the association between functional age and the five work outcomes was examined. In addition, an overview of the most frequency reported problems, barriers, facilitators and support needs due to ageing is outlined.

## Methods

### General procedure and settings

The data of this cross-sectional survey study were obtained from workers aged ≥45 years. Nine companies in the northern part of the Netherlands, invited by their occupational health physicians, were willing to participate in the study. These organizations represent four different sectors: health care, education, government and industry.

A self-administered questionnaire, consisting of 132 items on demographics, questions about ageing, chronic diseases, health status and work ability, was sent to all workers aged ≥45 years ($n = 8417$). All companies enclosed a letter of recommendation. The anonymity of respondents and confidentiality of the information they provided were guaranteed. Four weeks after the initial mailing, all workers received a written reminder. The data were collected in February and March 2008.

Ethical approval was sought from the Medical Ethics Committee of the University Medical Center Groningen, which advised that, according to Dutch law, ethical clearance was not required for this cross-sectional study.

### Measures

Age, gender and educational level were among the demographical characteristics. Three items on occupation, sector and hours worked weekly were used to assess work characteristics. Occupation was divided into four groups: executive, secretarial, policy and management. An open-ended question was used to determine the number of hours worked weekly under contract, and categorized in three groups: <25 h; 25–40 h and >40 h.

Chronological age was based on the calendar age of the workers and was categorized in five years age groups: 45–49, 50–54, 55–59, 60–64 years.

Functional age was measured with questions about perceived health status and the presence of a chronic health condition. Health status was measured using the Dutch version of the SF-36 Health Survey.[20] The SF-36 is a reliable and validated instrument that consists of eight scales covering: (i) physical functioning (10 items); (ii) role limitations resulting from physical problems (four items); (iii) social functioning (two items); (iv) role limitations resulting from emotional problems (threee items); (v) mental health (five items); (vi) vitality (four items); (vii) pain (two items); and (viii) general health (five items). The scores of each of the subscales range from 0 to 100, with higher scores reflecting a better health status.[20]

In accordance with many other studies, a chronic disease was defined as 'the subjective experience of long-term irreversible disease of more than 3 months duration'.[21,22] The presence of a chronic health condition was measured by asking the respondents the following question: 'Do you currently have a long-term or chronic disease of more than 3 months duration without the prospect of recovery?' (yes/no). In addition, the workers with a chronic health condition were asked if they experienced some degree of hindrance due to the chronic health condition. If hindrance was reported, the worker was asked to describe the degree of hindrance on a numeric scale of 0 (no hindrance) to 10 (a lot of hindrance).

Work outcomes were: work ability, problems while working due to ageing, barriers to perform work due to ageing problems, facilitators in the work situation and support needs to continue work. Work ability was measured by the Work Ability Index (WAI),[23] a self-administered questionnaire comprising seven scales: (i) subjective estimation of current work ability compared with lifetime best (0–100 points); (ii) subjective work ability in relation to both physical and mental demands of the work (2–10 points); (iii) number of diagnosed diseases (1–7 points); (iv) subjective estimation of work impairment due to diseases (1–6 points); (v) sickness absenteeism during the past year (1–5 points); (vi) own prognosis of work ability after 2 years (1 or 4 of 7 points); and (vii) psychological resources (enjoyment of daily tasks, activity and life spirit, optimism about the future) (1–4 points). The reliability[24] and validity[25] of the WAI are acceptable. Based on this WAI score, the individual's work ability was classified into two categories: moderate/poor (7–36 points) and excellent/good (37–49 points).[2,26]

Dichotomous (yes/no) questions were used for the other outcomes: problems, barriers, facilitators and support needs. The first question assessed whether the workers experienced ageing problems: 'Do you encounter problems in working life due to ageing?'. The next two questions concerned the barriers and facilitators to continuing working life: 'Do you experience barriers in performing work tasks due to ageing problems?' and 'Are there factors in your work which facilitate you in maintaining a sustainable working life?'. The final question was about the support needs to continue working life in the coming years: 'Do you need support in the work situation to continue working life in the coming years despite ageing?'. All respondents were asked to report a maximum of three examples of problems, barriers, facilitators and support needs. For each question with a 'yes' answer, the workers were asked to describe the factors which were on top of their mind.

### Statistical analyses

A description of the socio-demographic characteristics was given by frequencies and percentages. We used different types of analyses to examine the associations between chronological and functional age and work outcome measures. First, we examined the association between the age-groups (chronological age) and the five work outcome measures by using logistic regression analyses. We adjusted for gender, education, occupation, sector and working hours. To examine the association between functional age and the five work outcomes, univariate and multivariate analyses were conducted, adjusting for chronological age, gender, education, occupation, sector and working hours. All variables with a $P < 0.20$ in the univariate analyses were selected for the multivariate analysis. To study the association between chronological age and functional age, one-way analysis of variance (ANOVA) test was used to compare differences between age-groups on the measures of functional age (health status and presence of chronic health condition). Statistical significance was conducted for $P < 0.05$ in the logistic regression analyses, ANOVA tests and the multivariate analysis. All analyses were carried out with the statistical package SPSS version 16.0.

## Results

### Characteristics sample

A total of 8417 workers aged ≥45 years from the nine included organizations were invited to participate in the study, and 3008 returned the

self-administered questionnaire (36% response). Because age is one of the main variables in our analyses, we excluded 37 workers who did not report their age. The response rate differed across the nine organizations (28–55%), and seems to be associated with the number of employees in the organizations. The response rate in the two largest organizations (more than 4000 workers) was below 36%. All other organizations scored around 36% or higher. The mean age of the workers was 53.4 years (SD 5.0) ranging from 45 to 64 years of age. Most workers were highly educated (59%) and most of them were working in the sectors education (42%) and health care (41%). The presence of a chronic health condition was reported by 37% of the workers. Most frequently reported chronic health conditions were musculoskeletal diseases ($n = 878$, 25%), followed by mental health conditions ($n = 390$, 11%), neurological or sensory disease ($n = 351$, 10%) and cardiovascular diseases ($n = 99$, 9%). Of those workers who reported the presence of a chronic health condition, 50% reported some degree of hindrance due to the chronic health condition. The degree of hindrance due to the chronic disease, expressed on a numeric scale of 0 (no hindrance) to 10 (a lot of hindrance), was on average 6.7 (SD 2.4). With regard to the work outcome measures, the work ability of 75% ($n = 2213$) of the workers was excellent/good. In total, 42% ($n = 1236$) workers reported problems while working due to ageing, 25% ($n = 735$) experienced barriers in performing work tasks, 82% ($n = 2419$) reported facilitators and 38% ($n = 1138$) of the workers reported support needs to continue work in the next coming years. Detailed information about these characteristics are presented in table 1.

**Table 1** Characteristics and work outcomes among workers ≥aged 45 years ($n = 2971$)

| Variable | Total ($n = 2971$) | |
|---|---|---|
| | *n* | % |
| Age category (in years) | | |
| 45–49 | 856 | 29 |
| 50–54 | 923 | 31 |
| 55–59 | 847 | 28 |
| 60–64 | 345 | 12 |
| Female workers | 1524 | 51 |
| Chronic health condition | 1100 | 37 |
| Education | | |
| No education/primary school | 53 | 2 |
| Lower vocational education | 447 | 16 |
| Intermediate secondary and vocational education | 673 | 23 |
| Higher vocational education and university | 1717 | 59 |
| Sector | | |
| Health care | 1207 | 41 |
| Education | 1261 | 42 |
| Production | 274 | 9 |
| Government | 229 | 8 |
| Occupation | | |
| Executive | 1782 | 61 |
| Secretarial/administrative | 374 | 13 |
| Policy | 376 | 13 |
| Management | 395 | 13 |
| Working hours | | |
| ≤24 | 694 | 24 |
| 25–40 | 2194 | 74 |
| > 40 | 55 | 2 |
| Work outcomes | | |
| Problems while working due to ageing (yes) | 1236 | 42 |
| Barriers to perform work due to ageing problems (yes) | 735 | 25 |
| Facilitators in the work situation (yes) | 2419 | 82 |
| Support needs to continue work (yes) | 1138 | 38 |
| Work ability score | | |
| Excellent/good | 2213 | 75 |
| Moderate/poor | 751 | 25 |

## The association between chronological age and functional age

Chronological age was not significantly associated with the presence of a chronic health condition ($P = 0.34$). All other outcome measures of functional age differ significantly between the age groups ($P < 0.05$) (table 2). *Post hoc* analyses indicated that the youngest workers (45–49 years) scored significantly higher on physical functioning compared with the other groups ($P < 0.02$), and the general health of these workers was significant better than workers aged 55–59 years ($P < 0.04$). The workers in the oldest age group (60–64 years) reported significantly higher scores on the subscales social functioning ($P < 0.05$), mental health ($P < 0.05$) and vitality ($P < 0.001$) compared with the other age-groups.

## Chronological age and work outcome measures

In table 3, the results of the association between chronological age and experienced problems, barriers, facilitators, support needs and work ability are presented. Workers in the age-groups 50–54 years (OR 1.34; 95% CI 1.10–1.64) and 55–59 years (OR 1.64; 95% CI 1.34–2.01) reported significant more problems while working due to ageing compared with workers aged 45–49 years, but also reported more support needs to continue working life in the next coming years (OR 1.30; 95% CI 1.07–1.59 and OR 1.39; 95% CI 1.13–1.71, respectively). Workers between 50 and 64 years of age experienced significantly less facilitators in the work situation compared with the youngest age group (OR between 0.58 and 0.73). Workers >50 years of age had significantly more chance on a moderate/poor work ability (OR between 0.53 and 0.68). However, the chance of moderate/poor work ability was significantly lower in the oldest age group compared with the workers between 55 and 59 years of age. No significant differences between age-groups were found for barriers to perform work.

## Functional age and work outcome measures

Table 4 gives the crude and multivariate ORs and 95% CIs on measures of functional age on work outcomes. Univariate logistic regression analyses showed that the measures of functional age (health status subscales and presence of chronic health condition) were significantly associated with all work outcome measures ($P < 0.20$), except for the association between the presence of a chronic health condition and experienced facilitators ($P = 0.44$). In the multivariate analyses most health status subscales

**Table 2** Influence of chronological age, based on 5-years age groups, on functional age

| Functional age | Chronological age (years) | | | | | *F* | *P*-value |
|---|---|---|---|---|---|---|---|
| | Total ($n = 2971$) | 45–49 ($n = 856$) | 50–54 ($n = 923$) | 55–59 ($n = 847$) | 60–64 ($n = 345$) | | |
| Mean scores | | | | | | | |
| Physical functioning | 90.38 | 91.84 | 89.68 | 88.35 | 88.98 | 8.407 | <0.001* |
| Social functioning | 83.94 | 83.87 | 82.83 | 83.42 | 88.38 | 6.465 | <0.001* |
| Mental health | 69.85 | 69.78 | 69.03 | 69.84 | 72.26 | 5.895 | 0.001* |
| Vitality | 62.80 | 62.09 | 61.90 | 62.92 | 66.73 | 10.733 | <0.001* |
| General health | 69.74 | 71.12 | 69.03 | 68.76 | 70.63 | 3.37 | 0.018* |
| Frequency | | | | | | | |
| Presence chronic health condition (%) | 1113 (37%) | 292 (34%) | 347 (38%) | 334 (39%) | 117 (34%) | | 0.341 |

*$P < 0.05$

**Table 3** Association between chronological age and problems, barriers, facilitators, support needs and work ability, adjusted for gender, education, occupation, sector and working hours

| | Problems while working due to ageing (reference = no) OR (95% CI) | Barriers to perform work due to ageing (reference = no) OR (95% CI) | Facilitators in the work situation (reference = no) OR (95% CI) | Support needs to continue work (reference = no) OR (95% CI) | Excellent or good work ability (reference = moderate/ poor) OR (95% CI) |
|---|---|---|---|---|---|
| **Age groups (years)** | | | | | |
| 45–49 (reference) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 50–54 | 1.343* (1.101–1.638) | 0.982 (0.742–1.396) | 0.732* (0.555–0.965) | 1.301* (1.065–1.590) | 0.683* (0.538–0.867) |
| 55–59 | 1.641* (1.337–2.013) | 0.964 (0.754–1.427) | 0.583* (0.442–0.768) | 1.389* (1.130–1.709) | 0.529* (0.416–0.673) |
| 60–64 | 1.177 (0.893–1.551) | 0.801 (0.805–1.938) | 0.585* (0.41220.831) | 0.928 (0.697–1.235) | 0.661* (0.481–0.908) |

*$P < 0.05$

**Table 4** Association between functional age and problems, barriers, perceptions, support needs, and work ability adjusted for chronological age, gender, education, occupation, sector and working hours

| | Univariate | | Multivariate | |
|---|---|---|---|---|
| | OR (95%CI) | *P*-value | OR (95%CI) | *P*-value |
| Problems while working due to ageing (reference = no) | | | | |
| Physical functioning[a] | 0.973 (0.967–0.978) | <0.001* | 0.993 (0.986–1.000) | 0.048** |
| Social functioning[a] | 0.977 (0.973–0.981) | <0.001* | 0.999 (0.993–1.004) | 0.664 |
| Mental health[a] | 0.962 (0.956–0.969) | <0.001* | 0.991 (0.981–1.000) | 0.060 |
| Vitality[a] | 0.957 (0.951–0.962) | <0.001* | 0.975 (0.966–0.984) | <0.001** |
| General health[a] | 0.970 (0.965–0.975) | <0.001* | 0.991 (0.985–0.997) | 0.002** |
| Chronic health condition | 2.450 (2.088–2.875) | <0.001* | 1.518 (1.261–1.828) | <0.001** |
| Barriers to perform work due to ageing (reference=no) | | | | |
| Physical functioning[a] | 0.948 (0.937–0.959) | <0.001* | 0.976 (0.964–0.988) | <0.001** |
| Social functioning[a] | 0.963 (0.956–0.970) | <0.001* | 0.983 (0.974–0.992) | <0.001** |
| Mental health[a] | 0.964 (0.955–0.974) | <0.001* | 1.004 (0.989–1.020) | 0.574 |
| Vitality[a] | 0.946 (0.937–0.956) | <0.001* | 0.973 (0.958–0.987) | <0.001** |
| General health[a] | 0.964 (0.956–0.971) | <0.001* | 0.997 (0.987–1.008) | 0.600 |
| Chronic health condition | 3.571 (2.780–4.587) | <0.001* | 2.012 (1.508–2.684) | <0.001** |
| Facilitators in the work situation (reference=no) | | | | |
| Physical functioning[a] | 1.005 (0.999–1.012) | 0.123* | 0.996 (0.988–1.004) | 0.301 |
| Social functioning[a] | 1.011 (1.007–1.016) | <0.001* | 1.005 (0.998–1.012) | 0.158 |
| Mental health[a] | 1.018 (1.010–1.025) | <0.001* | 1.001 (0.990–1.013) | 0.846 |
| Vitality[a] | 1.020 (1.013–1.027) | <0.001* | 1.015 (1.004–1.026) | 0.008** |
| General health[a] | 1.010 (1.004–1.016) | 0.001* | 1.001 (0.994–1.009) | 0.747 |
| Chronic health condition | 0.922 (0.750–1.134) | 0.443 | —- (—-) | —- |
| Support needs to continue work (reference=no) | | | | |
| Physical functioning[a] | 0.979 (0.973–0.984) | <0.001* | 1.001 (0.944–1.008) | 0.819 |
| Social functioning[a] | 0.974 (0.970–0.978) | <0.001* | 0.993 (0.987–0.998) | 0.012** |
| Mental health[a] | 0.962 (0.956–0.969) | <0.001* | 0.996 (0.987–1.006) | 0.454 |
| Vitality[a] | 0.955 (0.949–0.961) | <0.001* | 0.970 (0.962–0.979) | <0.001** |
| General health[a] | 0.973 (0.968–0.978) | <0.001* | 0.995 (0.989–1.001) | 0.091 |
| Chronic health condition | 2.380 (2.025–2.798) | <.001* | 1.523 (1.261–1.838) | <0.001** |
| Excellent or good work ability (reference= moderate/poor) | | | | |
| Physical functioning[a] | 1.078 (1.069–1.087) | <0.001* | 1.030 (1.021–1.039) | <0.001** |
| Social functioning[a] | 1.066 (1.060–1.072) | <0.001* | 1.030 (1.022–1.038) | <0.001** |
| Mental health[a] | 1.072 (1.064–1.081) | <0.001* | 1.004 (0.991–1.017) | 0.572 |
| Vitality[a] | 1.100 (1.090–1.109) | <0.001* | 1.034 (1.020–1.047) | <0.001** |
| General health[a] | 1.090 (1.083–1.100) | <0.001* | 1.047 (1.038–1.057) | <0.001** |
| Chronic health condition | 0.122 (0.100–0.149) | <0.001* | 0.351 (0.271–0.451) | <0.001** |

a: Higher scores on the scale means a better physical functioning, social functioning, mental health, vitality or general health
*$P < 0.20$
**$P < 0.05$

(except mental health) and the presence of a chronic health condition remained statistically significant. Higher scores on vitality were associated with less problems due to ageing (OR 0.98; 95% CI 0.97–0.98), less barriers to perform work (OR 0.97; 95% CI 0.96–0.99), more perception of facilitators (OR 1.02; 95% CI 1.00–1.03), less support needs to continue working life (OR 0.97; 95% CI 0.96–0.98) and more chance of excellent/good work ability (OR 1.04; 95% CI 1.02–1.05). Having a chronic health condition resulted in more chance to report problems due to ageing (OR 1.52; 95% CI 1.26–1.83), barriers to perform work (OR 2.01; 95% CI 1.51–2.68), more chance to report experienced support needs to continue working life (OR 1.52; 95% CI 1.26–1.84) and less chance to score moderate/poor work ability (OR 0.35; 95% CI 0.27–0.45). Mental health did not remain significantly in the final multivariate model for all work outcome measures.

## Overview of the problems, barriers, facilitators and support needs

In the group of workers (42%; $n = 1236$) who reported problems while working due to ageing, the most frequently reported problems were energy decline (fatigue) (17%), muscle function decline (strength and endurance) (11%), concentration lapses (10%) and memory deterioration (8%). Most experienced barriers to perform work tasks, reported by 25% of the workers ($n = 735$), were tasks which require concentration

(22%), lifting and carrying objects (11%) and work pace (9%). Most reported facilitators, by 82% ($n = 2419$) of the workers, were support from colleagues (19%), formal relations in work (e.g. clients, patients or students) (12%) and the supervisor (8%). The workers reported predominantly support needs (38%, $n = 1138$) with regard to services, systems and policies at the company level (53%); for example, adjustments in tasks and functions, individual agreements about working hours and days and variety and autonomy.

## Discussion

The results of this study showed that chronological age and functional age are related, although the presence of a chronic health condition was not influenced by age. Workers with higher chronological age, especially between 50 and 59 years, experienced more problems due to ageing, fewer facilitators to continue working life and reported frequently more support needs to continue work in the next coming years compared with the younger ones. In addition, the work ability scores decreased by age. Experienced barriers to perform work were not associated with chronological age. The results of this study may suggest that employers can do far more to help older workers to remain in the workplace towards a sustainable healthy working life.

Workers in the oldest age group (60–64 years) reported higher scores on social functioning, mental health and vitality compared with the youngest age group (45–49 years). Although the general health of workers aged 55–59 years was significantly lower than the mean scores of the workers in the youngest age group, no significant difference was found for workers in the oldest age group. Also no significant difference was found for the presence of a chronic health condition between the two age groups. Based on the literature, it was expected that older workers had lower scores on measures of health status[6] and those workers experienced frequently more chronic health conditions.[15,16] This finding might be explained by the healthy worker effect, a phenomenon which is often studied in occupational cohorts.[27,28] Workers, especially the older workers, usually exhibit better health conditions than the general population because severely ill and chronically disabled are ordinary excluded from employment. This healthy worker effect might also explain why we found no significant difference between the oldest and youngest age group in the association between chronological age and work outcomes. The workers between 60 and 64 years who are still working, might be a very select, relatively healthy group of the general population of this age. Because of this selection bias due to the healthy worker effect, the results in this report are probably an underestimation of the problems in the entire age group.

Functional age was significantly associated with work outcomes; the associations were significant, but small ORs were found, except for the presence of a chronic health condition. Mental health did not contribute to experienced problems, barriers, facilitators, support needs and work ability. The impact of the presence of a chronic health condition was reduced by the other measures of functional age. Due to ageing, 42% of the workers aged ≥45 years reported problems in the work participation, and 37% reported a chronic health condition. Although most workers (82%) experienced facilitators in the work situation, 25% of the workers experienced barriers to perform work as well. To continue work in the next coming years 38% of the workers experienced support needs.

A strength of the study is that it was based on a considerable sample size of workers with various occupational activities (e.g. heavy physical labour, back office, health care, teaching and cleaning), employed in different companies. While this study had the advantage of using a population-based sample, there are some limitations in generalizing these findings.

The overall response rate of 36% at baseline was regarded to be reasonable for an anonymous survey in the working population, but results related to selective participation cannot be ruled out. Because of the anonymous study design, we were not able to investigate the characteristics of the non-responders properly. Nevertheless, we believe there is no reason to expect that workers with problems due to functional age or a chronic health condition returned the questionnaire less frequently than workers without problems. The questionnaire addressed a variety of themes, and did not emphasize functional age or chronic health condition.

A second issue concerns the self-reporting nature of the study because the perception of workers' responses could not be externally validated. As a result, some bias may exist in the classification of respondents on the basis of self-reported data, resulting in an underestimation of the differences and associations under study. However, it is known from literature that the self-reporting of health status and of certain physical chronic diseases (diabetes, cardiovascular disease, musculoskeletal and respiratory problems) is reasonably reliable.[29] Therefore, we do not expect that the self-reporting of health and problems due to ageing introduced any significant bias for this kind of health conditions. However, this expectation is based on a limited number of studies concerning physical conditions and might not self-evidently be generalizable to other physical or mental health conditions.

Finally, the current study does not distinguish between specific chronic health conditions because of the lack of knowledge of the severity and limitations of the conditions. Not distinguishing between workers suffering from various chronic health conditions in relation to a sustainable working life is supported by Detaille *et al.* among physically ill workers.[30,31] They showed that different groups of chronically ill workers were experiencing the same bottlenecks, although their priority varied. These findings support the idea that the impact of chronic health conditions may be applicable for workers in general, in the Netherlands and other industrialized countries.

An overview was given of the most frequency reported problems, barriers, facilitators and support needs due to ageing. We used the responses based on open-ended survey items and calculated for each work outcome separately which example of problems, barriers, facilitators and support needs were reported most frequently in our sample. We found that factors to enhance working life were reported at both personal and organizational level. The next step for research is to outline in more detail analysis on sub-group level (e.g. differences between age groups or workers who report problems while working due to ageing) on the most frequently experienced barriers to perform work, facilitators in the work situation and support needs to continue working life. Based on the qualitative analyses, a list of relevant factors can be developed. Insight in these factors may be useful for developing interventions and strategies towards a sustainable healthy working life.

*Conflicts of interest*: None declared.

## Key points

- Due to ageing, 42% of the workers aged ≥45 years reported problems while working, 37% reported a chronic health condition.
- The presence of a chronic health condition was not influenced by chronological age in workers aged 45 years and older.
- Increased chronological age resulted in more experienced problems, more support needs, less experienced facilitators and decreased work ability.
- With respect to functional age, predominantly a chronic health condition was associated with more problems, more barriers, more support needs and lower work ability scores.
- Reported problems in work functioning increased with chronological age, but workers in the aged group 60–64 years did not report more problems and barriers compared with workers between 45 and 49 years of age.

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# Unemployment and mental health—who is (not) affected?

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**Background:** The aim of this study is first, to investigate the association between periods of unemployment and mental distress, adjusting for previous health status, and second, to study differences and similarities between groups defined by age, sex, family situation, socioeconomic position and work environment. **Methods:** The analyses are based on a cohort of participants in Stockholm county council's Public Health Survey 2002 with a follow-up in 2007. Selected from the initial cohort are respondents 20–59 years who were employed at T1 and had no unemployment in 2001–02. Logistic regression is used and differences between groups are expressed as odds ratios. Interaction analyses are also performed. **Results:** Initial odds ratios of 1.84 in the group with 1 year of unemployment or more compared to the reference group with no unemployment is reduced to 1.52 after adjustment for prior mental and somatic health. Analyses show that the impact of unemployment in this sample is stronger for men, those working overtime, those with high social support or low control at their previous job, self-employed and those with low occupational class or low previous wage. Regarding family situation, unemployment is least associated with mental distress among individuals living in couples without children. **Conclusion:** Results show an independent effect of unemployment on mental distress, but this effect varies between groups. Both proposed theories: role loss and differential susceptibility, receive some support. Since all interaction analyses are insignificant, results should be interpreted with caution.

## Introduction

While there is abundant research investigating the potential effect of unemployment on mental health,[1–6] few studies focus on variations in the association between demographic and/or socioeconomic groups. Among the individual factors that have been shown to mediate the effect of unemployment on mental health are work-role centrality,[7–8] job quality,[9] financial strain,[10,11] social support, coping strategies,