Post-retirement age workers and health and safety

Report submitted to the IOSH Research Committee

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Abstract

In the UK, people will work for longer, following recent legislation and raising of the State pension age. So what are the health and safety risks associated with delays in retirement? This study was undertaken in three phases. It began with a systematic review of existing evidence concerning safety practices and risks to workers aged over 60. Previous reviews had not focused specifically on the over-60s and little evidence was found. Workers over 60 have fewer but more serious accidents and injuries than younger workers (the younger comparison age group varies in different studies). Age-related hearing loss may affect safety. Safety in this age group has not been shown to relate to work patterns, including shift work or overtime. Work experience and part-time working may help to encourage safety awareness and behaviour among this oldest group in the workforce.

The second phase, a qualitative interview study, explored perceptions of workplace hazards and discomforts among people working beyond the normative retirement age for their company or profession (n=40, aged 60–91). Few hazards were identified, and no accidents recorded since reaching retirement age. Perceived hazards included physical demands of work, tiredness, driving, and interpersonal difficulties such as client/customer complaints/excessive demands. Most of the work-related hazards identified (for example, prolonged sitting at computers, lifting heavy items, driving) were perceived as affecting workers of all ages similarly, not just the oldest workers. Reported coping strategies included adapting to age-related changes (for example. decreased stamina), part-time working, altering work roles, limiting driving, applying work-related expertise, assertiveness, using authority/status, and (if employed in larger organisations) accessing support from company/organisational policies and practices. Participants emphasised individual responsibility for managing workplace hazards and perceived few personal risks.

The third phase of the project surveyed 267 workers (aged 21–70 and over), comparing experiences and attitudes regarding safety at work across different age groups. Workers aged over 60 were more likely to work part-time and reported significantly greater vitality, but there were no differences in safety attitudes. No differences in exposure to hazards emerged, except that workers over 60 reported less computer usage, less stress from e-mails and less daily driving. Relatively little published evidence exists in this field. The study found that workers aged over 60 report good health and vitality, and share with younger workers positive safety attitudes and coping strategies for hazards at work. Nonetheless, such favourable characteristics may not necessarily apply to future groups who will have less choice about whether or not they work in later life, and less recourse to part-time hours, due to planned increases in the age at which the payment of the UK State pension is paid.

Executive Sumary

This three-phase project examined the health and safety risks associated with continuing in employment beyond what was (during the course of this project) the default retirement age (age 60 for women and age 65 for men). The rationale for this project relates to the topical concern that people working into their late 60s and beyond might have increased health and safety risks. On the other hand, anecdotal evidence points to distinct safety benefits for the organisation and the individual where older workers with valuable experience remain in the workplace. This is a topical subject, as there has been much recent political debate about the need to delay the payment of State retirement benefits to age 67 and beyond, given increases in longevity and a worsening ratio of workers to pensioners. In October 2011, the default retirement age in the UK was abolished, which will inevitably lead to increases in people working into their late 60s and beyond.

Various characteristics of workers aged 60 and over, and their work patterns (such as prevalence of part-time working) suggest that they are a distinctive segment of the workforce, as will be documented in the main body of this report. Consequently, much current research into 'older workers' (aged below 60) may not be generalisable to those in their 60s and beyond. Definitions of the 'older worker' in published research have not been consistent, which posed a major problem for this review. Many studies have defined an 'older worker' as someone aged 50 or older, but in some research the cut-off has been even lower. For the purpose of this systematic review, post-retirement age (PRA) was defined as aged 60 and over for all workers.

In the first phase of the project, a systematic review was conducted of published studies that offered analysis of data from workers aged 60 and over. Epidemiological and psychosocial research was uncovered from in-depth strategic searches of relevant databases and also manual searches of relevant journals.

The systematic review focused on the epidemiological research associated with safety aspects (hazards, accidents, risks, ill health). The studies are grouped into occupational accidents and injuries among workers over 60, investigations of accidents which focus on individual capabilities (such as physical capacity, hearing loss and cognitive function) and workplace factors (fatigue, job stress, overtime and shift work) that influence risk of injury. As with reviews of research into older workers under 60, evidence suggests that the over-60s typically have lower rates of injury, but when injuries occur, they are more serious, and may lead to retirement. The review found that workers over 60 cope well with job demands. There is no robust evidence that work patterns including shift work, or overtime (unless excessive), affect the safety of workers over 60, more than workers in their 50s. Similar to other studies of older workers (typically focusing on the over-40s or over-50s), the over-60s seem able to apply protective or compensatory strategies to maintain safe working practices (for example, when driving). Education and experience also have important protective effects on the workers over 60.

There may be some risks associated with hearing loss and lengthy exposure to noise in the workplace. No published evidence has been located as to whether PRA workers enhance safety practices in their organisation, or in any other way support others' morale and well-being in the workplace.

The second (qualitative) phase of the project explored well-being, motives for working, perceived hazards and discomforts at work among people working beyond the normative retirement age. Although there has been limited previous enquiry into people's reasons for continuing to work beyond the age at which they could retire, no previous research was located concerning perceptions of safety risks among this particular group of workers. Forty people were recruited (aged 60–91, with a median age of 70), using a range of advertising strategies. This was a substantially larger sample of PRA workers than found in previous published research. In line with previous research, three-quarters worked part-time, but contrary to previous findings, only a few had moved to less senior positions or bridge jobs (the latter being short-term jobs approaching or following retirement from the main career, often associated with a new skill set, and forming a 'bridge' between the long-term career and full retirement). Some had started their own businesses since retiring from their main careers, and some were working in consultancy or locum positions.

The participants were all interviewed following a semi-structured interview schedule, and described a range of motives for continuing to work, not only financial. They believed that working helped to maintain their physical and psychological health, increased vitality and prevented 'sagging' or giving in to illness. They also reported working to maintain identity and engage in personal development. Some difficulties were noted in the pilot interviews as some participants considered that questions

about health and safety at work might suggest ageist assumptions underlying the topic. However, it was found that participants reflected on this topic much more willingly when it was broached as a discussion of perceived discomforts and hazards at work. It is likely that participants understood 'hazards' to mean threat, danger and risk (as defined by everyday usage and dictionary definitions) and did not distinguish hazard from risk in the more technical health and safety sense. Most participants did not consider that hazards at work had increased or become more problematic with age, and described managing these adequately in their own view. The perceived hazards that were experienced as increasing or becoming more burdensome with age were fatigue, the challenges of driving, psychosocial stresses, and (for the few manual workers) physical demands such as lifting. Reported coping strategies included making adaptations to age-related changes in functioning (for example, decreased stamina), reducing hours of work, altering work roles, limiting driving, applying work-related expertise, being more assertive, using personal authority/status, and (if employed in larger organisations) making use of supportive company/organisational policies and practices. Participants emphasised individual responsibility for managing hazards at work and perceived little/no elevation of risk. As a group, participants in this qualitative phase seemed to manifest characteristics of 'positive ageing', viewing later life as a continuing opportunity to develop and participate actively in society, and to cope with challenges at work and elsewhere. Nonetheless, qualitative research rarely achieves a random sample but relies on volunteers who are willing to speak at length about their experiences. This means that samples may not be representative of the wider population, and themes cannot be automatically generalised. There may have been a skew towards a socioeconomically advantaged sample. For example, few participants were working primarily for financial reasons. Most were relatively advantaged in socioeconomic terms, and many had held white-collar posts in education, health, therapy and business, at least until statutory pension age. Very few (four out of 40) were engaged in manual/manufacturing work. Hence the findings cannot be generalised to people who continue working in manual jobs into later life and/or those who work primarily for financial security.

The third phase entailed a questionnaire survey exploring experiences and attitudes regarding safety at work among workers of all ages. Comparisons were planned between younger workers and those working beyond 60. Difficulties were encountered in gaining organisations' agreement to distribute the questionnaire, linked with the economic downturn and company downsizing/restructuring which seemed to affect older workers disproportionately. The survey was distributed eventually by the British Safety Council (BSC) and the Institution of Occupational Safety and Health (IOSH). A total of 267 participants completed the survey, with 263 giving both age group and gender. Of these 263, 187 were men, and 76 were women. The sample had a good representation of workers aged over 60 (56 participants: 21 per cent). To gain more data about the themes arising from both the systematic review and the qualitative study, the questionnaire collected data about work experience, work sector, number of hours worked, reasons for working beyond statutory pension age (where relevant), exposure to hazards and any reported accidents, strategies for managing hazards at work, vitality, and attitudes towards safety climate at work. Workers aged over 60 were more likely to work part-time, reported significantly greater vitality, but no differences in safety climate attitudes, compared with younger workers.

A range of reasons for working beyond 60 was offered, and in line with previous published research and also the themes emerging from Phase 2, several motives were commonly endorsed in addition to financial benefit. No differences in reported exposure to hazards (or accidents) emerged, except that workers aged over 60 reported less computer usage, less eye strain and less stress from e-mails. Significantly fewer of the workers over 60 reported that they thought their safety at work was improved through using their authority, assertiveness skills, or experience, compared with younger workers. It was not clear whether this difference reflected modesty about their capabilities, a view that the workplace was not particularly hazardous and in need of attention, a position on the margins of an organisation (through working as a locum for example, with limited authority), or from understanding these particular questions differently from the younger age groups. The main limitation of this phase of the research was that recruitment via BSC and IOSH was likely to result in a sample with positive interest in health and safety, although snowballing also occurred. The over-60s age group contained very few women, so female experience has been very underexplored, which is unfortunate as previous research shows that men and women have somewhat different motives for continuing to work into their 60s.

In conclusion, relatively little published evidence exists in this field. The findings from this suggest that currently workers aged over 60 report good health and vitality, are highly motivated to work, believe themselves to have sufficient experience to manage hazards/risks, and share with younger workers many positive safety attitudes and coping strategies for hazards at work. In line with previous research, they are a relatively socially advantaged group.

To further explore the health and safety experiences of people working into their late 60s and beyond, it is recommended that longitudinal designs track change over time in safety-related practices and attitudes. Qualitative methods in combination with objective data could explore in detail older workers' experiences of accidents, any triggering circumstances and coping strategies. Detailed ethnographic study of the workplace might also reveal in nuanced detail how older workers influence the safety climate and practices of the workplace, and also how safety and risk among the oldest workers may be influenced by factors outside the workplace, such as the stress of caring for frail loved ones, and onset of ill health or disability.

The findings overall suggest that workers in the UK are well placed to work beyond the previous default retirement age, and pose few safety risks. However, when accidents do occur, they tend to result in more serious injury. We caution that our findings are based on data from older people who are currently working. They may be an advantaged group in terms of health, socioeconomic status and motivation (the so-called 'healthy worker effect'). Many were also drawing pensions alongside their work remuneration which enabled choice over working hours and a better quality of work-life balance. When payment of State pensions is delayed, older people will have less lifestyle choice. They may have to stay, by necessity, in full-time work. If work is then experienced as more onerous physically and psychologically, older people may then become more susceptible to workplace hazards. This issue needs to be addressed in a future research project.

1 Introduction and rationale for the project

This research project has been carried out following the successful awarding of a grant by the Institution of Occupational Safety and Health (IOSH) following a call for bids in 2008. The theme that the project addressed within the IOSH bid statement was for 'research into how best to meet the challenges of securing healthy and safe work for all members of a diverse working population and the means to enable them to participate while minimising risk of harm...Studies may relate to particular subsets of the working population, for example, age/gender groups...' A three-phase project was funded, exploring the safety attitudes and experiences of people working beyond the normative retirement age. A systematic review of the literature was the first goal, followed by a qualitative study of post-retirement age (PRA) workers' experiences of health and safety in the workplace, and then a quantitative survey comparing the health and safety experiences and attitudes of older and younger workers. The agreed focus was to explore older workers' vulnerability and perception of workplace safety/risks, safety training/programmes, individual specialist skills/valuable experience relevant to workplace safety, perception of the role of directors/senior managers in relation to safety culture, perceived contribution of the oldest group of workers to safe working environments/safety culture of the organisation, and employee needs/suggestions to facilitate safe working in people who are working beyond the normative retirement age.

In October 2011, the default retirement age of 65 was ended by the UK government[1] and employers can no longer force employees to retire on the grounds of age. However, all data were collected prior to this date, and the term PRA and 'post-statutory pension age' worker will continue to be used throughout this report. For the empirical work, the normative retirement age of 60 was assumed for female workers and 65 for male workers. However, had the systematic review focused solely on studies of male workers aged over 65, there would have been virtually nothing to review. As previous reviews of safety attitudes, behaviour and accidents among the over-60s were lacking, studies that included workers aged 60 and above were eligible for the systematic review.

Western societies have increasing older populations primarily due to improved life expectancy with better health and living conditions. UK legislation is encouraging, and indeed will shortly require people, to continue in work beyond 65 years. Attitudes towards later life working seem quite favourable among some groups. In 2006, it was reported that more than 50 per cent of workers in the United States expected to work past 70 years[2] while a UK survey[3] reported that 80 per cent of workers would consider working beyond the default retirement age. Part of the European Lisbon Strategy is to increase the participation of older people in the labour market.[4] Current concerns with the declining value of both State and occupational pensions are encouraging a willingness to work into the 60s and beyond, and numbers will further rise, as the government schedules delays in payments of State pensions to 67 years or beyond. Nevertheless, there are many other reasons for people to stay in work 'post-retirement age', beyond the financial. Psychosocial benefits of working include maintaining identities as active, valued people, feelings of competence, and preserving active social relationships with co-workers.[5] However, a 2007 Delphi study of health and safety experts conducted by the European Agency for Safety and Health at Work[6] forecasted that the ageing workforce, and increasing numbers of people working right up to and beyond normative retirement age, posed a potential emerging risk with respect to occupational safety and health.

There is some previous research into the health and safety risks of older workers but much less on their positive practices and attitudes. Most of this research has concentrated on 'older workers' substantially under what has until very recently been regarded as the default retirement age. Summarising research which has focused on the risks and resources (or compensatory abilities) of older workers of pre-retirement age (usually in their 50s), certain age-related problems have been identified which potentially compromise safety. These include difficulties in tasks requiring divided attention, slower information processing speeds, and physical losses such as poor visual acuity in low light; back pain; reduced strength, flexibility, and standing tolerance.[7] Night shifts seem to bring particular problems for older workers, such as poor sleep and fatigue.[8] Ergonomic adaptations that promote health and reduce risk of harm or fatigue for workers (of all ages) include arranging tasks and equipment to reduce extreme joint movements, to limit tasks requiring strength or force, and to design out highly repetitive tasks.[9]

While some safety risks are associated with the specific physical declines of ageing,[9] older workers also apply compensatory factors. Their greater work experience, sense of responsibility, positive attitudes towards safety and patience are all resources that may promote safer behaviour.[10] Greater safety consciousness may also help to compensate for any age-related decline in physical strength.[11] In the UK, the Health and Safety Laboratory Report of 2005 challenged negative assumptions about older workers' ability to work effectively and safely.[12]

Evidence from workers under the age of 60 may not necessarily generalise to those who work beyond the State pension age, as the latter group have greater choice about whether to work through receiving a basic income from State and, in some cases, occupational pensions. Evidence from the Centre for Research of Older Workers survey[3] and other research suggests that employees with health problems or occupational injuries, caring responsibilities at home, or disaffection with their jobs, tend to 'shake out' of the workforce in their mid-50s, leaving older people who are highly motivated to remain in employment.[3,13] Such workers seem to reflect the 'healthy worker effect' whereby those remaining in the workforce are in fact the healthiest.[14] This means that evidence about the health and safety of pre-retirement age workers may not generalise to women aged over 60 or men aged over 65.

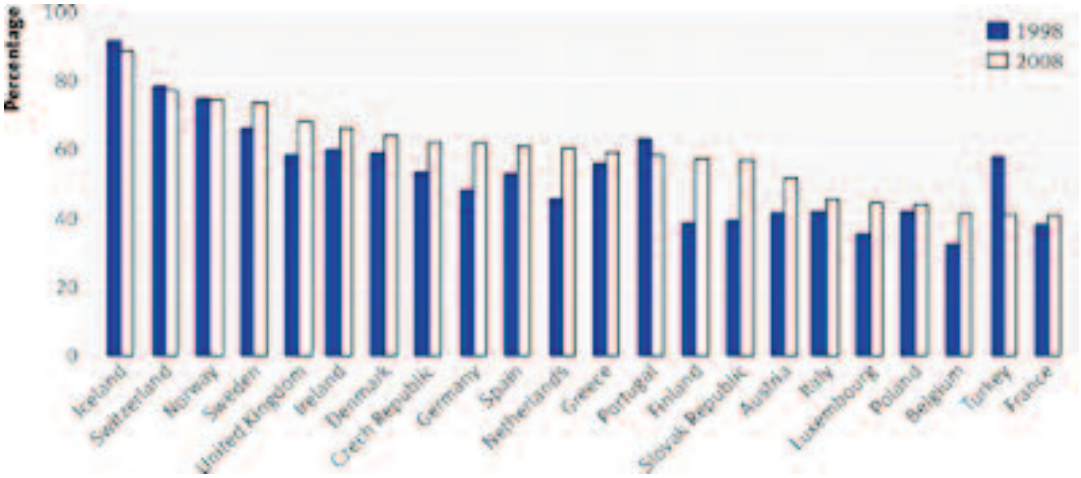
Regarding the health and safety of PRA employees, the current research literature on the 'older worker' has several limitations. First, as argued above, where older workers' perceptions of safety have been studied, (for example, by Ringenbach and Jacobs)[11] 'older' has tended to be defined as 50-plus, rather than people over the normative retirement age (who may have different characteristics). Second, the relatively few research studies that have been conducted with age groups over 60 have tended to focus on objective accident rates and days lost from injury rather than health and safety perceptions and experiences of these particular older workers. Third, opinions of managers/employers predominate in discussion articles about PRA working.[15] Fourth, where PRA workers' experiences have been directly studied, research has focused on their broader motivations for working, rather than enquiring specifically into their experiences of safety in the workplace. Finally, many articles present 'top-down' approaches to the safety of older workers, such as recommending that designers and engineers create skid-resistant flooring, shallow-angle stairs, and larger screen displays.[16] PRA workers' own experiences of safety and risk-taking behaviour at work, and their suggestions for improving safety, have not directly been examined. Yet, in other fields (such as the National Health Service), worker consultation is increasingly recognised as offering valuable insights into positive and negative working practices. The insights of older workers into hazards faced at work and their coping or compensatory strategies are similarly valued in this study. Clearly, there is a need for further research into the health and safety experiences of workers aged over 60, particularly as the UK government's initiatives will increase this segment of the working population. The first phase of this project offers a systematic review, as the first step in identifying the evidence that is already available.

2 Background

2.1 Dependency ratios
In the UK between 1983 and 2008, people aged over 65 increased by 1.5 million, representing 16 per cent of the total population. By 2033, it is projected that those aged 65 and over will have increased to 23 per cent of the total population compared to 18 per cent who will be aged 16 or younger.[17] The size of this demographic effect is seen in the trend of the 'old-age dependency ratio', that is the number of people aged 65 and over as a proportion of the number of people aged 16 to 64. The old-age dependency ratio is projected to increase from 23.8 per cent in 2005 to 29.7 per cent in 2020.[18] In Europe and the United States one person out of every 10 is now 60 years or older. There are projections that by 2050, one person out of five will be 60 years or older; and by 2150, one out of three will be 60 years or older.[19]

Increasing older populations have an increasing impact on the old-age dependency ratio. If there is no change in work and retirement patterns, the ratio of workers to older non-employed persons in the EU states (EU-25), presently 3:1, will increase to 1:1 in 2050, making pensions unsustainable.[20] Figure 1 shows participation in the labour force among people aged 55 to 64 in selected European countries, in 1998 and 2008. In most countries, this has increased over the 10-year period.

Figure 1: Participation in the labour force among people aged 55 to 64 in selected European countries, 1998 and 2008.[21]



The potential socioeconomic impact on society that may result from an increasing old-age dependency ratio is an area of growing research as well as public and political debate. This has led to government concerns about adequate pension support and the need to raise the statutory pension age in stages to 67 years between 2026 and 2028.[22]

2.2 Labour market demography in the UK
From about 1970 until 1993, the employment rate for people aged 50 and over decreased[23] but by the middle of 1993 this trend had reversed, with a growing proportion of older workers in employment. The overall picture between 1971 and 2008 showed the employment rate for those aged 50 to State pension age to have increased steadily by 8.6 per cent, in contrast to a decreased employment rate of 15.5 per cent for 16–17-year-olds. With respect to those of State pension age and above, the employment rate increased by 3.6 per cent over these decades.[24, 25] Workers past the (current) retirement age of 60 (female) and 65 (male) are now the fastest growing age group within the UK population. According to the Office for National Statistics,24 by July 2009, levels of employment for this group had increased to a record 1.378 million. The employment rates for May–July 2009 compared with the same quarter in 2008 indicate a 0.2 per cent increase in rates of PRA working, constituting 12.0 per cent of the age group compared with 11.7 per cent for May–July 2008. The rate of employment was down in all other age groups.

European policy has shifted over the last 10 years or so to promote the retention of older workers in the workforce. Following the European Union Employment Equality Directive (2000), UK legislation in 2006 prevented companies from applying a compulsory retirement age prior to 65 years. Since October 2011, the default retirement age in the UK has been ended.

2.3 Characteristics of the post-retirement age workforce

Before considering and critiquing evidence about the health and safety of workers aged 60 and over, an overview of the characteristics of this segment of the workforce will be given. In a quantitative comparative survey in the UK,[26] none of the older workers who described their health as very poor remained in work after statutory pension age. This study, based on secondary analysis of data from the Labour Force Survey, the Family Resources Survey, and the British Household Panel Survey, revealed further, multi-faceted characteristics of those who continue to work past retirement age. In addition to good health, this study found that those who remained in employment (either full-time or part-time) had a range of other distinguishing characteristics. Certain financial needs were predictive of later life working. For example, older people with mortgages still to pay, and divorced or separated women (who typically have little or no occupational pension to rely on), were more likely to continue in employment after retirement age. Smeaton and McKay[26] found that only 25 per cent of the female participants reported having an occupational pension compared with 67 per cent of male participants. An event history analysis, tracking respondents who were in work at 50 years of age, showed that having an occupational pension was highly predictive of men (but not women) leaving work in the ensuing years. Nevertheless, financial status did not have straightforward effects. For example, a very low income during pre-retirement working life did not encourage continued employment past retirement age. These researchers found that those with the least savings were less likely to work, possibly in order to preserve their social security benefits. Older people who continue in work typically have personal and social reasons for doing so, beyond financial needs.[27] Having higher educational qualifications and a partner remaining in employment were found to be very important factors in continued working past retirement age. For men, PRA working was associated with relatively high levels of job satisfaction. These various advantageous characteristics of PRA workers suggest that they are not an equivalent group to those working in their 50s and therefore research findings from those in their 50s may not be straightforwardly generalisable.

There are also characteristic work patterns in this age group which need to be considered when studying health and safety. The survey data[26] showed that greater numbers of men and women worked on a part-time, rather than full-time basis after retirement age, with most describing that they preferred this pattern of working. The survey showed that a move to part-time hours was often associated not only with a drop in income but also declining status and skill level. This indicates the possibility that many PRA workers bring considerable skills and experience to the workplace, although these may not be reflected in their job titles or salaries. From their previous careers, they may have attributes that contribute to health and safety that are unrecognised by management and colleagues. This provides a further justification for focusing the literature review on the health and safety aspects of PRA workers specifically.

2.4 Defining the 'older' and post-retirement age worker

There are no consistent ways of defining the 'older worker' in published research. Many studies define an 'older worker' as one aged 50 or over,11 but in some research the cut-off has been even lower. For example, age 40-plus was described as 'older' by Ng and Feldman[28] and Kowalski-Trakofler *et al*.[7] pointed out that the United States Age Discrimination Act applied this cut-off. Given the different ages at which women and men are considered eligible for State pensions in the UK, as well as variations in Europe and beyond, we will classify PRA as 60 or above regardless of gender. There are various advantages to doing so. Had cut-offs of 65 years for men and 60 years for women been applied, there would have been very little literature left to review. Most health and safety studies of older workers have 59 years as the upper limit, and therefore synthesising evidence about the over-60s successfully adds to knowledge of the oldest groups of workers. Many men retire before 65 and many women retire after 60, and this pattern also suggests that 60 is a suitable cut-off age to define PRA working for this particular study (conducted 2008–2011).

3 Phase 1: Systematic literature review – safety and risks associated with working beyond 60

3.1 Search strategy
A systematic literature review needs to address a research question[29] and the overall question was: 'What are the health and safety risks associated with post-retirement age (PRA) working?'

For the purpose of this review, studies that included analysis of data from workers over 60 were deemed relevant. Relevant databases included MEDLINE, Cochrane reviews, the National Institute for Occupational Safety and Health, the Canadian Centre for Occupational Health and Safety, OSHROM, OSHUPDATE, the HSE, Academic Search Complete, PsycInfo, CINAHL, Scopus, Proquest and CISTI. Individual occupational health and safety journals were also searched using specific search terms, as detailed below. Primary research was sought rather than reviews.

A key problem in locating relevant evidence was that article titles and abstracts were rarely explicit about whether or not data from workers over 60 years of age had been included in studies. A specific search strategy combining 'work' with search terms such as 'post-retirement' ('all text'), or 'post-pension', or 'pension' ('all text'), was found to miss relevant studies. In order to gather the maximum amount of available evidence, a *sensitive* search strategy was required[29] using general terms such as 'older worker' and 'ageing worker'. The process of locating relevant studies was therefore laborious, requiring a search for information from the method sections of many articles to identify whether or not they presented data from workers aged 60 and over.

This search process is illustrated by outlining the PUBMED database search strategy (in 2009). Limits were: English language, humans AND all adults over 19 years AND 1995 to 2009.

Exclusions were: reviews, farming, agriculture. The reason for this is that farmers comprise a small proportion of the UK workforce (0.5 per cent according to DEFRA in 2010). Despite this small percentage, farmers are an unusual group in having high reported accident rates, an unusual tendency towards lone working with large machinery/dangerous chemicals, and full-time workers are likely to be self-employed. Asian and Far East research was excluded as safety attitudes and environments of older workers may differ from those in Western countries (for example, factory safety standards in some Far East countries are poor).

Terms for locating potentially relevant research were: Ageing OR older worker OR elderly worker OR older employee OR post-retirement worker AND one of the following: 'health AND safety' (n=55); 'safety' (n=41); 'accident' (n=35); 'occupational injury' (n=286); 'chronic illness' (n=32). 'Risk' in combination with 'ageing' or 'older worker' was found not to be a precise enough search strategy, generating large numbers of studies not related to health and safety at work (for example, risk of unemployment). However, closer searching of abstracts, and in most cases methods and results sections of the articles, yielded only a small number which presented data about the workers aged 60 and over.

This process (with its attendant problems) was repeated with the other databases.
Further examination of the most relevant journals verified whether all relevant research studies had been located. Examples included: *International Archives of Occupational and Environmental Health*, *European Journal of Ageing* and *Occupational and Environmental Medicine*.

Exclusion criteria were: reports not in English; dissertations; opinion, predictions or advice pieces, policy statements/anti-discrimination practices; management perceptions of older workers' benefits and liabilities (anecdotal, without additional research evidence); brief research 'digests' in specialist occupational safety and health magazines; health after voluntary or involuntary retirement (i.e. among the older *non*-working population); empirical studies of 'older workers' which included no participants over 60 (or none *explicitly* identified as above 60;[10, 30] studies where there were very few over 60s relative to the sample size (less than five per cent) and whose data could not be extracted from the findings – for example, the very few 61-year-olds included in the over-50s category.[31, 32] Reviews of older people's functioning (measured in the laboratory/*outside* the workplace) were excluded as many participants are already retired[33] and so clearly, findings do not reflect the functioning of PRA workers. Studies were also excluded of older people looking back retrospectively at work experiences from the vantage point of retirement,[34] as this current project was studying people aged 60 and above *currently* at work, and retrospective memories of safety attitudes and incidents may not be a reliable source of evidence.

The setting of inclusion criteria and assessment of evidence quality was guided by published advice[35] on doing a systematic review in an occupational setting. Both authors evaluated the studies to decide on eligibility.

The studies were grouped into occupational accidents and injuries among workers over 60, explanations for accidents which focus on individual capabilities (such as physical capacity, hearing loss, and so on) and workplace factors that influence risk of injury in this age group.

In many systematic reviews, studies are excluded on the basis of research design, with randomised controlled trials being favoured. As interventions were not the focus of this enquiry, many different research designs were considered acceptable. Prospective longitudinal designs to investigate changes in work performance, and/or health and safety with age, are the most appropriate for revealing causal influences. But such studies are expensive to conduct and challenging to sustain over time. Various research designs were used in the studies reported here, including case control, retrospective review of injury records, and national questionnaire surveys. Very little qualitative evidence was found.

3.2 Occupational injury, accidents, sick leave and fatalities

Are workers over 60 more or less at risk of accident and injury at work? Previous reviews and studies of 'older workers' (which focus almost entirely on pre-retirement groups aged over 40 or over 50) conclude that older workers have fewer accidents at work, but that those which occur tend to be more serious, leading to longer periods of sickness absence and in some cases early retirement.[9, 11, 36–38]

Several studies which have analysed data specifically from workers over 60 support these conclusions. For example, a retrospective longitudinal study of Swedish iron ore miners drew on national registers over 10 years, for frequency and severity of age-related accidents and associated factors.[39] Nevertheless, evidence was limited as the oldest age group studied was grouped into the category 55–65, and this constituted only one per cent of the sample in most years in which data were collected. In grouping the workers into this age band (a typical problem encountered in many of the studies reviewed), clearly many *pre-retirement* workers provided data. This oldest group tended to report fewer accidents than younger miners, but more severe injuries, leading to more days away from work.

It is uncertain whether the better safety records of the older workers in these various studies were associated with being promoted (or demoted) into less risky jobs. The workers' greater job experience might also have led to compensatory strategies. Factors or confounders other than age (such as physical fitness), might also account for these relationships or disguise them.[40] It is not always clear whether consideration has been given in the analysis, to the number of hours that the older people are working, as some may have changed to part-time working (according to other evidence).[26] Furthermore, the evidence is extremely limited regarding the specific environmental events and human errors which led up to the recorded accidents and injuries.

Illnesses and injuries were studied which led to early retirement in a population of construction workers in Ireland.[41] Records of sickness absence for members of the Construction Federation operatives pension and sick pay scheme since 1981 also included records from 1972 of early retirement on health grounds. There were between 17,300 and 33,400 eligible workers for each year (annual mean of about 22,300 for both absences and early retirement outcomes). Data that could not be validated were excluded, resulting in 28,792 records of absence and 3,098 of early retirement (from 1972 to mid-1996). The workers were 99 per cent male and aged between 18 and 64 years. The rate and length of absence increased with age (being twice as high in those aged 60 to 64 as those between 20 to 29). However for the 60-64 age group injury was a cause of only 3% absences, compared to 35% in the 20-29 age group; infectious disease accounted for 26% of absences in the 20-29 age group and only 3% in those over age 60. Musculoskeletal problems accounted for 18% of absences in 20-29 age group and 6% in the over age 60 group, absence due to cardiovascular disease and chronic obstructive airways disease represented 11% in the 20-29 age group and 13% in the over age 60 group while mental illness accounted for 13 of absences in the 20-29 age group and 4% in the over age 60 group (see Table 2 in reference 41). Overall, there were 12 per cent more injuries in workers under the age of 40 compared with older workers, but injury severity (as reflected in difficulties in recovery and sickness absence), was more pronounced in the latter age groups. This repeats the pattern noted in many other studies of older workers. [These percentages have been calculated by age group as a proportion of those working using the figures in Table 2.]

A study that is particularly relevant to PRA workers drew on data from several large-scale national surveys from the United States.[42] Unusually, this study included a group of people aged 65 and over. The surveys showed that sickness absence from injuries at work increases in step-wise fashion from one decade to the next, with a median of five days away at age 20–24, and 18 days away at 65 and over. Those aged 65 and over were particularly vulnerable to fracture injuries according to their figures, perhaps linked with ageing signs such as osteoporosis. Whereas younger workers may receive bruises and cuts from falls, those aged 65 or over are more likely to experience a fracture. The researchers provided the example of heavy truck drivers aged over 65, who had twice the number of fractures than younger workers when involved in accidents. Overall, workers aged over 65 were particularly vulnerable to injuries associated with transportation/driving. However, Rogers and Wiatrowski[42] point out that injuries in these studies were not confined to 'dangerous' jobs, driving or heavy manual work. Retail sales work was associated with the highest rate of same-level falls for the over 65s age group. Falling is associated both with ageing processes, including reduced speed of processing and changes in sensorial vestibular cells, as well as extrinsic environmental factors.[43]

Given evidence that workers aged 65 and over tend to have more serious (albeit infrequent) injuries at work, the question arises whether such workers receive more compensation. An incidence study of United States nationwide data for 1993 compared costs across age, race, gender, and occupational groups as well as categories of injuries and illnesses (fatal and non-fatal).[44] The data were abstracted from workers' compensation records, estimates of lost wages and jury awards. Those under 17 were the least costly ($655 per employed worker) compared to the most costly 25–34 age group ($997). The 55–64 age group cost $671 and the over-65s age group cost $681 in compensation per employed worker. Although these figures are from 1993, it is of interest in terms of the cost comparisons between age groups. The data do not support heightened risk of compensation among the oldest workers.

In addition to being more vulnerable to serious injury, do older workers also suffer from more fatal accidents at work? An analysis of data from the National Traumatic Occupational Fatalities (NTOF) surveillance system in the United States from 1980 to 1991 recording external causes of death from injuries at work addressed this issue.[45] The study is particularly relevant to the review as it included a group of workers aged 65 and over. There were 6,471 fatalities of workers in this oldest age group, with a rate three times higher than the rate for workers aged 16–64. The four main causes of death for workers aged 65 and older were: machinery (28 per cent), motor vehicles (19 per cent), falls (13 per cent) and deaths by homicide (13 per cent). The machinery-related fatalities for men aged over 65 were almost six times greater than the rate for men aged 16–64. The fatality rate for falls among women aged 65 and over was 14 times greater than women aged 16–64. It is unclear from these data whether natural illness events (such as stroke or myocardial infarction) among the oldest workers contributed to having an accident at work which then led to death, or whether age-related declines in attentional and other cognitive processes were responsible. Many studies link injury rates with age and other variables but omit to study the specific events which led to the events in question.

One issue that may influence injuries and fatalities at work is job experience. Older and younger workers may face different risks at work, owing to their specific jobs, experience and awareness of safety and environmental complexity. To give an example, proportional mortality rates from the Bureau of Labor Statistics in the United States indicated that electrocutions in the construction industry between 2004 and 2006 showed some age relationships.[46] Younger workers were more likely to die from contact with overhead power cables but older workers (over 65) were more likely to die from touching electrical wiring and transformers. This age difference may reflect not age itself but the different types of work performed by people in different age groups (for example, a larger proportion of younger workers than older workers may be expected to work at height). When the fatality data were compared with all-cause deaths, however, the younger workers were much more likely to be electrocuted compared with the oldest age group, perhaps indicating greater safety awareness among the latter group of workers. No further data were available to explain the individual and environmental factors which may have played a part in exposing these older (or younger) workers to electrocution.

While there is little evidence of the detailed events leading to accident and injury among older workers of 60 and over, there is some consideration of the role of individual variables such as physical capacity, hearing loss, visual and other perceptual problems, cognitive functioning, chronic illness, fatigue and use of medication. Job and workplace factors will also be considered briefly, even though evidence is very limited in relation to the target age group. Within this category, evidence relating to fatigue/job demands, job stress, overtime and shift work will be presented.

3.3. Individual factors associated with workplace accidents and injuries

3.3.1 Physical capacity of older workers

A previous review[7] concludes that older people experience various declines in functioning, including reductions in mobility, strength, dexterity and balance; sensory losses including loss of visual contrast sensitivity and loss of hearing (especially in the higher frequencies); and cognitive changes such as slower information processing speed and delayed reaction times. Such changes may increase the risk of accidents and, where they occur, their severity. Yet chronological age does not equate with functional age, and some people in their 60s perform as well as much younger people on cognitive and other tasks. The 'healthy worker' effect makes it important to look for specific evidence about PRA workers' task performance and accidents at work, and relationships with physical capacity. Most studies of older people's physical capacities, sensory processes and cognitive abilities have recruited participants from the general population and not focused upon people who remain in employment in their 60s and beyond. Results of tests of the general older (mostly retired) population may not generalise to people who continue to work into later life, who are a distinctive group in many ways, as outlined previously (see section 2.3 Characteristics of the post-retirement age workforce).

Physical capacity includes muscle strength and stamina. Yet ageing brings musculoskeletal problems, associated with biological changes such as degenerative changes of the intervertebral discs, and other joints, from conditions such as osteoporosis and arthritis, and loss of muscle fibres.[7, 47] Muscle strength declines by about 25 per cent from the adult peak to the age of 65. Work involving poor postures and lifting of heavy loads is associated with musculoskeletal disorders. Such disorders are leading causes of disability in some industries such as construction, affecting larger proportions of workers in the older age groups, and are often responsible for workers taking early retirement.[48] Work environments which fail to compensate for older workers' declining strength by changing tasks, workload and work conditions seem likely to pose particular risks to health and functioning.[49, 50]

A search for primary research into the physical/functional status of workers aged over 60 yielded very little. Most studies in this field have either taken large groups of older people regardless of working status;[51] have focused on 'older workers' below 60; or have not extracted data from their participants aged 60 and above. For example, two studies[52, 53] examined musculoskeletal disorders among older female computer workers in several European countries. A variety of self-reports of problems with the neck, shoulder and other sites were linked with physiological recordings, measures of stress, and workplace characteristics. Larsman *et al*.[52] inferred from their analysis that perceived demands in the workplace influenced stress which in turn affected neuromuscular functioning, while Sjøgaard *et al*.[53] linked neck and shoulder problems to eye strain (including blurred vision) and strained head positions during work, and found distinctive electromyography readings. While both studies included some over-60s in their samples (Larsman *et al*.[52] reported 20 per cent of their sample as aged 60–65; Sjøgaard *et al*.[53] recruited older women aged 45–68 years), there was no analysis by age group in either study. No inferences can be made from these findings about whether people working beyond normative retirement age, as a defined group, have more or fewer musculoskeletal problems, nor whether those affected by these symptoms have similar or distinctive problems with stress or job demands compared with younger workers.

One study of physical capacity was located that did include analysis of data from a group of workers aged 60 in Finland.[54] It surveyed municipal employees aged 40–60 to identify relationships between performing physically demanding work and reported declines in physical functioning. Data were obtained from questionnaires from a sample of 5,802 employees in the City of Helsinki in 2000 and 2001. Of these employees, 11 per cent of the women and 14 per cent of the men were aged 60. However, nobody older than 60 was included. A scale within the SF-36 health questionnaire was used to quantify 'role limitations due to physical health problems'. There was no simple relationship between performing more items of physically demanding work and physical decline, so no strong causal influence could be inferred. Various logistical regression analyses were performed, including entering age and physically demanding work items in order to predict poor physical functioning. A steady increase in the prevalence of role limitations at work due to physical health problems was evident from age 40 to 60. In men at 40, 26 per cent were affected by role limitations, rising to 35 per cent at age 60; in women, 30 per cent reported role limitations at age 40, rising to 48 per cent at age 60. The authors suggested that there was a tendency for men (more so than the women) to do less demanding work as they aged. However, it may be questionable to compare directly the physical demands and role limitations of these older male and female employees as most were doing very different kinds of work. Many of the female employees worked in social and health care (for example, nurses), whereas the men mostly occupied different roles such as fire fighting (from which early retirement is usually expected).

The measure of role limitations consisted of only four items and would therefore have been relatively insensitive. Many of the trends, though reported in detail, were statistically non-significant. So while this study suggests that, compared with younger workers, more 60-year-olds encounter role limitations due to physical health problems and experience some reductions in the physical demands of their work (by choice or imposition), the meaning of these changes and impact on their work performance remains unclear. The study was cross-sectional and therefore data cannot provide evidence for changing roles into less physically demanding work. Clearly this group may not be representative of workers over 60 years old, so the findings must be treated with caution.

In terms of construction work, the small numbers of workers who remain in the workforce beyond retirement age may be regarded as 'survivors', who might be expected to have higher levels of physical functioning than their retired peers. There is some evidence specifically related to occupational back problems among carpenters aged over 60.[55] A cohort of 18,768 carpenters working in the State of Washington (United States) between 1989 and 2003 was identified. The study looked at work-related back injuries and medical claims for treatment. A significant reduction in the rate of claims for back injuries was seen among those between 50 and 60 years of age (compared with younger workers) with a further reduction in the over-60 age groups. The rate for new claims (rather than recurrences) for the under-20s was 9.6 claims per 200,000 hours worked, compared to 3.8 claims in the 50-year-old group and 2.6 claims in the over-60 group. For crude rates, the youngest workers were at greatest risk of both incident and recurrent back injury, but when adjusting for gender, time in the union and predominant type of work, the 30–40-year-olds had the highest rates. This evidence is of interest due to the large numbers of workers over the age of 60 in this occupation, and its support of the trend towards the oldest workers being a healthier, better functioning group.

As physical capacity declines, the body becomes more prone to muscle strain and back pain. Musculoskeletal injury has been studied in cooks and food service workers, and related to age in a study of 173 occupational injuries in a 12-month period (2004 to 2005) in British Columbia (Canada).[56] Of the injuries reported, 67.4 per cent were serious, resulting in time loss. With respect to specific injuries, the rates for musculoskeletal injury, contusion, burns, irritations and allergies were all lower in the over-60 age group, being approximately half those found in the 30–39 age group. However, using a regression model with three age groups (under 39, 40–49, over 50) and with the under-39s as the reference group, there was no significant reduction in injuries in the older worker, which may indicate that other variables have important determining effects. Study limitations were that the sample of cooks and food service workers came from the healthcare sector, which might have influenced attention to injuries in the workplace, only two health regions were represented, and only about 10 per cent of the healthcare workforce of the province of British Columbia was included. Also small numbers in the over-60 age group resulted in wide confidence intervals, making it harder to achieve statistical significance. It is also likely that underreporting might be an issue in this occupational group where injuries may be seen as part of the job. It is also unknown whether people over 60 also fear reporting such injuries for fear of losing their jobs as they approach or go beyond a company's preferred retirement age, as many are aware of the considerable difficulties that older people face in gaining new employment.[106]

3.3.2 Hearing loss and occupational risk factors for workers over 60

Age-related hearing loss (presbycusis) is characterised by the progressive deterioration of auditory sensitivity associated with ageing, especially as regards high-frequency sounds. It is the most common cause of adult auditory deficiency and affects approximately 23 per cent of the population between 65 and 75 years of age and 40 per cent of the population older than 75 years of age, according to United States statistics.[57] Among the most common occupational causes of hearing loss is noise exposure,[58] especially unprotected exposures to noise above 85 dBA[59] or 95 dBA.[60] This may therefore be a problem that is relevant to people working beyond 60, both because hearing loss is so prevalent in the population, and because any lengthy exposure to noise over a longer working life increases risk.

Within the Beaver Dam, Wisconsin (United States) population, a longitudinal study identified the five-year incidence and development of hearing impairment in a population-based study of adults aged between 48 and 92.[61] There were 1,085 participants with hearing loss and 1,636 participants without hearing loss at baseline. Hearing impairment was 21 per cent at the five-year follow up, with age as a main risk factor for incidence and progression. After adjusting for age, it was found that male gender, work occupation and poorer education were also risk factors. Operations/fabricators had the highest odds ratio of 1.92, linked with noisier working environments. Hearing sensitivity also declined over time among those who already had hearing loss at baseline. Despite approximately half of the sample being 60 or over, and the examination of occupational risk factors within this study, the findings can

only be generalised with caution to the over-60s worker. The authors point out that many of the participants were retired (in which case previous occupations were included in the analysis), and it is not made clear in this article how many were still working during the five-year follow-up period. Whether PRA workers exhibit as much hearing loss as the general population is unclear. Whether they run greater risks through longer exposure to the workplace also has not been directly demonstrated by this study, although this seems a likely outcome. Hearing impairment may require routine screening in an older workforce as this is a health and safety issue, and appears to be an increasing risk for those exposed to chronic noisy environments.

Presbycusis (hearing loss at high frequencies specifically age related) was studied in nine audiological centres across Europe.[62] Risk factors (medical and environmental) were investigated for association with age-related hearing impairment. There were 4,083 participants aged between 53 and 67 years (mean age approximately 60 years), recruited from clinic and community sources. Data included audiometric measures and ascertainment of environmental risk factors and medical history. Work histories were taken but, as with the study above, the data do not reveal which of the older participants were currently or recently working. Hearing levels were analysed for any association with exposure to risk factors with adjustment for age and sex. Exclusions included those with a history of disease that could have an impact on hearing. Noise exposure was associated with a significant loss of hearing at high sound frequencies (higher than 1 kHz). Even one year of work in a noisy environment increased these risks. Smoking was significantly associated, in a dose-dependent manner, with increased high-frequency hearing loss. The results suggest that both a healthy lifestyle and low-noise working environment can protect against age-related hearing impairment. The study is limited in terms of the evidence provided about the PRA worker, in that the study did not report clearly which participants were working beyond normative retirement age. It remains possible that the noise exposures occurred some years previously.

Age-related trends in hearing loss linked to occupational noise exposure were further supported by a survey of over 22,000 adults of working age.[63] The oldest group (aged 55–64) had the highest numbers of people with self-reported hearing difficulties, and these difficulties were associated with lengthy exposure to noise in the workplace. However, the evidence is limited in terms of this review, in not revealing the numbers of over-60s taking part and, even more importantly, in not specifying whether the older participants were working or not, or recalling pre-retirement noise exposures. Much more relevant, at first sight, is a study which examined hearing difficulties in over 130,000 current workers in United States industries, aged between 18 and 64 years of age, participating in the National Health Interview Survey (NHIS).[64] About 10 per cent of the sample were in the oldest age group (55–64), but unfortunately no details were provided about the numbers of over-60s. The average incidence of hearing difficulty was 11.4 per cent, but rates were much higher (22 per cent) in the oldest age group (55–64). The adjusted prevalence ratio (PR) for those aged 55–64 was 3.68 (95 per cent Confidence Interval, 3.37, 4.01) compared to a PR of 1.17 in the 25–34 age category. The PRs after adjustment for age and gender were highest among railroad workers, mining and metal manufacture. Mechanics, repairers and transportation equipment operators were jobs with increased risk of hearing difficulty. This study has the advantage of large sample size. Limitations include the cross-sectional study design and the possibility that industry-occupation categories may not have been homogeneous. Audiometric tests were not done to validate self-reports of hearing difficulty. The findings suggest that the oldest workers (which include over-60s) are at elevated risk of hearing loss, linked both with normal ageing and also occupational noise hazards, but further study of this oldest segment of the workforce is recommended.

While hearing impairment creates impediments to social contact, the further issue arises of whether it increases accident risks in the workplace. In a large retrospective Canadian study,[65] an association was established between accident risk and workers' hearing sensitivity. The study sample of 52,982 male workers, aged 16–64, was made up mostly of blue-collar workers. Participants were monitored for five years following a recent hearing test. The number of occupational accidents was determined from individual work histories registered with the Quebec workers' compensation board for the 1983–1998 period. A hearing loss of 20 dBA correlated with a rise of 1.14 for risk of accident when age and occupational noise exposure at the time of hearing test were taken into account. The strongest association was found in metal transformation, metal product manufacturing and transportation equipment manufacturing, which appear to be the noisiest of environments. 'Passive accidents' and 'same-level falls' were categories of accident most strongly associated with hearing loss, the occurrence of which may suggest attentional distraction. Overall, 12.2 per cent of accidents were found to be attributable to a combination of noise exposure in the workplace (of 90 dBA or more) and noise-induced hearing loss.

This study did not only examine relationships between hearing impairment and accidents, but also the influence of age. The authors explained that although older workers present risk in terms of being more likely to have hearing losses, they also have reduced accident risk through their longer work experience. The authors found that while accident rates increased with greater levels of hearing impairment, older age was protective. Risks of accidents were approximately halved among the oldest group (over-55s). However, data for the over-60s were not presented separately, so it is not clear whether workers electing to work beyond retirement age would be in a more advantaged, disadvantaged or similar position. The study is limited in that duration of exposure to occupational noise obtained from questionnaires is likely to be an imprecise predictor for noise exposure over a working career.

Occupational noise exposure (of 100 dBA and above) and noise-induced hearing losses, even when hardly noticeable, may interfere with the safe operation of motor vehicles.[66] This large retrospective cohort study linked driving records maintained by the Quebec National Institute of Public Health with information on occupational noise exposure and hearing sensitivity, available for 46,030 male workers employed in noisy industries who also held a valid driving licence. While participants were aged 16–64 years, the oldest workers were grouped into a category of over-55s in the analysis. Overall, it was a young sample with an average age of just over 30 years, suggesting that few over-60s were included in the study. The study found that the oldest age group (55 and older) had fewest driving accidents (proportionately). However, results were also complex as hearing impairment increased in the older age groups, and regression analysis indicated that hearing loss (and daily exposure to loud noise in the workplace) was associated with increased risks of accidents and highway code violations. There were several limitations, including the use of traffic and accident violation data which was limited to Quebec, and the absence of data on minor driving incidents. But above all, for the purposes of this review, the study primarily addressed relationships between hearing loss and drivers' behaviour and did not fully explore the relevance of age or possible compensatory strategies of older, highly-experienced workers. While the findings suggest that older drivers may be better able to compensate for hearing loss when driving, far more evidence on the over-60s age group is needed.

Girard and colleagues[67] also reported on data from the Canadian retrospective study of work-related accidents and workplace noise exposure.[65] In order to adjust for age as a confounder with respect to hearing status, they categorised age into five intervals (16–24, 25–34, 35–44, 45–54 and 55–64 years). Results found that single and multiple accidents were associated with occupational noise and that hearing loss induced by exposure to noise at work may be a contributory factor. However, age was not further considered in the analysis, so the contribution of this evidence to this review of the safety of the older worker is limited.

Noise exposure has also been found as an important risk factor for work-related injuries in a population-based case control study in Brazil.[68] Cases (n=94) were identified from systematic random sampling of households and defined as having experienced work-related injuries during 90 days prior to the start of the study. Controls (n=282) were non-injured workers matched to cases by age and sex. The full adult age range was represented, including workers aged over 70. However, the numbers in each age subgroup were not stated. Multiple regression analysis found that workers who reported 'always' or 'sometimes' being exposed to high level noise at work had statistically significant higher relative risks of 5.0 and 3.7, respectively, for work-related injuries than those who reported little/no exposure. For the purpose of this review, the study provides limited evidence about safety in PRA workers as the number/proportion of over-60s was not described. In the 60–79 age group there were only 2.2 per cent who reported injuries at work (n=2). It is unclear whether such low rates represent the safe working practices of these older workers or very low numbers of participants still working in these oldest age groups. Study limitations include no validation of reported workplace noise and no objective evidence of hearing impairment.

This part of the review has established that older people, in general, are very vulnerable to hearing loss (especially of higher frequency sounds), and that even a year's exposure to noisy working environments increases this risk.[62] Nevertheless, there is no direct evidence with respect to the levels of hearing impairment specifically among PRA workers. It may be similar to the population at large, lower (through self-selection and healthy worker effects) or higher (through extended occupational exposure). Despite these uncertainties, it appears that older workers should avoid noisy environments which may exacerbate 'normal' age-related hearing loss, and that regular assessment is advisable. There is some limited evidence that hearing impairment generally increases risks of accidents/injuries at work,[67] but that the oldest groups of workers have safer track records, perhaps through applying compensatory strategies or greater work experience. Nevertheless, no studies were found that focused in detail on older workers of over 60 who have opted to work beyond a normative retirement age.

Researchers have tended to quantify noise exposure through work histories, seeking general trends in the data, rather than singling out its effects for particular age groups.

3.3.3 Visual and other perceptual problems

While previous reviews of the older worker have pointed out certain common visual decrements with increasing age (such as susceptibility to glare), a search for evidence about changes in the PRA worker located no relevant studies. Where research has taken place recently into the visual functioning of older people, and its association with accidents, falls and fractures, participants have been drawn from the population-based study of Beaver Dam Wisconsin, without reference to whether they are continuing in work or not.[69]

Age-related decreases in vestibular, visual, auditory and sensory systems have been shown, and correlated (weakly) with changes in gait and balance.[70] This evidence may contribute to understanding the age relationship with falls, accidents and musculoskeletal injuries in older adults, but it may not generalise to those who opt to work into their 60s and beyond. This study did not address the workplace environment or specifically older age groups who remain in the workforce.

Occupational injuries among older workers with disabilities were studied in a prospective cohort study of health and retirement.[38] The participants were aged between 51 and 61 years at the time of the first sampling in 1992. The prospective study enabled calculation to be made of any association of the risk factors measured in 1992 with occupational injuries that occurred from 1992 until 1994. Self-reported disability – odds ratio=1.58, (95 per cent CI, 1.14, 2.19) – and specifically poor hearing – odds ratio=1.35 (0.95, 1.93) – and poor sight – odds ratio=1.45 (0.94, 2.22) remained risk factors for occupational injury even after control for occupation, heavy lifting, and self-employment. This study provides some evidence for an association between pre-existing disabilities and subsequent workplace accidents. The study strengths include the large, nationally representative sample, an 82 per cent participation rate enabling generalisation of results to the population of older workers from the United States, and the prospective nature of the study ensuring that the potential risk factors preceded the injuries. Therefore injury occurrence did not bias recall of specific risk factors.

3.3.4 Cognitive functioning

In laboratory, context-free or puzzle tests, older people show age-related declines in many cognitive functions, including information processing speed, increased difficulties with divided attention, and working memory.[7, 71, 72] But as most workers do not use their full cognitive capacities, it appears that older workers bring their more extensive experience to their jobs, and generally perform as well as younger people. No evidence was found regarding cognitive change and accidents/safety issues in the workplace among people working beyond the normative retirement age.

Cognitive decrements have a marked effect on tasks requiring complex sensorimotor integration such as driving. Popkin *et al*.[73] reviewed a number of studies relating to the driving and transportation work sector, although few explicitly addressed the safety of drivers aged over 60. One exception was a study[74] which included subgroups of participants aged 50 and under, 50–54, 55–59, 60–64, and 65–76. This reported on measures of driving performance associated with perceptual, cognitive, and psychomotor abilities. Ageing typically brings measurable decrements in perceptual processing including loss of visual acuity, reductions in contrast sensitivity, and impairments in judgement about depth and distance. Clearly these changes seem likely to affect driving skills. The authors point out that about 10–15 per cent of the population aged over 65 have cognitive impairments, including slower information processing speeds and difficulties with selective attention, but as suggested before in this review, these figures should not be generalised automatically to the segment of the population who continue to work. In terms of leisure-based driving, older people may have latitude to choose when to drive, but commercial drivers do not have such choices so any age-related decrements in perceptual and cognitive functioning may have a larger impact on accident rates, according to these authors.

Llaneras *et al*.[74] presented a large battery of context-free cognitive assessments and psychomotor tasks and related the scores to the age and driving performance of truck drivers. Many age-related decrements were seen in the context-free cognitive and psychomotor assessments. However, age-related deterioration in driving performance was less marked. Eight of the 24 measures of driving did show age-related deterioration, with the oldest groups worse, for example, at negotiating curves and turns. However, for two of these measures, the older drivers scored *better* (on lane position and fuel mileage), indicating that lengthy driving experience can play a compensatory role. Overall, driving skills were more closely related to cognitive measures than to age itself, which did not predict driving performance; in particular, decision-making skills were not significantly different for drivers over 65 and those below 50.

Findings from an intervention study, also reported within the same article, showed that older drivers were able to benefit from further training on perceptual and other tasks and thereby maintain their driving skills. Such evidence challenges common assumptions that older workers do not benefit from training.

Does higher mental workload protect the cognitive functioning of older people? A study of 708 participants aged between 50 and 80 at baseline was drawn from the Maastricht Ageing Study.[75] Participants reported their mental demands at work at baseline and completed tests of information processing speed and other cognitive functions at baseline and again about three years later. The study found that cognitive functioning was best preserved in those who rated their jobs as more mentally demanding. These findings suggest that PRA workers may be protected from cognitive decline if they are employed in stimulating work. However, there are marked limitations to this study, as participants without current work were permitted to rate the mental demands of their *previous* jobs. Education predicted cognitive performance on the tasks presented. Numbers of participants in each age group were unclear, and therefore the total number of people working beyond 60 could not be extracted from the report. There were further limitations, in that less educated people, and those in less demanding jobs tended not to respond at baseline and were more likely to be lost at follow-up. This study found that there were declines in information processing speed among people in their 60s, which accelerated after retirement. However, complexity of work with people (but not work with things or data) was associated with better cognitive functioning. The authors reported that 51 per cent of the sample had a retirement age of 65, and so the data are relevant to this review. Further data analysis specific to those working beyond 60 is needed for more robust evidence.

3.3.5 Use of medication (antihistamine)

While one might expect people aged over 60 to be using more prescribed medications than younger people, there is very little research into the influence of medication use on accidents at work. A case control investigation of risk factors for traumatic occupational injury and economic impact[76] included eight per cent of cases and three per cent of controls, over age 60. The study investigated the sedating effects of using antihistamines for aeroallergens and allergic rhinitis. A comparison was made of 1,200 cases to 1,200 controls using a standardised telephone interview survey. Cases were acute injuries, 'falls or slip injury', 'struck by objects', or 'caught in/between objects or machines'. These cases were selected because reaction time, fatigue, and lack of attentiveness are thought to be strong risk factors (and possibly modulated and/or caused by antihistamine use) for such injuries. The study found that antihistamine use in the prior two weeks raised the odds of accidental injury almost three times. Adjusted analysis included the interaction of age with antihistamine use. There were no important differences between cases and controls for the crude prevalence of sedative antihistamine use (nine per cent versus eight per cent respectively). Those participants who did not use sedating antihistamines reflected the age-related injury risk structure in the total study group, showing that in this sample *traumatic injury* risk increased with increasing age. The participants using antihistamines for sedation demonstrated the reverse of this: sedating antihistamines were associated with increased traumatic injury risk only in *young* workers. Further research into the risks of workplace injury associated with other forms of psychotropic medication (for example, anti-anxiety drugs) is clearly needed.

3.3.6 Fatigue

Is fatigue implicated in workplace injuries? One study[77] examined occupational accidents within the Maastricht Cohort Study of 'Fatigue at Work', a prospective cohort study of employees from a wide range of companies and organisations. The study population comprised 7,051 employees between ages 18 and 65, working at least half-time. They were employed in a variety of different jobs across 45 different companies and reported varying educational levels. While the lowest relative risk for accident was observed in the oldest age group and was 0.54, (95 per cent Confidence Interval, 0.26, 1.14) this was not a statistically significant difference. Workers with the lowest education had a seven-fold increase in likelihood of injury, perhaps being a particularly vulnerable population due to lack of job skills and exposure to more dangerous tasks. Smoking (but not moderate alcohol use), shift work, and using machinery, were all variables that increased likelihood of injury, in addition to fatigue. However, the analysis did not address whether the oldest workers were more or less vulnerable to these influences on their safety. Age was simply treated as a confounder in the regression analyses.

Fatigue has also been investigated in pilots. Pilots face considerable demands on both their physical and mental abilities, and the International Civil Aviation Organisation has implemented a series of regulatory measures to manage some of the risks associated with ageing. These include a mandatory retirement age, regular medical assessments for fitness to fly, and limits on the duration of duty and

rest. The mandatory retirement age was recently increased from 60 to 65 years for one member of a two-person cockpit crew.[78] While the traditional focus is on cardiovascular risk factors, this is not a cause of accidents in a two-person cockpit aircraft. Pilot fatigue, on the other hand, is an acknowledged cause of accidents.[79] Greater sleep loss is reported by older long-haul pilots, as well as other older shift workers, compared to younger people working similar duty patterns. Nevertheless, further studies[79, 80] report that neither crash circumstances nor prevalence and patterns of pilot error appear to change significantly as age increases from the 40s to the 50s and the early 60s. Even so, it has been proposed that fatigue and sleep-related issues should become a standard part of fitness-for-work medical assessments, particularly for older shift workers.[81]

3.4 Job and workplace variables associated with risk of specific injury and accidents among workers over 60

Age may be confounded with other variables such as level of education and seniority in some studies. Age-related decrements in functional performance and safety at work may also be exacerbated by lifestyle and psychosocial risk factors such as smoking, fatigue, body mass index, lack of education, all of which appear to increase risk of accidents. However, some of these influences seem to increase the vulnerability of the inexperienced younger worker, rather than having a clear role to play in the health and safety of PRA workers. Job and workplace factors may also create difficulties for the PRA worker. The final section will present evidence relating to fatigue, job stress, overtime and shift work.

3.4.1 Job stress/demands

It may be that job stress/workload demand increases the likelihood of accidents through having detrimental effects on cognitive performance. The most recent results from the Whitehall II study found that longer exposure to high job strain and shorter exposure to active jobs were associated with lower scores in most of the cognitive performance tests that the authors carried out in later phases of the project.[82] These findings need to be followed up though, to understand their implications for people working into their 60s. There were several limitations of this study from the point of view of addressing the question being posed in this review. The mean age of participants was 54.8 years, and although some participants were over 60, it was unclear whether any were people working beyond the normative retirement age. Given that the usual retirement age is 60 in this job sector, and that participants' job characteristics were recorded in an earlier phase of this 16-year longitudinal study, it remains possible that very few of the participants were working beyond 60.

3.4.2 Overtime

Given concerns that older people may be more affected by fatigue at work than younger people, it is important to examine whether long hours at work/overtime have a disproportionate effect on the safety of older workers. Secondary analyses were carried out on longitudinal data of 2,746 workers at heavy manufacturing sites in the United States during 2001 to 2002.[83] The effects of overtime on employee health, safety and productivity outcomes were analysed with a comparison of older versus younger workers. The initial five-year age bands between ages 30 and 65 included 174 workers in the 60–64 age group and 27 who were over 65. As found in many other studies, though, the upper age bands were collapsed into a single subgroup of age 50 and over. Analyses sought to establish i) the impact of overtime on the age groups under-45s, 45–49 and those over 50, and ii) a comparison of the impact of overtime for the three age groups by hourly-paid versus salaried status. Measured outcomes included physical and mental health, disease counts, acute injuries, musculoskeletal injuries, other injuries and short-term disability. Older age was associated with higher rates of some adverse outcomes with respect to overtime, but these were confined in the main, to hourly employees working extended overtime (averaging over 60 hours per week) and occurred on only four of the nine study outcomes. With respect to moderate overtime (48–60 hours) and a possible impact of past overtime (associated with prior disability episodes), increases in age did not associate with worse health outcomes. In many cases, older workers had decreased likelihood of injuries. Older salaried employees showed no trend towards having more health or injury problems if they did more overtime. Where rates of adverse outcomes increased, they were confined to subgroups of employees doing specific types and levels of work and longer work hours. While this study suggests no adverse effects of moderate overtime on older employees, the evidence cannot confidently be generalised to PRA workers. This is because the analysis uses a coarse age categorisation and did not take into account potential influences upon overtime and safety such as job motivation, which may be particularly high among PRA workers.

3.4.3 Shift work

There is limited evidence about shift work in relation to over-60s workers, even though previous evidence suggests that it may create difficulties for pre-retirement older workers.

One study has addressed whether shift work affected cognitive performance in workers over 60.[84] In the sample of over 3,000 workers, 14.5 per cent were aged 62. The study found that male shift workers showed reduced cognitive performance (for example, in immediate or short-term memory) but no problems were noted with female shift workers. No associations with age were noted. The 62-year-olds did not appear more or less affected by their shift work patterns than younger workers.

Another study examined a total of 7,717 compensation claims for injuries filed by hospital employees (age range under 25 to over 65) between 1990 and 1997 in the state of Oregon.[85] There was little variation by age or gender between day, evening and night shifts. The age groups with the lowest percentage of claims were those under 25 (8.5 per cent) and those aged 56–65 (8.7 per cent); for those over 65 there were only 0.7 per cent of claims.

While shift workers have been found to have greater deterioration in health with increasing age compared to day workers,[86] further research is required to establish whether this pertains to people working into their 60s and beyond.

3.5 Conclusions from the systematic literature review

A study of older people in the UK working past pension age demonstrated that they have (as a group) specific characteristics.[26] They tend to be in better health than their retired counterparts, and in need of income (for example, to boost inadequate pensions, to pay for mortgages or to support young families). Their spouses tend to be continuing in work. Part-time working arrangements are common, and many of this group tend to enjoy higher levels of education and derive satisfaction from their work. These various characteristics mean that evidence taken from mixed samples of working and non-working older adults, or people working in their 50s (either to study age-related changes in performance or occupational health and safety) may not generalise to this specific working subgroup.

A diligent literature search was conducted, which included scrutiny of many articles to identify the age groups of workers studied, and considered within the data analysis. This yielded no other piece of research that focused explicitly and solely on the safety and risks of the PRA worker – i.e. workers who had gone through the normative age of retirement and decided to remain in their jobs or move to new, part-time or 'bridging' jobs. In turning to the relatively few studies which included workers aged 60 and over, evidence suggested that their health and safety patterns were largely shared with workers aged 50 and over. Therefore the over-60s were shown in most studies to have lower accident and injury rates compared with younger workers, although they were more seriously affected when accidents did occur and took more sickness days off. They were more likely to suffer fractures in workplace accidents. Such events were then found to increase likelihood of retirement. There was sound evidence that older people, in general, develop hearing loss and that as little as one year's exposure to noisy working environments increases this risk, and furthermore, elevates risk of accidents. However, there were no studies on noise and accidents that focused specifically on older workers who had opted to work beyond retirement age. Another major limitation was ascertainment of noise exposure from work histories, rather than objective noise monitoring.

While the older population as a whole tends to show cognitive decline with advancing years, there was little evidence for such changes affecting job performance or safety in the over-60 worker, although somewhat mixed outcomes were seen for driving safety.

There was no robust evidence that patterns of work including shift work, or overtime (until it became excessive at over 60 hours per week), affects the safety of the over-60 worker, more than any other older worker.

Like other studies of older workers (which have typically focused on the over-40s or over-50s), the over-60s seem able to apply protective or compensatory strategies which help to maintain safe working practices (for example, when driving). Education and experience seem to have important protective effects on the over-60 worker. On the other hand, detailed information on the number of hours worked, the time of the accident, the contribution to accidents made by illness (such as stroke) or medication, and specific environmental events such as weather conditions were not usually available for analysis. Furthermore, injury rates are generally calculated using number of workers in each age group instead of hours worked; if workers are part-time (as appears common among the over-60s)[26] injury rates based on a denominator of worker numbers, may underestimate the risk of injury. Job experience may also confound injuries and fatalities at work that appear to be associated with age. PRA workers may also face different workplace risks, relating to specific job tasks, as noted among the electrical workforce.[46]

Overall, evidence suggested that workers aged over 60 are able to cope well with their work and job demands, although much more detailed research is required. There were no explicit research data that included analysis of PRA workers and workplace factors associated with injury or accident, that is, for workers who had gone through the normative age of retirement and decided to remain in their jobs or move to new, part-time or 'bridging' jobs. The lack of age-specific injury and illness data by job title or other exposures prevents the discussion of factors that will enable workers to remain safely in work into their late 60s or beyond. This is an important gap in knowledge now that, since 01 October 2011 the default retirement age of 65 has ended in the UK.

3.6 Some recommendations for future research on safety and risks among workers aged over 60

This review has found little direct evidence about the safety practices and risks of people working beyond 60, and even less regarding those who specifically choose to work beyond the default or normative retirement age. Even estimating risks from data which are taken from workers over 60 is open to question, as many of these individuals might regard themselves as approaching retirement rather than having chosen to work beyond it. For some analyses, data were grouped into broad age categories, (for example, workers 'over 55'), even when people working in their 60s were included in the study, reducing specificity of the findings. Workers in their late-50s might regard retirement as a distant horizon and may have very different attitudes, abilities and other characteristics compared with workers opting to stay beyond the default retirement age. The prevalent recourse to part-time working among the PRA workforce might have positive implications for health and safety but these have not been examined in previous studies.

There are few longitudinal studies documenting any age-related changes in work performance and safety of workers in their 60s and 70s. These are needed to address the 'healthy worker' effect that may have a profound influence on PRA workers' safety at work. Studies based on recall of exposure to hazards have potential to bias results particularly in comparative studies of older versus younger workers, where the older worker is recalling more distant events. Details of events and processes (psychological, somatic and environmental) leading to accidents and injuries in this subgroup of the workforce have not been examined in detail in previous research. The Share survey[87] started in 2004 will follow work, health and other factors prospectively to identify some of the issues hidden, for example, within the selection bias of the 'healthy worker'. To encourage retention of workers over 60, the variables associated with health and well-being, and the age-related impact of negative working conditions, should be identified and addressed.

This review has uncovered some evidence but overall shows that relatively little is known about people who work beyond 60 and into their later years. Such evidence is needed to inform policy, human resource management, training, work scheduling and ergonomics. Additional longitudinal research is needed to address the specific, possibly changing health and safety issues confronting workers who stay on beyond 60, and the influence of protective resources such as work experience, limited hours of work and seniority of status at work.

In addition to objective evidence (for example, from accident statistics), qualitative evidence about PRA workers' awareness and opinions about safety cultures and practices within the workplace is also lacking. Elucidation of strategies that PRA workers use to maintain safety in their work necessitates detailed qualitative research and mixed-method studies. These might combine objective data such as accident records and levels of compensation, with self-reports of current risks at work, coping strategies and safety culture. Any resources that the over-60s bring to the workplace that enhance personal and organisational health and safety also deserve further enquiry.

4 Phase 2: Experiences of hazards and discomforts at work at post-retirement age – a qualitative study

4.1 Aims of Phase 2 and rationale for a qualitative study

This second phase of the research project sought to explore post-retirement age (PRA) workers' experiences of health and safety at work, through a qualitative method. The limited previous research into the health and safety of PRA workers largely uses quantitative methods, as established through the literature review (Phase 1), rather than exploring subjective experience qualitatively. To address some of these gaps in knowledge, this study aimed to explore PRA workers' perceptions of safety risks (and incidents) and positive safety practices in the workplace.

Qualitative studies do not seek large random samples. Numerical analysis of themes is usually inappropriate. Rather the intention is to gain rich 'insider' perspectives from a relatively small group of participants who are able to reflect in depth on their experiences, and offer nuanced insights that might be difficult to anticipate when designing a questionnaire, or to capture in quantitative formats.

4.2 Method

Design: A qualitative interview study was conducted, based on single interviews with people all of whom were working beyond retirement age (defined as 60 years and beyond for women; 65 years and beyond for men).

Ethics: Prior to data collection, the project was approved by the ethics committee of the School of Health Sciences and Social Care at Brunel University. Participants making enquiries about the project received full information, including the interview topic guide, and signed consent forms prior to interview. In line with ethics committee requirements, all data have been anonymised (in terms of personal, place and company names) and participants' personal details are held securely.

Recruitment: We originally proposed recruiting 20–30 participants through three organisations that had expressed provisional interest, but repeated enquiries to their head offices thereafter failed to elicit formal support. Changes in economic circumstances meant that the companies that had expressed interest in the study withdrew, as they were downsizing, which was judged to be affecting morale, especially of older workers (who were more likely to be laid off). We also informed the managers of five local supermarkets and DIY stores, and one supermarket based in the North of England. Although they all identify themselves as having a good track record of employing older workers, none offered support. Enclosed in the letters explaining the research project (and the funding by IOSH) were notices that could be placed in staffrooms which advertised the project to interested workers. No participants were recruited through these means and it seems likely that the notices were not displayed. Participants were eventually recruited through three routes:

i) Community science fair, Uxbridge shopping centre: a community exhibition of research being conducted by Brunel University on the topic of ageing was held in March 2010. The authors organised a stand which displayed reports of our current research studies involving older people, and some visitors to the stand took away the detailed project information sheets and consent forms. A total of 28 information packs were distributed and nine people were recruited through this route. A tenth person was also interviewed but not included in the final sample as the interview uncovered that he had retired the previous year, aged 67.

ii) A letter requesting participants for the project was published in a national magazine written for an older readership. This yielded about 40 enquiries and 26 eventual participants. Readers who enquired about the project after the active period of data collection had been completed were sent letters of thanks for their interest.

iii) Snowballing: five participants heard of the study through others who had been interviewed. This included three partners of participants who then also requested to be interviewed.

In the latter stages of recruitment, purposive sampling was used, in order to gain similar proportions of men and women, and the planned-for numbers of people working in the various employment sectors (such as education). Manufacturing proved the most difficult sector to recruit from, and we succeeded in gaining only four participants (rather than the five that were proposed). As the recent Social Trends survey[24] shows that only one in 10 of the workforce is employed in manufacturing, this may be an understandable difficulty.

As noted above, qualitative studies are generally reliant on willing volunteers rather than random samples of participants. During the analysis and interpretation of findings, due weight has to be given to the specific characteristics of the sample and how these may affect the accounts being offered. Recruitment ended when saturation of themes was achieved.

Sample: 40 participants were recruited, aged 60–91 years (median age 70). Interviews were conducted with two further recruits, but the interviewer only discovered during the interview itself that they had retired recently from PRA working (thereby not meeting the inclusion criteria). These two interviews have not been included in the data analysis as we wish to focus upon current employment experiences. We recruited 19 women (aged 60–76), and 21 men (aged 67–91), currently in paid employment or self-employment.

Forty represents a much larger sample than originally specified in the research proposal (20–30). It has the advantage of having nearly equal numbers of women and men. This is helpful as men and women seem to engage in rather different decision-making processes in opting to work beyond pension age.[26, 27] Another advantage is that considerably more people were interviewed than in the qualitative study that might be considered 'closest' in subject matter. Barnes *et al*.[27] provided a report on people's experiences of working beyond statutory pension age, based on 24 interviews. Only four of their participants were over 70 years old, and out of a total sample of 24, seven were not currently working beyond State pension age. This IOSH-funded study has been unusual in achieving a sample where more than 50 per cent (n=23/40) were aged 70 and above.

In terms of employment sector, four were working in manufacturing; seven in retail; nine in healthcare or therapy; 10 in education, and 10 in 'other' (this included HGV/PSV driving, financial sector, communications, market research and PR management). Several participants (both men and women) were running their own businesses, a few of whom had started their business upon retiring from their main career jobs. The majority (n=30) were working part-time. The sample could have been increased further, as the magazine letter prompted many enquiries, but evidence of saturation of key themes in the data led the authors to decide that the sample of 40 was of sufficient size and variation.

Procedure: Semi-structured interviews were conducted either face-to-face in person or by telephone. Telephone interviews were offered to participants who lived outside London and its suburbs, and this enabled people to take part living as far afield as Cornwall, Wales and Scotland. All interviews were audio-recorded and transcribed verbatim. Interviews ranged from about 30 minutes in length to an hour and a half. The telephone interviews were not, on the whole, shorter or less rich in content. The interview began by exploring participants' motives for working and their perceptions of the influence of work upon well-being. This was thought to provide useful background to understand their perceptions of any hazards at work, and their ways of managing or reducing these.

The following topics and questions were presented to participants, with additional questions and probes added as needed to help elaborate their accounts.

1. Overview of past and current work
2. Motives for working past statutory pension age
3. Perceptions of the influence of work on health and well-being
4. Perceptions of any adverse factors/risks at work (or hazards and discomforts)
5. Views regarding whether awareness/experience of safety issues has changed over time
6. Ways of managing and/or reducing hazards and discomforts at work
7. (If relevant to the job and work setting) experiences of safety/near-miss incidents at work, attributions for these, self-management of these incidents, and personal impact
8. Suggestions for how to make the working environment safer or healthier or more positive for older workers

The first three questions above were included to provide contextual background and only the main themes will be presented, without elaboration and quotation (more details can be found in the paper listed in Appendix D). The report of the main findings below focuses on participants' perceptions and strategies for managing hazards at work.

Data analysis: This report is based on a thematic analysis of the data which yielded a number of key emergent themes. Independent coding by the researchers, and discussion to elaborate further interpretations of the data, helped to achieve findings of demonstrable high quality.

4.3 Findings

In the following quotations, participants are given pseudonyms and other names (of people, places and companies) have also been changed to preserve anonymity. Some quotations have been shortened intentionally and missing words are indicated by the usual convention of ellipsis (…). Words that have been added by the authors to clarify the meaning of quotations are indicated by square brackets.

4.3.1 Reasons for working beyond statutory pension age

To understand participants' experiences of health and safety relating to work, it was helpful to consider their motivations for working at the start of the interview. These motives shed light on the considerable range of subjective benefits that the participants were deriving from their work. The recurring themes are summarised in Table 4.1 below.

Table 4.1: Key themes: motives for working beyond statutory pension age

1. To improve financial status
- Maintaining a customary lifestyle
- Ongoing support of dependents/partners/adult children

2. To maintain physical health
- Keeping active
- Mental alertness and vitality
- Work obligations and routines help resist 'giving in' to illness, 'laziness' and low mood
- Work as a distraction from pain and other health problems

3. To experience job satisfaction

4. To engage in developmental opportunities
- Continuing personal development
- Challenge and achievement
- Social connectedness and status
- Preserving personal and social identity

Work had many meanings, and appeared to function as a source of identity, development and support, in addition to offering financial benefits. Work was perceived as helping to maintain both psychological and physical well-being.

4.3.2 Awareness of hazards and discomforts at work

In the first few interviews, when participants were asked about safety and risks in connection with work, some queried why safety should be an issue at all. They questioned whether there might be 'ageist' assumptions underpinning the research study, which implied that older people could not manage the physical or technical aspects of their work. This created potential for difficult interactions during the early interviews. After some thought, as well as some trial and error in the early interviews, it was found acceptable to ask participants to consider the 'hazards and discomforts of working', rather than the 'health and safety' aspects. Although participants were aware of a range of issues that they should manage with care in the workplace, such as heavy lifting, or prolonged sitting at desks and computers, most did not see these as personal concerns. Many in the sample could not identify any particular hazards. Of those who did disclose safety issues at work, four types of hazard and/or discomfort recurred in participants' accounts (see Table 4.2).

Table 4.2: Working beyond 60: perceived hazards and discomforts in the workplace

Physical demands of work (for example, lifting, prolonged sitting, using computer screens)

Driving (for business and commuting)

Interpersonal hazards (for example, customer/client aggression, complaints, pressures)

Tiredness (loss of stamina)

4.3.2.1 Physical demands of work

Several participants expressed awareness of the physical challenges associated with prolonged sitting (at computers, especially), bending, and lifting heavy items, but most considered that they affected people working in different jobs, and that they themselves were not personally vulnerable. In contrast, a participant who had experienced a workplace injury a few years previously, described how

his work had changed in recent years to involve much less lifting, through factors such as better technology, his decision to work fewer hours, and taking more personal care:

> 'The amount of drops [deliveries] I see on jobs [now], they're nothing. I mean you're talking about 10 to 15 drops a day. I was doing 60 to 90 drops a day. From the end of a half ton lorry!' (Sam, 67, HGV driver)

A nurse expressed awareness of the moving and handling demands of her work, although she described herself as having sufficient knowledge and resources to manage these safely, both through lengthy work experience and by learning from a personal incident many years previously that had resulted in injury:

> 'As far as lifting and things like that, handling people, moving people about, I wouldn't put myself now in danger, you know. Some people say "Oh let's just ...", but I say "No, no, we'll use the hoist ..." It's the same with carrying, like the trays are very heavy. And I wouldn't ... carry two of those upstairs. I'm far more careful because you know it's easy to hurt yourself. You know in the past I have hurt myself.' (Sarah, 66, bank nurse)

Another part-time hospital worker also identified a range of hazards in the workplace, but again emphasised his capacity to cope, through keeping fit as well as using safety strategies learned during his previous experience in the army (and as a heating engineer):

> 'We lift quite heavy weights, trays of instruments can go … I think it's 20lbs, 25lbs, the heavy metal ones ... And yes, it's a way of keeping the body toned, because it's all upper arm strength and waist muscles and stomach muscles if you're lifting things ... There'll be sharp instrument injuries because we have very fine probes that if you're not careful, you can pop yourself, and burns … The main things might be there's a certain amount of heavy lifting but I'm short and stocky and I was used to working with Bailey bridges and things, fortunately, touch wood, I've got no problems with backs and anything like that, I usually do my fair share of lifting. So I feel that I'm putting my five eggs in and keeping up with things and trying to, I know it sounds a bit trite, but trying to give older people a good image if they want to employ more.' (Christopher, 70)

Most of the participants who worked in office environments (whether employed or self-employed) considered that they encountered very few physical hazards in their work:

> 'I can't really think of anything that really affects me at all, I mean sitting about too long [at a computer] is not a good thing. But I am not by any means overweight … I keep myself fit, I've just come in from the gym as it happens half an hour ago. No, the safety issue is never a consideration.' (Joseph, 78, running his own recruitment business)

4.3.2.2 Driving

Driving long distances (either for business or to commute to work) was mentioned by a few participants as somewhat hazardous and uncomfortable. Although some thought their slightly increased difficulties were associated with age, a larger proportion who referred to driving as a discomfort or potential hazard considered that worsening traffic conditions affected everyone regardless of age:

> 'There are some physical demands like keeping alert when driving out to a distant place or something, but they're the same things that would apply to anybody. I don't feel they're particularly more difficult for me than other people … I suppose I am more careful about stopping if I'm feeling tired and I suppose I'm more aware of places where one can stop to empty one's bladder or something (laughs) than I might have been as a younger man, this sort of thing, but otherwise, no.' (Ben, 76, locum GP)

4.3.2.3 Interpersonal hazards

Most commonly mentioned were the interpersonal hazards of lone working, and clients' aggression, accusations or complaints (especially in the therapy, health and social care, and education sectors). Interpersonal hazards broadly relate to problems in communications or relationships between people. Bureaucracy and form-filling were common discomforts mentioned by those who worked in the health and education sectors. Some of these issues were described by Josie, who had retired from being a mental health nurse and had since moved to working part-time with nurses, in a supportive

counselling role. She explained why she had retired from her full-time job in a mental health setting in terms of escaping these pressures:

> 'The thing was I didn't want the responsibility of psychiatry anymore. Because it's a huge, huge responsibility. Any nursing job at the moment, all the paperwork and the fear of being sued and that sort of thing. And then I'd had enough of patients telling me, somebody saying on a Friday night they were going to kill themselves, because they would do it to see what reaction they could get. But then you've got to think, "Do I get the doctor, do I just risk it [over the weekend], what do I do?" And I thought I don't want this anymore … I think it's like the police force. They spend hours writing up things and they'd really be out there. And that's what I felt. Everything you did had to be immediately recorded.' (Josie, 63, workplace stress counsellor)

Another interpersonal hazard related to the pressure of e-mail and the increasing expectations and demands of customers, clients (and in a few cases, managers).

> 'I get very cross with e-mails and all this nonsense ... I sometimes think that people expect too much, you know, they send you an e-mail at half past 10 in the morning and 11 o'clock they're ringing up and saying "Did you get it? Where's the reply?" (Geoff, 70, self-employed financial services)

Increasing pressure from managers to make sales was described by some of those working in retail. A few found management styles unacceptably aggressive:

> 'There was a certain amount of bullying that was going on and the management seemed to think that was acceptable. I'm afraid I don't agree with them and I think the health service doesn't allow it either, it's in their doctrine that they don't allow bullying, but it's very difficult to prove sometimes in a big pathology department.' (Christopher, 70, part-time hospital worker)

The hazards posed by aggression (and unfounded complaints) from clients were judged to be worsening over time, for all workers, regardless of age. The locum vet who was interviewed even thought that these behavioural problems were evident in pets:

> 'I think that as compared with the pets that we handled then and that we handle now, that we've always got muzzles now … nobody thinks for a second about putting a muzzle on to a dog or even on to a cat for that matter … because there is so much more aggression in pets these days.' (Graham, 68, locum vet)

4.3.2.4 Tiredness

Some participants, more particularly those aged 70 or over, described increased physical tiredness or loss of stamina as the main discomfort associated with working beyond 65. However, they did not find this unmanageable or believe that their mental capacity was affected:

> 'I say to people, I'm a tinny old car which don't work properly, you find your eyes are getting a little bit weaker and your legs and so on don't work … they get tired quite easily, you find that … well, perhaps every bit of your body I think is not working as well as it should do. But I have a highly active brain, I'm always thinking of some scheme and so on ... I'm mentally pretty active, I always have something to think about, I always have some project on the go.' (Eric, 80, full-time worker in his own horticulture business)

Tiredness, for some, was attributed to work, whereas for others, it was attributed to a general age-related slowing down within the body:

> 'I now find that if I do an 8 to ten hour day, when you get home you do feel a bit tired, have a good night's sleep. But if you do two days on the trot then you tend to be a bit longer in the morning to get going ... obviously the older you get the longer it takes you to get going in the morning. But, um, but I mean I do a bit of gardening, a bit of computing, we go out occasionally, usual lifestyle, and it keeps your mind active.' (Sam, 67, HGV driver)

While some, like Eric (above), attributed his physical fatigue to advancing years, others saw it as a normal response to hard work:

> 'Sometimes, at the end of the day, I'm getting a bit mentally tired, I can feel myself making a few silly errors because I think "Oh well, you're getting to the end of the day now" but I think it happens to everybody, doesn't it?' (Christopher, 70, part-time hospital worker)

4.3.2.5 Further issues

No recent harmful incidents at work were reported. The few incidents that were discussed in interviews all related to the pre-retirement age period. It remains an issue for further research whether PRA workers are indeed rather rarely found in arduous or risky manual work, through opting out of such settings when they reach pensionable age.

In addition, no-one reported any need for special adaptations at work or job re-design. But it should be noted that participants typically enjoyed considerable control over their working hours and tasks, and some had explicitly developed their businesses or portfolios of employment in ways that suited their needs and interests. Many were able to influence their working environments, especially those working from offices at home or from private therapy/consulting rooms, who described designing their workspaces to suit their needs for light, organisation of materials and so on. Very few people were employed in manual jobs with little autonomy. As noted below, these less powerful workers thought that they had sufficient personal coping skills for safeguarding themselves (such as assertiveness).

From a qualitative perspective, it is not possible to infer that there are no objective hazards for the PRA worker. Rather, the data show that these PRA workers subjectively felt able to cope with the everyday challenges of their work, to the extent that they rarely saw these as posing safety risks. They mostly considered hazards to be minor and/or open to measures with which they were fully familiar. They described a number of strategies which they thought helpful for reducing discomforts and hazards, as outlined next.

4.3.3 Strategies for enhancing safety and comfort at work

Participants described a range of strategies for managing discomforts and hazards at work, as summarised in Table 4.3.

Table 4.3: Strategies for managing hazards and discomforts at work

Adapting to age-related changes in functioning
Reducing hours and driving commitments
Applying expertise derived from lengthy experience of work
Thinking for oneself
Being assertive
Using one's authority and status
Supportive company/organisational policies and practices

4.3.3.1 Adapting to age-related changes

Tiredness and some loss of stamina were the most prevalent reported discomforts at work, and some felt that these problems might be worsening with age. Nevertheless, this affected a small minority of the participants. Personal coping strategies such as 'power naps' (described by a few of the older male participants only), keeping fit and the change to part-time working, helped to ameliorate these problems:

> 'Obviously, you get more tired, but on the other hand, we do go to the gym regularly and therefore, as a person, I feel very fit. Certainly my blood pressure has gone down because I'm not under the same sort of stress you are when you're a full-time teacher. And then high blood pressure was quite a concern at one time and it isn't now [since retirement from full-time work], so yeah, sometimes I think I feel fitter than the children actually.' (Barbara, 60, supply teacher)

> 'I work a highly irregular seven-day week and I'm about to try and import a small sofa into my office in [X University] ... in order to be able to cat-nap. So I think cat-napping for the elderly is very important. It's a quick restore of the batteries, yes.' (Paul, 70, university researcher)

However, a few were concerned that taking naps might lead to further age-related decline:

> 'A great friend of ours who lived next door is increasingly too tired to do this and that, and must have a lie down after lunch and this sort of thing. And my view is that ... they have no focus to go on.' (James, 79, self-employed, full-time mail order business)

Some additional coping strategies were described for age-related changes in cognitive and physical functioning:

> 'The hazards really come out of somebody saying to you "Have you sent that e-mail off?" or … "Have you got a so and so and this, that and the other?" and you've got no idea about it, it's completely gone from your memory. That and, as well, names, you've got a picture in your mind of somebody and you just can't remember the name … But either you busk round it and don't ever mention a name at all, or you come straight out and say "Your face is very familiar, but I'm damned if I can remember it."' (Eric, 80, runs own horticultural business)

A locum vet who was affected by arthritis in the hands was unusual in explicitly acknowledging the support of colleagues. This enabled him to limit the type of work he did at their practices:

> 'I can still stitch up a dog fight or a road accident thing, but I would much rather not because even with painkillers, I find difficulty in my hands [because of arthritis]. And it is a given [in all the veterinary practices attended] that Graham doesn't operate. Only perhaps on a Saturday, if I'm the most experienced vet in that particular practice when we're running a bit shorthanded … well then I might well do it. And I'll do it quickly and I'll do it well, but there's always the worry that my hands are going to seize up.' (Graham, 68, locum vet)

4.3.3.2 Reducing hours and driving commitments

The most common means of avoiding or reducing work-related hazards and discomforts was by moving to part-time or portfolio jobs after retirement age. This allowed participants to perform the specific roles that they enjoyed while limiting onerous responsibilities:

> '… And the good bit is that I don't have to go to meetings, so I don't do staff meetings, I don't have to meet parents, I don't have any planning to do, I don't have any responsibilities within the school, so I don't have any paperwork to fill in … and my real responsibility is to do the job that I love, which is teach the children, obviously mark all the work, which is why I was slightly delayed today, because I have to mark it before I leave. And then I say "Thank you very much" while they're all in their staff meeting and I can go home and enjoy my evening.' (Barbara, 60, took up primary school supply teaching six weeks after retirement from a full-time teaching post.)

Reducing hours of work also allowed participants to achieve a better work-life balance, reduce tiredness, and extend their leisure pursuits:

> 'If you've had a long day and then you're then confronted with a particularly, um, uncooperative couple it can deplete the energy, so generally I work on Fridays and I can come home on a Friday a bit crashed out, heading for the G and T [gin and tonic]! I probably could do another day a week, but I choose not to because I've got other things I want to do.' (Doug, 73, part-time family mediator)

Some had reduced their exposure to driving hazards by restricting their choice of work locations (even if this reduced their income), to minimise stress and possible harm. For example, Laura ran a business with a colleague providing 'moving and handling' courses to therapists all over the UK. She explained her increasing reluctance to travel to more distant venues:

> 'You know, you don't realise then [when younger] just how much of an effort that is, all that amount of travelling. Because to be honest, I don't think I could do that now. I don't think I'd want to. You know the thought of driving away down to Manchester or Birmingham or

> something – that doesn't appeal any more. I would go, but I would probably get the train or something of that ilk. Don't forget, I've seen a tremendous change in the volume of traffic over the years that I've been working. From it being very pleasant to absolutely horrendous. My business partner lives in X [a town further South]. She's got more travelling to get to venues nowadays – but that's no problem for her, she's just a young thing.' (Laura, 73)

4.3.3.3 Applying expertise derived from lengthy experience of work

Lengthy experience at work (not only gained in the current job, but from previous jobs, and life experience more generally) was considered to enhance current awareness of safety issues:

> 'I'm very keen on health and safety and that was one of the things I did at health control. I was a rep for health and safety and fire things and that's still with me, you know. I carry that right over. Also working at the airport [previously, as an immigration officer] you see, we were very tuned into the risk of bombs and things you know. And I was there at the time when the IRA were very rife and you know we had one or two incidences which were really not very nice. So I'm very aware of all of those sorts of things.' (Carol, 64, complementary therapy coordinator at a cancer centre)

Several participants considered that their years of experience in many different jobs had prepared them to be more aware of safety than their younger colleagues. Christopher (71), for example, described drawing upon his early experiences of working with explosives in the army as a young man, and then his later years of experience as a heating engineer, to enhance his safety when sterilising medical equipment (a part-time job that he took up after retirement age). He reckoned that he was more safety conscious than the management team. Several participants thought they had become more cautious in later years, linked both to age and work experience. For example, after being asked about whether his awareness of safety was changing, Sam, an HGV driver said firmly:

> 'It's sharpened, even though I mean I'm getting older and another thing is the older you get the more space you leave in front of you, between you and the vehicle in front … But there's a lot of factors in driving which I don't think many people take into account. So yes I think you slow down as you get older in life. To take into account what you're doing. You realise you've got to slow down. It's no use being a boy racer when you're 65 or 70, because you'll come a cropper. But the driving as a result is, you know, kind of more appropriate as a result, more cautious.' (Sam, 67, HGV driver)

Two participants reported experience of back/shoulder strains from their work prior to retirement and believed that they had learned how to work more safely as a consequence. For example, Nathan had worked in retail all his life and had bought his own shop after retirement age (to help provide for a young second family):

> 'But I've learnt from experience I never try and lift anything. I'd rather unpack a parcel on the floor and lift the goods up one by one if you see what I mean. Although perhaps I might have struggled before, but I did suffer from a bad back at one time. But now, no, I've been very careful not to do anything that will make it bad.' (Nathan, 71, shop owner)

4.3.3.4 Thinking for oneself

Linked to extensive work experience, but placing more emphasis on problem-solving skills, several participants considered that they coped with workplace hazards by thinking things through. Some of the men referred to having to cope with dangerous situations in the armed services in their youth, which instilled lifelong caution and 'common sense'. A few thought that current health and safety policies and legislation actively discouraged workers from thinking through issues themselves. They considered that age and experience brought advantages in this respect, whereas younger people were thought to need more explicit rules and guidance:

> 'People are not taught to be sensible any more these days, because you have to be told not to do things rather than think to yourself "Should I be doing it or shouldn't I be doing it?" So people, I don't think they think for themselves as much as perhaps we used to do when we were younger.' (Barbara, 60, supply teacher)

4.4.4.5 Being assertive

A large subgroup of participants thought that their age and previous work experience (often at senior levels) had increased their assertiveness and the ability to decide for themselves whether or not to

carry out a task that might prove hazardous (such as lifting heavy items, or lone working in potentially dangerous circumstances). They were not afraid to speak up about such issues:

> 'Maybe when you get a bit older, you can be more assertive, to say, this [conveyor] belt isn't working, I'll have to close the till. I am not dragging or lifting things that are too heavy.' (Fay, 62, shop assistant, former scientist)

> 'With my rail passenger count … I feel a little bit nervous when I'm sitting there [at an isolated station] at 10 o'clock at night. Waiting for the next train and you don't know whether a drunk is going to get off it. Or whether you're going to be attacked, because you're the only one there. So I made representations to the, um – again it's my insurance background that sort of helped me with this – I made representations to the people who control how many trains you stay for [to count passengers], and we now don't stay beyond seven o'clock at night in the winter for these little stations, because of the hazard.' (Adrian, 72, traffic/rail passenger enumerator, former insurance professional)

Several felt that their assertiveness had increased, not simply because of their work experience, but also because they were not particularly worried about losing their part-time jobs. As they had pensions to fall back on, they did not feel wholly reliant on their work income. Indeed, they regarded their situation as more fortunate than younger people in the same organisation who might be nervous about commenting on safety practices for fear of management reprisals. Some felt that co-workers looked to them to be assertive because of their extensive work – and life – experience:

> 'I mean I give my frank opinion because I've got the confidence nowadays to do that, whereas before I might have curbed what I wanted to say.' (Marilyn, 69, administrator, children's nursery)

> 'I always feel it's part of my job actually [to advocate safe practices]. Hospitals are highly pressurised now, you can get people who … let's put it this way, overstate their authority if you like. And if you've got young people onboard, they will accept it as normal and I know it isn't normal and I will not let them suffer under that regime.' (Christopher, 70, medical sterilisation department)

4.3.3.6 Using one's authority and status

Some participants were currently self-employed or employed in senior positions in their companies, thereby having considerable control over delegating tasks.

> 'It's the fact that as you get older, you find it more difficult to do heavy physical jobs. I haven't got the same energy … the same strength that I used to have, and now if it's just a case of heaving something about which is quite heavy, I let somebody else do it … It's the advantage of being the boss!' (Eric, 80, owner of a horticultural business and full-time worker)

A minority of the participants had relatively little autonomy or power in the workplace, including those who were now employed in less senior positions than they had occupied prior to retirement (for example, shop assistant, call centre worker). This group generally pointed to personal skills such as knowledge and assertiveness in helping them to address any perceived laxities or hazards in the workplace (as illustrated by the quotation from Christopher in the previous section, who used his previous work experiences in explosives and engineering to support his 'stand' for safe working practices in a hospital).

4.3.3.7 Supportive company/organisational policies and practices

The few participants who were employed by large organisations typically described potential workplace hazards (for example, lifting heavy items, office seating arrangements) as sufficiently managed by the company to ensure their comfort and safety. No aspect of their work was seen as posing special risks to PRA workers, compared with any other age group.

> 'If you're sitting and you know you're sitting in one position for a long time you've got to make sure you're in a comfortable seat. And the company does make an effort to provide people with comfortable seating if they have back problems. You know they're pretty good on that and it sort of complies with all the HSC directives and whatever, so yeah no problem really.' (Aileen, 67, call centre worker in a mail order company)

Employers were generally thought to offer adequate protective resources:

> 'Certainly with the estate agency, you are issued with a yellow jacket to wear if you're on a site where yellow jackets are the norm. You're also issued with a rape alarm, which you know every member of staff has … I think it was the Lamplugh case that sort of brought it to the attention of employers.' (Adrian, 72, part-time estate agency worker)

Some described younger staff as being given the responsibility at work to carry out physically demanding work such as lifting or working on ladders:

> **Researcher:** 'For any teacher who, like yourself, who's planning to stay on for some time beyond 60 years, are there any physical risks?'
> **Barbara (60, locum teacher):** 'Not that I'm aware of. You don't, obviously … (sighs) you're not encouraged to get involved in lifting heavy things and things like that, moving things around, putting up displays, etcetera, those are all devolved responsibilities these days … that's now down to the teaching assistants.'

4.4. Discussion of qualitative findings

The participants in this study portrayed themselves as a highly engaged, experienced workforce, largely unencumbered by the frailties traditionally associated with ageing. In this respect, they resembled participants in a previous qualitative study of workers continuing beyond pension age, who typically regarded their good health as enabling them to continue in work.[27] Even though more than half of the participants interviewed were aged 70 or over, they appeared to manifest many of the characteristics of 'successful', 'active' or 'positive' ageing. These overlapping, multi-dimensional constructs connote not simply the achievement of good physical health in later life but a state of life satisfaction derived from engagement in meaningful roles, personal development, and affirmative social relationships.[88–90] The findings challenge negative stereotypes which equate later life with physical and mental deterioration.[88]

The qualitative accounts revealed that PRA work held a rich array of meanings, offering not only financial benefits, but also better health, self-esteem, a familiar competent identity, stimulation and a sense of belonging within a wider social network. These themes resonate with the findings of previous UK studies that have surveyed people working beyond statutory pension age.[26, 27]

Previous qualitative research[27] has found that people working beyond retirement age typically consider their work to promote their physical and psychological well-being, and several quantitative investigations have supported this relationship.[91, 92] Participants in a previous qualitative study[27] described their work as helping them to stay mentally and physically active, stimulated and in social contact with colleagues. The current study elaborated further on these perceived benefits. According to participants, work enhanced their alertness, cognitive functions and vitality, even those who were living with long-term health problems such as diabetes, arthritis or heart disease. The routines and regular obligations of work were experienced as helping participants to maintain their current health status and resist deterioration, increasing perceived control. These subjective views resonate with research findings which link control beliefs to the maintenance of health in later life. For example, older people who have strong beliefs that they can influence their own health show less cognitive decline over time,[93] and seem to use more active health promotion strategies.[94]

Although the content of work was considered by most to be satisfying, the reduced hours and (in many cases) increased choice over patterns of work was also experienced as contributing to the health and well-being of those who worked part-time. The majority of the participants had taken the option of reducing their hours of work since reaching statutory pension age, a pattern that has been noted in two previous UK studies.[26, 27] However, unlike previous research, only a few participants had moved to less skilful, lower status positions.

In the current study, part-time work was valued for heightening choice over lifestyle, reducing stress and obligation, and offering opportunities for continuing personal development, all of which increased the experience of vitality. Some participants welcomed reductions in the drudgery and stressful obligations that they had endured as full-time employees. A previous study (though confined to university academics working beyond retirement age) found similar benefits.[95] Those who had taken up part-time consultancy, freelance or supply roles (for example, as a teacher or veterinarian) often felt more valued and less taken-for-granted by co-workers and managers, which also increased their subjective well-being.

A previous survey[26] found that a shift to part-time hours after retirement age was often associated with declining status and skill level, a pattern not reported by the majority of participants in this current study. The few employees who had moved to notably less senior positions seemed to find compensatory benefits, through applying their previous work-related knowledge and skills to their new roles, receiving recognition of their skilful contribution to the workplace from others, gaining a better home-work balance, and experiencing increasing confidence to speak up about matters that they felt strongly about.

The study has been unique in exploring PRA workers' subjective experiences of hazards and discomforts at work, and their strategies for managing these. Very few workers were recruited to this study from the manufacturing sector, a gap noted in previous relevant UK research.[26, 27] Perhaps not surprisingly, therefore, there was very limited concern in the sample with heavy lifting, bending, stretching or working at height. Instead, interpersonal hazards such as lone working, complaints, aggression and accusations (from clients or students/pupils) were more often thought to be troubling. Driving and traffic congestion were also thought to have become more hazardous. These various difficulties were not thought to affect PRA workers disproportionately. Rather, most participants who recounted these hazards presented them as increasing in frequency or severity in recent years, affecting everyone in the participants' line of work regardless of age. None of the participants reported any safety incidents in their PRA work lives, although some admitted to being more prone to fatigue. This was managed largely through part-time working and keeping fit. Taking daytime naps was a strategy employed by a few of the older men but was thought by others to be risky and likely to herald further age-related deterioration.

To some extent, hazards and discomforts were avoided or managed through opting for part-time work or new work roles. Participants also felt confident that their length of work experience, ability to think for themselves, and increased preparedness to be assertive were helpful for managing these issues at work. Some recognised that they enjoyed sufficiently high status/authority to delegate certain physical tasks. These largely individualistic attitudes towards the management of risk might reflect the specific work contexts of a substantial group who were self-employed or freelance, and hence necessarily self-reliant. However, this individualistic emphasis has also been noted among temporary workers (compared with full-time permanent workers who place more emphasis on organisational responsibilities for safety).[96] It remains open to further research to determine whether these individualistic perceptions of safety were linked with the liminal status of some of the participants in this study (who saw themselves as occupying a transitional role between full-time work and complete retirement, often in roles and settings that had changed since retirement age, or working sporadically across a variety of teams and locations).

Previous research has suggested that some workers have optimistic beliefs regarding their safety in the workplace[97, 98] although this previous research has not included PRA workers. In the present study, it cannot be determined whether participants denied facing hazards at work through being motivated to project a competent self-image to the interviewer, or even through lacking knowledge. At face value, though, the accounts suggest that PRA workers in professional, therapy, business and education fields regard themselves as sufficiently safety conscious, and able to cope with hazards at work, which are largely of an interpersonal nature. There is also some indication that those who bring a wealth of past work experiences and assertiveness to their current roles may even enhance safety practices at work. This study did not support the view of Brun and colleagues[6] that people who work beyond statutory pension age increase safety risks in the workplace.

The shift to part-time work patterns is well recognised among women and men working beyond 60/65, but this study has uncovered that reducing hours may not only increase well-being through creating opportunities for a better work – life balance, but potentially increases comfort and safety. Unfortunately, this will not be an option that is available to many older people, once the age for receiving State pensions is increased.

4.4.1 Critical evaluation

The participants' qualitative accounts linking post-retirement working with health and well-being should not be regarded as demonstrating any objective association. Participants' limited safety concerns may have genuinely reflected their knowledge and awareness derived from considerable work (and life) experiences. These experiences could increase confidence for speaking up about such issues if they arose. The types of work represented in this sample (mostly professional or self-employed business-related fields) may indeed present very few physical hazards. The accounts cannot be assumed to generalise to others of PRA who work in manual jobs or harsher work environments.

Nevertheless, participants did identify some hazards and discomforts, especially interpersonal difficulties in the workplace, although they judged these to be stressful for all workers regardless of age.

No simple generalisations are possible from qualitative studies as samples are relatively small, and inevitably self-selected. Participants tend, by virtue of their interest in being interviewed, to be reflective and better educated. As in previous research into this segment of workers,[26, 27] manual employment was under-represented in the sample. Nevertheless, the research has been valuable for shedding insights into people's motives for later-life working, and for emphasising that PRA workers can bring enormous experience and commitment to their work. Lengthy experience may help to increase awareness of certain hazards and safe practices at work, and the assertiveness that is built on such experience may also help to manage any such hazard as it arises, but we are mindful that the accounts reflect a particular range of largely white-collar jobs and work environments, including self-employment.

Positively, the sample was larger, and older, than recruited in the previous UK qualitative study of people working beyond statutory pension age.[27] It has therefore been valuable, in particular, for illuminating the experiences of people working into their 70s and beyond regarding health, well-being and safety in the workplace. Saturation in the themes helps to support the credibility of the findings.

4.5 Conclusions from Phase 2

This qualitative study was based on the accounts of 40 people working beyond retirement age, with a median age of 70 years. Most were working part-time; a small minority worked in manual or low status occupations. We found that most participants had a diverse array of motives for continuing in work beyond the normative retirement age, in addition to financial need. Participants almost all perceived that their continuing work promoted their health and well-being. Psychological well-being increased through maintaining professional identities, meeting challenges, continuing personal development and social affirmation at work. Not everyone described their health as good.

Nevertheless physical health and vitality were thought to benefit from the physical activity involved in working and even more so, through maintaining routines and obligations. Nevertheless, the prevalence of part-time work, which enabled further leisure and physical activities to be incorporated into daily life, may also have been beneficial for health.

Participants believed that they encountered very few hazards and discomforts in their current work. The main age-related discomfort was tiredness, which was largely managed through keeping fit and working part-time hours. Although participants identified certain hazards such as prolonged sitting at computers, lifting heavy items and driving, their main focus was upon interpersonal difficulties such as complaints and aggression from clients. Participants generally perceived these issues to affect all workers similarly, regardless of age. A range of strategies was identified for managing hazards and discomforts, including making adaptations to age-related change (such as loss of stamina), reducing hours of work and limiting driving commitments, applying expertise derived from lengthy past experience of work, thinking for themselves, being assertive, using their authority and status (as most had a high degree of control over their work roles), and making use of supportive company/organisational policies and practices (among the minority who were employed by larger companies). The study located a group of highly-motivated people whose accounts challenge any lingering negative stereotypes of PRA workers. They gained considerable well-being from their work and offered a great deal of expertise in return:

> 'It's a nuisance growing older … My hearing is not good, I wear a hearing aid, my eyesight is nothing very good and the less said about my sex life the better. I think one worries about loss of energy in every sense, but the opportunity of growing old is to get wiser. I've decided what I want on my tombstone, "He was never important but sometimes he was quite useful". And I think that probably sums up my attitude to myself and what I do. And also properly engaged and valuable. I think people have to feel valuable, otherwise they just spend their time playing golf and I really don't think it would be … really, life is very short and you've really got to do something with it.' (Adam, 75, business consultant)

5 Phase 3: Reports of hazards and safety attitudes at work among workers aged 60 and under, and workers aged over 60 – a quantitative survey

5.1 Aims of Phase 3 and rationale for a survey method

This phase was designed to survey a larger number of workers above and below 60 years of age, to explore their awareness and management of risks and hazards at work. As noted in the systematic review, there is very little evidence relating to post-retirement age (PRA) workers' own perceptions and experiences of hazards at work. The little available evidence mostly focuses on objective accident and injury statistics, leaving little understanding of older workers' everyday encounters with risks and their strategies for managing these.

The previous qualitative phase was designed to elicit qualitative accounts of perceived hazards in the workplace, as recounted by workers aged 60 and above. Interviews elicited their narratives about how they managed, reduced or avoided hazards at work, and their ways of contributing to safety in the workplace. It was intended that these salient issues would be used as the basis for questions and response options in a postal or computer-based questionnaire. The research proposal also outlined a need to identify relevant validated questionnaire tools to study perceptions of workplace risks and safety culture.

To determine whether older workers had distinct attitudes towards safety and experiences of hazards at work, this phase sought to compare the responses of workers aged 60 and under, with those aged over 60.

Quantitative survey designs are useful for collating self-reports from larger numbers of participants than can be realistically interviewed in a qualitative study. Questionnaires are economical, can be tailored to the study's aims, using self-designed and pre-validated questions and response options, and can reach a geographically wider area of respondents than face-to-face interviews. It is possible to analyse the data statistically to determine the likelihood of finding group differences by chance. The self-report data remain open to self-editing processes by participants (such as over-optimism or concealment of socially undesirable responses), but are thought to be a useful way of capturing some of the attitudes and beliefs that may underpin behaviour.[99]

5.2 Method

Questionnaire design

Once the themes emerging from Phase 2 had been identified, they were used to design some questions within the questionnaire (see Appendix 1).

Initial questions elicited respondents' work sector, length of service within their present organisation, gender, age category and hours worked per week. In order to elicit information about the position of the employee in respect to retirement and PRA working, further questions were asked about the organisation's preferred retirement age (if any), and whether the respondent had retired at the State pension age and then returned to work subsequently. (These data were collected prior to the abolishing of the default retirement age in October 2011.)

For those working beyond the default, or company-specific, retirement age, various options were offered to capture their principal motives for doing so, drawn from Phase 2 and previous studies.[27]

Questions 13–35 elicited various perceived hazards at work and, in some cases, associated injuries. Question 40 asked for days lost through accidents in the last three years. These questions were based on the salient hazards emerging from Phase 2, together with previous validated questionnaires.[11]

Questions 36–39 elicited some strategies for managing hazards at work such as reducing time pressures and hours of work, again based on themes that recurred in Phase 2 interviews.

Question 42 measured vitality (low scores indicating loss of stamina and/or low mood). These questions and response options were drawn from the Vitality subscale of the validated SF-12, which is designed to survey physical and mental health.[100] This variable was included as some participants in Phase 2 described increased tiredness as a discomfort associated with working (and clearly this is an issue that can lead to inattention and risky behaviour). It is also a measure used (in either the short or longer SF-36 form) in previous research into workplace health and safety.[54, 101, 102]

The researchers studied a range of validated measures designed to explore attitudes to workplace safety and safety cultures. The questionnaire[11] originally suggested in the proposal was insufficiently tailored to the issues emerging from Phase 2. For example, it was clear that jobs requiring 'manual labour' were very much under-represented according to previous research.[26, 27] The safety climate questionnaire[103] was found to be helpful and relevant. Although developed originally to measure safety climates in the chemical industry, its questions had a sufficiently generic focus and could be applied in a wide variety of work contexts. The questionnaire was shown to have predictive validity by its authors, not only being used to measure individual safety attitudes but predictive of self-reported accident rates. The original safety climate questionnaire was extremely long, with 54 questions, shown through factor analysis to group into eight factors. To keep the questionnaire for Phase 3 of this study at a manageable length (to minimise the likelihood of non-response)[99] we decided to select the questions for four of the factors, namely Factor 1: Management commitment and actions for safety, Factor 2: Workers' knowledge and compliance with safety, Factor 4: Workers' participation and commitment to safety, and Factor 8: Risk justification. These items formed question 43 of the questionnaire for this study.

Validity and reliability
Reliability testing was conducted in a pilot study. Checks were made on the comprehensibility of the questions and response options, to reduce confounding influences. No formal validation process could be conducted, as this considerable task could not be taken on within the funding and timescale of the IOSH project. Nevertheless, validity was enhanced by modelling most items on existing survey questionnaires that have been through careful validation processes.[103] Formal validation of the devised questionnaire also has to be balanced against the need to work in a consultative way with the organisations taking part in the survey, as those who distributed the questionnaire wished to have influence on its content so that the findings were deemed to have relevance.

Piloting
The questionnaire went through 15 revisions, with adjustments being made through consultation and piloting with colleagues, as well as people working in the health and safety field.

Ethics
The School Ethics Committee of the host university granted ethical approval for this phase of the research, after review of the proposal and the final questionnaire.

Recruitment
It was originally intended that a postal survey of three organisations would be carried out. These organisations represented manufacturing, retail and education sectors. The aim was to achieve approximately equal numbers of respondents aged 60 or younger and over 60. However, although verbal interest was originally gained from three companies/organisations, they subsequently declined to offer formal support, linked with increasing challenges in the UK economy, downsizing/redundancy of staff, and difficulties with morale of the workforce. After a considerable period of liaison, final agreement was secured through IOSH and the British Safety Council to make the survey available electronically to members, via the SurveyShare website. Due to slow recruitment of participants, the survey remained open for five months. It is possible that some participants were attracted to the study through snowballing (i.e. through knowing a person who had responded to the BSC magazine article publicising the survey) but numbers cannot be known with certainty.

5.3 Survey findings

5.3.1 Sample
A total of 267 participants completed the survey (of those who reported gender, 188 were men and 76 were women). In the various age categories (of those who reported age), there were 128 (aged 21–50), 80 (aged 51–60) and 56 (aged 61–over 70). In the oldest group (over 60) there was a significant bias towards male gender. In the 60 and over group, there were 137 men and 70 women, whereas in the over 60 group, there were 50 men and only six women (chi-square (χ^2) p=0.001, see Table 5.1; Appendix B, Table 1). There were missing data from three participants on each variable.

5.3.2 Analysis (1): Comparing questionnaire responses of the age 60 and under group and the over-60s group
In the following sections, questionnaire answers will be compared between the over-60 group and all respondents aged 60 and under (i.e. over 60 and 21–60). The statistically significant differences are reported in Table 5.1.

5.3.2.1 Patterns of work

Work hours (categorised as 'up to 20', '21–40' and 'over 40 hours per week') were significantly associated with age group. A greater percentage of the older (over 60) age group (27.3 per cent) compared to the younger (60 and under) age group (5.2 per cent), reported working 20 hours per week or less (χ^2 analysis showed statistical significance, p=0.000). Furthermore, fewer of the over-60 workers reported working more than 40 hours per week (29.1 per cent compared with 42.4 per cent of the 60 and under group). Looking at self-reported part-time and full-time work, significantly more of the over 60 group (34.5 per cent) described themselves as working part-time compared with the younger participants (8.7 per cent), (χ^2 test, p=0.000). See Table 5.1; Appendix B, Tables 2, 3.

5.3.2.2 Retirement age and motives to continue working

Knowledge of whether the organisation of the respondent had a preferred retirement age (yes, no and don't know): Perhaps unsurprisingly, the over 60 group were significantly more likely to report that their work organisation did NOT have a preferred retirement age (53.6 per cent compared with 29.6 per cent of younger workers). Also, the oldest group were more likely to know their organisation's retirement age (with 10.7 per cent not knowing this, compared with 26.2 per cent of younger workers (χ^2 test, p=0.002, Appendix B, Table 4).

Reported motives for remaining in work beyond default or company's preferred retirement age: 29 in the older age group (over 60) answered this question. In descending order, participants rated the following as 'quite' or 'very important' motives for working beyond retirement age: keeping an interest in work/professional matters (93 per cent); financial (90 per cent); social (86 per cent); to prevent boredom (72 per cent); a reason to get up in the morning (72 per cent); partner continuing to work (34 per cent).

5.3.2.3 Perceptions of safety and risk at work

The frequency (on average) of needing to lift/move very heavy objects (more than 30kg/66lbs) was cross-tabulated with 'age group' (21–60, over 60). Of the 263 people who answered this question, there were 87.1 per cent who responded 'rarely or never'. There was no statistically significant difference between the older and younger age groups. The lifting of heavy objects was also not statistically significantly associated with accidents or near misses with respect to the age groups. (Figures not shown in tables as not statistically significant.)

The frequency (on average) of dealing with sharp objects (for example, slicer, saws) was cross-tabulated with 'age group' (21–60, over 60). Of the 263 people who answered this question there were 79.5 per cent who responded 'rarely or never'. Use did not vary with age group. Reported use of sharp objects was also not associated with accidents or near misses in any age group. (Statistics not shown as non-significant.)

The frequency (on average) of contact with flames/hot surfaces (for example, welding) was cross-tabulated with 'age group' (21–60, over 60). Of the 263 people answering this question, 84.4 per cent responded 'rarely or never'. Reported use did not vary with age group. Contact with flames/hot surfaces was also not associated with accidents or near misses with respect to the age groups. (Statistics not shown as non-significant.)

Frequency of use of a work computer (question 19) was not associated with age groups in the initial cross-tabulation. On recoding this variable into: up to three hours per day, four to six hours per day and more than six hours per day, the analysis showed a statistically significant association with 'age group' (21–60, over 60) (chi-square χ^2 test, p=0.030). Those over age 60 were more likely to use the computer for fewer hours (0–3) per day (28.6 per cent) compared to the younger age group (15.0 per cent). The over-60s also had a significantly lower proportion using a computer for more than six hours per day (25 per cent) compared to 39.3 per cent in the younger age group (Table 5.1; Appendix B, Table 5). As there was a linear (inverse) association between computer use and age group, a correlation was carried out with the age group coded into five age groups (21–40, 41–50, 51–60, 61–65, 66 and over) and the three categories of hours of computer use each day (up to three hours, four to six hours, more than six hours). The correlation result is shown in Appendix B, Table 6 indicating a statistically significant non-parametric Spearman correlation p-value of 0.018.

Eye strain after use of a computer at work (question 20) was cross-tabulated with age groups. There was a statistically significant association between these variables (χ^2 test, p=0.015); 46.8 per cent of the younger age group reported eye strain, compared to 28.6 per cent of the older age group (Table 5.1; Appendix B, Table 7).

Feeling excess pressure from a need to respond to e-mails in the present job (question 21) was cross-tabulated with age groups. There was a statistically significant difference between the age groups (χ^2 test, p=0.004); 66 per cent of the younger age group reported feeling excess pressure to respond to e-mails compared to 44.4 per cent of the older age group (Table 5.1; Appendix B, Table 8).

There were no statistically significant age differences in responses to question 22 regarding 'ever thought the size of the fonts should be larger?' (38.7 per cent of the younger respondents agreed, compared with 34.5 per cent of the older respondents.) Nor were there age differences with respect to question 23 regarding feeling pressure from changing software/programmes (a problem endorsed by 41 per cent of younger compared with 30.9 per cent of older workers). Workers below and above 60 reported similarly to question 24 on regular driving for work, apart from commuting (51.0 per cent younger; 42.9 per cent older).

For question 25, there were 130 people who reported regular driving for work, apart from commuting. In terms of the amount of driving reported per week, significant age differences emerged. The results indicated a borderline (p=0.047) statistically significant association with the over-60 age group less likely to drive each day (19.4 per cent) compared to the younger respondents (24.3 per cent). The older age group, however, reported driving statistically significantly more frequently in the 'once to three times per week' category (71 per cent) compared with the younger age groups (47.6 per cent). Fewer older people reported driving less than once per week, (9.7 per cent compared to 28.2 per cent in the youngest age group), and this was statistically significant.

There were no statistically significant associations to questions 26 through 30: driving within the job in the last six months being more tiring (agreed by 37.7 per cent younger; 29.4 per cent older workers); driving while being tired leading to accidents or near-misses (agreed by 15.3 per cent younger; 12.1 per cent older workers); working alone each day (19.7 per cent younger; 28.6 per cent older); anxiety if working alone (11.7 per cent younger; 7.3 per cent older); feeling threatened if working alone (5.9 per cent younger; 1.8 per cent older). Tables are not shown as there were no statistically significant associations with age group.

Question 31 ascertained whether job tasks had changed in the business in the previous six months. Thirteen people, all in the younger age group (versus zero in the older age group), answered 'not applicable' to this question, and their responses were treated as missing data. Chi-square tests showed that there was a statistically significant difference (p=0.002) between age groups in whether the job tasks had perceptibly changed in the business in the previous six months, with 60.3 per cent of younger workers reporting this issue and 37.5 per cent of older workers (Appendix B, Table 9).

Question 33 requested information on whether stress was an issue if job tasks had changed in the previous six months. The 'not applicable' category was coded as missing a value. The cross-tabulation with age group is shown in Table 5.1. There was a statistically significant difference with respect to age group (Fisher's exact test, p=0.004). Among the older age group 62.5 per cent reported 'no greater stress with respect to changed job tasks in the previous six months' compared to 40 per cent of the younger age group (Appendix B, Table 10).

For question 32 (If YES to change in job tasks in the last six months, was less customer focus ever an issue), and question 34 (If Yes to changed job tasks in the last six months, has 'cutting corners' to save money, ever been an issue) showed no statistically significant difference with respect to age groups (54.9 per cent younger; 53.8 per cent older workers said 'yes'). Likewise, for question 35, older and younger workers did not perceive that communicating less with clients was an issue at work (approximately 25 per cent in each age category agreed).

Question 36 asked six questions with respect to safety at work in the previous six months (Table 5.1 shows statistically significant differences according to age group).

Table 5.1: Summary table of statistically significant results comparing age groups under 60 and 60 and over

Characteristic		N (%)	N (%)	N (%)	Statistical significance
		21–60 age group	61 to >70 age group	Total	p-value
Gender	Men	137 (66.2)	50 (89.3)	187 (71.1)	
	Women	70 (33.8)	6 (10.7)	76 (28.9)	
Total		207 (100.0)	56 (100.0)	263 (100.0)	(Fisher's exact test) 0.000
Work hrs/wk	Up to 20 hrs	10 (5.2)	15 (27.3)	25 (10.2)	
	21–40 hrs	100 (52.4)	24 (43.6)	124 (50.4)	
	>40 hrs	81 (42.4)	16 (29.1)	97 (39.4)	(Pearson chi-square) 0.000
Total		191 (100.0)	55 (100.0)	246 (100.0)	(Linear-by-linear association) 0.000
Worked part-time or full-time?	Part-time	18 (8.7)	19 (34.5)	37 (14.2)	(Pearson chi-square) 0.000
	Full-time	188 (91.3)	36 (65.5)	224 (85.8)	(Fisher's exact test) 0.000
Total		206 (100.0)	55 (100.0)	261 (100.0)	(Linear-by-linear association) 0.000
Does organisation have preferred retirement age?	Yes	91 (44.2)	20 (35.7)	111 (42.4)	
	No	61 (29.6)	30 (53.6)	91 (34.7)	(Pearson chi-square) 0.002
	Not known	54 (26.2)	6 (10.7)	60 (22.9)	(Likelihood ratio) 0.002
Total		206 (100.0)	56 (100.0)	262 (100.0)	(Linear-by-linear association) 0.552
In the last six months, use of pc recoded	Never – 1–3 hr/day	31(15.0)	16 (28.6)	47 (17.9)	
	4–6 hr/day	94 (45.6)	26 (46.4)	120 (45.8)	(Pearson chi-square) 0.030
	>6 hr/day	81 (39.3)	14 (25.0)	95 (36.3)	(Likelihood ratio) 0.035
Total		206 (100.0)	56 (100.0)	262 (100.0)	(Linear-by-linear association) 0.009
Ever had eye strain after use of pc in your job?	Yes	95(46.8)	16(28.6)	111 (42.9)	(Pearson chi-square) 0.015
	No	108 (53.2)	40 (71.4)	148(55.1)	(Fisher's exact test) 0.015
Total		203 (100.0)	56 (100.0)	259 (100.0)	(Linear-by-linear association) 0.015
Ever felt excess pressure from a need to respond to e-mails in present job?	Yes	136 (66.0)	24 (44.4)	160 (61.5)	(Pearson chi-square) 0.004 (Likelihood ratio) 0.006
	No	70 (34.0)	30 (55.6)	100 (38.5)	(Fisher's exact test) 0.005
Total		206 (100.0)	54 (100.0)	260 (100.0)	(Linear-by-linear association) 0.004
If YES to regular driving in job, how often, on average?	Each day	25 (24.3)	6 (19.4)	31 (23.1)	
	1–3/wk	49 (47.6)	22 (71.0)	71 (53.0)	(Pearson chi-square) 0.047
	< 1/wk	29 (28.2)	3 (9.7)	32 (23.9)	(Likelihood ratio) 0.035
Total		103 (100.0)	31 (100.0)	134 (100.0)	
If job tasks have changed in last six months, was greater stress an issue?	Yes	117 (60.3)	21 (37.5)	138 (55.2)	(Pearson chi-square) 0.002 (Likelihood ratio) 0.003
	No	77 (39.7)	35 (62.5)	112 (44.8)	(Fisher's exact test) 0.004
Total		194 (100.0)	56 (100.0)	250 (100.0)	(Linear-by-linear association) 0.003

Characteristic		N (%)	N (%)	N (%)	Statistical significance
		21–60 age group	61 to >70 age group	Total	p-value
In the last six months, ever thought your safety at work was improved by more awareness of the hazards?	Yes	166 (81.4)	36 (65.5)	202 (78.0)	(Pearson chi-square) 0.011 (Likelihood ratio) 0.015
	No	38 (18.6)	19 (34.5)	57 (22.0)	(Fisher's exact test) 0.017
Total		204 (100.0)	55 (100.0)	259 (100.0)	(Linear-by-linear association) 0.012
In the last six months, ever thought your safety at work was improved by being more assertive?	Yes	144 (72.0)	25 (48.1)	169 (67.1)	(Pearson chi-square) 0.001 (Likelihood ratio) 0.001
	No	56 (28.0)	27 (51.9)	83 (32.9)	(Fisher's exact test) 0.002
Total		200 (100.0)	52 (100.0)	252 (100.0)	(Linear-by-linear association) 0.001
In the last six months, ever thought your safety at work was increased by using your authority?	Yes	160 (81.6)	36 (67.9)	196 (78.7)	(Pearson chi-square) 0.031 (Likelihood ratio) 0.037
	No	36 (18.4)	17 (32.1)	53 (21.3)	(Fisher's exact test) 0.038
Total		196 (100.0)	53 (100.0)	249 (100.0)	(Linear-by-linear association) 0.031

The six questions of question 36 were cross-tabulated with age groups. There was a statistically significant difference associated with age group for 'safety at work being improved by more awareness of the hazards' (Fisher's exact test, p=0.017). Of the older age group, 65.5 per cent responded 'yes' to this question, compared to 81.4 per cent of the younger age group. There was also a statistically significant difference associated with age group for 'safety at work was improved by being more assertive, (question 36f) (Fisher's exact test, p=0.002). Of the older age group, 48.1 per cent responded 'yes' to this question compared to 72 per cent of the younger age group. Fewer in the oldest group reported addressing safety at work with respect to being more aware of hazards or more assertive (Appendix B, Tables 11, 12).

Question 37 asked, 'In the last six months have you ever thought that being able to (or encouraged to) apply expertise from years of experience might increase the level of safety in the organisation?' This was cross-tabulated with the age category variable. There was no statistically significant association with age.

Question 38 asked, 'In the last six months have you ever thought that your safety at work was increased from being able to use your authority or status to implement health and safety company policy or practices?' This was cross-tabulated with age groups in two categories. The statistically significant results from this question indicate that older workers over 60 were much less likely to agree with this statement (Fisher's exact test, p=0.038) (Table 5.1; Appendix B, Table 13).

Question 39 asked, 'In the last six months have you ever thought that varied roles gave you more knowledge and skills to manage hazards at work?' This was cross-tabulated with age groups in two categories, and no significant difference was noted.

5.3.2.4 Combining questionnaire responses to provide composite health and safety measures
a. Vitality
For the purpose of this study, an overall vitality measure was desired, first to determine whether there were statistically significant differences in self-reports between the older and younger groups, (following on from the qualitative findings), and second to determine whether participants expressing greater vitality had more positive, proactive attitudes towards safety at work.

There were three questions taken from the SF-12, relating to vitality (see question 42, Appendix A). Cronbach's alpha showed that there was acceptable to good internal consistency of 0.741 (n=256) among the scores across the three questions, suggesting that the items were testing the same construct, and therefore that the scores could be combined into a single scale.[104] See Table 5.2.

b. Management commitment and actions for safety ['Management Commitment']
Of the available attitude statements loading on this factor, 24 out of 25 were taken from the validated safety climate questionnaire.[103] The excluded statement concerned 'safety celebrations' which were thought unlikely to be relevant to British work cultures. Scores from the 24 items relating to this construct showed a Cronbach's alpha of 0.944 (n=241), representing very high internal consistency, similar to that reported by Vinodkumar and Bhasi,[103] and justifying calculation of a composite measure.

c. Workers' knowledge and compliance with safety ['Workers' knowledge'"]
All seven original items were used in the Phase 3 questionnaire. Cronbach's alpha was 0.958 (n=256), exceeding the figure reported in the original study[103] of 0.80. This figure also justified the use of a composite score.

d. Workers' participation and commitment to safety ['Workers' participation']
All five of the original items were used, with a Cronbach's alpha of 0.921 (n=252). This was higher than the α level of 0.74 reported in the original study[103] and again supported the calculation of a composite score.

e. Risk justification
Scores from the two items had a Cronbach's alpha of 0.554 (n=254), which is less than acceptable and does not support addition of the two scores to form a composite. The original research[103] reported a low, but still acceptable α of 0.65. The two items were entered separately into subsequent analyses [variable names 'Risk justification: over-familiarity', and 'Risk justification: not practical'].

5.3.2.5 Age comparisons 21–60 and over 60: composite measures
Table 5.2 shows that the over 60 group of workers reported significantly higher levels of vitality than younger workers (mean 11.49 compared with 9.94, respectively) (t-test, p=0.000). However, answers on all composite safety climate measures and the two risk justification items were similar with respect to age – no significant differences emerged.

Table 5.2: Means, SDs and age comparisons: composite vitality and safety climate variables

Variable	N	Mean	SD	t	Sig
Vitality					
21–60	201	9.94	2.62	-4.02	<0.001
>60	55	11.49	2.11		
Management commitment					
21–60	190	77.9	16.7	-0.39	ns
>60	52	78.9	13.3		
Workers' knowledge					
21–60	201	31.0	4.8	0.23	ns
>60	54	30.9	3.3		
Workers' participation					
21–60	199	21.8	3.5	1.35	ns
>60	53	21.1	3.2		
Risk justification: over-familiarity					
21–60	204	2.36	1.21	1.64	ns
>60	54	2.11	0.95		
Risk justification: not practical					
21–60	203	2.32	1.12		
>60	52	2.37	1.14	-0.29	ns

N varies due to missing data; p-values after independent groups t-test; all Levene's tests showed equality of variances between the two groups.

5.3.2.6 Relationships among vitality and safety climate measures
Using Spearman correlations, younger workers reporting higher levels of vitality were significantly more favourable about management commitment to safety (r=0.393, p=<0.001); although this had no relationship with the other safety climate measures.

Those gaining higher scores on the more positive safety climate composite measures were significantly less likely to justify taking risks (Appendix B, Table 14).

Among the older age group, over 60, vitality was unrelated to any of the safety climate composite scores. Those who endorsed their own participation and commitment to safety were more likely to report higher scores on 'workers' knowledge and compliance with safety' (r=0.659, p=<0.001, n=53), and greater 'management commitment' (r=0.372, p=<0.001, n=51). (See Appendix B, Table 15.) Higher scores on workers' knowledge and workers' participation were significantly associated with low levels of risk justification.

These figures suggest that some workers (of all ages) report a positive safety climate at work and that dimensions of safety climate are distinguishable but related.

No clear differences emerged between the views of older and younger workers to these safety factors.

5.3.2.7 Vitality, safety climate measures and hours worked

Are part-time workers more marginalised from safety issues, or do they report as much commitment and support regarding safety at work? Correlations yielded no significant relationships between hours worked and safety climate measures. Among younger workers, those working fewer hours per week reported slightly, but significantly, higher vitality scores (r=-0.164, p=0.025; n=186). A similar but much weaker pattern was shown among the over-60 group and this did not reach significance (r=-0.107, ns, n=54).

Table 5.3: Relationships among self-reported energy levels, hours of work and age

Mode of work				Age groups 2 categories		
				21–60	61 to >70	Total
part-time	42b lot of energy	all/most/good bit	Count	6	13	19
			% within 2 age groups	33.3%	68.4%	51.4%
		some/little/none of time	Count	12	6	18
			% within 2 age groups	66.7%	31.6%	48.6%
	Total		Count	18	19	37
			% within 2 age groups	100.0%	100.0%	100.0%
full-time	42b lot of energy	all/most/good bit	Count	87	26	113
			% within 2 age groups	46.8%	72.2%	50.9%
		some/little/none of time	Count	99	10	109
			% within 2 age groups	53.2%	27.8%	49.1%
	Total		Count	186	36	222
			% within 2 age groups	100.0%	100.0%	100.0%

Chi-square tests Mode of work		Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
part-time	Pearson chi-square	4.555[a]	1	.033		
	Continuity correction[b]	3.259	1	.071		
	Likelihood ratio	4.652	1	.031		
	Fisher's exact test				.050	.035
	Linear-by-linear association	4.432	1	.035		
	N of valid cases	37				
full-time	Pearson chi-square	7.816[c]	1	.005		
	Continuity correction[b]	6.831	1	.009		
	Likelihood ratio	8.069	1	.005		
	Fisher's exact test				.006	.004
	Linear-by-linear association	7.781	1	.005		
	N of valid cases	222				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 8.76.
b. Computed only for a 2x2 table
c. 0 cells (.0%) have expected count less than five. The minimum expected count is 17.68.

Taking one question from the vitality scale, the cross-tabulation for self-rated energy in two categories (all/most/a good bit versus some/little or none) was repeated, controlling for mode of working, (full-time, part-time) with age group (older versus younger). The older age group workers working part-time (68 per cent) reported statistically significantly more energy (all/most/a good bit of the time) compared to the younger age group part-time workers (33 per cent). (Pearson chi-square p-values, p=0.033.) Similarly with respect to full-time workers, older age category workers were statistically significantly more likely to report having energy (all/most/a good bit of the time) compared to the younger workers (72 per cent older; 47 per cent younger). Both full-time and part-time older workers (over 60) were a distinctive group with high levels of subjective health. However, numbers were small and therefore this result should be considered with caution (Table 5.3).

5.3.3 Analysis (2): Selective comparison of groups aged 51–60 and over 60
If the less healthy or committed workers 'shake out' of the workforce before retirement age,3 it seems possible that these two groups would differ in some of their experiences and attitudes towards risk and hazards. So a further analysis was conducted to determine whether there were any distinctive responses in workers approaching 60 and those working beyond this age. Such comparisons are rare in previous research, and yet are important to explore given that people working beyond 60 may be a distinctive group, as argued in the Phase 1 literature review.

There were 80 respondents in the 51–60 age group, and 56 in the over-60 group. The over-60s had proportionately fewer women (11 per cent compared with 29 per cent in the 51–60 group). The over-60 group had a significantly higher proportion of people working part-time (34.5 per cent compared with 10 per cent of the 51–60-year-olds; chi-square χ^2 test, p=0.000) (Table 5.4 added). Comparisons were re-run as described above. Most comparisons were not statistically significant, and very similar to those presented above when the comparisons between the 21–60 and over-60 groups were reported.

5.3.3.1 Exposure to hazards and reported accidents (age groups 51–60 and over 60)
There were no differences in reported physical hazards or accidents at work (questions 13–18), with few respondents in both groups reporting any exposure. The over-60 group reported significantly less eye strain (p=0.002), were less likely to report pressure to answer e-mails (p=0.014); were less likely to report pressure from changing software (p=0.016), or that their job tasks had changed in the last six months (p=0.006). These features suggest that the over 60 group was less subject to stress, although whether this was linked to having greater choice of whether to work, or the job itself, or the greater prevalence of part-time working, is unclear.

5.3.3.2 Vitality
The 51–60 age group reported less vitality (on each survey item as well as on the composite measure). Of the over-60 group, 58.2% reported feeling calm and peaceful all/most/a good bit of the time, compared with 32.9 per cent of 51–60-year-olds (χ^2; p=0.010). Having lots of energy (all/most/good bit of the time) was reported by 69.6 per cent of over-60s, compared with 32.9 per cent of 51–60-year-olds (χ^2 p=0.001). In terms of feeling depressed, 35.7 per cent of the over 60 group reported feeling depressed none of the time, whereas 22.8 per cent gave this answer in the 51–60 group (χ^2 p=0.008). As shown in Table 5.5, composite vitality scores were significantly different (mean of 11.49 for the over 60 group and 9.87 for the 51–60 group (t-test; p=0.000). Again, these findings suggest that post-60 workers are a distinctive, highly motivated group.

5.3.3.3 Composite safety climate measures
There were no differences between the two age groups in the three safety climate composite measures or in the two risk justification measures (Table 5.5).

5.4 Discussion of survey findings
More men responded to this survey, especially in the oldest (over 60) age category. To some extent this should be expected as more men work beyond 60, linked with factors such as women's lower (current) age of entitlement to the State pension, and likelihood of having older, retired male partners.[26] Even so, women were very much under-represented in this study, especially in the older category, and findings cannot be assumed to generalise to the wider population of women who are working into their 60s and beyond.

This survey phase found that workers aged over 60 reported significantly more part-time patterns of working and shared many motives for working, as found both in previous research[26, 27] and Phase 2 of this study. Choosing to work beyond 60 because partners were working seemed rather less important

Table 5.4: Statistically significant differences between the 51–60 age group and the oldest (over 60) age group for specific characteristics or responses (χ^2 analysis for 2 x 2 table)

Characteristic		N (%)	N (%)	N (%)	Statistical significance
		51–60 age group	60+ age group	Total	p-value
Gender	Men	57 (71.3)	50 (89.3)	107 (78.7)	
	Women	23 (28.8)	6 (10.7)	29 (21.3)	
Total		80 (100.0)	56 (100.0)	136 (100)	(Fisher's exact test) 0.009
Use of pc [recoded]	Never to 1–3 hr daily	12 (15.2)	16 (28.6)	28 (20.7)	
	4–6 hr daily	39 (49.4)	26 (46.4)	65 (48.1)	
	>6 hr daily	28 (35.4)	14 (25.0)	42 (31.1)	
Total		79 (100.0)	56 (100.0)	135 (100.0)	(Linear-by-linear association) 0.045
Ever had eye strain after use of pc in your job?					
	Yes	43 (55.1)	16 (28.6)	59 (44.0)	
	No	35 (44.9)	40 (71.4)	75 (56.0)	(Fisher's exact test) 0.003
Total		78 (100.0)	56 (100.0)	134 (100.0)	(Linear-by-linear association) 0.002
Ever felt excess pressure from a need to respond to e-mails in present job?					
	Yes	52 (68.4)	24 (31.6)	76 (57.1)	
	No	27 (34.2)	30 (55.6)	57 (42.9)	
Total		79 (100.0)	54 (100.0)	133 (100.0)	(Fisher's exact test) 0.012
Felt pressure from changing software/ programs?					
	Yes	41 (51.9)	17 (30.9)	58 (43.3)	
	No	38 (48.1)	38 (69.1)	76 (56.7)	(Fisher's exact test) 0.012
Total		79 (100.0)	55 (100.0)	134 (100.0)	(Linear-by-linear association) 0.002
Job tasks changed in the business (e.g. for customer focus)?					
	Yes	47 (61.8)	21 (37.5)	68 (51.5)	
	No	29 (38.2)	35 (62.5)	64 (48.5)	(Fisher's exact test) 0.005
Total		76 (100.0)	56 (100.0)	132 (100.0)	(Linear-by-linear association) 0.006
If job tasks have changed in last six months, was greater stress an issue?					
	Yes	39 (72.2)	10 (34.5)	49 (59.0)	
	No	15 (27.8)	19 (65.5)	34 (41.0)	(Fisher's exact test) 0.001
Total		54 (100.0)	29 (100.0)	83 (100.0)	(Linear-by-linear association) 0.001
Worked part-time or full-time?					
	Part-time	8 (10.0)	19 (34.5)	27 (20.0)	
	Full-time	72 (90.0)	36 (65.5)	108 (80.0)	(Fisher's exact test) 0.000
Total		80(100.0)	55 (100.0)	135 (100.0)	(Linear-by-linear association) 0.001
Hrs worked/wk					
	Up to 20 hr	4 (5.4)	15 (27.3)	19 (14.7)	
	21–40 hrs	41(55.4)	24 (43.6)	65 (50.4)	Pearson chi-square 0.002
	>40 hrs	29 (39.2)	16 (29.1)	45 (34.9)	Likelihood ratio 0.002
Total		74 (100.0)	55 (100.0)	129 (100.0)	Linear-by-linear association 0.008

to this group, compared with previous research. However, it should be noted that in the previous UK survey of people working beyond State pension age,[26] women were more likely to have working partners than men (and perhaps continued in work to maintain the couple's familiar lifestyle and relationship). In the current study, women were very much under-represented. Also, the questionnaire could not gain a modulated description of the importance of this motive compared with others, which made interpretation of the data somewhat uncertain.

Perhaps reflecting the low representation of manufacturing in the sectors surveyed, only small minorities came into contact with physical hazards such as heavy loads, flames and sharp objects during their work. No age differences emerged for these variables. The over 60 group was significantly less likely to be using computers for lengthy periods each day, and perhaps linked with this moderate usage, they were significantly less likely to report eye strain or pressure to answer e-mails. Interestingly, the oldest group was less likely to report recent changes in work tasks, or associated stress at work, indicating higher levels of work manageability, perhaps through self-selection (i.e. the positive choice to 'opt in' to working) and greater use of part-time work patterns. These contrasts were noted both when the oldest group was compared with the 21–60 group, and also when compared with the 51–60 group. It is also possible that more of the older workers had the advantage of being more selective over the nature of their jobs, as shown previously with the qualitative interviews, and that this choice might positively influence stress and well-being at work.

Table 5.5: Means, SDs and age comparisons: composite vitality and safety climate variables

Variable	N	Mean	SD	t	Sig
Vitality					
21–60	201	9.94	2.62	-4.02	<0.001
>60	55	11.49	2.11		
Management commitment					
21–60	190	77.9	16.7	-0.39	ns
>60	52	78.9	13.3		
Workers' knowledge					
21–60	201	31.0	4.8	0.23	ns
>60	54	30.9	3.3		
Workers' participation					
21–60	199	21.8	3.5	1.35	ns
>60	53	21.1	3.2		
Risk justification: over-familiarity					
21–60	204	2.36	1.21	1.64	ns
>60	54	2.11	0.95		
Risk justification: not practical					
21–60	203	2.32	1.12		
>60	52	2.37	1.14	-0.29	ns

N varies due to missing data; p-values after independent groups t test; all Levene's tests showed equality of variances between the two groups.

Although older and younger workers largely reported similar views regarding hazards/risks, a few age differences emerged. Workers aged over 60 were less likely to report that being more aware of hazards, or being more assertive, or using their authority/status helped to improve safety. It may be that older workers genuinely give lower ratings to these resources or strategies, compared with younger workers. But some may have been working in new roles (such as consultancy or locum roles) after 'retirement' from their main careers (as noted among some of the participants in the qualitative phase, as well as previous research,[27, 95, 105] meaning that they may not have felt as confident to locate hazards, or be assertive within teams, if working perhaps on a temporary or occasional basis. Some of the higher status older workers may not have felt the need to be personally assertive with colleagues or those working in subordinate positions. Alternatively, some may have moved to lower status work after retirement from a main career (as shown before).[26] This information is not available from the questionnaire to help interpret the reasons for the answers that were given, and points to a need for follow-up qualitative research. Some respondents may have interpreted the question to mean *increasingly* aware or *increasingly* assertive over the last six months, and may have judged their performance in these respects to have changed little over time, hence answering 'no' or 'don't know'. These issues will be returned to later in the critical evaluation.

The differences in composite 'vitality' scores were interesting and showed significant elevation in the oldest age group (compared both with the 21–60 group and even more remarkably compared with the 51–60 group). To some extent, these self-reports of positive vitality, derived from a validated scale,

resonate with the lively, highly motivated narrative accounts emerging from Phase 2. While in Phase 2, some reported having to manage tiredness, this was not felt to detract from work, and was managed through strategies such as reducing hours of work and keeping fit. In this survey phase, working part-time was associated with higher levels of self-reported vitality (in both older and younger groups), although the association only reached significance for the younger age group. The over 60 group of workers reported more vitality regardless of full- or part-time working.

The safety climate measures showed high levels of internal consistency similar to the original validation study,[103] and no differences according to age group. Higher acceptance of risky practices was significantly and negatively correlated with positive views about management commitment to safety, as well as personal commitment and knowledge regarding safety, across the age groups.

5.4.1 Critical evaluation

The sample size was large enough to perform a number of statistical analyses so the study makes a contribution to knowledge about the safety experiences and attitudes of workers over 60, in a field where little evidence exists to date. Nonetheless, there were difficulties in recruiting participants, and the sample was smaller than originally envisaged. Despite much persistence in contacting companies to distribute this questionnaire, no support was forthcoming, linked to adverse economic circumstances, downsizing and low morale. By distributing the questionnaire eventually via IOSH and the BSC, it seems likely that workers already interested in safety issues would be more likely to respond. The findings regarding perceptions or risk and attitudes to safety cannot be generalised with confidence to the wider UK workforce. In the oldest age group, the proportion of female workers was small, so their experiences and attitudes are very much under-represented. Nonetheless, the reasons for working beyond default, or company retirement age resonated with those found in previous literature. Few age differences were shown in reported hazards and safety climate attitudes, echoing patterns in the wider literature on the safety of older workers, but it is important to note that questionnaire answers cannot be probed or elaborated. It remains possible that the wording of some of the strategies for improving safety at work (being more assertive, being more aware of hazards) was interpreted in various ways by respondents, although these cannot be ascertained. The use of a validated safety climate measure provided robust data and revealed no age-related differences in safety attitudes or perceptions of management commitment to safety.

5.5 Conclusions from the Phase 3 survey

On the whole, the oldest age group (over 60) seemed to report fewer problems regarding working with computers, eye strain and stress at work, compared with the younger age groups. There was no evidence for elevation of accidents or greater exposure to physical hazards among the oldest age group. Similar positive attitudes to safety climate at work were found across all age groups. The oldest age group reported significantly greater vitality, which may represent the 'opting in' process,[3] whereby those who are healthier and more committed to work tend to stay beyond 60. The oldest age group did not report greater safety consciousness (contrary to a previous suggestion)11 and were less likely to say that their safety at work was improved by being more aware of hazards, more assertive or more able to use authority or status. However, the reasons for these age group differences are unclear. The oldest group may have been modest about their expertise and some may have moved into new or locum positions across a range of job contexts, reducing familiarity with their job, or work context. Some may have been in high-status posts, requiring ability to plan and delegate rather than be directly assertive with others. Some may have moved to less senior positions in their 60s, as noted in earlier research.[26] The questionnaire did not enable probing of the reasons underpinning the answers given. There was also possible ambiguity in the use of the comparator 'more' within these particular safety questions.

From the systematic review of the literature (Phase 1), it was concluded that the health and safety patterns of workers aged over 60 are broadly similar to those of younger workers, and that they cope well with work demands, perhaps through self-selection and the 'healthy worker' effect. This survey broadly supports this conclusion, finding that workers aged over 60 demonstrated similar perceptions of hazards and safety attitudes, as younger workers, although as a group, they experienced less stress in relation to computer use. They were more likely to work part-time hours, described more manageable driving commitments (rather than daily car usage), and reported significantly greater levels of vitality than younger workers.

6 Working beyond 60: Final conclusions and implications from this project

This three-phase project explored the health and safety of workers over 60 years, some of whom were opting to work beyond retirement age, as set by their companies or as marked by the age at which State pensions are paid. During the course of this project, the UK government brought in legislation, first to allow workers to request to work beyond the State pension age, and in October 2011, to abolish the default retirement age. The government plans to raise the age at which State pensions are paid, which will result in more people working into their late 60s and beyond. This study has been topical.

The systematic review of evidence to date, showed that very few studies have been carried out with workers who were continuing past statutory retirement age, and very few indeed addressed health and safety (as opposed to motives for working and influences of work on well-being). For this reason, the review included studies that offered analysis of the experiences of people working beyond 60. This added to knowledge as previous studies have tended to define the 'older worker' as over 50 or even over 45.

Evidence suggests that those who work into their 60s and beyond statutory pension age, tend to be distinctive. They seem to enjoy better health, more advantaged socioeconomic backgrounds and higher levels of education, especially in the UK where people do not have to work to pay for health insurance. Many work because they enjoy their jobs and to maintain identity and lifestyles as well as for financial reasons. Part-time working is a popular choice.

The published evidence to date does not suggest that workers of 60 years and above face elevated safety risks at work. The over-60s were shown in most studies to have lower accident and injury rates compared with younger workers, although they were more seriously affected when accidents did occur (such as suffering fractures) and took more sickness days off subsequent to accidents. Such events were then found to increase likelihood of retirement. There was limited but sound evidence that older people, in general, develop hearing loss and that as little as one year's exposure to noisy working environments increases this risk, and furthermore, risk of accidents. A major limitation of the evidence relating to noise exposure was reliance on self-report and work history, rather than objective noise monitoring over time.

While the older population as a whole tends to show cognitive decline with advancing years, there was little evidence for such changes affecting job performance or safety in the over-60 worker, although somewhat mixed outcomes were seen for driving safety. The over-60 workforce seems to be in good cognitive health, possibly through self-selection but also linked to work providing cognitive stimulation and social contact. The over-60s did not appear to be at risk from shift-work or overtime, unless hours were in excess of 60 per week. Again, while evidence is limited, the over-60s seem to be able to apply protective or compensatory strategies which help to maintain safe working practices (for example, when driving). Education and experience seem to have important protective effects on the over-60 worker.

The qualitative study conducted in Phase 2 was highly successful in recruiting a larger, older sample of current PRA workers than reported in previous published research. Participants' reasons for working beyond the State pension age (60 for women and 65 for men, as these ages applied at the time of data collection) broadly resonated with previous research, although further detail was obtained about the various sources of well-being derived from later life working. In line with previous research, most were working part-time, and only a small minority worked in manual or low status occupations. We found that most participants had a diverse array of motives for continuing in work beyond the normative retirement age, in addition to financial need. Participants almost all perceived that their continuing work promoted their health and well-being. Psychological well-being increased through job satisfaction, maintaining professional identities, meeting challenges, continuing personal development, and social affirmation at work. Physical health and vitality were thought to benefit from the physical activity involved in working and even more so, through maintaining routines and obligations.

Participants believed that they encountered very few hazards and discomforts in their current work. The main reported age-related discomfort was tiredness, which was largely managed through keeping fit and working part-time hours. A few mentioned taking daytime naps but others saw this strategy as risky and likely to lead to deterioration. Although participants mentioned hazards such as prolonged

sitting at computers, lifting heavy items and driving, their main focus was upon interpersonal difficulties such as complaints and aggression from clients. Participants generally perceived these issues to affect all workers similarly regardless of age. Participants were comfortable with their strategies for managing hazards and discomforts, including making adaptations to age-related change (such as loss of stamina), reducing hours of work and reducing driving commitments, applying expertise derived from lengthy past experience of work, thinking for themselves, being assertive, using their authority and status (as most had a high degree of control over their work roles), and making use of supportive company/organisational policies and practices (among the minority who were employed by larger companies).

These themes were then explored further in a quantitative questionnaire survey, distributed to people across a wide age range (21 to over 70), in order to determine whether there were differences in safety perceptions and experiences of workers over 60, compared with younger workers. A mixture of self-designed questions and response options, based on themes emerging from Phase 2 were used, together with some validated items used in previous research (to measure vitality and safety climate). A total of 267 people took part, with 56 aged over 60. Although the sample was smaller than desired, it still offered a relatively large group of workers aged over 60, given the paucity of evidence in this field. In line with the qualitative accounts from Phase 2, the older age group (over 60) identified similar motives for continuing in work and did not report more safety problems than younger workers. They reported certain advantages such as significantly less work with computers, less pressure from e-mails, less eye strain and less concern with stress at work. Their safety attitudes were similar to those of younger workers. The over 60 group reported significantly higher vitality, and although there was some relationship between this measure and part-time working, this did not reach significance. In common with other questionnaires, the answers could not be probed for nuances or for reasons behind the responses given.

The project has collected self-reported data from a large number of people working beyond 60, and has been unusual in recruiting a substantial sample of workers aged 70 and above. But it is acknowledged that there was likely bias in recruitment, as people who agreed to join this study were likely to be more confident and more comfortable with discussing risks and safety at work. Although fewer women than men work into their late 60s and beyond, women in the survey sample were particularly under-represented. Methods of recruitment for Phase 2 and 3 (which included websites, a safety magazine, and a general magazine for older audiences) seem likely to have attracted more socially advantaged participants. Difficulties recruiting people who work beyond State pension age in manual or arduous jobs have been noted in previous research. It is acknowledged that the experiences of older people working primarily through financial need in low paid and low status work had limited representation in both Phase 2 and 3. Yet this is unsurprising given national statistics that show relatively few people work beyond retirement age in manufacturing and other physically demanding forms of work.

Overall, the evidence collated here from review of the literature and empirical research suggests that workers aged over 60 are able to cope well with their work and its safety aspects, although much more detailed research is required. There were no previous studies of safety and risks among workers who had gone through the normative age of retirement and decided to remain in their jobs or move to new, part-time or ‘bridging’ jobs. The lack of age-specific injury and illness data by job title or other exposures prevents the discussion of factors that will enable workers in the future to remain in work into their late 60s or beyond. How older people can be supported to combine continued paid work or employment with caring responsibilities, and perhaps their own declining health, are further issues that need addressing. These are important gaps in knowledge now that the default retirement age of 65 has ended in the UK leading to inevitable increases in people working into their late 60s and beyond.

Two main implications follow from this study. First, the findings reveal that some older people find great satisfaction from working into later life, if they plan for a meaningful and manageable working pattern. Options such as portfolio employment (consisting of taking on a ‘patchwork’ of part-time jobs), locum employment, and bridge employment may offer stimulating challenges while reducing everyday pressures of paperwork or computing, humdrum routines and team responsibilities. New forms of self-employment, for some people, enable later life to be experienced as a time for fresh challenges and personal growth. It appears from the findings that older people are sufficiently safety-conscious and that former careers can offer safety awareness that can be applied in new roles. Similarly, work is appreciated in later life when it becomes one element of a rewarding work–life balance, with possible benefits for health. However, we recognise that these distinctive ways of

managing work in later life depend on two major resources – having choice and having sufficient alternative income to support part-time working. When payment of the State pension is delayed, older people will have far less choice over their hours of work. Older people who stay in work primarily for financial need, with little choice over the jobs they are qualified to take, or who are in poor health, may feel particularly burdened by having an extended working life imposed by the State. The second implication is that employers may feel confidence in their older workers, both in terms of their motivation and safety awareness. Some studies show a willingness among older workers to take on new roles and training, and this study has identified high levels of vitality and desire for personal growth. Safety awareness and good practices seem unrelated to age, and indeed qualitative evidence suggests that older workers who take on new, perhaps lower status work after retirement from their main careers can be a considerable source of expertise in the workplace in terms of safety awareness. We are mindful, though, that these positive findings reflect self-selected, highly motivated people who have chosen to extend their working lives into their late 60s and beyond. When every older person is required to work for longer, such advantages may be lost.

Taken together, the many findings of this research study challenge negative stereotypes of older people in the workplace, as illustrated by this final quotation:

> 'I don't feel inside, old. And I think that that is encouraged by continuing to work. And it's probably the biggest … one of the biggest contributory factor to what follows from that, which is basically, reasonably good health.' (James, 79, mail order business owner, a business he set up after retiring from his main career in the health service)

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Appendix A

Survey questionnaire
[Please see separate attachment in the electronic version]

Health and Safety Survey March 2011

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This research is being conducted by Alex Farrow and Frances Reynolds, who work in the School of Health Sciences and Social Care, Brunel University, Uxbridge, UB8 3PH. It has been funded by the Institution of Occupational Safety and Health and is supported by the British Safety Council. The research has received ethical approval from the university.

In this survey, you are invited to give your views and experiences of safety at work. There are no right or wrong answers and your answers are entirely anonymous. They cannot be traced back to you, or your particular workplace. We hope that you will find the survey interesting, though there is no obligation for you to take part, and your decision does not affect your employment in any way.

People who complete this survey need to be currently employed, whether on a full-time or part-time basis. Everyone is welcome although we particularly wish to include people who are working beyond the usual retirement age, as this group has often been ignored in previous studies.

The questionnaire is likely to take you about 15 minutes to complete. At a number of points in the survey you can 'save and continue later' (online version).

Please note that the questionnaire is anonymous. All answers will be treated in the strictest confidence and no information from any individual questionnaire will be released to anyone. Because your answers are completely anonymous, you cannot withdraw them once you have submitted the survey. Your consent to join the study is indicated by submitting the questionnaire.

You can complete online but further paper copies can be obtained from the researchers at the above address, or e-mail Alexandra.farrow@brunel.ac.uk with your address and the questionnaire will be sent with a stamped addressed envelope. Thank you for your interest!

1) Please state your work sector and present job title.

2) How long have you been working in the present job within this organisation?

- Less than 1 Year
- 1-2 Years
- 3-6 Years
- 7-10 Years
- 11-15 Years
- 16-20 Years
- 21-25 Years
- More than 25 years

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3) What is your gender?

- male
- female

4) Does your organisation have a preferred retirement age?

- yes
- no
- not known

5) *IF RETIREMENT AGE IS KNOWN, what is it?*

6) Are you past the present retirement age of your organisation?

- Yes
- No
- Not known

7) Which age group are you in?

- <21
- 21-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51-55
- 56-60
- 61-65
- 66-70
- >70

8) Do you work?

- Part-time
- Full time

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9) How many hours, on average, do you work each week?

10) In the last 6 months, have you retired and now returned to work?

- Yes
- No

11) IF WORKING BEYOND THE STATUTORY RETIREMENT AGE, how important are ANY of the following factors for encouraging you back to work OR encouraging you to remain in work (and not retire)? Tick one per line.

IF NOT WORKING PAST THE STATUTORY RETIREMENT AGE, GO TO QUESTION 13.

	Not important	Quite important	Very important
Financial			
Social			
Boredom			
Keeping interested in work/professional matters			
Reason to get up in the morning			
Partner continuing to work			

12) IF WORKING BEYOND STATUTORY RETIREMENT AGE, please state any other important factor(s) that encouraged you back to work OR encouraged you to remain in work (and not retire)?

13) In the last 6mths, in your job, how often have you needed to lift or move very heavy objects (i.e. more than 30kg or 66lbs) on average?

- Once each day or more
- 2-3 times/week
- Once/week
- Rarely or never

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14) In the last 6 months, in your job, did lifting/moving heavy objects ever lead to an accident/near miss?

- ○ Yes
- ○ No

15) In the last 6 months, in your job, on average, how often have you dealt with sharp objects (e.g. slicer, saws, etc?)

- ○ Once/day or more
- ○ 2-3 times/week
- ○ Once/week
- ○ Rarely or never

16) In the last 6 months, in your job, did use of any sharp object ever lead to cuts, accident or a near miss?

- ○ Yes
- ○ No

17) In the last 6 months, in your job, how often on average have you been in contact with flames/hot surfaces (e.g. welding, industrial cooker?)

- ○ Once/day or more
- ○ 2-3 times /week
- ○ Once a week
- ○ Rarely or never

18) In the last 6 months did contact with heat ever lead to burns, accident or a near miss?

- ○ Yes
- ○ No
- ○ Not applicable

19) In the last 6mths, in your job, how often have you used a computer (on average)...

- ○ Never
- ○ Up to 1 hr/day
- ○ 1-3 hrs/day
- ○ 4-6 hrs/day
- ○ More than 6 hrs/day

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20) Have you ever had eye strain after using the computer in your job?

- Yes
- No
- Don't use a computer at work

21) Have you felt excess pressure from the need to respond to e-mails in your present job?

- Yes
- No
- Don't use a computer at work

22) Have you ever thought that the size of the fonts should be larger?

- Yes
- No
- Don't use a computer at work

23) Have you felt pressure from changing software/programs?

- Yes
- No
- Don't use a computer at work

24) In the last 6 months, has your job involved regular driving (apart from commuting)?

- Yes
- No

25) If YES to regular driving in your job, (apart from commuting), on average how often was this?

- Each day
- 1-3 times/week
- Less than 1/week
- Not applicable

26) In the last 6 months has driving within your job role been more tiring?

- Yes

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- ○ No
- ○ Not applicable

27) In the last 6 months, within your job, has driving while tired ever led to an accident/near miss?

- ○ Yes
- ○ No
- ○ Not applicable

28) In the last 6 months, has your job involved working alone (including alone in an office) without other colleagues, on average..

- ○ Never
- ○ Less than 1/wk
- ○ 1-3 times/wk
- ○ Each day

29) In the last 6 months, has working alone ever caused you anxiety?

- ○ Yes
- ○ No
- ○ Never work alone

30) In the last 6 months, has working alone ever caused you to feel threatened?

- ○ Yes
- ○ No
- ○ Never work alone

31) In the last 6 months, have job tasks changed in the business (e.g. for customer focus)?

- ○ Yes
- ○ No
- ○ Don't know

32) If YES to change in job tasks in the last 6 months, was less customer focus ever an issue?

- ○ Yes

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- ○ No
- ○ Not applicable

33) If YES to changed job tasks in the last 6 months, has greater stress ever been an issue?

- ○ Yes
- ○ No
- ○ Not applicable

34) If Yes to changed job tasks in the last 6 months, has 'cutting corners' to save money, ever been an issue?

- ○ Yes
- ○ No
- ○ Not applicable

35) If Yes to changed job tasks in the last 6 months, has communicating less with clients ever been an issue?

- ○ Yes
- ○ No
- ○ Not applicable

36) In the last 6 months have you ever thought that your safety at work was improved by:

	Yes	No	Don't know
undertaking tasks in your own time without organisational pressure?	☐	☐	☐
reducing your work hours?	☐	☐	☐
taking a modified role in the organisation?	☐	☐	☐
applying your expertise gained from years of experience?	☐	☐	☐
being more aware of hazards?	☐	☐	☐
being more assertive?	☐	☐	☐

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37) In the last 6 months have you ever thought that being able to (or encouraged to) apply expertise from years of experience might increase the level of safety in the organisation?

- ○ Yes
- ○ No
- ○ Don't know

38) In the last 6 months have you ever thought that being able to use your authority or status for health & safety company policy or practices has increased your safety?

- ○ yes
- ○ no
- ○ don't know

39) In the last 6 months have you ever thought that varied work roles gave you more knowledge and skills to manage hazards at work

- ○ yes
- ○ no
- ○ don't know

40) In the last 3 years, while working in this company, have you ever had an accident at work that resulted in two or more lost working days?

- ○ Yes
- ○ No
- ○ Not applicable (not worked here for 3 years)

41) About how many days of work did you miss in the past 12 months because of a work related accident or injury? (If less than 1 day, enter 000.)

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42) ENERGY AND EMOTION: *Please choose ONE in each row* that best describes *or* comes closest to your energy levels and how you have felt in the last 4 weeks.

	All/most of the time	A good bit of the time	Some of the time	A little bit of the time	None of the time
Have you felt calm and peaceful?	○	○	○	○	○
Did you have a lot of energy?	○	○	○	○	○
Have you felt downhearted and blue (depressed)?	○	○	○	○	○

43) SAFETY QUESTIONS: Please choose *ONE in each row* that best describes your opinion on safety in the organisation:

	Strongly disagree	Disagree	Neither disagree or agree	Agree	Strongly agree
1. Safety is given high priority by management.	○	○	○	○	○
2. My company gives comprehensive health and safety training to employees.	○	○	○	○	○
3. Management usually seeks employee opinion before making final decisions on safety related matters.	○	○	○	○	○
4. Safety rules and procedures in my company are sufficient to prevent incidents.	○	○	○	○	○
5. Safety rules and procedures are strictly followed by the management.	○	○	○	○	○
6. New recruits are trained adequately to learn safety rules and procedures.	○	○	○	○	○
7. Management operates an open door policy on safety issues.	○	○	○	○	○
	Strongly disagree	**Disagree**	**Neither disagree or agree**	**Agree**	**Strongly agree**
8. In my company	○	○	○	○	○

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employees are rewarded for reporting hazards (with thanks, cash or other recognition e.g. newsletter, etc.)					
9. Corrective action is always taken when management is told about unsafe practice.	○	○	○	○	○
10. There is enough time to discuss and deal with safety issues in meetings.	○	○	○	○	○
11. My supervisors and managers always try to enforce safe working procedures.	○	○	○	○	○
12. In my workplace managers and supervisors do not show interest in worker safety.	○	○	○	○	○
13. Management promotes employees' involvement in safety related matters.	○	○	○	○	○
14. Safety inspections are carried out regularly.	○	○	○	○	○
15. Management considers safety to be equally important as production.	○	○	○	○	○
16. Management encourages the workers to attend safety training programmes	○	○	○	○	○
17. In my company safety week and other safety promotional activities arranged by the management are effective in creating safety awareness among the workers.	○	○	○	○	○
18. The safety procedures and practices in this organization are useful	○	○	○	○	○

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and effective.					
19. When near-misses are reported, management acts quickly to solve problems.	○	○	○	○	○
20. Safety training given to me is adequate to enable me to assess hazards at work.	○	○	○	○	○
21. Management consults with employees regularly for workplace health and safety.	○	○	○	○	○
22. There is open communication about safety issues in the workplace.	○	○	○	○	○
23. Preventive maintenance works are carried out regularly in the workplace.	○	○	○	○	○
24. My company provides sufficient safety equipment for the workers.	○	○	○	○	○
25. I know how to perform my job in a safe manner.	○	○	○	○	○
26. I use all necessary safety equipment to do my job.	○	○	○	○	○
27. I know how to use safety equipment and standard work procedures.	○	○	○	○	○
28. I always carry out my work in a safe manner.	○	○	○	○	○
29. I know how to maintain or improve workplace health and safety.	○	○	○	○	○

	Strongly disagree	Disagree	Neither disagree or agree	Agree	Strongly agree
30. I know how to	○	○	○	○	○

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reduce the risk of accidents and incidents in the workplace.					
31. I know the hazards associated with my job.					
32. I follow correct safety rules and procedures while carrying out my job.					
33. I make sure of the highest levels of safety when I carry out my job.					
34. I put in extra effort to improve the safety of the workplace.					
35. I voluntarily carry out tasks or activities that help to improve workplace safety.					
36. I encourage my co-workers to work safely.					
37. Over familiarity with the job, may mean I occasionally undertake unsafe work procedures.					
38. It is not always practical to follow all safety rules and procedures while doing a job.					

Thank you for taking part in this survey.
The findings will be made available from the Institution of Occupational Health and Safety later this year and a summary report of the findings will be available from alexandra.farrow@brunel.ac.uk or frances.reynolds@brunel.ac.uk

If you have felt concerned or distressed about any of the issues raised in this survey, please consult your occupational health nurse, union representative, or GP for support. You may also like to read more about health and safety at work at the following website: http://www.hse.gov.uk/

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Appendix B

Tables showing statistical analyses for Phase 3 (comparing 21–60 and over 60 age groups)

Table 1: 'Gender' cross-tabulated with 'age group' (21–60, over 60)

Gender			Age groups 2 categories		Total
			21–60	61 to >70	
	Male	Count	137	50	187
		Expected count	147.2	39.8	187.0
		% within age groups 2 categories	66.2%	89.3%	71.1%
	Female	Count	70	6	76
		Expected count	59.8	16.2	76.0
		% within age groups 2 categories	33.8%	10.7%	28.9%
Total		Count	207	56	263
		Expected count	207.0	56.0	263.0
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	11.449[a]	1	.001		
Continuity correction[b]	10.352	1	.001		
Likelihood ratio	13.229	1	.000		
Fisher's exact test				.000	.000
Linear-by-linear association	11.405	1	.001		
N of valid cases	263				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 16.18.
b. Computed only for a 2x2 table

Table 2: 'Work hours' cross-tabulated with 'age group' (21–60, over 60)

Recoded work hours			Age groups 2 categories		Total
			21–60	61 to >70	
	Up to 20 hr/wk	Count	10	15	25
		Expected count	19.4	5.6	25.0
		% within age groups 2 categories	5.2%	27.3%	10.2%
	21–40 hr/wk	Count	100	24	124
		Expected count	96.3	27.7	124.0
		% within age groups 2 categories	52.4%	43.6%	50.4%
	>40 hr/wk	Count	81	16	97
		Expected count	75.3	21.7	97.0
		% within age groups 2 categories	42.4%	29.1%	39.4%
Total		Count	191	55	246
		Expected count	191.0	55.0	246.0
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	22.971[a]	2	.000
Likelihood ratio	19.078	2	.000
Linear-by-linear association	12.957	1	.000
N of valid cases	246		

0 cells (.0%) have expected count less than five. The minimum expected count is 5.59.

Table 3: 'Part-time or full-time work' cross-tabulated with 'age group' (21–60, over 60)

Work mode			Age groups 2 categories		
			21–60	61 to >70	Total
	Part-time	Count	18	19	37
		Expected count	29.2	7.8	37.0
		% within age groups 2 categories	8.7%	34.5%	14.2%
	Full-time	Count	188	36	224
		Expected count	176.8	47.2	224.0
		% within age groups 2 categories	91.3%	65.5%	85.8%
Total		Count	206	55	261
		Expected count	206.0	55.0	261.0
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	23.764[a]	1	.000		
Continuity correction[b]	21.690	1	.000		
Likelihood ratio	20.020	1	.000		
Fisher's exact test				.000	.000
Linear-by-linear association	23.673	1	.000		
N of valid cases	261				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 7.80.
b. Computed only for a 2x2 table.

Table 4: 'Does organisation have preferred retirement age' cross-tabulated with 'age group' (21–60, over 60)

Does your organisation have preferred retirement age?			Age groups 2 categories		
			21–60	61 to >70	Total
	Yes	Count	91	20	111
		Expected count	87.3	23.7	111.0
		% within age groups 2 categories	44.2%	35.7%	42.4%
	No	Count	61	30	91
		Expected count	71.5	19.5	91.0
		% within age groups 2 categories	29.6%	53.6%	34.7%
	Not known	Count	54	6	60
		Expected count	47.2	12.8	60.0
		% within age groups 2 categories	26.2%	10.7%	22.9%
Total		Count	206	56	262
		Expected count	206.0	56.0	262.0
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	12.640[a]	2	.002
Likelihood ratio	12.790	2	.002
Linear-by-linear association	.353	1	.552
N of valid cases	262		

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 12.82.

Table 5: 'In the last six months, use of a computer – frequency of use recoded' cross-tabulated with 'age group' (21¬–60, over 60)

Hours pc/day recoded with age groups in 2 categories			Age groups 2 categories		
			21–60	61 to >70	Total
	Never to 1–3 hr/day	Count	31	16	47
		% within age groups 2	15.0%	28.6%	17.9%
	4–6 hr/day	Count	94	26	120
		% within age groups 2	45.6%	46.4%	45.8%
	>6 hr/day	Count	81	14	95
		% within age groups 2	39.3%	25.0%	36.3%
Total		Count	206	56	262
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	6.985[a]	2	.030
Likelihood ratio	6.724	2	.035
Linear-by-linear association	6.790	1	.009
N of valid cases	262		

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 10.05

Table 6: Cross-tabulation with correlation statistic of age groups (five categories) and hours of pc use/day

Hours pc/day recoded			5 age groups					
			21–40	41–50	51–60	61–65	>66	Total
Hours pc/day recoded	Never to 1–3 hr/day	Count	11	8	12	5	11	47
		% within 5 age groups	18.0%	12.1%	15.2%	14.3%	52.4%	17.9%
	4–6 hr/day	Count	24	31	39	21	5	120
		% within 5 age groups	39.3%	47.0%	49.4%	60.0%	23.8%	45.8%
	>6 hr/day	Count	26	27	28	9	5	95
		% within 5 age groups	42.6%	40.9%	35.4%	25.7%	23.8%	36.3%
Total		Count	61	66	79	35	21	262
		% within 5 age groups	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	23.338[a]	8	.003
Likelihood ratio	19.317	8	.013
Linear-by-linear association	6.658	1	.010
N of valid cases	262		

a. One cell (6.7%) has expected count less than five. The minimum expected count is 3.77.

Symmetric measures		Value	Asymp. std. error[a]	Approx. T[b]	Approx. sig.
Interval by interval	Pearson's R	-.160	.070	-2.609	.010[c]
Ordinal by ordinal	Spearman correlation	-.145	.064	-2.370	.018[c]
N of valid cases		262			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.

Table 7: 'Ever had eye strain after use of pc in your job?' cross-tabulated with 'age group' (21–60, over 60)

Eye strain after use of pc in your job?			Age groups 2 categories		
			21–60	61 to >70	Total
	Yes	Count	95	16	111
		Expected count	87.0	24.0	111.0
		% within age groups 2 categories	46.8%	28.6%	42.9%
	No	Count	108	40	148
		Expected count	116.0	32.0	148.0
		% within age groups 2 categories	53.2%	71.4%	57.1%
Total		Count	203	56	259
		Expected count	203.0	56.0	259.0
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	5.954[a]	1	.015		
Continuity correction[b]	5.233	1	.022		
Likelihood ratio	6.156	1	.013		
Fisher's exact test				.015	.010
Linear-by-linear association	5.931	1	.015		
N of valid cases	259				

a. 0 cells (.0%) have expected count less than five. The min expected count is 24.00.
b. Computed only for a 2x2 table.

Table 8: 'Ever felt excess pressure from a need to respond to e-mails in present job' cross-tabulated with 'age group' (21–60, over 60)

Felt excess pressure from a need to respond to e-mails in present job			Age groups 2 categories		
			21–60	61 to >70	Total
	Yes	Count	136	24	160
		Expected count	126.8	33.2	160.0
		% within age groups 2 categories	66.0%	44.4%	61.5%
	No	Count	70	30	100
		Expected count	79.2	20.8	100.0
		% within age groups 2 categories	34.0%	55.6%	38.5%
Total		Count	206	54	260
		Expected count	206.0	54.0	260.0
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	8.414[a]	1	.004		
Continuity correction[b]	7.527	1	.006		
Likelihood ratio	8.219	1	.004		
Fisher's exact test				.005	.003
Linear-by-linear association	8.382	1	.004		
N of valid cases	260				

a. 0 cells (.0%) have expected count less than five. The min expected count is 20.77.
b. Computed only for a 2x2 table.

Table 9: 'In the last six months, have job tasks changed in the business (for example, for customer focus)' (recoded with not known as missing value) cross-tabulated with 'age group' (21–60, over 60)

In the last six months, recoded job tasks change			Age groups 2 categories		Total
			21–60	61 to >70	
Recoded job tasks change	Yes	Count	117	21	138
		% within age groups 2 categories	60.3%	37.5%	55.2%
	No	Count	77	35	112
		% within age groups 2 categories	39.7%	62.5%	44.8%
Total		Count	194	56	250
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	9.142[a]	1	.002		
Continuity correction[b]	8.243	1	.004		
Likelihood ratio	9.135	1	.003		
Fisher's exact test				.004	.002
Linear-by-linear association	9.106	1	.003		
N of valid cases	250				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 25.09.
b. Computed only for a 2x2 table.

Table 10: 'If YES to changed job tasks in the last six months, was greater stress ever an issue' cross-tabulated with 'age group' (21–60, over 60)

If YES to changed job tasks in the last six months, has greater stress ever been an issue			Age groups 2 categories		Total
			21–60	61 to >70	
	Yes	Count	78	10	88
		Expected count	71.9	16.1	88.0
		% within age groups 2 categories	60.0%	34.5%	55.3%
	No	Count	52	19	71
		Expected count	58.1	12.9	71.0
		% within age groups 2 categories	40.0%	65.5%	44.7%
Total		Count	130	29	159
		Expected count	130.0	29.0	159.0
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	6.247[a]	1	.012		
Continuity correction[b]	5.257	1	.022		
Likelihood ratio	6.254	1	.012		
Fisher's exact test				.014	.011
Linear-by-linear association	6.208	1	.013		
N of valid cases	159				

a. 0 cells (.0%) have expected count less than five. The min expected count is 12.95.
b. Computed only for a 2x2 table.

Table 11: 'In the last six months have you ever thought that your safety at work was improved by more awareness of the hazards' (XQ36e) cross-tabulated with 'age group' (21–60 versus over 60) (not known = missing)

Your safety at work was improved by more awareness of the hazards			Age groups 2 categories		
			21–60	61 to >70	Total
	Yes	Count	166	36	202
		% within age groups 2 categories	81.4%	65.5%	78.0%
	No	Count	38	19	57
		% within age groups 2 categories	18.6%	34.5%	22.0%
Total		Count	204	55	259
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	6.395[a]	1	.011		
Continuity correction[b]	5.501	1	.019		
Likelihood ratio	5.928	1	.015		
Fisher's exact test				.017	.011
Linear-by-linear association	6.370	1	.012		
N of valid cases	259				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 12.10.
b. Computed only for a 2x2 table.

Table 12: 'In the last six months have you ever thought that your safety at work was improved by being more assertive' (XQ36f) cross-tabulated with 'age group' (21–60 versus over 60) (not known = missing)

Your safety at work was improved by being more assertive			Age groups 2 categories		
			21–60	61 to >70	Total
	Yes	Count	144	25	169
		% within age groups 2 categories	72.0%	48.1%	67.1%
	No	Count	56	27	83
		% within age groups 2 categories	28.0%	51.9%	32.9%
Total		Count	200	52	252
		% within age groups 2 categories	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	10.693[a]	1	.001		
Continuity correction[b]	9.637	1	.002		
Likelihood ratio	10.207	1	.001		
Fisher's exact test				.002	.001
Linear-by-linear association	10.651	1	.001		
N of valid cases	252				

a. 0 cells (.0%) have expected count less than five. The min expected count is 17.13.
b. Computed only for a 2x2 table.

Table 13: 'In the last six months, have you ever thought that your safety at work was increased from being able to use your authority or status to implement health and safety company policy/practices?' cross-tabulated with 'age group' (21–60, over 60)
(not known = missing)

Have you ever thought that your safety at work was increased from using your authority/status to implement health and safety company policy/practices?			Age groups 2 categories		
			21–60	61 to >70	Total
	Yes	Count	160	36	196
		% within age groups 2 cats	81.6%	67.9%	78.7%
	No	Count	36	17	53
		% within age groups 2 cats	18.4%	32.1%	21.3%
Total		Count	196	53	249
		% within age groups 2 cats	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	4.679[a]	1	.031		
Continuity correction[b]	3.897	1	.048		
Likelihood ratio	4.359	1	.037		
Fisher's exact test				.038	.027
Linear-by-linear association	4.660	1	.031		
N of valid cases	249				

a. 0 cells (.0%) have expected count less than five. The min expected count is 11.28.
b. Computed only for a 2x2 table.

Table 14: Correlations among safety climate measures (21–60 age group)

Correlations[a]		Management commitment	Workers' knowledge	Workers' participation	Vitality	37. Over familiarity with the job, may mean I occasionally undertake unsafe work procedures	38. It is not always practical to follow all safety rules and procedures while doing a job
Management commitment	Pearson Corr.	1	.382**	.342**	.394**	-.203**	-.269**
	Sig. (2-tailed)		.000	.000	.000	.005	.000
	N	190	188	185	184	189	189
Workers' knowledge	Pearson Corr.	.382**	1	.821**	.116	-.165*	-.193**
	Sig. (2-tailed)	.000		.000	.107	.019	.006
	N	188	201	196	195	200	200
	Pearson Corr.	.342**	.821**	1	.113	-.239**	-.234**
	Sig. (2-tailed)	.000	.000		.118	.001	.001
	N	185	196	199	193	198	198
Vitality	Pearson Corr.	.394**	.116	.113	1	-.065	-.077
	Sig. (2-tailed)	.000	.107	.118		.360	.279
	N	184	195	193	201	198	197
37. Over familiarity with the job, may mean I occasionally undertake unsafe work procedures	Pearson Corr.	-.203**	-.165*	-.239**	-.065	1	.401**
	Sig. (2-tailed)	.005	.019	.001	.360		.000
	N	189	200	198	198	204	202
38. It is not always practical to follow all safety rules and procedures while doing a job	Pearson Corr.	-.269**	-.193**	-.234**	-.077	.401**	1
	Sig. (2-tailed)	.000	.006	.001	.279	.000	
	N	189	200	198	197	202	203

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level.

Table 15: Correlations among safety climate measures (over 60 group)

Correlations[a]		Management commitment	Workers' knowledge	Workers' participation	Vitality	37. Over familiarity with job, may mean unsafe work procedures	38. Not always practical to follow all safety rules and procedures while doing a job
Management commitment	Pearson Corr.	1	.068	.372**	.219	-.095	-.203
	Sig. (2-tailed)		.632	.007	.123	.504	.157
	N	52	52	51	51	52	50
Workers' knowledge	Pearson Corr.	.068	1	.659**	-.078	-.450**	-.270
	Sig. (2-tailed)	.632		.000	.577	.001	.053
	N	52	54	53	53	54	52
Workers' participation	Pearson Corr.	.372**	.659**	1	.073	-.477**	-.459**
	Sig. (2-tailed)	.007	.000		.609	.000	.001
	N	51	53	53	52	53	51
Vitality	Pearson Corr.	.219	-.078	.073	1	.020	-.117
	Sig. (2-tailed)	.123	.577	.609		.888	.412
	N	51	53	52	55	53	51
37. Over familiarity with the job, may mean I occasionally undertake unsafe work procedures	Pearson Corr.	-.095	-.450**	-.477**	.020	1	.315*
	Sig. (2-tailed)	.504	.001	.000	.888		.023
	N	52	54	53	53	54	52
38. It is not always practical to follow all safety rules and procedures while doing a job	Pearson Corr.	-.203	-.270	-.459**	-.117	.315*	1
	Sig. (2-tailed)	.157	.053	.001	.412	.023	
	N	50	52	51	51	52	52

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix C

Tables showing statistical analyses for Phase 3 (comparing 51–60 and over 60 age groups)

Table 1: Gender

What is your gender?			Age group 51–60, 61+		Total
			51–60	60+	
	Male	Count	57	50	107
		% within age group 51–60, 61+	71.3%	89.3%	78.7%
	Female	Count	23	6	29
		% within age group 51–60, 61+	28.8%	10.7%	21.3%
Total		Count	80	56	136
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	6.387[a]	1	.011		
Continuity correction[b]	5.357	1	.021		
Likelihood ratio	6.834	1	.009		
Fisher's exact test				.012	.009
Linear-by-linear association	6.340	1	.012		
N of valid cases	136				

a. 0 cells (.0%) have expected count less than five. Minimum expected count is 11.94.

Table 2: Use of computer

In the last six months, in your job, how often have you used a computer (on average)?			Age group 51–60, 61+		Total
			51–60	60+	
	Never	Count	0	1	1
		% within age group 51–60, 61+	.0%	1.8%	.7%
	Up to 1hr/day	Count	1	2	3
		% within age group 51–60, 61+	1.3%	3.6%	2.2%
	1–3 hr/day	Count	11	13	24
		% within age group 51–60, 61+	13.9%	23.2%	17.8%
	4–6 hr/day	Count	39	26	65
		% within age group 51–60, 61+	49.4%	46.4%	48.1%
	>6hr/day	Count	28	14	42
		% within age group 51–60, 61+	35.4%	25.0%	31.1%
Total		Count	79	56	135
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	4.993[a]	4	.288
Likelihood ratio	5.330	4	.255
Linear-by-linear association	4.484	1	.034
N of valid cases	135		

Table 2a: Use of computer (hours recoded)

In the last six months, in your job, how often have you used a computer (on average)?			Age group 51–60, 61+		Total
			51–60	60+	
	Never	Count	0	1	1
		% within age group 51–60, 61+	.0%	1.8%	.7%
	Up to 1hr/day	Count	1	2	3
		% within age group 51–60, 61+	1.3%	3.6%	2.2%
	1–3 hr/day	Count	11	13	24
		% within age group 51–60, 61+	13.9%	23.2%	17.8%
	4–6 hr/day	Count	39	26	65
		% within age group 51–60, 61+	49.4%	46.4%	48.1%
	>6hr/day	Count	28	14	42
		% within age group 51–60, 61+	35.4%	25.0%	31.1%
Total		Count	79	56	135
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	4.993[a]	4	.288
Likelihood ratio	5.330	4	.255
Linear-by-linear association	4.484	1	.034
N of valid cases	135		

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 11.61.

Table 3: Eye strain

Have you ever had eye strain after use of pc in your job?			Age group 51–60, 61+		
			51–60	60+	Total
	Yes	Count	43	16	59
		% within age group 51–60, 61+	55.1%	28.6%	44.0%
	No	Count	35	40	75
		% within age group 51–60, 61+	44.9%	71.4%	56.0%
Total		Count	78	56	134
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	9.329[a]	1	.002		
Continuity correction[b]	8.282	1	.004		
Likelihood ratio	9.533	1	.002		
Fisher's exact test				.003	.002
Linear-by-linear association	9.259	1	.002		
N of valid cases	134				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 24.66.
b. Computed only for a 2x2 table.

Table 4: Excess pressure to respond to e-mails

Have you ever felt excess pressure from the need to respond to e-mails in your present job?			Age group 51–60, 61+		
			51–60	60+	Total
	Yes	Count	52	24	76
		% within age group 51–60, 61+	65.8%	44.4%	57.1%
	No	Count	27	30	57
		% within age group 51–60, 61+	34.2%	55.6%	42.9%
Total		Count	79	54	133
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	5.986[a]	1	.014		
Continuity correction[b]	5.145	1	.023		
Likelihood ratio	5.993	1	.014		
Fisher's exact test				.020	.012
Linear-by-linear association	5.941	1	.015		
N of valid cases	133				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 23.14.

Table 5: Pressure from changing software/programs

Have you felt pressure from changing software/programs?			Age group 51–60, 61+		
			51–60	60+	Total
	Yes	Count	41	17	58
		% within age group 51–60, 61+	51.9%	30.9%	43.3%
	No	Count	38	38	76
		% within age group 51–60, 61+	48.1%	69.1%	56.7%
Total		Count	79	55	134
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	5.819[a]	1	.016		
Continuity correction[b]	4.996	1	.025		
Likelihood ratio	5.914	1	.015		
Fisher's exact test				.021	.012
Linear-by-linear association	5.776	1	.016		
N of valid cases	134				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 23.81.
b. Computed only for a 2x2 table.

Table 6: Change in job tasks over the last six months

In the last six months, have job tasks changed in the business (for example, for customer focus)?			Age group 51–60, 61+		
			51–60	60+	Total
	Yes	Count	47	21	68
		% within age group 51–60, 61+	61.8%	37.5%	51.5%
	No	Count	29	35	64
		% within age group 51–60, 61+	38.2%	62.5%	48.5%
Total		Count	76	56	132
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	7.649[a]	1	.006		
Continuity correction[b]	6.705	1	.010		
Likelihood ratio	7.720	1	.005		
Fisher's exact test				.008	.005
Linear-by-linear association	7.591	1	.006		
N of valid cases	132				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 27.15.
b. Computed only for a 2x2 table.

Table 7: Greater stress from changes in job tasks

If YES to changed job tasks in the last six months, was greater stress an issue?			Age group 51–60, 61+		
			51–60	60+	Total
	Yes	Count	39	10	49
		% within age group 51–60, 61+	72.2%	34.5%	59.0%
	No	Count	15	19	34
		% within age group 51–60, 61+	27.8%	65.5%	41.0%
Total		Count	54	29	83
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	11.112[a]	1	.001		
Continuity correction[b]	9.606	1	.002		
Likelihood ratio	11.163	1	.001		
Fisher's exact test				.001	.001
Linear-by-linear association	10.978	1	.001		
N of valid cases	83				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 11.88.
b. Computed only for a 2x2 table.

Table 8: Part-time or full-time work and age groups (51–60 and over 60)

Do you work?			Age group 51–60, 61+		
			51–60	60+	Total
	Part-time	Count	8	19	27
		% within age group 51–60, 61+	10.0%	34.5%	20.0%
	Full-time	Count	72	36	108
		% within age group 51–60, 61+	90.0%	65.5%	80.0%
Total		Count	80	55	135
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	12.273[a]	1	.000		
Continuity correction[b]	10.787	1	.001		
Likelihood ratio	12.191	1	.000		
Fisher's exact test				.001	.001
Linear-by-linear association	12.182	1	.000		
N of valid cases	135				

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 11.00.
b. Computed only for a 2x2 table.

Table 9: Hours worked per week and age groups (51–60 and over 60)

Hours worked per week recoded			Age group 51–60, 61+		
			51–60	60+	Total
	Up to 20 hrs/wk	Count	4	15	19
		% within age group 51–60, 61+	5.4%	27.3%	14.7%
	21–40 hrs/wk	Count	41	24	65
		% within age group 51–60, 61+	55.4%	43.6%	50.4%
	>40 hrs/wk	Count	29	16	45
		% within age group 51–60, 61+	39.2%	29.1%	34.9%
Total		Count	74	55	129
		% within age group 51–60, 61+	100.0%	100.0%	100.0%

Chi-square tests	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	12.033[a]	2	.002
Likelihood ratio	12.282	2	.002
Linear-by-linear association	7.023	1	.008
N of valid cases	129		

a. 0 cells (.0%) have expected count less than five. The minimum expected count is 8.10.

Appendix D: List of journal articles and conference presentations reporting on this project's findings

Journal articles

Farrow A and Reynolds F. Health and safety issues associated with working beyond age 60: a systematic literature review, *Occupational Medicine* 2012: 62; 4–11.

Reynolds F and Farrow A. Working beyond 65: A qualitative study of perceived hazards and discomforts at work. Accepted by *Work: A Journal for Prevention, Assessment and Rehabilitation*.

Reynolds F, Farrow A and Blank A. 'Otherwise it would be nothing but cruises': Exploring the subjective benefits of working beyond 65. Accepted by *International Journal of Ageing and Later Life*.

Conference presentations

Reynolds F and Farrow A. Post-retirement age workers' experiences of health and safety at work: a qualitative study: Occupational Psychology Conference, Stratford-on-Avon, organised by the British Psychological Society Division of Occupational Psychology, 12–14 January 2011.

Reynolds F and Farrow A. Staking a place in wider society: A qualitative study of the meanings of continuing employment among people working into their 7th and 8th decades: New Cultures of Ageing Conference, Brunel University, 8–9 April 2011.

Reynolds F and Farrow A. Why do people work beyond 70 years of age? A qualitative study: BPS Health Psychology Conference, Southampton University, 15–16 September 2011.

Farrow A, Reynolds F and Shah SS. Ageing and health and safety: Society of Occupational Medicine, Annual Scientific Meeting, 18–21 June 2012.

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