

CONSTRUCTION WORKERS' VIEWS ON WORKPLACE DESIGN AND 'HEALTHY' AGEING

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With the recent abolishment of a retirement age we are seeing an increase in an ageing workforce. This can often be difficult to manage, particularly in tough working environments such as the construction industry. Construction and building trades are well known for being tough, heavy and manually challenging, which can prove difficult for the older worker to remain healthy in whilst also exacerbating the decline in physical ability seen in the ageing population. Construction workers are often faced with cold, dark, poorly ventilated working environments however, some organisations working in areas such as maintenance provide somewhat less harsh conditions, often with a slower pace of work in comparison to the building trades and industrial work. In this paper, findings from interviews with 74 construction workers will be presented. Workers came from a small maintenance facility, a medium-sized domestic new-build company and a large civil engineering company. In-depth semi structured interviews took place with participants aged from 18 to over 50 in their place of work, incorporating the Stage of Change questionnaire, Nordic Musculoskeletal questionnaire and the Work Ability Index. In this paper comparisons are made between working practices, cultures and attitudes in these three organisations. The aim of this research is to provide direction for better work place design using the experience, knowledge and ideas of construction workers by encouraging healthy ageing in the industry, facilitating healthier working behaviours and enabling positive change.

Keywords: ageing, culture, ergonomics, organisation.

INTRODUCTION

Construction is an essential worldwide industry, contributing nearly £90 billion to the UK economy and providing nearly 3 million jobs (Department for Business Innovation and Skills 2013). It is also renowned for being a tough, heavy industry to work in with workers often finding themselves in unforgiving environments which can be dark, damp, poorly ventilated and noisy. Heavy lifting, repetitive movements and awkward and cramped postures are commonplace which can lead to musculoskeletal problems later in life. Certain musculoskeletal disorders are more common in particular trades, such as lower back pain in roofers and floorers, back and knee pain for bricklayers and all body areas in scaffolders (Holmström and Engholm 2003; Boschman *et al* 2012). Musculoskeletal disorders can be debilitating and can cause severe pain to construction workers both in and out of work. This can be a particular problem if workers are self-employed or sub-contracted and not entitled to sick pay, causing them to remain in work whilst being in pain. In severe cases,

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musculoskeletal disorders can force workers into an early retirement, with as many as 63% having to retire due to medical conditions (Arndt *et al* 1996).

We are currently experiencing an ageing workforce; in the wake of a recession older workers are unable to retire early due to economic pressures and the recent abolishment of an official retirement age (BBC 2011). The harsh conditions found in construction can exacerbate the natural decline of ageing on the body; stamina and muscle strength are considerably reduced, injuries take longer to recover from, eyesight and vision deteriorate and hearing ability decreases, particularly in the speech frequencies (Larsson, Grimby and Karlsson 1979; Lemasters *et al* 2006; Chau *et al* 2004). These factors can potentially be problematic in construction, as older workers may not be able to see tripping hazards, hear instructions clearly or carry out work as quickly as younger workers. Despite this, older workers are highly valued in the industry and are considered to be experienced, dedicated and produce work of a high quality. However, these positives are outweighed by a negative perception that they are slow (Leaviss *et al* 2008). Many older workers have the desire to remain in work, having spent a large proportion of their lives in their trades (Leaviss *et al* 2008). However a more recent study found that despite being able to remain in work beyond the age of 65, workers are less willing to, due to being in awkward postures and suffering from musculoskeletal complaints (Hengel *et al* 2012).

More research is needed regarding working environments which facilitate healthy ageing and that can accommodate the needs of all workers in construction activities. The research presented in this paper is part of a larger project, funded by Age UK, investigating how construction workers can be part of this process to improve quality of working life using a participatory ergonomics framework. Health and safety is a well-rehearsed topic in construction, however amongst the many protocols and standards related to safe working on construction sites, there are fewer on health and well-being, which has been the case for many years (Gyi *et al* 1999). This is slowly beginning to change, with Dame Carol Black paying a large role in government reforms; *"a shift in attitudes is necessary to ensure that employers and employees recognise not only the importance of preventing ill health, but also the key role the workplace can play in promoting health and well-being"* (Black, 2008)

This paper presents the findings of an exploratory study investigating construction workers' views of the design of their workplace and health and well-being at work. Interviews were conducted with 74 construction workers from different organisations representing a number of different trades such as bricklayers, plumbers, electricians and carpenters/joiners. Comparisons are made between three different sized organisations, a small maintenance facility, a medium domestic build company and a large civil engineering company with sites situated in sewage treatment and railway. These findings are part of a larger project which will incorporate the workers' views and experiences using participatory ergonomics to improve health and well-being at work.

METHODOLOGY

In-depth semi structured interviews took place with a stratified sample of 74 construction workers. The aim of these interviews was to understand the breadth and depth of workers' knowledge about the design of their workplace and their health and well-being at work.

A range of ages were interviewed, in categories of under 25, 25-34, 35-49 and 50+. Project managers were approached through professional and personal contacts, who then selected appropriate and available English-speaking tradesmen. Trades of particular interest were those whose work included heavy lifting, twisting, turning and being in awkward and cramped positions for long periods of time. Demographic data was collected from the workers such as their trade, age range, employer and length of employment in the industry. A flexible interview schedule (table 1) was used to allow free discussion around a number of pre-determined topics including the participant's job, any issues they have and the personal protective equipment they wear. The Stage of Change questionnaire (Prochaska and DiClemente 1983; Whysall *et al* 2007) was used to facilitate discussion around ideas they have to make their workplace safer or more comfortable and quantitative data was collected using the Nordic Musculoskeletal Questionnaire (Kuorinka *et al* 1987; Sang *et al* 2010) and the Work Ability Index (Ilmarinen 2003). Issues raised in the interviews were evidenced by observations where possible, with photographs and videos being taken to triangulate the data.

Table 1: Flexible interview schedule

	Questions and issues
Demographics	Age range. Occupation. Time spent in employment
Their Job	Everyday tasks? Tools and equipment used? PPE requirements and usage? Location of job? Awkward/cramped positions? Use of chemicals? Is there dust, noise?
Ideas & Current Changes	Stage of Change (Prochaska & DiClemente 1983; Whysall <i>et al</i> 2007) What ideas do you have to make your job easier? To make the workplace better? New/different equipment? Flooring, lighting, PPE, talks, workshops, job rotation, micro-breaks, better facilities? What advice would you give to a younger worker? What would you do differently? E.g. Plasterer- how do you cope with the weight of the trowel and wet plaster? Electricians- what do you do about extra lighting in smaller areas? Bricklayers- what issues do you face with working outside? Weather? What is being done right now to make your job easier? Who comes up with these changes? Who is responsible for implementing and maintaining these changes? Are you using different equipment? Altering current equipment? Order of jobs? Wearing knee pads / particular gloves / other clothing modification?
Health (Quantitative)	Nordic Musculoskeletal Questionnaire (Kuorinka <i>et al</i> 1987; Sang <i>et al</i> 2010) Work Ability Index (Ilmarinen 2003)

FINDINGS

A total of 74 workers were interviewed (table 2); 28 from a small maintenance facility, 30 from a medium sized domestic build company and 16 from a large civil engineering company with sites based in sewage treatment and railway. Efforts were made to have an evenly stratified sample, however the outcome is representative of the peripatetic nature of construction; high numbers came from the stabilised maintenance facility which was based on one permanent site and from the medium domestic build company in which the researcher had personal contacts. The large civil engineering company had several management change-overs before data collection was possible. Interviews were conducted using a flexible interview schedule and were conducted in site offices. Interviews were recorded on a Dictaphone and took place after participants had read an information sheet and signed their informed consent. This study was approved by the University Ethics Committee.

Table 2: Age ranges of interviewed workers and the size of company they worked for

	Small	Medium	Large	Total
Under 25	3	6	1	10
25-34	1	7	4	12
35-49	6	11	7	23
50+	18	6	4	28
Total	28	30	16	74

Quantitative findings

As discussed, quantitative data was collected using the Nordic Musculoskeletal Questionnaire and the Work Ability Index and was analysed using IBM SPSS Statistics software.

From the Nordic Musculoskeletal Questionnaire, period (12 month) and point (7 day) prevalence of musculoskeletal symptoms were identified in specific areas of the body. The severity of these and whether the workers believed them to be directly related to their work was also recorded.

Workers from the small facility reported a higher number of symptoms in the wrists and hands (68%) and the knees (75%) in comparison to the medium and large companies. This may be related to the higher age range or number of plumbers interviewed within this facility. These workers also reported the highest point prevalence for these areas (43% and 39% respectively) and over half believed that these symptoms were a direct result of their work. This implies that many workers in this facility are continuing to work through their aches and pains. There were similar reports of lower back pain across all three organisations; 57% in the small, 55% in the medium and 63% in the large. In the large company, 56% of sufferers believed their work to be the direct cause of these symptoms. There was also a higher prevalence of symptoms in the elbows reported from the workers of the larger company (44%) in comparison to the small organisation (14%). Overall the wrists, lower back and knees were problem areas for workers in all size organisations, with a large number of these workers attributing these to their work.

Despite suffering with musculoskeletal symptoms, workers rated their work ability as high across all three companies. Using the Work Ability Index, they were asked to rate their current workability from 0 to 10, with 0 being completely unable to work and 10 being the best they've ever worked. The average rating for the small facility was 8.1, for the medium company, 8.9 and for the large company, 8.5. However these findings are likely to be subject to the 'healthy worker effect' where less healthy workers may have already left their jobs, leading to a skewed set of results (Stattin and Järvholm 2005).

Qualitative findings

The quantitative data was triangulated by collecting both observations on site where possible and qualitative data through in-depth semi-structured interviews. The interview data was coded and thematically analysed in QSR International NVivo software. During this analysis it became clear that the workers' experiences and ideas differed significantly between organisations.

Moving jobs

Many of the workers in the small maintenance facility had made the conscious decision to move there from other areas in the industry such as 'house bashing' or engineering with the view of taking a 'slower paced' job. Reasons for this included preservation of health as a result of damaged hearing or diabetes and 'getting out of the harsh conditions of the building trade'. A similar attitude was found in the younger workers of the medium size company, who openly spoke about not wanting to remain in their trades for a long period of time, instead wanting to own their own businesses or just "get out of" the industry.

Tasks

There was a variation of tasks reported by workers, both between and within the different organisations, with workers agreeing that each day's tasks depended on the demands of the job. Tasks in the maintenance facility appeared to be more similar on a day to day basis, such as "very light work with small installation works" and "changing lamps, repairing sockets...fault finding". The variation of tasks reported within the domestic company and the civil engineering company was reflective of both the many different trades working on the sites and the peripatetic nature of large construction sites. As the work moved forward on these building sites, the nature of the tasks changed. There were more references to heavy lifting and frequent use of machinery in comparison to the small facility, including wider discussion of materials used and the environment in which they have to work in. Workers in the small facility made frequent references to being in awkward and cramped positions due to having to maintain 'the voids' - spaces in the ceilings of old buildings. These awkward postures were also reported by workers in the large civil engineering company who were building trial holes in the ground on their site.

Pace of work

Workers from the small facility referred to their jobs as being safer and 'slower', particularly those who had previous experience in heavy industry. The overall opinion was that the employers of this facility prioritised health and safety over speed of production and that they were given all the time they needed to complete their jobs safely. Workers reported the difference between maintenance and their previous jobs, where they felt they were unable to 'waste time' on retrieving personal protective equipment from the van or take the time to consider the most comfortable way to do the job compared to maintenance where they felt they no longer needed to cut corners or rush their jobs. This was also viewed as having a positive effect on their health and well-being, as they felt the work was less physically demanding and as a result, they were not having to 'abuse their bodies as much'.

This was strongly contrasted with the workers of the medium domestic build company, who frequently reported feeling under a great deal of stress to complete their job in the allocated time frames. Workers within this company were on domestic build sites and had important deadlines to meet for paying tenants. These time pressures had an effect on their attitude towards health and safety, causing the workers to become less concerned about their well-being at work. There were reports of individual manual heavy lifting, which would normally be done by two people or with machinery, laying bricks in a way to increase production rather than to maintain health and comfort, with one worker stating "you can't put the drill down...you gotta just keep going to earn more money".

There was very little discussion of time pressures from workers in the large civil engineering company, however they were not working to such a strict timescale as they were working on a sewage treatment plant, digging large numbers of trial holes.

Employer relations

Relationships between the workforce and employers in the small maintenance facility differed significantly to those in the other two companies, whereby workers appeared to have a more direct relationship with their managers. Workers in the medium domestic build and civil engineering companies more commonly spoke to their supervisors rather than their overall employer. This was evidenced by workers in the small facility referring to their manager on a first name basis, whereas workers in the two larger companies referred to “*the employer*” or “*my company*”. The main reason for this could be attributed to the permanent nature of the maintenance facility, being situated on static site with the workers being paid a salary. In comparison, the peripatetic nature of the larger two companies meant that the main workforce was sourced from sub-contracting companies with workers moving on soon after project completion.

Using the Stage of Change questionnaire as a basis for discussion, it was clear that workers from the different sized organisations felt differently about the way their employers cared for them and had made changes. Overall workers in the small facility had a positive perception of their employers and felt that they had their best interests at heart. This was particularly the case for the older construction workers, who felt that they were really accommodated particularly when they were suffering with illnesses such as diabetes. When asked if their employers had made any changes to improve their health at work, a number of responses referred to the wide range of health and safety courses available to the workforce and being given as much time as they need to complete their jobs comfortably and safely.

Workers in the medium domestic build company were also asked if their employers had made any changes, however their responses centred around health and safety improvements, with no mention of any personal changes being made for the workers. Interestingly it was a supervisor of the bricklayers in this company who most openly talked about his experience of the culture of the building trade;

“[if you picked up blocks] properly it would take a day and they’d be building nothing...I’ve got to get a floor up today...it’s gonna fly up, so all corners are being cut...they’re [management] not interested, they don’t care about the health of them up there, all they wanna see is a measure and a pound note” (50+, bricklayer, medium company).

Responses from workers in the large company varied, with some workers referring to legislation changes as ‘necessary’ and therefore not being on a personal level, such as having to make changes ‘just to cover them on insurance’ and to ‘tick boxes’.

These differences in relationships also affected the workers’ perceptions and openness to change within their company. Interestingly in the small facility, the close relationship between employer and workers was not indicative of a more positive reaction to change. In fact, this appeared to have caused more issues as some workers felt they were not being listened to by their manager. One issue raised by several workers was that of contracting on site - with the workforce being static and maintenance based, there was a great deal of ownership surrounding their work. However, management had increased the number of external contractors being bought

in, which had caused unrest within the internal workforce. Workers felt they were being forced to surrender ownership of their jobs, having to fix problems left by the contractors, with one worker stating *"they're not listening, I call it the FM Titanic 'cos we're pointing out that it's gonna fail but they're not listening!"*. Several workers reported a real need for apprentices to be enrolled in the company so that the older workers could pass down their knowledge and experience, with workers expressing their concern of the ageing workforce, many close to retirement with 'no-one coming up behind them'. Despite the considerable amount of communication between the workforce and management, this did not translate into the workers' understanding of the situation, leaving confusion and bad feeling about why changes were not being put into place. In the domestic build company, the main issue between workers and employers appeared to be related to money, particularly because the workers were on price. Workers felt that the main priority for their managers was to get the job finished on or ahead of time and that they were not concerned about their health and well-being. In the large civil engineering company, there were issues raised about the facilities, workers wanted hot running water and more toilet roll. Again, there was a dubious perception of these issues being not resolved due to a lack of communication between the workforce and the management, with one worker reporting an 'us and them' hierarchy.

Ideas for change

When workers were asked if they had any ideas for change in their jobs in order to make their work healthier or safer, there were large differences between the organisations. This was reflective of both the perception of their employers and also the sites on which they were working; hygiene facilities were an important factor for the workers from the large company, who were based on a sewage treatment plant whereas for the workers in the small maintenance facility, where the majority of the workers were over 50 and looking to retire, bringing in apprentices was an issue many of the workers felt strongly about.

Many of the workers from maintenance felt that changes were not necessary, as they already had good facilities with a large number of health and safety courses available to them. The main change workers wanted to see was the hiring of apprentices as previously discussed, with one worker also wanting more consideration given to older workers in terms of being placed on the rota for evening and weekend callouts.

Some workers in the medium domestic build company wanted a more personal emphasis on health and safety to be implemented, through encouraging workers to think about their own health in toolbox talks and by going on educational courses. Other workers had good ideas which they thought helped them work more comfortably, such as warming up and stretching before beginning a physically strenuous job and 'warming down' afterwards.

Most ideas from workers in the large civil engineering company were based around the need for better facilities, including more space for them to hang their personal protective equipment in the wet weather.

Although other changes were suggested such as making the tools lighter and using more electric, cordless tools, they were instantly dismissed due to the potential cost they could incur as the workers assumed that the company would not be willing to pay the extra money. Other ideas from workers were; worktables at the correct height for cutting materials, creating more durable, waterproof protective gloves and ways to

resolve the issue of goggles steaming up when they were worn at the same time as a dust mask, such as all-in-one breathing apparatus.

Limitations

Due to the time constraints of the study and the peripatetic nature of construction sites, the interviewed workers are not representative of the size or type of organisations worked with, particularly in the larger domestic build and civil engineering companies. There are multiple sites within these companies and only a small number were able to be visited throughout the time of the study, therefore these findings cannot be generalised to other companies throughout the industry.

The individual differences observed could also be due to the age and make-up of the workforce, with the small maintenance facility being typically made up workers over the age of 50. However, the views expressed by these workers in the small facility were also echoed by the younger cohort of workers, who had previous experience in larger companies. The workers in the medium domestic build company and large civil engineering company were mostly sub-contracted, meaning that they were not directly employed by the companies and their employment was of a temporary nature.

CONCLUSIONS

From the quantitative data it is clear that a number of workers in all organisations are suffering with aches and pains and that a high number of these are considered to be directly related to their job. Despite this, they are still keen to remain in work which is a finding supported by the qualitative interview data. Many workers in the small maintenance facility had moved from harsher, faster paced industrial work to 'slower' maintenance work in an attempt to reduce their aches and pains, suggesting that workers are considering their health and well-being at work and make changes to accommodate their abilities.

Communication is an essential factor for worker satisfaction and well-being, it is the quality of communication that is important and not just the quantity. It is also essential that managers and employers are aware of the smaller issues as well as the larger ones, which can improve quality of working life and in turn increase the work ability and productivity of their employees.

The range of both low cost ideas for change and longer interventions from construction workers in all companies demonstrate a good level of knowledge, creativity and experience of the industry. These findings suggest that the companies would benefit from a participatory approach, facilitating healthy workplace behaviours and design. This is supported by the high ratings of work ability, suggesting that workers are not only coming up with ideas and solutions, but that they are able to implement these and continue working.

The next phase of this research consists of presenting these findings to stakeholders within the industry including project managers, health and safety officials and occupational health professionals in order to investigate the opportunities and barriers for change in the industry. It is hoped that by using a participatory ergonomics approach, construction workers can contribute to healthy workplace design. This has the ability to improve the quality of working life for both younger and older construction workers alike. Methods such as 'train the trainer', where the knowledge comes from within the company, are hoping to be used, to ensure the experience of older construction workers does not go to waste; a method which has shown to be successful in previous research (Gyi, Sang and Haslam 2013). This research provides

a solid foundation for future investigation and can be used to provide guidelines for different size organisations when using a participatory approach to encourage healthy working behaviours in industry.

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REFERENCES

- Arndt, V, Rothenbacher, D, Brenner, H, Fraisse, E, Zschenderlein, B, Daniel, U, Schuberth, S and Fliedner, T M (1996) Older workers in the construction industry: results of a routine health examination and a five year follow up. *"Occupational and Environmental Medicine"*, **53**, 686-691.
- BBC (2011) Compulsory retirement age at 65 fully abolished. Available from <http://www.bbc.co.uk/news/business-15127835> (accessed 20th February 2013).
- Black, C (2008) *"Working for a healthier tomorrow; Dame Carol Black's Review of the health of Britain's working age population"*. London: Crown.
- Boschman, J S, van der Molen, H F, Sluiter, J K, and Frings-Dresen, M H W (2012) Musculoskeletal disorders among construction workers: a one-year follow up study. *"BMC Musculoskeletal Disorders"*, **13**, 196-205.
- Chau, N, Gauchard, G C, Siegfried, C, Benamghar, L, Dangelzer, J L, Français, M, Jacquin, R, Sourdou, A, Perrin, P P and Mur, J M (2004) Relationships of job, age and life conditions with the causes and severity of occupational injuries in construction workers. *"International Archives of Occupational and Environmental Health"*, **77**, 60-66.
- Department for Business Innovation and Skills (2013) UK Construction: An economics analysis of the sector. Available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210060/bis-13-958-uk-construction-an-economic-analysis-of-sector.pdf (accessed 24th April 2014).
- Gyi, D E, Gibb, A G F and Haslam, R A (1999) The quality of accident and health data in the construction industry: interviews with senior managers. *"Construction Management and Economics"*, **17**, 197-204.
- Gyi, D, Sang, K and Haslam, C (2013) Participatory ergonomics: co-developing interventions to reduce the risk of musculoskeletal symptoms in business drivers. *"Ergonomics"*, **56**(1), 45-58.
- Hengel, K M O, Blatter, B M, Geuskense, G A, Koppes, L J L and Bongers, P M (2012) Factors associated with the ability and willingness to continue working until the age of 65 in construction workers. *"International Archives of Occupational and Environmental Health"*, **85**(7), 783-790.
- Holmström, E and Engholm, G (2003) Musculoskeletal disorders in relation to age and occupation in Swedish construction workers. *"American Journal of Industrial Medicine"*, **44**, 377-384.
- Ilmarinen, J (2003) Work Ability Index: a tool for occupational health research and practise. Available from http://www.promozionedellasalute.ch/pdf_doc_xls/d/betriebliche_gesundheitsfoerderung/allgemeines/BGF_Tagung_Archiv_2005/d/Symposium_13_Praesentation.pdf (accessed 24th June 2013).

- Kuorinka, I, Jonsson, B, Kilbom, A, Vinterberg, H, Biering-Sorensen, F, Andersson, G and Jorgensen, K (1987) Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *"Applied Ergonomics"*, **18**(3), 233-237.
- Larsson, L, Grimby, G and Karlsson, J (1979) Muscle strength and speed of movement in relation to age and muscle morphology. *"Journal of Applied Physiology"*, **46**, 451-456.
- Leaviss, J, Gibb, A and Bust, P (2008) Understanding the older worker in construction. Available from http://www.sparc.ac.uk/media/downloads/executivesummaries/exec_summary_gibb.pdf (accessed 10th December 2012)
- LeMasters, G, Bhattacharya, A, Borton, E and Mayfield, L (2006) Functional impairment and quality of life in retired workers of the construction trades. *"Experimental Aging Research: An International Journal Devoted to the Scientific Study of the Aging Process"*, **32**(2), 227-242.
- Prochaska, J and DiClemente, C (1983) Stages and processes of self-change of smoking: toward an integrative model of change. *"Journal of Consulting and Clinical Psychology"*, **51**(3), 390-395.
- Sang, K, Gyi, D and Haslam, C (2010) Musculoskeletal symptoms in pharmaceutical sales representatives. *"Occupational Medicine"*, **60**(2), 108-114.
- Stattin, M and Järholm, B (2005) Occupation, work environment and disability pension: a prospective study of construction workers. *"Scandinavian Journal of Public Health"*, **33**, 84-90.
- Whysall, Z, Haslam, C and Haslam, R (2007) Developing the stage of change approach for the reduction of work-related musculoskeletal disorders. *"Journal of Health Psychology"*, **12**(1), 184-197.