



WORKING FOR A HEALTHY FUTURE

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The Health and Wellbeing of Remote and Mobile Workers

Final Report

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IOM

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EXECUTIVE SUMMARY

Introduction

Remote and mobile workers are defined as individuals who spend the majority of their working time away from a home or work base. It is estimated that there are 1 million workers in the UK and Ireland working this way, the majority of who are involved in customer services and software development. What is unknown is the impact that being a remote or mobile worker has on health and wellbeing. The aim of this study was therefore to assess the impact of this type of working on the health and wellbeing of this occupational group. The study was carried out in 3 stages; a systematic review of available evidence and semi-structured interviews with remote and mobile workers, and this informed the development of a questionnaire survey that was carried out with two companies employing this occupational group.

Ethical Clearance

The project was submitted for review by the University of Birmingham Ethical committee and was given clearance to continue.

Systematic Review

The systematic review was carried out using the methods developed by the University of York Centre for Review and Dissemination. The review questions aimed to identify the health effects, the psychosocial effects, ergonomic factors affecting remote and mobile workers as well as organisational and management factors identified as affecting this group. Search terms and inclusion criteria were developed and used in 9 search databases. After screening, 10 papers were included in the review. Data were extracted and synthesised into evidence statements.

The review identified that within this occupational group there is a high prevalence of lower back pain and other musculoskeletal symptoms. Associations were also identified between lower back pain, driving more than 15000 km per annum, driving more than 20 hours per week, having an uncomfortable car seat, being over 45 years old and reporting stress and anxiety.

Psychosocial effects associated with remote and mobile working included associations between poor mental wellbeing and longer hours per week, low decision authority, conflict, job insecurity, role ambiguity and role conflict. Conversely better mental health was associated with more time with customers and higher mileage. Back and shoulder symptoms were associated with psychosocial factors including high demands, job security, low levels of interaction with colleagues and feeling overworked.

Ergonomic workplace factors were also evaluated by the review and it was identified that having or using adjustable lumbar supports in vehicle seats were found to reduce absence with low back pain. Shoulder pain was associated with not having steering wheel adjustment. Furthermore, other risk factors identified were discomfort being associated with a lack of headroom in the vehicle, poor pedal position, no backrest angle adjustment and poor steering wheel adjustment. Finally manual handling in and out vehicles was identified as an additional risk factor for musculoskeletal injury.

Organisational and management factors identified as influencing remote and mobile workers included for some workers increased flexibility in working time and place of working but this was not the case for those involved in the service industries. Although mobile workers were positive about some of the personal benefits associated with this way of working, there is a need for managers involved in supervision of such work to be trained in both trust and communication. One study found there were no significant differences in hours worked

between mobile workers and office based workers. There is the potential that problem identification and solution may be an issue for this group of workers through lack of contact with supervisors or colleagues.

Although there was a lack of primary research available for the review, there is evidence of effects on mental health, musculoskeletal health, ergonomic factors and organisational factors having the potential to affect this group both positively and negatively.

Interviews

Semi-structured interviews were carried out with 31 participants; 20 in Service Stations in the West Midlands and 11 from businesses employing remote and mobile workers. The aim of the interviews was to obtain information to further inform and develop the questionnaire survey. Topics included in the interviews were work and working time, contact with managers, sources of pressure, positive and negative impacts on them, types of vehicle used, comfort in vehicles and equipment used in vehicles. Data from the interviews were collated and used in the development of the questionnaire survey.

Questionnaire Survey

A questionnaire survey tool was developed including validated questionnaires (General Health Questionnaire (GHQ), the Nordic Musculoskeletal Questionnaire (NMQ), the Pennebaker Index of Limbic Languidness, the Chronic Fatigue Scale and the Short Quality of Life Questionnaire) and specifically developed questions including demographic data, the job, vehicles and driving, working time, access to services at work as well as work and family life. The questionnaire was piloted with 20 respondents and amendments made.

Recruitment of companies to the study was difficult and only two agreed to take full part. A total 3600 questionnaires were sent out to the two companies and the resulting response rate was 6.8% for the total sample. Further analysis of the age distribution and region of response of questionnaires, identified that they were representative of the total population of the companies involved.

The questionnaire survey identified that caseness for psychological distress was reported by 64.2% of those surveyed. Further analysis identified that higher scores were found for somatic symptoms, anxiety and social dysfunction but not severe depression. The responses for physical health identified that the majority were in the normal range for ill health symptoms but for musculoskeletal symptoms the commonest areas reported were the lower back (68.4%), knees (51.1%) and right shoulder (45.9%) over the previous 12 months.

Contact with managers was reported by the majority through mobile phones or emails whereas contact with colleagues was, on the whole, face-to-face. The majority of respondents (85%) reported being comfortable in their vehicle. A range of responses with regard to hours working in the vehicle (0 to 55 hours per week) and mileage (50 to 1500 miles per week) were reported.

The majority of responses to the subjective rating of work factors, access to services, work-life balance and supervision were positive. The majority of those sampled were not able to choose where they worked as they were both service-based companies. Although the majority reported making decisions without managers, they did report that they would consult managers before important decisions had to be made. One important issue identified was that the minority of respondent said that access to training courses was easy. This suggests a potential problem in ensuring equal access to this group of workers.

Relational analysis of the results were carried out and identified that there were significant associations between being a case for psychological distress and chronic fatigue, ill health symptoms and hours of driving. Further analysis identified that ill health symptoms were

associated with increasing psychological distress and chronic fatigue, increased contact with managers and hours driving but was found to decrease with average miles driven.

A number of associations were also identified for musculoskeletal symptoms. Pain or discomfort in the right shoulder, right elbow and left wrist was associated with increasing mileage. Hip or thigh pain was found to be associated with increasing age.

The three measures of chronic fatigue, GHQ and health symptoms were found to be associated with each other. The majority of the relationships were positive with increases in one being reflected by increases in the other.

Conclusions

Although there is limited research available for this group of workers within the review and the survey was limited by a small sample the results indicate that there are some key issues affecting remote and mobile workers. These include the impact of high levels of psychosocial distress and musculoskeletal symptoms among the sample.

Further Research

Further research required in this area would, of course, include a survey with a larger number of participants and an improved response rate but would also include more female employees and those driving cars as the majority in this survey drove vans. Further factors identified within this project that warrant further research include:

- Identifying sources and solutions to the high levels of psychological distress identified within this group.
- Identifying if sources of stress were different in different groups, for example, those involved in sales as compared to service industries.
- Examination of the impact of fatigue and recovery on remote and mobile workers.
- Identification of the impact of this type of work on individuals in less physical jobs

Guidance

Guidance for managers has been developed from this research and is available as a stand alone document.

1 INTRODUCTION

1.1 DEFINITION OF A REMOTE WORKER

An operational definition of remote and isolated working (RIW) can include those tasks which require workers to be away from either their base/headquarters (HQ) or their home for the majority of their working time. A more strict definition would include those workers who have fewer than four hours of face-to-face contact with colleagues or managers per week. They have been described as nomadic or mobile teleworkers, multi-locational e-workers and dispersed technical workforces (Huuhtanen 2005; Huws & O'Regan 2001; Jacobs 2004; Kurland & Bailey 1999). The types of work carried out by remote and mobile workers can be varied and includes sales representatives, repair engineers and delivery drivers. However, there is usually a link via telephone and/or computer between the individual worker and the workplace. Within this research project, we are not including HGV drivers or those whose main role is driving.

1.2 DEMOGRAPHIC INFORMATION

It is estimated that within the EU member states plus Hungary, Poland and the Czech Republic that 49% of establishments are practising some form of eWork (including teleworking, home working, multi-locational teleworking, telecottages), with 9.9% of the eWork population defined as multi-locational teleworkers (Huws & O'Regan 2001). Multi-locational eWorkers are defined as individuals working remotely with work delivered via a telecommunications link. In terms of numbers, estimates of the number of multi-locational teleworkers across the EU15 are 3,700,000 individuals (Bates & Huws 2002).

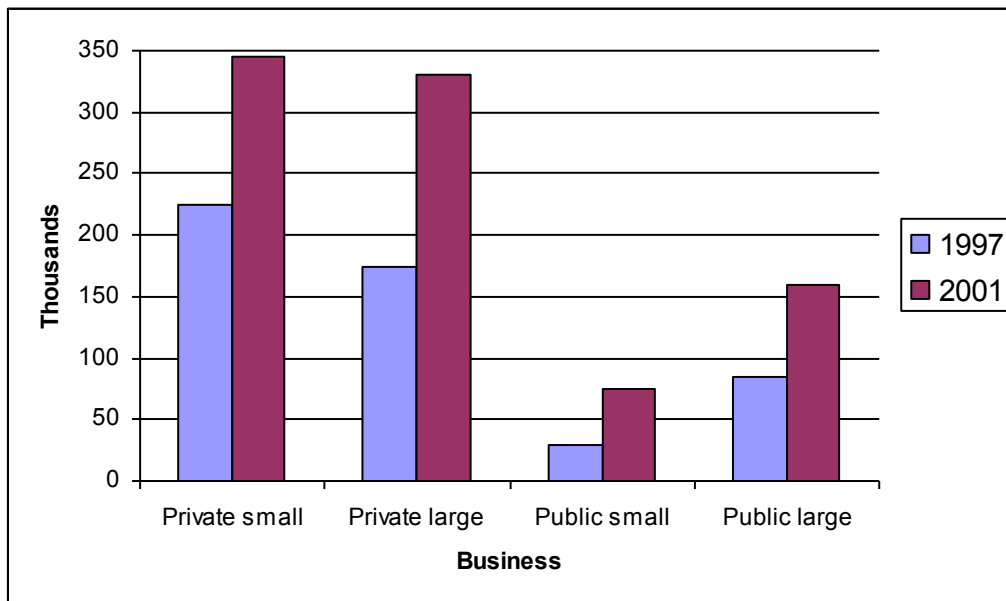


Figure 1 Growth in UK based Multilocal eWorking
(Bates & Huws (2002))

Within the UK, from the EMERGENCE Europe study, 13% of businesses surveyed were using multi-locational eWorkers and the estimated number of workers with this definition in the UK and Ireland was 1,000,000 (Bates & Huws 2002). The growth in numbers of workers in this sector was from 520,000 employees in 1997 to 910,000 in 2001. The data broken

down by work sector are presented in Figure 2. with the majority of workers are involved in customer service and software development work. Across the EU-15, it is estimated that the number of multi-locational eWorkers will increase to 14,332,000 through employment growth and organisational change by 2010 (Bates & Huws 2002). However, caution must be taken with this data as it is sampled from businesses consisting of more than 50 employees, and e-Workers are defined as those who have a telecommunications link to deliver the work. It is unclear from the research methodology whether all remote and isolated workers would be considered within the multi-locational teleworkers definition.

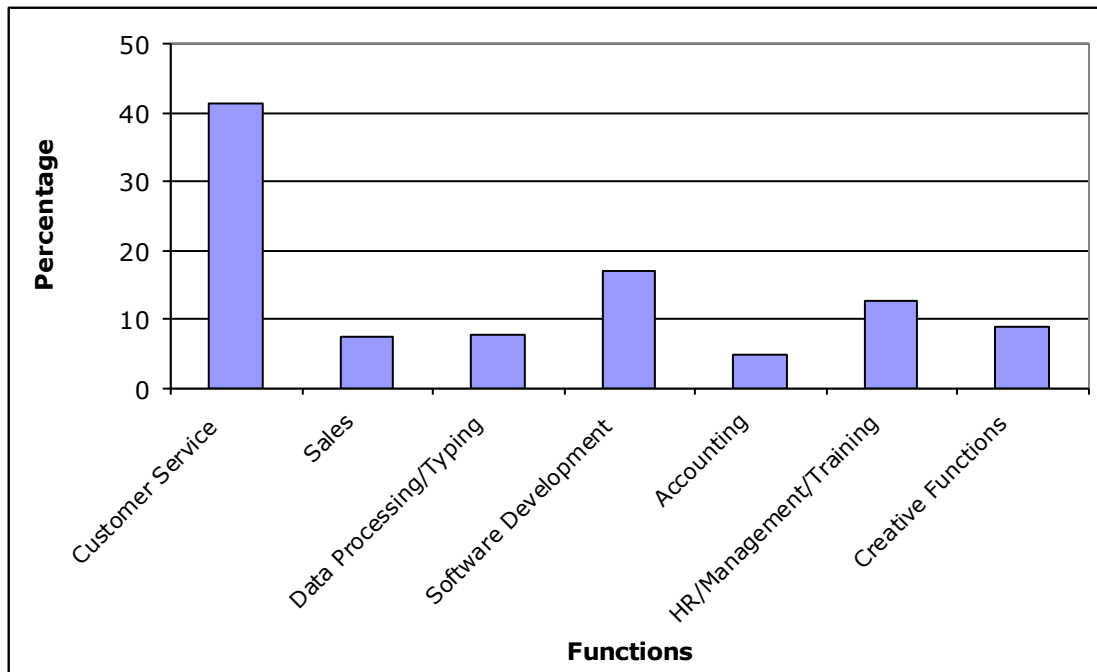


Figure 2. Functions involved in multi-locational eEmployment in EU (15)
(Huws & O'Regan 2001)

Within the working population in Europe, 49% of the workforce is female. There have been assumptions made about the use of eWork and how the flexibility it allows can be particularly helpful for those who have responsibility for domestic and childcare issues i.e., within the EU this is still generally women. However, when Figure 3. is examined, it can be shown that within multi-locational eWorkers, this is not the case. From Figure 3, 46% of businesses surveyed identified that there were either no females or less than 25% of the workforce were female (Huws & O'Regan 2001)

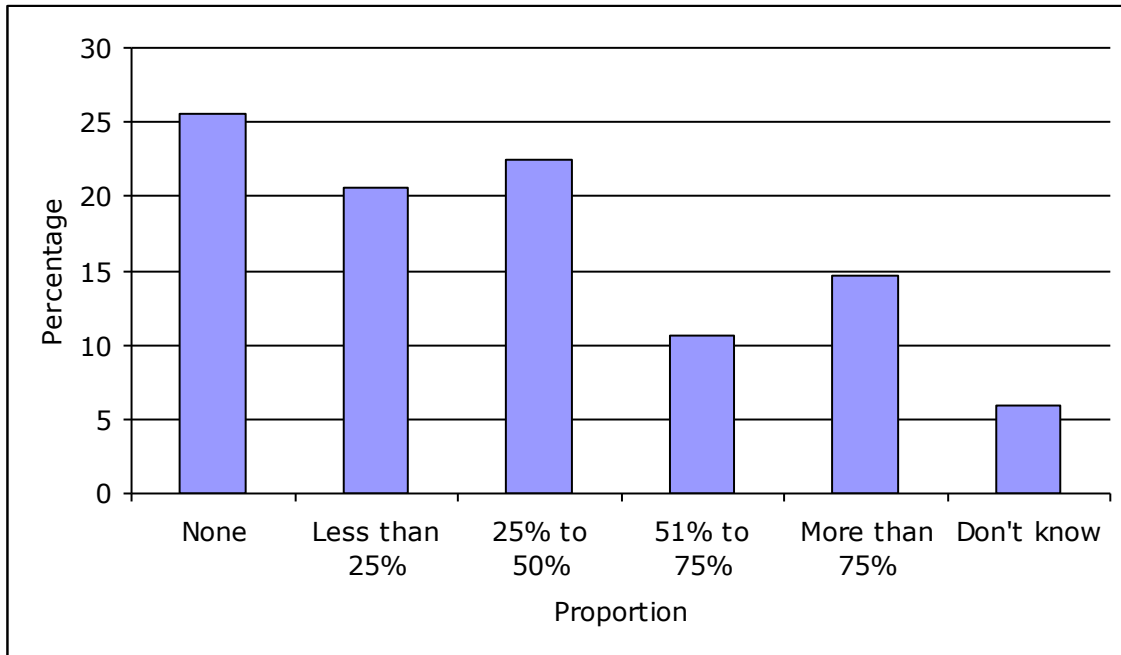


Figure 3. Gender of Multi-locational eEmployees EU (15)
(Huws & O'Regan 2001)

In terms of managing RIW, a number of advantages and challenges have been identified by Kurland & Bailey (1999) and are presented in Table 1. From this descriptive research there are both positive and negative issues suggested in the management of remote workers including increased productivity as well as the challenges of performance monitoring and managerial control. At an individual level the research suggests positive effects such as autonomy and flexible timing but against such challenges as isolation and being away from the office environment. This descriptive work does raise a number of issues but is unable to identify if the advantages and challenges exist or not.

Table 1 Advantages and Challenges for RIW

Organisational Level		Individual Level	
Advantages	Challenges	Advantages	Challenges
Greater Productivity Lower Absenteeism	Performance Monitoring Performance Measurement Managerial Control	More autonomy Schedule flexibility	Social Isolation Professional Isolation
Customer Proximity	Synergy Informal Interaction Organisation Culture Virtual Culture Organisation Loyalty Availability Schedule Maintenance Work Coordination Communication Guidelines Technology	Absence of office politics	Organisation Culture Reduced office influence Longer hours Access to resources Technical savvy

(Kurland and Bailey 1999)

In summary, there are currently estimated to be 1 million workers within the UK and Ireland described as multi-locational eWorkers. The majority of workers are involved in customer service and software development. However, this data should be treated cautiously as it is based on surveys of businesses with 50 or more staff and therefore does not give an indication of the numbers of workers in small businesses. In addition the multi-locational eWorker is described as remote work carried out by a telecommunications link. This definition may not cover the whole group of remote and isolated workers described in the research project.

1.3 ETHICAL CLEARANCE

The research project was submitted for ethical clearance with the University of Birmingham Research Ethics Committee. The project was approved for both phases involving data collection; that is the interviews and questionnaire survey.

2 SYSTEMATIC REVIEW

2.1 THE AIM OF THE SYSTEMATIC REVIEW

The aim of the systematic review on remote and isolated workers was to identify the potential hazards and benefits for individuals employed in remote and isolated work and to identify data gaps within the research to inform the development of a research methodology to address those data gaps.

The following questions were developed to identify potential risk factors to this group of workers.

1. What health effects are associated with remote and isolated working?
2. What psychosocial effects are associated with remote and isolated working?
3. What ergonomic factors affect those involved in working in a mobile and remote environment?
4. What organisational/management factors have been identified as influencing remote and isolated workers.

2.2 INITIAL SCOPING WORK

Initial scoping work into RIW, identified little published research in this field. However, it was appreciated by the researchers that the search terms in this field were likely to be diverse and from a number of different sources. To develop the systematic review, the methodology used was that of the Centre for Research and Dissemination at York University (The University of York: NHS centre for reviews and dissemination 1996).

2.3 DEVELOPMENT OF SEARCH TERMS

In the initial stages, keywords and search terms were developed from existing research; these are presented in Table 1. Inclusion criteria were also developed and are presented in Table 2. The search engines used to identify literature included Medline, Web of Knowledge (which includes the Science Citation Index and the Social Science Citation Index), Ergonomics Abstracts, Psychinfo, SIGAL, COPAC, BLPC and specific occupational medicine and occupational health journals. Government literature was also reviewed from sources including the HSE, the European Agency for Health and Safety and NIOSH.

The first phase was an initial liberal sweep to identify published research in this field from 1980 onwards. The papers identified were managed in Reference Manager (Version 11).

Table 2. Search Terms for Remote and Isolated Workers

Types of Work	Psychosocial Factors
Lone Work/er/ing	Quality of life
Remote Work/er/ing	Psychological well-being
Isolated Work/er/ing	Stress
Mobile Work/er/ing	Job satisfaction
Rural	Social Support
Rural Work/er/ing	Social Isolation
Sole working	Job demands
Solitary work/ing/er	Role conflict
Telework/er/ing	Decision latitude
Nomadic Telework	Autonomy
Mobile Telework	Time Pressure
Dispersed technical workforces	Target hitting
Delivery Drivers	Relationships with co-workers
Service Technicians	Role ambiguity
Sales Representatives	Role conflict
Peripatetic work/er	
Multi-locational eWorkers	
Ergonomic Factors	Health Outcomes
Vehicle	Ill health
Driving	Illness
Vehicle as office	Musculoskeletal Discomfort
Mobile Office	Musculoskeletal Pain
Pervasive Computers – SAT NAV, Active	Stress/Strain
Traffic Management	Voice Disorders – vocal load
Monotony	
Conditions of employment	
Personal Isolation	
Job Performance	

Table 3. Inclusion Criteria

Population
Employed individuals working more than 30 hours per week who spend less than 4 hours per week at an office or home base or in face-to-face contact with managers or other staff.
Study Design
RCTs Quasi-experimental Observational Cross-sectional Case reports Qualitative Research
Outcome
All outcomes to be assessed in relation to the studies obtained based on population, interventions and study design

Study selection criteria and inclusion criteria were developed and each paper independently assessed against inclusion criteria. The papers were reviewed and data extracted onto prepared forms for ease of access later. A copy of the Data Extraction form is presented in Appendix A. Data synthesis involved collation and summarising of the results included in the primary review. This was a descriptive data synthesis and includes information such as the population, interventions, validity of evidence included, sample sizes, results of the studies reviewed and a global overall score of scientific merit. The data were presented in tabular format with the strength of evidence weighted. Consistency of evidence was also evaluated by identifying the degree to which results of the research reviewed were similar. By using the methodology developed by the Centre for Reviews and Dissemination, a consistent approach was taken within the literature review to enable a synthesis of knowledge and, just as importantly, identify any gaps in current knowledge.

2.4 MANAGEMENT OF INFORMATION

The searches were managed by Reference Manager (version 11) which is a software programme developed for this purpose. All papers identified from searches were stored on this programme. The programme allowed printing of abstracts for review.

2.5 REVIEW STRATEGY

The abstracts were independently reviewed by two of the team members and a consensus reached as to the relevance of the papers with regard to the inclusion criteria. For abstracts that met the inclusion criteria, full papers were ordered. A total of 139 papers were obtained for the review. Two team members independently reviewed each of the full papers that were obtained. The data was extracted onto a data extraction form that is presented in Table 3. Where team members were unable to agree on the quality of research, a meeting was organised to review the extracted data and paper.

The reviewers were asked to summarise the main points of the paper and grade it on the following scales.

- *** Strong evidence, provided by consistent findings in multiple, high quality scientific studies
- ** Moderate evidence, provided by generally consistent findings in fewer, smaller or lower quality scientific studies
- * Limited or contradictory evidence, produced by one scientific study or inconsistent findings in multiple scientific studies
- No scientific evidence

This method was successfully used for the development of occupational health guidelines for low back pain (Waddell & Burton 2000) HAVS (Mason & Poole 2004) and a review of musculoskeletal disorders in the telecommunications industry (Crawford et al. 2007).

2.6 RESULTS

2.6.1 The Initial Sweep of Databases

In the initial sweep of databases, 280 reference sources were identified. After screening independently by 2 reviewers, agreement was reached that 133 abstracts reached the inclusion criteria. Out of the 280 abstracts, 9 references were not agreed upon. These were discussed by the reviewers and agreement was reached to obtain 6 other documents and exclude 3 papers. In total 139 documents were obtained for further review.

2.6.2 Articles Reviewed

After review of the documents was carried out, a large number were rejected due to not meeting the inclusion criteria. On the whole this was due to poor descriptions of the sample used within the research papers including terms such as “teleworkers” being used to describe “homeworkers” and remote workers meaning those in remote geographical locations but not working alone. In total, 10 papers were included in the systematic review.

2.7 HEALTH EFFECTS ASSOCIATED WITH RIW

2.7.1 Evidence Statements

The most frequent areas of symptom reporting were the neck, shoulders and lower back (**)

Prevalence rate of low back pain at for men was 25.1%, for women 34.9% (***)

Women are at an increased risk of neck and shoulder symptoms (**)

Neck symptoms for women were associated with driving more than 15000 km per annum, and carrying out sedentary work for more than one quarter of working time (**)

Shoulder symptoms were associated with being in a car for more than 10 hours per week and being a smoker or ex-smoker (**)

Low back symptoms were associated with driving more than 15000 km per annum, driving more than 20 hours per week, sedentary work all the time, standing, having an uncomfortable car seat, carrying loads in and out of cars, being a smoker or ex-smoker, being over 45 years old and reporting psychological problems including depression and anxiety (**)

A correlation found between sickness absence with low back pain and those who drive as part of their job and the numbers of hours driven (**)

Long distance driving linked to an increased risk of road traffic accidents (*)

Access to occupational health and rehabilitation may be problematic for staff (*)

Table 4. Evidence for Health Effects of RIW

Study	Study Design	Population	Method	Outcomes	Rating
(Harris, Mayho, & Page 2003)	Review Article	Peripatetic Sales Staff	Review of occupational health risks associated with peripatetic work	<ul style="list-style-type: none"> Long distance driving linked to an increase in risk of road traffic accidents. Access to occupational health and rehabilitation may be a problem. Must develop policies to deal with violence and personal safety issues 	*
(Pietri et al. 1992)	Cross-sectional and longitudinal	<p>Commercial Drivers spending more than half their time visiting clients</p> <p>N=1709 at first interview T₀ and 1115 at second interview T₁</p> <p>Men N=1376</p> <p>Mean Age 38.7 (SD 9.5)</p> <p>Women N=343</p> <p>Mean Age 37.6 (SD 9.4)</p>	<p>Reviewed during annual medical examination and interviewed. Follow-up was 12 months later.</p> <p>Data included in the regression analysis was socio-demographic, lifestyle, work environment and psychological survey questions</p>	<ul style="list-style-type: none"> Prevalence rate of low back pain at T₀ for men was 25.1%, for women 34.9%. At T₁, the cumulative incidence of low back pain was 12.6% (N=514) for men and 16.8% (N=113) for women. At T₀, low back pain in the previous 12 months was associated with being over 45 years old OR=1.4 (95%CI 1.1-1.9), driving more than 20 hours per week OR=2.0 (95%CI 1.3-3.1), having an uncomfortable car seat OR=2.1 (95%CI 1.6-2.9), carrying loads in and out of the car OR=1.3 (95%CI 1.0-1.7), standing OR=1.3 (95%CI 1.0-1.6), tobacco consumption OR=1.4 (95%CI 1.1-1.7) and psychological factors OR 1.7 (95%CI 1.3-2.2) with 1 or 2 factors and OR=3.3 (95%CI 1.9-5.4) for 5 or more factors. At T₁, the one year cumulative incidence of low back pain was associated with between 10 and 20 hours driving per week OR =4.0-4.8, having an uncomfortable car seat OR=1.9 (95%CI 1.0-3.7) and having 3 or 4 psychological factors OR=2.5 (95%CI 1.2-5.1) Back pain 1 year prevalence was elevated with age (in males only) 	***

(Skov, Borg, & Orhede 1996)	Cross-sectional questionnaire survey	Salespeople N=1998 Response Rate, 1306, 66% Men N=1167 Mean Age 42 (SD 9.9) Women N= 137 Mean Age 36.5 (SD 7.8)	Questionnaire survey using the Nordic Musculoskeletal Questionnaire	<ul style="list-style-type: none"> • Prevalence of symptoms in the last 12 months • Men • Neck 54%, Shoulders 35% and Low back 63% • Women • Neck 76%, Shoulders 47% and Low back 64% • For neck symptoms, women had an increased risk of symptoms OR=2.76 (95%CI 1.72-4.43), and symptoms were associated with driving more than 15000 km per annum OR=1.48-2.43 (95%CI 1.01-2.99) and sedentary work for more than ¼ of work time OR=2.68 (95%CI 1.31-5.49). • Shoulder symptoms were associated with being female OR=1.77 (95%CI 1.2-2.62), more than 10 hours in the car per week OR=1.64 (95%CI 1.19-2.27) and being a smoker or ex smoker OR=1.46 (95%CI 1.08-1.96) • Low back symptoms were associated with driving more than 15000 km per annum OR=2.23 (95%CI 1.29-3.85), sedentary work all the time OR=2.45 (95%CI 1.24-4.85) and being an ex smoker OR=1.51 (95%CI 1.09-2.1) 	**
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<p>(Porter & Gyi 2002)</p>	<p>Structured Interview of drivers and passengers</p>	<p>N=600, 303 men, 297 women Non-drivers N = 135 Social, domestic and pleasure drivers N=309 Drive as part of the job N=113</p>	<p>Nordic Musculoskeletal Questionnaire as a structured interview</p>	<ul style="list-style-type: none"> • Significant positive correlation found between number of days absent from work with low back pain and mileage of 25000 miles or over ($r=0.2$, $p \leq 0.001$), • number of days ever absent from work with low back pain and hours driving ($r=0.4$, $p \leq 0.001$) • From multiple regression with those who drive as part of their job, hours driven at work ($r^2=0.16$, $p \leq 0.001$), having a back accident ($r^2=0.21$, $p \leq 0.003$) and number of cigarettes smoked ($r^2=0.25$, $p=0.02$) found to be linked to sickness absence with low back pain. • Discomfort reported in at least one body area by 54% of driving sample and most frequent areas of discomfort were the low back (26%) and the neck (8%). 	<p>**</p>
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2.8 PSYCHOSOCIAL EFFECTS ASSOCIATED WITH RIW?

2.8.1 Evidence Statements

Poor mental health is associated with longer working hours per week, more customers per month, high psychological demands, low decision authority, conflicts, job insecurity, unclear roles and role conflicts (**)

Better mental health was associated with more time with customers and a high level of mileage (**)

Neck symptoms were associated with high work demands, low control over time, lack of variation in work and high levels of perceived competition (**)

Shoulder symptoms were associated with high work demands and uncertainty over employment (**)

Back symptoms were found to be associated with low levels of interaction with colleagues and feeling overworked (**)

Isolation and frustration through lack of communication may be a risk factor for RIW (*)

Table 5. Evidence for Psychosocial Effects of RIW

Study	Study Design	Population	Method	Outcomes	Rating
(Borg & Kristensen 1999)	Cross-sectional questionnaire survey	Salespeople N=1998 Response Rate, 1306, 66% Men N=1167 Mean Age 42 (SD 9.9) Women N= 137 Mean Age 36.5 (SD 7.8)	Questionnaire survey using Mental Health scale of the SF-36, and psychosocial environment assessed by the measure based on Karasek's model and the Whitehall II study.	<ul style="list-style-type: none"> From regression analysis 5 factors were associated with mental health, longer working hours per week ($p \leq 0.01$) and more customers per month ($p \leq 0.01$). Conversely, the higher the number of hours per customer ($P \leq 0.01$) and the higher the number of kilometres driven ($P \leq 0.1$) were associated with better mental health. Poor mental health was found to be associated with high psychological demands ($p \leq 0.001$), low decision authority ($p \leq 0.05$), low skill discretion ($p \leq 0.001$), many conflicts ($p \leq 0.001$), job insecurity ($p \leq 0.001$), unclear roles ($p \leq 0.001$) and role conflicts ($p \leq 0.01$) 	**
(Harris, Mayho, & Page 2003)	Review Article	Peripatetic Sales Staff	Review of occupational health risks associated with peripatetic work	<ul style="list-style-type: none"> Isolation and frustration due to lack of communication/human interaction identified as a risk factor 	*

(Skov, Borg, & Orhede 1996)	Cross-sectional questionnaire survey	Salespeople N=1998 Response Rate, 1306, 66% Men N=1167 Mean Age 42 (SD 9.9) Women N= 137 Mean Age 36.5 (SD 7.8)	Questionnaire survey using the Nordic Musculoskeletal Questionnaire and psychosocial factors assessed by survey using Karasek's model and the Whitehall II study	<ul style="list-style-type: none"> • Neck symptoms were associated with higher work demands OR=1.43 (95%CI 0.99-2.06), low levels of control over time OR=1.44 (95%CI 1.07-1.93), low variation in work OR=1.82 (95%CI 1.23-2.69) and high levels of perceived competition OR=1.44 (95%CI 1.08-1.91) • Shoulder symptoms were associated with high work demands OR=1.47 (95%CI 1.05-2.07) and high levels of uncertainty over employment OR=1.76 (95%CI 1.26-2.46) • Back symptoms were associated with lower levels of interaction with colleagues OR=1.48 (95%CI 1.03-2.14) and a tendency to feel overworked OR=1.45 (95%CI 1.06-1.98) • Recommends job re-design to achieve more time spent in the workplace. • Shorter and less irregular working hours 	**
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2.9 ERGONOMIC FACTORS AFFECTING THOSE INVOLVED IN RIW?

2.9.1 Evidence Statements

An adjustable lumbar support in a vehicle is associated with fewer absences from work with back pain (**)

Shoulder pain was associated with not having steering wheel adjustment within the vehicle (**)

Higher levels of discomfort in cars was linked to drivers reporting problems of not enough headroom, poor pedal position, poor steering wheel adjustment and no backrest angle adjustment (**)

Fixed postures when driving are linked to musculoskeletal pain (*)

Handling bulky materials in and out of vehicles identified as a risk factor (*)

Individuals who carry out office work in their vehicles have identified issues including a lack of temperature control, cramped conditions, lack of time, lack of storage space and physical pain (**)

Table 6. Evidence for Ergonomic Effects on RIW

Study	Study Design	Population	Method	Outcomes	Rating
(Eost & Flyte 1998)	Cross-sectional observational	Individuals who carried out office work in their cars N=90 87 males 3 females	Interview, case studies and diaries	<ul style="list-style-type: none"> • Participants spent 4 hours per day driving, ½ to 1 hour per day doing paperwork. • 95% did office work from the driver's seat and items such as clipboards, Dictaphones, participants used laptops. • The main issues raised by participants were:- • A lack of temperature control in the car (especially when stationary and working) • Cramped conditions • Lack of time • Physical pain caused by working in the car • Lack of storage space • Poor mobile phone reception 	**

(Harris, Mayho, & Page 2003)	Review paper	Peripatetic Sales People	Review of literature	<ul style="list-style-type: none"> • Review raised issues of fixed postures when driving linked to low back, neck and upper extremity pain. • Ergonomic issues identified included musculoskeletal problems with the lower back, neck and upper extremities; heavy lifting out of vehicles also raised as a risk factor • Ergonomic problems related to long hours driving. 	*
(Porter & Gyi 2002)	Structured Interview of drivers and passengers	<p>N=600, 303 men, 297 women</p> <p>Non-drivers N = 135</p> <p>Social, domestic and pleasure drivers N=309</p> <p>Drive as part of the job N=113</p>	Nordic Musculoskeletal Questionnaire as a structured interview	<ul style="list-style-type: none"> • Of the driving group, those with an adjustable lumbar support reported fewer absences from back pain (0.3 ± 0.8 versus 0.7 ± 2.4 days $p \leq 0.05$), having or not having steering wheel adjustment and shoulder pain (0.3 ± 3.4 versus 0.02 ± 0.2 $p \leq 0.05$). • Drivers reported problems such as not enough headroom (7%), poor pedal position (10%), poor steering wheel position (5%), and no backrest angle adjustment (9%). This group reported significantly higher discomfort with their car. • 12% of small car drivers compared with 3% of large family car drivers reported neck troubles in the past 12 months. However, 12% of both small and family car drivers reported having low back pain interfering with normal activity in the past 12 months. 	**

2.10 ORGANISATIONAL/MANAGEMENT FACTORS IDENTIFIED AS INFLUENCING RIW?

2.10.1 Evidence Statements

In one study, no significant differences were found between mobile workers and office workers in terms of hours worked (**)

Mobile workers were found to have increased flexibility in the timing of work and more hours in customer's offices (**)

There is contradictory evidence on the impact of choice on where to work (*)

For mobile service engineers, supervision is strict and the work is often in public (*)

Mobile teleworkers were positive about the personal benefits associated with this way of work, the flexibility in work location, the timing of work and ability to balance work and family life (**)

For individuals with pre-school children they were more positive with regard to having time for family life, the influence of mobile working on home life, having time for personal life, balancing work and family and more time for social interaction (**)

There is likely to be difficulty in problem identification and solution within remote working groups (*)

It is recommended that managers will need further training to supervise RIW, develop trust and improve communications (-)

Table 7. Evidence for Social and Managerial Factors Affecting RIW

Study	Study Design	Population	Method	Outcomes	Rating
(Harris, Mayho, Page 2003)	Review paper	Peripatetic Sales People	Review of literature	<ul style="list-style-type: none"> Identifies that workers remote from the office therefore it is both difficult to identify and solve problems within this workforce. Personal safety training should be given as part of general sales force training 	*
(Hill, Hawkins, & Miller 1996)	Cross-sectional computer based questionnaire survey	Mobile teleworkers, marketing and servicing employees N=399 Response rate N=249, response rate 62% versus office workers N=89	Computer based survey tool, not validated. Used 3-point and 5 point Likert scales to evaluate responses	<ul style="list-style-type: none"> No significant difference found between mobile and office based workers in terms of hours worked. Within the mobile working group, there was significantly increased flexibility in the location of work ($p<0.01$), the timing of work ($p<0.01$) more hours in the customers' offices per week ($p<0.001$) The perceptions of the mobile teleworkers were that 72% were positive about the personal benefits of this way of working, 60% positive about the flexibility in work location, 52% positive about the timing of work, 51% positive about the influence on the ability to balance work and home, 53% were negative about the ability to balance work and family life. The study identified that those with pre school children compared to those without pre school children were significantly more positive about having time for family life ($p<0.05$), the influence of mobile working on home life ($p<0.05$), having time for a personal/home life ($p<0.01$), the ability to balance work and family life ($p<0.05$), the positive influence this has on relationship with spouse ($p<0.05$), relationship with children ($p<0.05$) and more time for social interaction 	**

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				(p<0.05)	
(Helms & Raiszadeh 2002)	Descriptive Paper	Discusses virtual offices including remote working	N/A	<ul style="list-style-type: none"> • Suggests managers need further training to supervise such workers • Communication not as good in the virtual environment • Trust vital when managing teams • New processes will be developed with the introduction of new technology • Suggests if customers unhappy managers will hear about it and vice versa 	-
(Jacobs 2004)	Observational study, qualitative interviews and focus groups	Mobile Service Engineers (MSEs) N=60 Service Managers N-15	Qualitative interviews and focus groups	<ul style="list-style-type: none"> • MSEs exposed to the challenges of telework but also the additional challenges of no choice when or where they work, the working environment is public and supervision is tight. Recommends the development of unscheduled communication between management and engineers and engineers and engineers 	*
(Kurland & Bailey 1999)	Descriptive paper	Discusses teleworking and mobile working	N/A	<ul style="list-style-type: none"> • Identifies the issues regarding remote working including work away from home, increased travel, difficulty balancing work and home life. 	*

2.11 DISCUSSION

From the evidence tables, it can be seen that there is a dearth of quality research on remote and isolated workers. Although it is appreciated that the definition used within the EMERGENCE study is restrictive and based upon information being passed using a telecommunications link; RIW work (such as travelling sales representatives) has been present for many decades.

2.11.1 Health Effects in RIW

The main evidence identified with regard to health effects was that of musculoskeletal problems of the back and upper limbs. A number of factors have been identified that have been linked to reporting of musculoskeletal symptoms including high mileage, more than 20 hours driving per week and being a smoker or ex-smoker. Low back symptoms in particular have been researched and have been linked to age, having an uncomfortable car seat, carrying loads in and out of vehicles, standing, sedentary work all the time and psychological symptoms. However, the research reported concentrated on musculoskeletal symptoms rather than any other health issues.

One further issue raised in a summary paper but with no supporting evidence was that access to occupational health and rehabilitation may be difficult for RIW. It is not possible from the current body of research to support or refute this suggestion.

2.11.2 Psychosocial Effects in RIW

Within this group of workers a number of psychosocial effects were impacting on mental health. The potential impact of psychosocial hazards upon any pre-existing health problems in such workers was not covered in the literature and any such relationship remains to be investigated. Surprisingly, higher mileage was associated with better mental health although its association with musculoskeletal problems had a negative impact. In addition allowing more time for interaction with customers also had a positive effect on mental health.

A number of associations were also found with musculoskeletal symptoms and psychosocial factors. This reflects other research with regard to the impact of psychosocial factors and musculoskeletal symptoms found in other working groups (Bongers et al. 2006; Devereux, Buckle, & Vlachonikolis 1999; Devereux, Vlachonikolis, & Buckle 2002).

There was limited evidence that isolation and frustration through lack of communication may be a risk factor within the remote and isolated work force. The evidence is unclear as to whether this is the case and identifies a data gap in the current knowledge base.

2.11.3 Ergonomic Effects in RIW

Ergonomic issues identified as having an impact on RIW include moderate evidence suggesting that adjustable lumbar support and steering wheel adjustment reduce both musculoskeletal problems with the back and shoulders. Where discomfort was reported this was linked to a lack of headroom, poor pedal position and no backrest angle adjustment. This research indicated that having adjustability and adjusting to fit reduces the impact on the musculoskeletal system. However, there is no further

current evidence to show that individuals who adjust their vehicles then reduce their musculoskeletal symptoms.

Only one paper was found that investigated the impact of carrying out office work in vehicles (Eost & Flyte 1998). The issues highlighted included the difficulties in actually trying to carry out office work in the car. Although this research suggested a number of design solutions, there is no further evidence to show that the design changes suggested have been taken on board by those involved in RIW.

A further factor identified was that of handling bulky materials in and out of vehicles being linked to low back pain. However, there is no further research to give evidence that risk assessment and manual handling training can reduce the incidence of such problems and identifies a further data gap.

2.11.4 Organisational and Management of RIW

Within the review, five papers were identified that researched organisational and social factors in relation to RIW. Again, the quality of the evidence ranged from limited to moderate evidence and in one case no evidence. However, this section does raise a number of issues and data gaps.

With regard to working hours, in one study no difference was found between hours worked by office workers and mobile workers. The claims for a more flexible working time are not evident within the research as this depends on the working group. For example, service engineers are under strict supervision and have no choice in where to work, whereas other staff groups may not be so restricted.

Some positive benefits of remote working were also identified in that among mobile teleworkers compared with office workers, there was increased flexibility in the location and timing of work. In addition those with pre-school children were significantly more positive about the impact of this type of work and work-life balance issues. Thus depending on the type of work being carried out, there is the opportunity to increase flexibility and autonomy within the work force.

There were two further issues raised from the body of research reviewed. Firstly that where problems do arise within a mobile workforce, it may be difficult to identify them and any possible solutions due to the lack of face-to-face communication within the workforce. The second issue raised was with regard to the management of individuals working in a mobile and remote environment. There was no evidence to support the statement but it may be a correct perception that managers will need to undergo further training when supervising this type of work. As a result of technology change and the increase in ability to work remotely, this will require a different approach and more trust and worker autonomy than when supervising workers in more traditional closely-knitted working environments.

2.12 EVIDENCE GAPS

The research identified within the systematic review was limited but did raise a number of data gaps that will need to be addressed by future studies.

2.12.1 Health

Apart from musculoskeletal symptoms, no further health effects have been researched. Without prejudicing future research outcomes, it is vital that this group of workers are assessed to ensure they are not being exposed to other health effects that have not yet been identified or conceptualised.

2.12.2 Psychosocial Factors

Some evidence was identified with regard to the impact of psychosocial factors on RIW including the impact of specific factors on mental health and an association between musculoskeletal disorders and psychosocial factors. However, further research needs to identify the impact of isolation, possible lack of social support and other relevant psychosocial factors on this group of workers.

2.12.3 Ergonomic Factors

Although there is evidence of musculoskeletal disorders linked to driving, there is only limited evidence of the impact of using new technology in vehicles and using the vehicle as an office. Within remote and isolated workers, there is a need to identify how and what technology is being used and if this has an impact on musculoskeletal or other health symptoms. There is also a need to measure accurately how much time is spent working within vehicles and whether this has an impact on symptoms or whether symptoms are related to other work tasks.

2.12.4 Organisational and Management Factors

Although there is a perception that remote and mobile working will allow benefits in terms of flexibility and autonomy, this is countered by questions with regard to isolation and fixed working schedules met by those in service industries. There is a need to examine further the impact of flexible versus non-flexible working, how problems are identified and managed within this occupational group and whether access to health is an issue.

2.13 CONCLUSION

Within this systematic review only ten papers were identified as fitting the inclusion criteria for review. This reflects a lack of research on this group of workers. However, there is evidence for musculoskeletal health effects, psychosocial factors impacting on mental health, ergonomic factors affecting musculoskeletal complaints and organisation factors which are both positive and negative depending on the type of work being carried out.

3 INTERVIEWS

3.1 INTRODUCTION

The first stage of the project was a systematic review of the literature on mobile and remote workers. The review was limited by the lack of literature available within this occupational group but did inform where research gaps existed. As a result of this, the next stage of the project was to carry out a series of interviews with individuals working in this capacity. The aim of the interviews was to inform and develop the questionnaire design to ensure the topics addressed by the questionnaire were relevant to this group.

3.2 METHODOLOGY

A structured interview pro forma was developed by the researchers and is presented in Appendix B. The pro forma was developed using information identified within the systematic review and understanding of the types of roles that individuals who carry out mobile and remote workers have.

To obtain participants for the interviews, the managers at four service stations in the West Midlands were approached for permission to come onto site and interview customers. Three of the service stations gave permission. To ensure the safety of the researchers, two researchers were interviewing on the same site at the same time.

Individuals were approached and invited to participate in the interviews if they fitted the criteria of a remote or mobile worker. The study was explained to them and time was made to allow them to read the participant information sheet and give informed consent to take part in the study.

After carrying out twenty interviews in the Service Stations, the researchers identified that the majority of interviewees were car drivers involved in sales or management roles rather than a mix of different vehicle or job types. To ensure a cross-section of workers were interviewed for the study, a series of interviews were set up with service companies who employed remote and mobile workers.

The results of the interviews were collated and are presented below. As this stage of the study was more qualitative in nature, a summary of responses has been prepared. This reflects the quality of the data obtained within the interviews and as much of it is factual rather than opinion based, the use of NVivo analysis was not applicable.

3.3 RESULTS OF THE INTERVIEW

In total 31 participants took part in the interviews. Although it was aimed to interview 10 participants at each of the three businesses approached, individuals had to be elsewhere at the time of the interviews.

3.3.1 Demographic Information

The age range of the participants was 28 years to 64 years old. Out of the sample, only one female agreed to be interviewed. The job titles of those interviewed included Health and Safety Advisors, Traffic Officer Highways, Sales Manager, Service Technician, Consulting Engineer, Account Manager and a Pharmaceutical Representative.

3.3.2 Work and Working Time

The time of working in their current job ranged from 3 months to 40 years. In terms of how long interviewees had been remote working this also came across the range of 3 months to 40 years.

The interview then asked respondent about their contracted hours of work. The range of contracted hours was 37 hours per week to 40 hours per week. When this was followed up by how many hours they actually worked, this ranged from 40 hours to 70 hours. One individual commented that he had contracted out of the Working Time Regulations.

To ensure we had obtained the correct individuals to interview for the project, respondents were asked how much time they spent away from a home or office base. This ranged from 1 to 2 days per week up to 5 days per week. The majority of interviewees spent most of their working time away from either a home or office base.

In addition, a further question was asked as to how many hours they spent driving per week. This ranged from 1 hour per day to 15 hours per day. However the latter number was reported by 2 individuals whose mileage was in the higher range. When asked about mileage per week, this ranged from 250 miles per week to 800 miles per week.

The interviewees were asked to identify how much time they spent working in their vehicles. This ranged from no time to 6 to 8 hours per day. For example, service technicians spent more time working outside the vehicle whereas the traffic officers spent the majority of time within the vehicle unless dealing with a traffic incident. One individual did report carrying out paperwork occasionally within his vehicles.

When asked about working in the vehicle, three interviewees reported that they did not work in the vehicle but moved to another area such as a service station. The types of equipment used when working in the vehicle itself included carrying out paperwork, using mobile phones, using a Blackberry and using a laptop for reading emails. When respondents were asked where they worked in the vehicle, they reported sitting in the driver's seat. Three respondents reported using a laptop in the passenger seat and twisting their upper body to use it. One respondent reported using a laptop but had the ability to move their seat around to be able to face the computer screen. None of the respondents reported having specialist equipment to aid them with working in their vehicle.

The next stage of the interview asked respondents how often they had contact with their managers. This ranged from daily to every 2 to 3 weeks. One respondent stated that contact was made as often as needed via emails and telephone calls. Contact with colleagues was also discussed with individuals reporting a range of meetings from daily, 3 or 4 times per week, monthly team meetings or contact via email and telephone calls.

With regard to the type of work carried out by interviewees, this was rated within the interview as sedentary, light, manual or physical. The respondents within the service stations reported having sedentary roles. However the service technicians reported that their work was physical. This is due to the nature of the job where although

technicians drive between jobs, their work within telecommunications includes handling of ladders, tools and equipment.

When respondents were asked whether they enjoyed work, every respondent answered that they did. One respondent did comment that they were concerned about safety issues and lone working. This was not elaborated upon by the individual. Interviewees were also asked about sources of pressure in their jobs. The responses included frustration, working in a dangerous environment, commuting, sales and other targets, colleagues and suppliers. When asked which factors influenced them in a positive way about work the responses included the variety in the work, helping people, interacting with people and the work being challenging.

3.3.3 Vehicles Used and their Maintenance

A wide range of vehicles were used by interviewees ranging from saloon cars, high range vehicles such as Jaguars, 4x4 vehicles, transit vans, small vans and people carriers. The vast majority of vehicles were serviced through the company but individuals who used their own vehicles for working were responsible for their servicing. When asked about safety inspections, a similar response was received as to who owned the vehicle. However, several respondents did admit that they did not know if company owned vehicles were safety checked.

The next question during the interview was whether the company supplied further emergency equipment such as water, torch or blankets. Again a varied response was obtained as some interviewees were clear that they either had emergency equipment supplied including first-aid kit or water. However, three individuals reported that no further equipment was supplied.

Comfort issues when driving were the next topic to be addressed. Two respondents reported back problems that they felt were aggravated by driving. One further individual identified that his whole musculoskeletal system was a problem getting comfortable in his current vehicle. In addition, one respondent reported that he had suffered from hip pain when using cruise control. He had rectified this problem by ensuring his seat was repositioned.

Further information identified within this question was that fatigue was an issue for some driving high mileages. One individual also reported having regular back massages which she felt helped with musculoskeletal discomfort.

Within the vehicle a number of different pieces of equipment were used for entertainment including the radio, CD player or audio books. Two individuals who used a two-way radio for communication reported that they could not listen to the radio in case of an emergency occurring. Other equipment used within the vehicle included Satellite Navigation systems, Blue Tooth phone systems and an A-Z map.

3.3.4 Additional Comments

On conclusion of the interviews, respondents were asked to make any additional comments about their work, working environment or other relevant factors. The additional comments included:-

“I don't seem to get a proper break”

“I have a good GP but no OH and the bulk of the people who drive are overweight”

“Lack of exercise is a problem”

“Difficulties juggling home, traffic and time”

“Aggressive customers and the public can be a problem”

“People stealing from the vehicle can be a problem”

4 QUESTIONNAIRE DEVELOPMENT

The data from both the systematic review and the interviews was then fed forward into the questionnaire design. The questionnaire is presented in Appendix 3 with the participant information sheet and the accompanying invitation to participate. The questionnaire design was based on the use of a number of validated and standardised tools as well as further new questions.

The validated measures used within the questionnaire include the General Health Questionnaire 28 (GHQ-28) (Goldberg & Hillier 1979), the Nordic Musculoskeletal Questionnaire (NMQ) (Kuorinka et al 1987), the Pennebaker Inventory of Limbic Languidness (PILL) (Pennebaker 2000), the Short Quality of Life Scale (Lindholt 2002) and the Chronic Fatigue Scale (Chalder et al 1997).

In addition to validated measures, the final 3 sections of the questionnaire have been developed to ask for further more detailed information from respondents. This includes demographic information, information about job titles and the work they do, information about vehicles, tooling and equipment used and how respondents feel work impacts on other aspects of their lives.

The questionnaire was piloted with Company A using 20 participants. Minor changes were required as a result of piloting.

5 RECRUITMENT

At the initial proposal stage, there were 3 companies interested in taking part in the research. These included a telecommunications company, a soft drinks distributor and a drug company. Following restructuring in the latter two companies they withdrew from the study.

Eight further companies were contacted who had a population of remote and mobile workers. From this a further glass replacement service company was recruited to the study.

The project was also advertised through the IOSH website. However, no further companies were recruited. To try and improve the hit rate for recruitment, 100 companies were identified who were likely to employ remote and mobile workers. Two individuals contacted each of the companies to explain the project to them and encourage recruitment to the study. This method did not recruit any further companies to the research.

6 QUESTIONNAIRE SURVEY

6.1 RESPONSE RATES

From the two companies recruited to the study, 3600 questionnaires were sent out. The first company to complete the survey (Company A) was a glass replacement company who agreed to allow surveying of 50% of their technical workforce which was 600 employees. A total of 80 questionnaires were returned to IOM with a response rate of 13%. Company B was a telecommunications company and 3000 questionnaires were distributed to one region of the company. A total of 163 completed questionnaires were returned to IOM with a response rate of 5.4%.

As the questionnaire was designed to be anonymous, direct reminders could not be sent to the respondents to try and improve the response rates. However, reminders were sent out through the companies to remind individuals to complete the questionnaire.

6.2 RESULTS OF THE QUESTIONNAIRE SURVEY

6.2.1 Demographic Information

The results identified that the majority of respondents were male (n=237, 98.3%) with 4 (1.7%) female respondents, who all worked at company B. The mean age of the participants was 45.22 years but among the sample this ranged from 23 to 66 years of age. In breaking this data down, 52.2% were aged over 45 with 47.8% being 45 years of age and under.

To gain an impression of whether our sample of mobile workers was representative, in terms of age range, company B provided us with the age distribution of their workers.

Table 8. Breakdown of Age in Company B

Age Group	Company B workers surveyed (%)	Total workers surveyed (%)	Overall company B in Apr 08 (%)	Overall company B in Aug 09 (%)
16-20	0	0	0.20	0.04
21-25	4	3	3.44	3.01
26-30	3	6	7.31	6.67
31-35	3	7	6.62	6.23
36-40	10	16	10.67	9.66
41-45	15	16	15.71	14.17
46-50	17	17	19.95	18.68
51-55	32	24	22.73	26.48
56-59	12	8	11.15	12.18
60+	5	3	2.22	2.89

The comparison of the age profile of those surveyed to the age profile of all those working at company B in April 08 and August 09 shows that the sample has a slightly higher proportion of older workers in company B. However, the proportion of the whole sample surveyed in each age group is broadly the same as that of the workforce of company B so we can assume that the our sample of remote workers represent the general population of remote workers.

For company A, the age distribution could not be made available. The breakdown of the regions where responses were received identified that they were from a broad range of regions within the UK. These data are available in Appendix D.

The length of time in current employment ranged from 1 to 41.6 years with a mean of 17.8 years. The length of time individuals had worked as a mobile worker ranged from 0.25 to 41.6 years with a mean of 17.8 years. Both the length of employment and length of time as a mobile worker differed by company, 11 and 12 years, respectively for company A, and 21 and 20 years, respectively, for company B.

This all implies that the respondents from company A were younger, on average, than company B. The mean age of the respondents from company A was in fact lower than that of company B, 40 and 48 years old, respectively.

When examining working hours, the hours contracted to work by the sample was a mean of 38.6 hours with a range of 22 to 48 hours. The actual hours worked ranged from 22 to 72 hours with a mean of 42.9 hours. Just under half (43%) actually worked the hours that they were contracted to, 29% of company A and 50% of company B).

The majority of those sampled (87.7%) worked day shift with 2.5% working night shift and 8.5% working rotating shifts. There were 3 people who answered that they worked other types of shifts (1 worked a 9 day fortnight, 1 a twilight shift and 1 worked dayshift with a weekend rotation).

Only 20% of the respondents were current smokers, 25% were ex-smokers and 55% were never smokers. The proportion of smokers in the two companies differed slightly with 30% current, 27% ex and 43% never smokers in company A while in company B this was 15%, 25% and 60%, respectively.

6.2.2 Health

A number of both physical and mental health questionnaires were used within the survey. Firstly the Pennebaker Index of Limbic Languidness (PILL) was used to assess health symptoms within the sample. The PILL is a 54-item questionnaire where individuals are asked to assess common symptoms on 5-point scale from never or almost never to at least once a week. The results are scored into 4 areas which are listed below

- 0 to 21, Below Normal Range
- 22 to 66, Well Within Normal Range
- 67 to 84, Slightly Above Average, Within Normal Range
- 85 or Above, Top 25 Percent

As can be seen from Figure 4., the majority of individuals are scoring either below normal range or well within normal range, with 20% of individuals reporting a higher number of more severe symptoms. When the details of symptoms were examined from the PILL, there were no specific symptoms identified as being problematic within the sample. The pattern of symptom reporting can be seen in Appendix D.

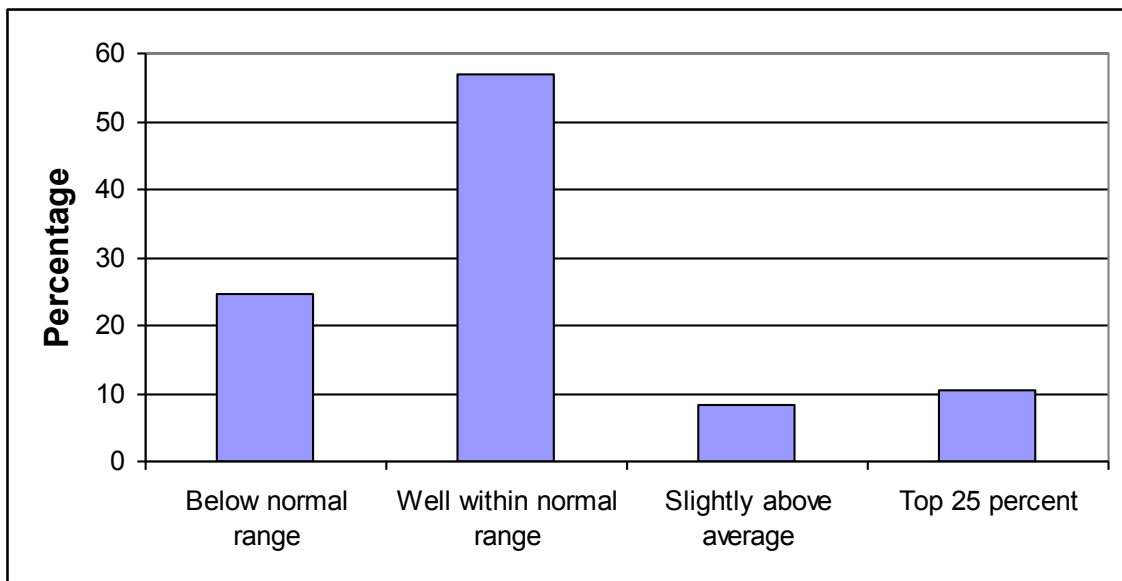


Figure 4. PILL Scores

The Nordic Musculoskeletal Questionnaire (NMQ) was used within the survey to identify levels of reporting of musculoskeletal discomfort and pain within the sample. The results are broken down into body region and the graphs depict the percentage of respondents reporting pain or discomfort in the last 12 months and the last 7 days.

The data indicate that low back pain, right shoulder pain and knee pain appear to be an issue in the sample of respondents in the past 12 months. For the previous 7 days, low back pain, neck and knee pain appear to be higher than other body areas.

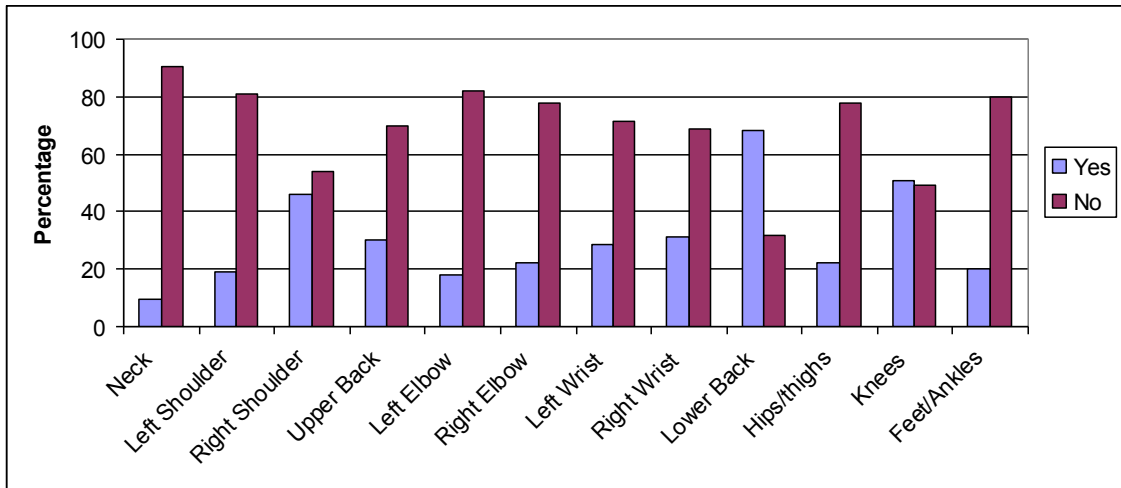


Figure 5. Musculoskeletal Pain and Discomfort in the last 12 months

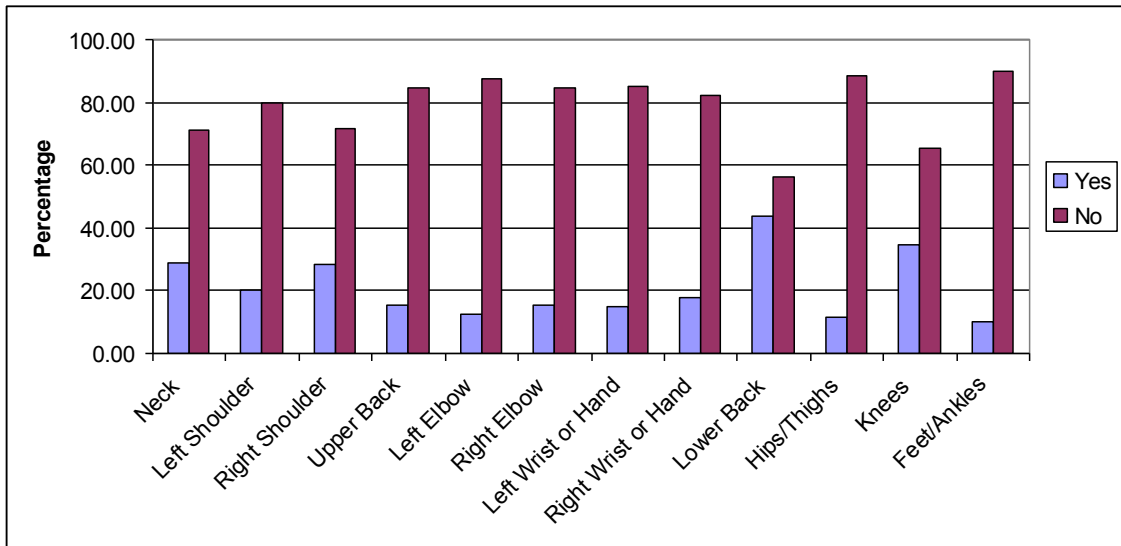


Figure 6. Musculoskeletal Pain and Discomfort in the last 7 days

Table 9. Proportion of those in each company (A and B) who have experienced symptoms of pain in the last 12 months.

	Neck	Shoulder (L)	Shoulder (R)	Upper back	Elbow (L)	Elbow (R)
Company A	68	48	62	42	22	27
Company B	49	29	38	24	16	20

	Wrists/ Hands (L)	Wrists/ Hands (R)	Lower back	Hips Thighs	Knees	Ankles/ Feet
Company A	42	48	84	24	51	23
Company B	22	22	61	21	51	19

A higher proportion of those from company A reported experiencing pain in the majority of the areas than those from company B.

The NMQ then asks participants to identify if pain or discomfort has prevented them from carrying out normal activities. Figure 7., presents the data graphically. This identifies that the majority of this impact is from lower back pain, left wrist pain and feet and ankle pain.

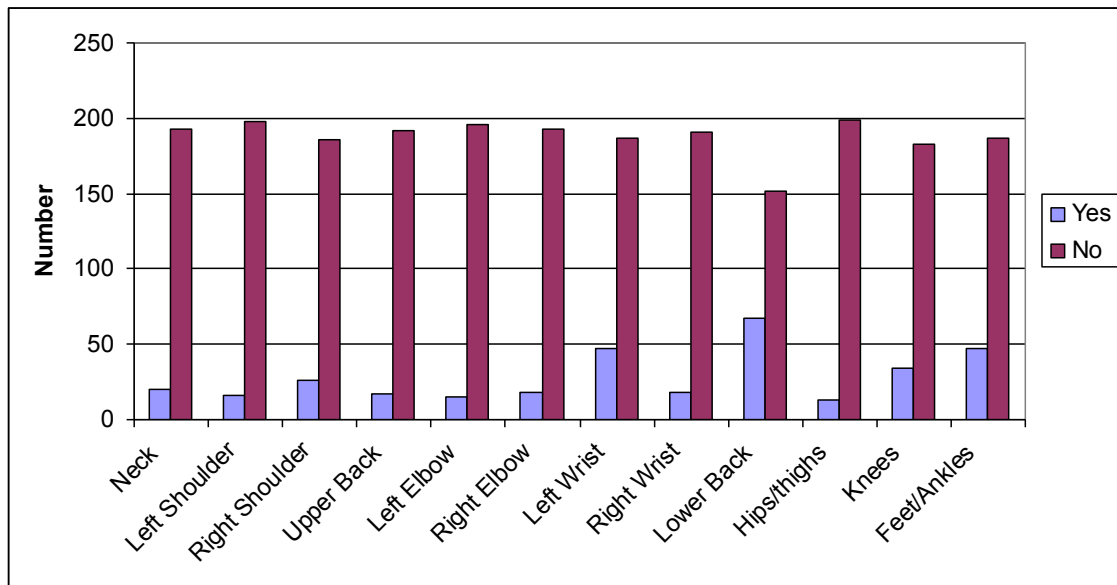


Figure 7. Whether pain or discomfort has impacted on activity

Figure 8., presents data on the number of participants who were seen by a medical professional as a result of their musculoskeletal symptoms. The majority of respondents had not seen a health professional but again lower back pain is the highest reported symptom but this is closely followed by knee and neck problems.

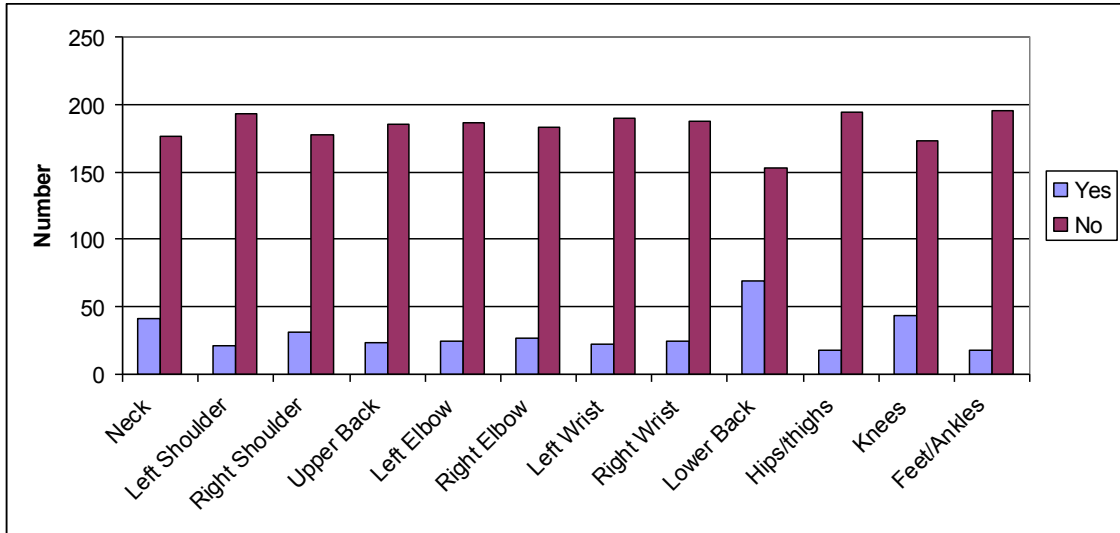


Figure 8. The numbers who were seen by nurse or doctor with regard to pain or discomfort

Respondents were asked how many days of discomfort they had felt in the last 12 months. Figure 9. shows that reporting rates for lower back pain, knee pain, shoulder pain, upper back pain and neck pain were more common.

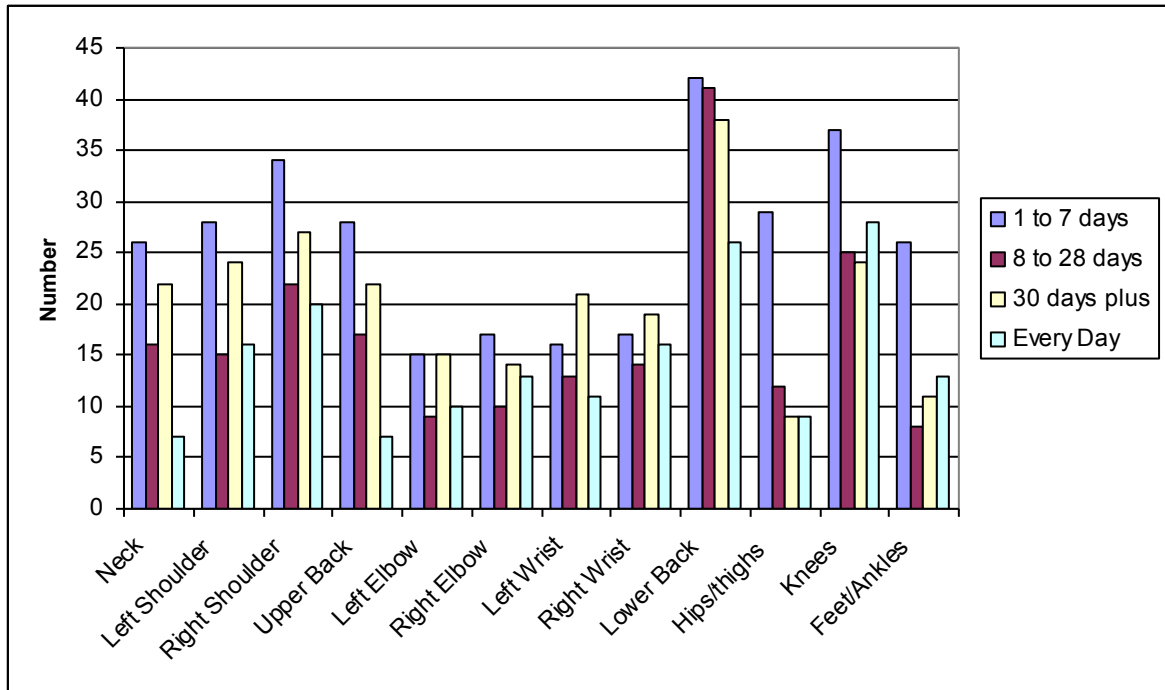


Figure 9. How many days of pain or discomfort in the last 12 months

The NMQ also asks respondents if they have ever been injured in the musculoskeletal system and if they have ever changed jobs because of injury. Figures 10 and 11 present this information as a number rather than a percentage because of the low responses. It can be seen the majority of respondents have not been injured but where injuries have occurred these have been in the lower back, knees, neck, shoulders, wrists and hands. On examining Figure 11, it can be seen that the majority of respondents have not changed their job due to injury and those that have this is mainly due to low back injuries.

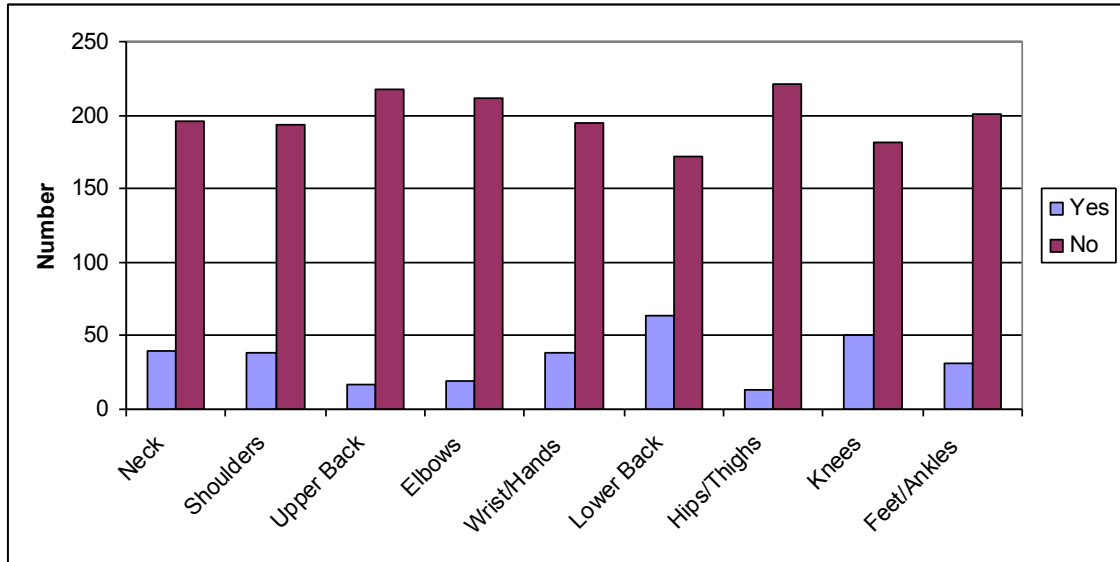


Figure 10. Areas of the body ever injured

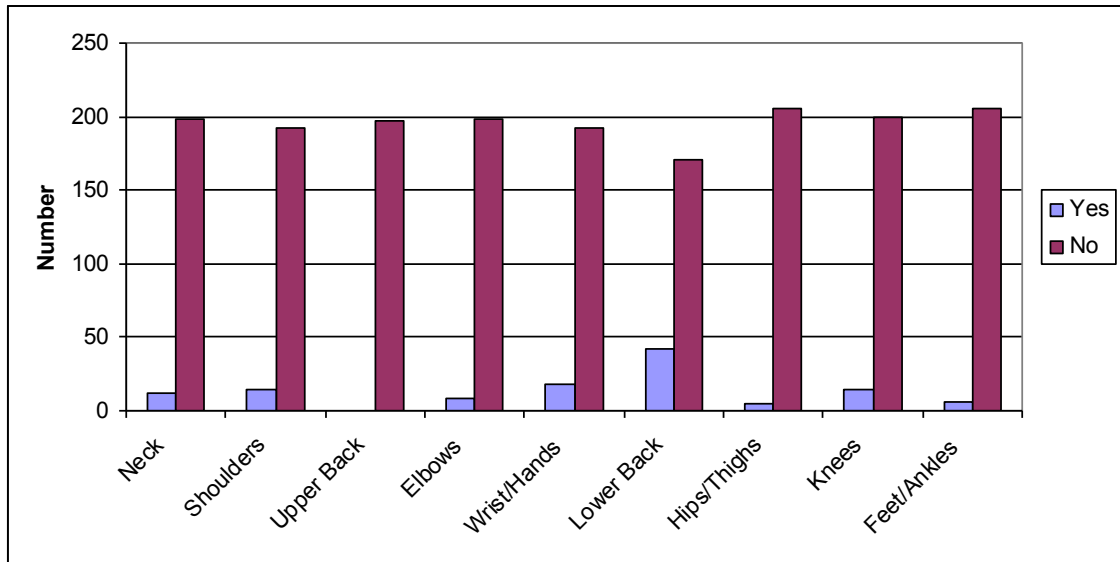


Figure 11. Ever changed jobs due to injury

The final sections of the NMQ ask respondents about reducing activity and being unable to work. Again positive results were identified within the sample but where higher numbers were found, for lower back symptoms, knee symptoms and shoulder symptoms activity was curtailed amongst those reporting symptoms.

The NMQ asks individuals to report how many days they were unable to work due to musculoskeletal symptoms. The majority reported being unable to work for between 1 and 7 days apart from those reporting lower back symptoms and wrist and hand symptoms.

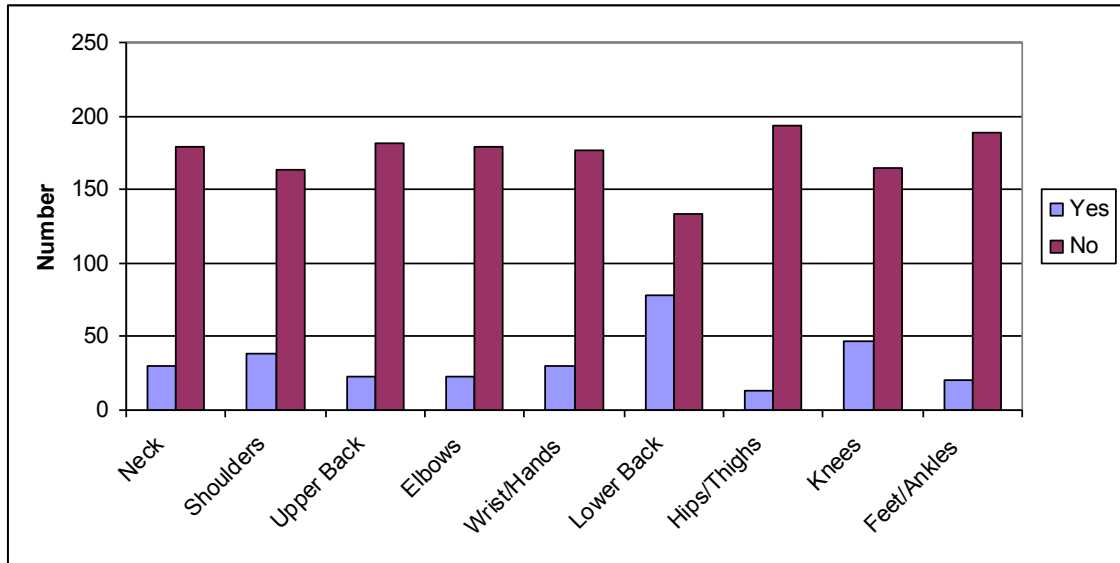


Figure 12. Needed to cut down on activity at home because of pain

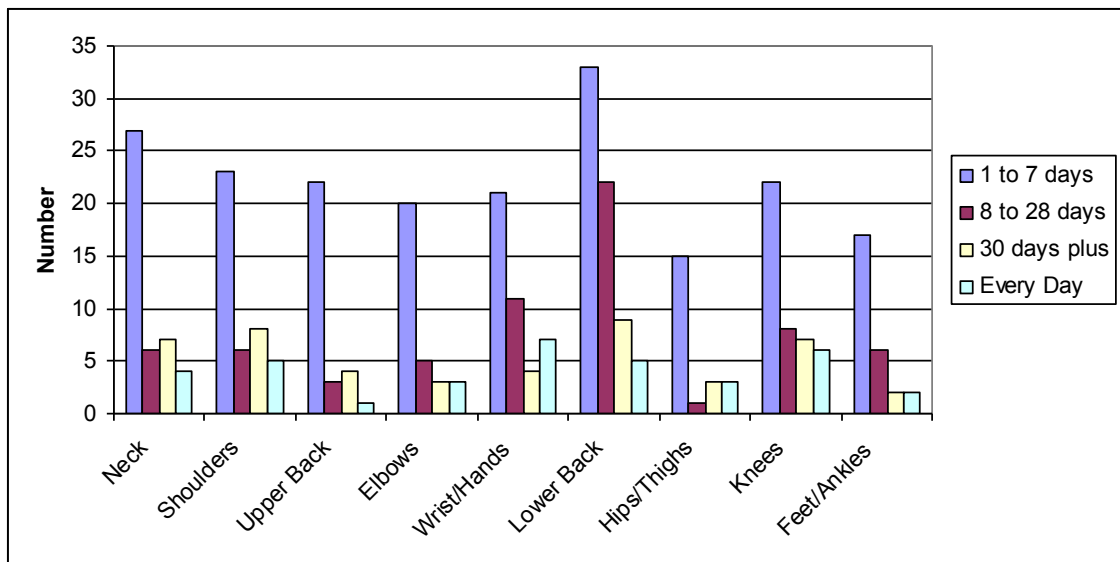


Figure 13. Days unable to work because of pain in the last 12 months

The General Health Questionnaire (GHQ-28) was used to evaluate psychological distress within this group. Using the binary scoring mechanism, the mean score of the sample was 7.5 with a range of 0 to 28. Using the linear scoring method the mean was 28.0 with a range of 1 to 81. When analysing the GHQ, 'caseness' is described as an individual who scores 4 or more on the binary scoring system. Analysing this data, 156 (64.2%) would be described as being a case for psychological distress, having a binary GHQ score over 4.

In using the GHQ-28, the questions can be broken down into 4 areas, somatic symptoms, anxiety, social dysfunction and severe depression. Table 10 presents a breakdown of the scores in relation to these factors. As can be seen from the data, scores were lowest in the severe depression category compared to the other groups.

Table 10. Mean (and median) GHQ Scores

		Somatic Symptoms	Anxiety	Social Dysfunction	Severe Depression	Overall
GHQ Score	Binary	2.4 (2)	2.5 (2)	1.7 (1)	0.9 (0)	7.5 (6)
GHQ Score	Linear	8.0 (7)	8.1 (8)	8.6 (7)	3.2 (1)	28.0 (25)

Chronic Fatigue was assessed using the Chronic Fatigue scale and data are presented in Table 11. This scale was developed to evaluate physical fatigue (total possible score of 7), mental fatigue (total possible score of 4) and an overall score of which a maximum would be 11. These data indicate that chronic fatigue does not appear to be a major problem within the sample tested. The overall proportion of the sample having a score of 4 or over was 64%, this again differed slightly by company with company A having 74% and company B 59%. There was a slightly higher proportion of 'cases' in those aged 45 and under (68%) compared to the older age group (59%).

Table 11. Mean Chronic Fatigue Scores

	Physical Fatigue	Mental Fatigue	Total Score
Company A	3.7	1.2	4.8
Company B	3.6	1.3	4.9
Total Score	3.6	1.2	4.9

A short Quality of Life (QoL5) was embedded within the questionnaire. This tool has been found to correlate with further questions but its shortness is useful in larger surveys. The data received from the questionnaire is scored into a percentage with the higher quality of life relating to a higher percentage. The responses are broken down

in objective quality of life, existential quality of life, subjective quality of life and a total score. The results are presented in Table 12.

Table 12. Short Quality of Life Scores

	Objective Quality of Life (%)	Existential Quality of Life (%)	Subjective Quality of Life (%)	Overall Quality of Life Score (%)
Company A	59.7	63.1	69.2	64.0
Company B	61.1	65.0	69.2	65.3
Score	60.7	64.4	69.2	64.9

6.2.3 Contact with Colleagues and Management

Participants were asked to identify how many times they had contact with their line manager each week. The mean number of times reported was 5 times per week with a range from 0 to 65 times per week. A small number of people answered the question in such a way that it could not be interpreted in terms of number of contacts and as such these were coded as missing. The follow-up question asked individuals to identify how contact was made. The main methods used to be in contact with the line manager were mobile phone (80.9%), face-to-face contact (71.6%), email (54.6%) and voicemail (13.2%).

With regard to contact with colleagues on a weekly basis, respondents reported a mean of 14 times ranging from 0 to 99 times per week. Contact with colleagues was made by face-to-face contact (93.3%), mobile phone (85.3%), email (32.4%) and voicemail (15.6%).

There were some differences apparent between the companies in the methods used for contact with managers. A much higher proportion of company B workers communicated with managers through email than company A (78% vs. 5%), similarly by using mobile phones (86% vs. 71%). Company A seemed to have more face to face contact with managers (84% vs. 66%). The proportion of workers using the different methods for contacting colleagues was very similar for both companies.

6.2.4 Your Vehicle and Driving

The survey asked respondents about the type of vehicle they drove while at work. As can be seen from Table 13., the majority of respondents drove either a transit van or a small van (89.4%).

Table 13. Type of Vehicle Driven

Type of Vehicle	Number	Percentage
Transit Van	183	77.2
Small Van	28	11.8
Small Van/Transit Van	1	0.4
Lorry	9	3.8
Transit Van/Lorry	5	2.1
Saloon Car	3	1.3
Estate Car	2	0.8
Hatchback	2	0.8
Four Wheel Drive Pick up	1	0.4
Hatchback/transit van	1	0.4
Mobile platform unit	1	0.4
Motorbike	1	0.4

The questionnaire then asked about how many hours individuals spent driving each week. The mean was 16.9 hours with a range of 2 hours to 55 hours per week. When asked about the number of miles covered, the mean was 362 miles per week with a range of 50 miles to 1500 miles.

Respondents were then asked whether they were comfortable when driving and 85% (N=199) reported that they were. This was followed up by a question regarding ability to adjust the seat in the vehicle to sit comfortably and 87.2 % (N=205) reported that they could.

The next section asked about the number of hours worked in the vehicle and this was an average of 13.6 hours with a range of 0 hours to 55 hours. A number of individuals reported discomfort issues when working in their vehicle (27.1%). Respondents were asked to identify what equipment they used when working in their vehicle and for the majority this was a mobile phone or a mobile phone and a laptop.

For those who reported working in their vehicles, participants were asked to identify where they worked in the vehicle. These data are presented in Table 14. As can be seen from the data, the majority of individuals worked from the driver's seat followed by the back of the vehicle.

Table 14. Where Work in Vehicle is carried out

Where in Vehicle	Number	Percentage
Driver's seat	136	76.8
Back of Vehicle	21	11.9
From the side of the vehicle	5	2.8
Do not work in vehicle	4	2.3
Passenger seat	4	2.3
Rear seat	2	1.1

For those who worked in their vehicle the types of equipment used were laptops (52.7%), Sat Navs (35.4%), mobile phones (87.7%) and a blackberry (0.4%)

Seventy-nine percent of company B workers had laptops while none of company A had access to laptops. Eighty-six percent of company A workers had access to sat-navs compared to only 10% of company B.

Further questions asked participants to identify what emergency equipment they routinely carried. This included a flashlight (58.8%), a map (46.1%), drinking water (45.7%), shovel (43.6%), a first aid kit (11.9%), irrigation water (7.8%) and blankets (2.5%). It appears that company B are more likely to carry emergency and safety equipment; drinking water (38% of company A vs. 50% of company B), shovel (5% vs. 63%), flashlight (44% vs. 66%), map (36% vs. 51%) and batteries (11% vs. 63%).

Finally in this section respondents were asked whether they had been subjected to road rage while working. The survey identified that 108 (45.6%) had, with respondents experiencing 4 incidents, on average.

This section continued asking whether individuals had been subjected to assault while on the road or working. A total of 25 (10.6%) reported that they suffered assault and the number of times was a mean of 0.6 times and a range of 0 to 20 times. With regard to theft, participants were asked to identify if they had had things stolen while on the road. A total of 64 (27%) reported that they had with the number of incidents ranging from 0 to 40 with a mean of 1.5 times.

6.2.5 Subjective Ratings of Work Factors

Respondents were asked to rate a number of questions in relation to their time at work, access to support, impact on home and family life and decision making. Figure 14. presents the responses to the first set of questions regarding time at work. As can be seen from the graph the final two questions indicate that most individuals have no choice on where and when they work. As both companies surveyed were service based industries dealing with clients this is not surprising.

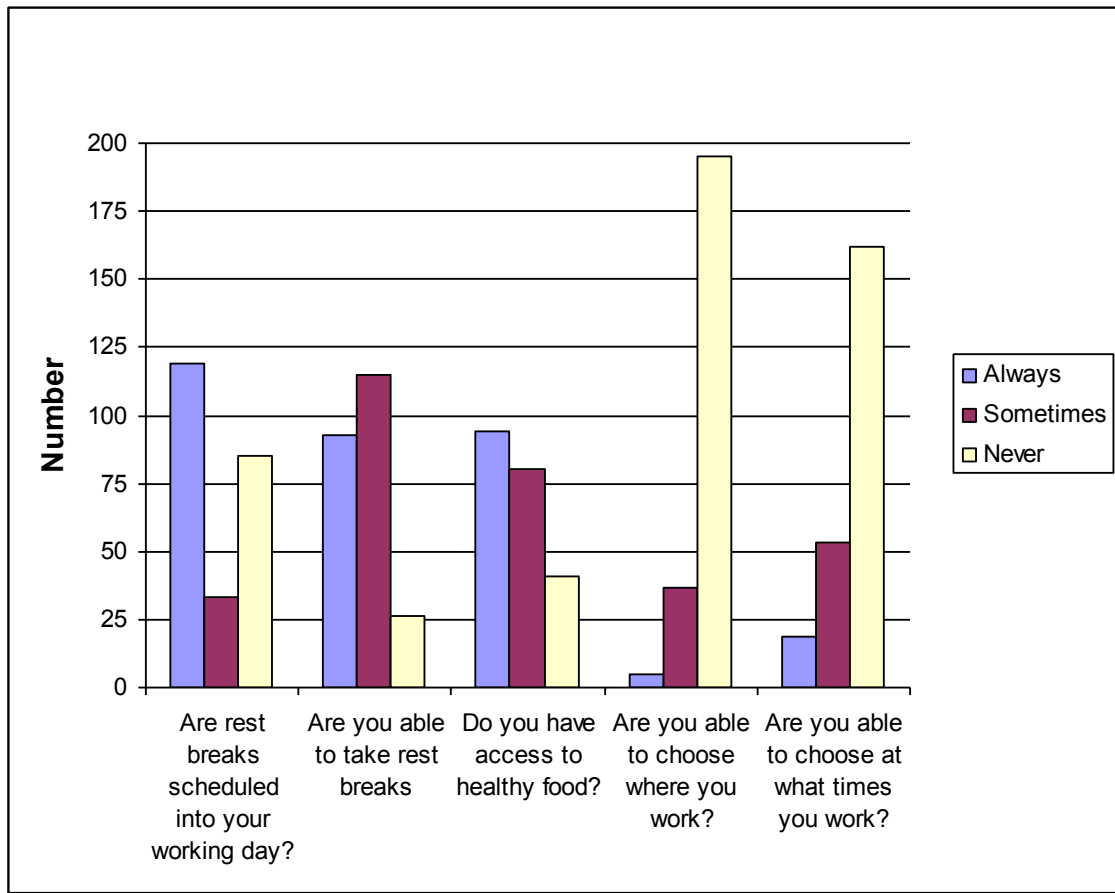


Figure 14. Working Time

Figure 15, is a graphical representation of the data collated on access to health, safety and training. The data appears positive for both access to safety and occupational health. However, this is not repeated on the final question with regard to training.

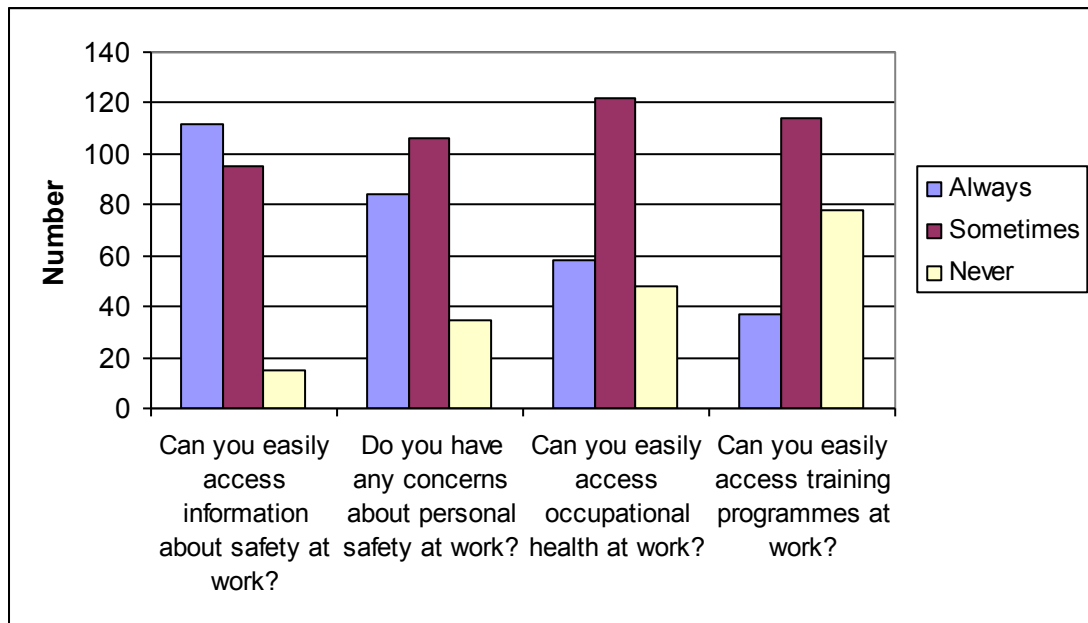


Figure 15. Access to Health, Safety and Training

With regard to the impact of work on home life, respondents were quite positive in that most found they had sufficient time for family life, could balance work and family life and felt that work had a positive impact on family life.

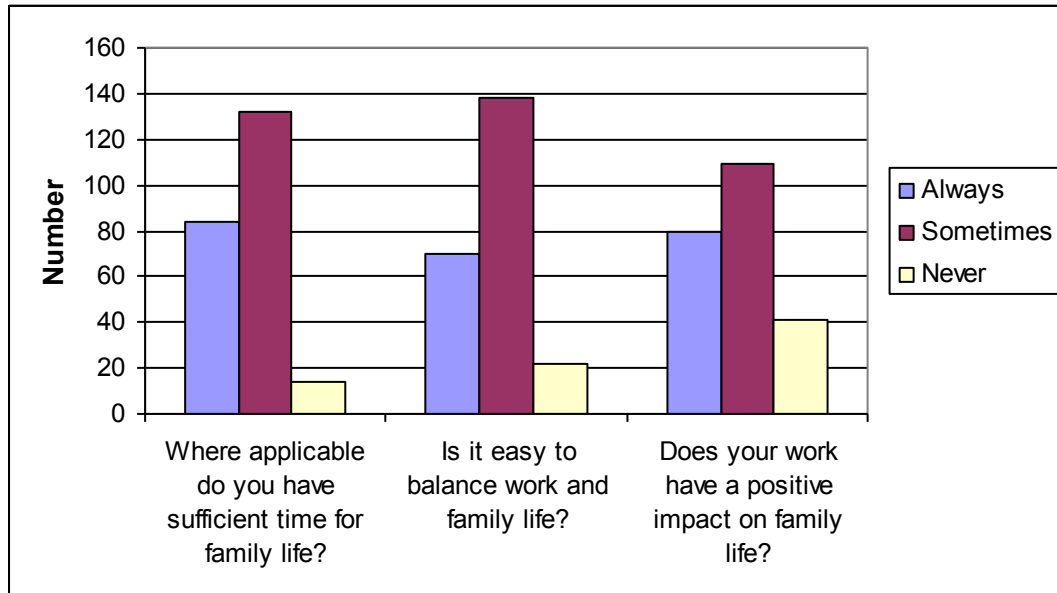


Figure 16. Work Life Balance

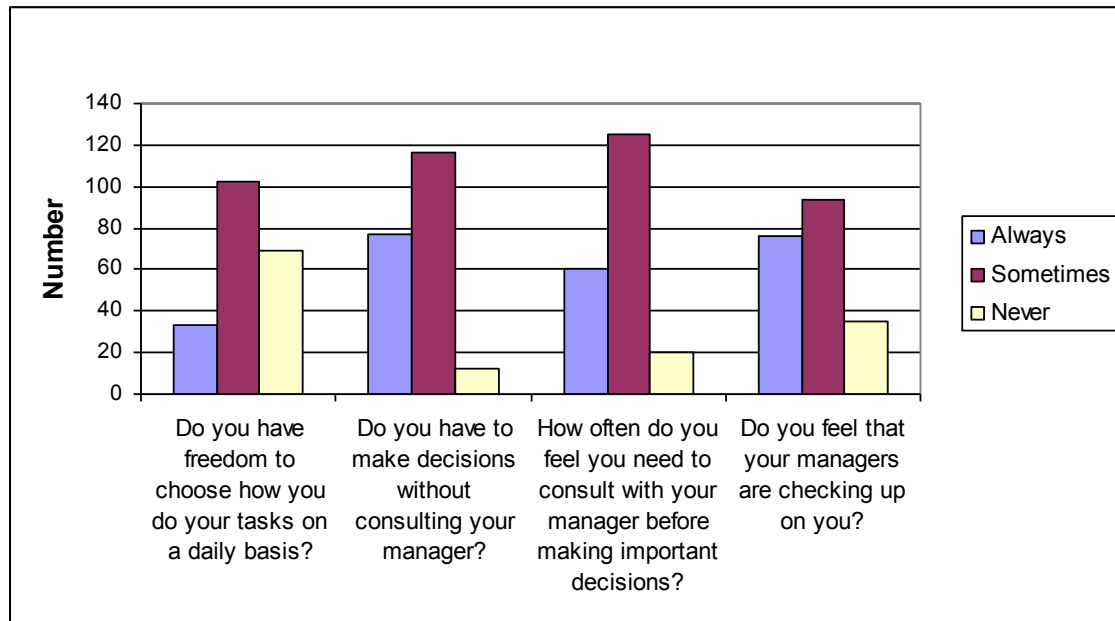


Figure 17. Supervision

6.2.6 Relational Analysis

A number of regression analyses have been carried out to identify any associations within the research group studied. All analyses have been evaluated at the 95% confidence level.

General Health Questionnaire

The response for the previous musculoskeletal regressions was binary (either yes or no) and for this reason binomial logistic regression was used. For the remainder of the regressions, however, the response is a score so we use Normal linear regressions instead to fit all of the following models. For these regressions the estimate generally represents the increase/decrease in risk associated with each variable, a negative estimate indicates that the risk is lowered with each increase in the specific variable.

For the binary scored GHQ, higher scores were associated with increased chronic fatigue, increased symptom reporting and hours driving, similarly for the linear scored GHQ (with the addition of hours worked in vehicles).

In breaking the GHQ-28 down into the four sections of somatic symptoms, anxiety, social dysfunction and severe depression a number of different links were identified. The GHQ somatic symptoms scores (both linear and binary) increase with increases in chronic fatigue score, PILL score and hours driving but decrease with increases in average miles driven, contacts with manager and if they work for company B, as compared to company A.

For anxiety, associations were found with chronic fatigue, physical symptoms and hours driving. The results for social dysfunction were associated with chronic fatigue, physical symptoms, lack of contact with manager and hours driving. The final section of the GHQ relates to severe depression and higher scores were associated with

physical symptoms, hours driving, higher scores for chronic fatigue and lack of contact with colleagues.

Table 15. Associations between GHQ, Chronic Fatigue, PILL and Driving

Parameter	GHQ Binary			GHQ Linear		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	-2.713	0.942	0.004	7.070	1.950	<0.001
Chronic Fatigue Score	0.977	0.143	<0.001	1.788	0.295	<0.001
PILL Score	0.070	0.015	<0.001	0.174	0.032	<0.001
Hours driving	0.146	0.039	<0.001	0.358	0.089	<0.001
Hours working in vehicle				-0.115	0.058	0.051
F probability			<0.001			<0.001

Parameter	Binary Somatic Symptoms Score			Linear Somatic Symptoms Score		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	1.794	0.553	0.001	5.550	0.987	<0.001
Chronic Fatigue Score	0.213	0.044	<0.001	0.440	0.079	<0.001
PILL Score	0.019	0.005	<0.001	0.047	0.009	<0.001
Company B	-1.201	0.365	0.001	-1.792	0.652	0.008
Average miles	-0.002	0.001	0.001	-0.003	0.001	0.002
Hours driving	0.039	0.017	0.023	0.080	0.030	0.007
Contact with manager	-0.052	0.024	0.031	-0.095	0.043	0.027
F probability			<0.001			<0.001

Parameter	Binary Anxiety score			Linear Anxiety score		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	-0.842	0.381	0.028	1.169	0.796	0.144
Chronic Fatigue Score	0.358	0.058	<0.001	0.610	0.121	<0.001
PILL Score	0.019	0.006	0.003	0.059	0.013	<0.001
Hours driving	0.046	0.016	0.004	0.128	0.036	<0.001
Hours working in vehicle				-0.056	0.024	0.021
F probability			<0.001			0.001

Parameter	Binary Social Dysfunction score			Linear Social Dysfunction score		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	-0.574	0.322	0.076	6.058	0.417	<0.001
Chronic Fatigue Score	0.286	0.048	<0.001	0.403	0.078	<0.001
PILL Score	0.018	0.005	<0.001	0.021	0.008	0.013
Contact with manager	-0.072	0.025	0.004			
Hours driving	0.026	0.013	0.055			
Contact with colleagues				-0.028	0.011	0.015
F probability			<0.001			<0.001

Parameter	Binary Severe Depression score			Linear Severe Depression score		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	-1.963	0.314	0.002	-4.100	1.240	0.001
PILL Score	0.014	0.005	0.004	0.041	0.013	0.001
Hours driving	0.042	0.012	<0.001	0.153	0.041	<0.001
Chronic Fatigue Score	0.139	0.046	0.003	0.436	0.117	<0.001
Contact with colleagues	-0.014	0.007	0.044	-0.036	0.017	0.035
Company B				1.778	0.838	0.040
F probability			<0.001			<0.001

Parameter	GHQ Caseness		
	Estimate	S.E.	p-value
Constant	-3.189	0.644	<.001
Chronic Fatigue Score	0.4301	0.0971	<.001
Hours Driving	0.0705	0.0257	0.006
PILL Score	0.0295	0.0109	0.007

GHQ 'caseness' is defined as having a GHQ binary score of 4 or more, investigating the possible relationships between 'caseness' and other factors is done by carrying out a binomial logistic regression with the response being either 'case' or 'not case'. Table 16 shows that the risk of being a 'case' is associated with the chronic fatigue score, pill score and hours spent driving, with an increase in the odds of being a case of 54%, 3% and 7%, with an increase in each, respectively.

Musculoskeletal Symptoms

The relationships investigated for musculoskeletal symptoms were carried out by fitting binomial logistic regressions, as the response was either yes or no (binary). In the tables the estimates for factors are as compared to the baseline level (e.g. company A). The exponential (or antilog) of the estimate is the equivalent of an odds ratio. Table 15 shows the factors that were found to be associated with having musculoskeletal symptoms in different areas of the body, including the estimated co-efficient, the standard error of the co-efficient and the associated p-value. The approximate χ^2 assesses the overall fit of the model and as all are less than 0.05 all models are significant.

For musculoskeletal injuries neck pain or discomfort was associated with working in the glass replacement company (A), where the risk of neck pain is approximately 50% lower for those working for company B.

Pain or discomfort in the right shoulder was found to be associated with higher levels of mileage (0.2% increase in odds of having pain or discomfort in the right shoulder with each mile increase), while pain or discomfort in the left shoulder was associated with working in the glass replacement company.

Pain in the right elbow was associated with higher average mileage (6% increase in risk with each mile increase) and age (0.2% increase in risk with each increase in age). Associations were also found for the wrists and hands with pain in the left wrist associated with working in the glass replacement company and higher mileage while

pain in the right wrist was found to only be associated with working in the glass replacement company.

Upper and lower back pain in the sample were both found to be associated with working in the glass replacement industry and hip or thigh pain was found to be associated with age (4% increase in risk for every year increase in age).

The fact that work in the glass replacement company (A) is negatively associated with pain and discomfort in the majority of areas in Table 15 is not completely surprising as a higher proportion of those working for company A reported musculoskeletal symptoms.

Table 16. Associations between musculoskeletal symptoms, mileage and age.

	Shoulder (R)			Shoulder (L)			Elbow (R)		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	-0.814	0.254	0.001	-0.090	0.245	0.714	-5.04	1.190	<0.001
Company B				-0.703	0.306	0.021			
Average miles	0.002	0.001	0.003				0.002	0.001	<0.001
Age							0.061	0.022	0.006
Approx χ^2 p-value			0.002			0.022			<0.001

	Wrists (R)			Wrists (L)			Upper Back		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	-0.090	0.245	0.714	0.737	0.505	0.144	-0.296	0.245	0.227
Company B	-1.096	0.315	<0.001	-1.541	0.412	<0.001	-0.852	0.316	0.007
Average miles				-0.002	0.001	0.025			
Age									
Approx χ^2 p-value			<0.001			<0.001			0.007

	Lower Back			Neck			Hips/Thighs		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Constant	1.558	0.317	<0.001	0.629	0.252	0.013	-3.093	0.929	<0.001
Company B	-1.195	0.361	<0.001	-0.671	0.303	0.027			
Average miles									
Age							0.039	0.020	0.047
Approx χ^2 p-value			<0.001			0.025			0.041

Physical Symptoms

From the PILL physical symptoms scores, increased reporting of physical symptoms was found to be associated with the GHQ linear score, chronic fatigue score and somatic symptoms scores. The binary GHQ somatic symptoms coefficient is negative indicating for every increase there is a decrease in PILL score. Fitting the same model but excluding binary GHQ somatic symptoms results in very similar estimates for all of the coefficients, with the exception of that of linear GHQ somatic symptoms. This coefficient is reduced to 1.8, suggesting that there is some confounding between the linear and binary somatic symptoms scores (to be expected). The model including both linear and binary somatic symptoms results in a moderation of the effects of the scores on the PILL score such that having high binary scores but low linear scores (i.e. answered 'no more than usual') will have little effect on the PILL score, whereas high binary and high linear (i.e. answered 'much more than usual') will have a bigger effect on the linear score.

Ignoring any possible relationship of the PILL score with any of the other scores to investigate other possible relationships it was found that there was an association between contacts with manager, average miles driven and hours spent driving each week, with PILL score increasing with increases in contacts with managers and hours driving but decreasing with average miles driven.

Table 17. Associations with PILL scores, GHQ and Work Factors

Parameter	Estimate	S.E.	P-value
Constant	-6.16	5.11	0.230
GHQ Linear Score	0.46	0.21	0.027
Chronic Fatigue Score	2.78	0.67	<0.001
GHQ Linear (Somatic Symptoms)	4.34	1.40	0.002
GHQ Binary (Somatic Symptoms)	-4.94	2.35	0.037
F probability			<0.001

Parameter	Estimate	S.E.	P-value
Constant	39.090	4.710	<0.001
Contacts with Manager	0.643	0.441	0.147
Average miles	-0.022	0.011	0.034
Hours Driving	0.615	0.301	0.042
F probability			0.045

Chronic Fatigue

Further analysis was carried out for the Chronic Fatigue Scale looking at the total score and scores for physical and mental fatigue separately. Total chronic fatigue scores were associated with physical symptoms (increase), contact with colleagues (increase), severe depression scores (decrease), hours driving (decrease) and average miles (increase). Physical fatigue was associated with higher GHQ scores, higher physical symptoms, contact with colleagues, average mileage and lower number of hours driven. Mental fatigue was associated with higher GHQ scores and physical symptoms.

The three measures, chronic fatigue score, GHQ score and PILL score have been found to have an association with each other, for the majority of these the relationships are positive (an increase in one score is associated with an increase in the other).

Table 18. Associations between Chronic Fatigue, GHQ, PILL and Work Factors

Parameter	Chronic Fatigue			Physical Fatigue			Mental Fatigue		
	Estimate	S.E.	P-value	Estimate	S.E.	P-Value	Estimate	S.E.	P-Value
Constant	1.547	0.464	0.001	1.808	0.314	<0.001	-0.069	0.163	0.670
GHQ Binary Score	0.285	0.043	<0.001	0.136	0.021	<0.001	0.083	0.016	<0.001
PILL Score	0.035	0.007	<0.001	0.018	0.005	<0.001	0.018	0.004	<0.001
Contact with colleagues	0.027	0.010	0.008	0.021	0.007	0.002			
GHQ Binary (Severe Depression)	-0.297	0.149	0.048						
Hours driving	-0.058	0.024	0.016	-0.043	0.016	0.009			
Average miles	0.002	0.001	0.041	0.001	0.001	0.024			
F probability			<0.001			<0.001			<0.001

6.3 DISCUSSION OF RESULTS

6.3.1 Recruitment

Recruitment to the study was difficult both at company level and at participant level. Efforts were made to contact a large number of companies (108) the lack of either interest or willingness to take part in the study was problematic. The two companies who did take part had large workforces involved in remote and mobile working and had identified the potential benefits with regard to taking part in the project. However, both companies had good support for the workforce in relation to health and safety.

The response rate to the questionnaire was also low. Reasons for this can only be hypothesised but may relate to the size of the questionnaire, the time taken to complete the questionnaire, competing interests between work and research and fear of responses being tracked. The latter was of course not possible in the sample due to the confidentiality assured to respondents. As no individuals could be identified, targeted reminders could not be sent out to improve response rates.

Although confidentiality for respondents is important in research, this can impact negatively on response rates to questionnaires. In future research the use of reasonable incentives should be considered to encourage participation such as a prize draw for an MP3 player for example. It would be hoped that such incentives be viewed as encouragement rather than coercion.

The individuals who did respond to the questionnaire were found to be representative of the age range of the company (Company B) and responses were returned from across the UK (Company A). Although a small sample, the health data collected does not indicate that respondents took part in the survey as a result of poor physical health.

6.3.2 Mental Wellbeing

The GHQ scores did identify that 64.2% of participants would be a potential case for psychological distress. Furthermore, the risk of being a case is associated with chronic fatigue, increased symptom reporting and hours spent driving. In the in-depth breakdown of results the results identified that higher scores were seen for somatic symptoms, anxiety and social dysfunction with the lowest scores being found for severe depression. In examining other working populations this figure appears higher than previous research on social workers at 37% (Gibson *et al* 1989) and 44% in Accident and Emergency Consultants (Burbeck *et al* 2002). However, the jobs are not comparable in terms of work tasks. In examining this further, relational analysis was carried out to identify which work or health factors were implicated within this. This is presented in section 6.3.5

The study focussed on employees who carry out high levels of physical work. Thus it cannot be assumed that the impact on mental wellbeing from workplace factors are going to be the same for employees involved in less physical jobs thus further research is required.

6.3.3 Physical Health

Two questionnaires assessed physical health and musculoskeletal health within the questionnaire. Physical health was assessed using the PILL and the majority of respondents were well within normal range for symptom reporting.

For musculoskeletal symptoms, Company A did report more musculoskeletal symptoms than Company B. The work of both companies at times places high physical demands on individuals. The commonest sites of pain and discomfort were the lower back (68.4%), knees (51.1%) and right shoulder (45.9%) over the last 12 months followed by lower back (43.7%), knees (34.8%) and neck (28.7%) in the last seven days. In comparing these results with other relevant surveys, Skov *et al* (1996) using the NMQ, found in salespeople that 63% reported low back pain, 35% shoulder pain and 54% neck pain in the last 12 months. Porter and Gyi (2002) found in a survey of drivers that 26% reported low back pain and 8% reported neck pain. From physical examination, Pietri *et al* (1992) found in commercial drivers a rate of 25.1% for low back pain.

The results are consistent with other studies of musculoskeletal symptoms although responses are at a higher rate. This may be due to the physical nature of the work undertaken by respondents in this study.

When self-reported absence due to musculoskeletal problems is assessed within the NMQ the results indicate that the majority of absence was short term absence (7 days or less). However, longer absences have been identified for lower back symptoms, knee symptoms, neck and shoulder symptoms.

6.3.4 Work Factors

Contact with Co-Workers

The questionnaire asked respondents to identify how they maintained contact with managers and colleagues. The range of contact times per week with both managers and colleagues was broad but the methods used were different. For contact with managers, Company A used mobile phones and Company B used emails more frequently. This is likely to be a reflection of the different technologies used by the companies. However, 70% of respondents did report face-to-face contact with managers indicating that for many individuals supervisor contact happens on a regular basis.

Contact with colleagues was made on the whole by face-to-face contact (93%) and by mobile phone (85.3%). The results suggest that individuals are not completely isolated from colleagues and contact is maintained.

Vehicles and Driving

The majority of respondents to the questionnaire drove either transit vans or small vans. Importantly, 85% of respondents reported they were comfortable when driving. The range of hours spent driving was between 2 and 55 hours per week with a mileage range of 50 to 1500 miles. Respondents were asked about working in the vehicle (not driving) and this ranged from 0 to 55 hours per week. One concern about this question

was whether it was interpreted as including driving hours rather than differentiating between working in the vehicle and driving the vehicle.

The types of equipment used in the vehicles were mobile phones and laptops. The majority of individuals reported using this equipment in the driver's seat. This may be causing further problems including musculoskeletal discomfort as reported by Eost and Flyte (1998).

With regard to incidents of road rage and assault, 46% reported being the victim of road rage at least once, 11% reported assault and 27% reported theft from vehicles at least once. While it is appreciated that these are self-reported numbers, the level of reporting does indicate that remote and mobile workers must be advised on both avoiding and managing these situations. As these individuals spend time lone working, this must be risk managed in line with other workplace hazards and ensure that reporting systems are in place for any incidents.

Subjective Rating of Work Factors

The questionnaire asked respondents a number of questions in relation to work factors, access to services, work-life balance and supervision. For the first section, working time, the majority of respondents are not able to choose where they work or when they are working. This is due to both companies being service industries where appointments are made at client's premises or homes. With regard to accessing services including safety and occupational health, most workers did not report a problem. However accessing training courses did seem to be an issue for some workers.

The majority of responses to questions with regard to work-life balance were again positive. Some interesting results were found with regard to supervision in that although decision are made without consulting managers, the majority of respondents would consult managers before making important decisions.

6.3.5 Relational Analysis

A number of regression analyses were carried out on the data including health, mental health and work factors. These results indicate similar results to other studies including the impact of driving and mileage. For example longer hours driving were associated with increased GHQ scores including the broken down scores of somatic symptoms, anxiety, social dysfunction and depression. Furthermore increased PILL scores were also associated with longer hours driving.

Musculoskeletal symptoms were found to be associated with higher mileage including elbow pain, wrist pain, right shoulder pain, upper back and lower back pain. However, higher mileage was also associated with decreased somatic symptoms and PILL scores. These data suggest that although there are some benefits in relation to higher mileages with regard to physical symptoms and mental health, this is affected by a negative impact on the musculoskeletal system. A relationship was also found between elbow pain, and hip and thigh pain and increasing age. This is a common finding in musculoskeletal research but the information is confounded by the fact that increasing age is also associated with longer exposure to musculoskeletal risk factors.

The relationship between physical health symptoms including musculoskeletal, hours and mileage are similar to those found by Pietri *et al* (1992), Skov *et al* (1996) and

Porter and Gyi (2002). For psychosocial effects, previous research has identified that higher mileages were associated with better mental health (Borg and Kristensen (1999) but this is impacted upon by poorer physical health as a result of higher mileage.

Contact with managers was found to be associated with a reduction in somatic symptoms on the GHQ but an increase in physical health symptoms but a lack of contact with managers was found to be associated with an increase in social dysfunction from the GHQ. In relation to contact with colleagues, lack of contact with colleagues was found to be associated with an increase in severe depression.

Working for Company A was found to be associated with an increased reporting of musculoskeletal symptoms and reduced somatic symptoms from the GHQ as compared to Company B. The work carried out by the company involves handling panes of glass, often in the external environment and working alone.

The analysis identified that there was a positive association between the chronic fatigue score, the PILL and the GHQ. As one increases the other scores increase also. This would indicate a relationship between physical health, mental health and fatigue. Although scores on the chronic fatigue scale were not high from the sample, associations were found between this and contact with colleagues, hours driving and average mileage. Thus further examination needs to be made in examining the relationship between driving and fatigue and whether adequate recovery time is available for individuals driving high mileages.

The links between physical and mental health identified within the research are not surprising in that interactions have been identified in the wider research field. There is a clear need to manage both within this workforce to ensure that health and wellbeing can be maintained.

6.4 CONCLUSIONS

Although the survey was based on a small sample, a number of key issues have been identified within the results. The participants reported a high number of musculoskeletal symptoms and psychological distress was identified in two thirds of the sample. A number of factors including long hours, high mileage and contact with managers or colleagues mediated these factors.

6.5 FURTHER RESEARCH

In terms of further research the main objective would be to survey a larger number of participants but specifically those driving cars and female workers. A number of associations have been identified within the survey results and future work should examine intervention strategies to reduce musculoskeletal symptom reporting and improve mental wellbeing. The impact of fatigue and recovery on this group of workers should also be further examined to identify the extent of its influence on health and wellbeing.

The levels of caseness for psychological distress identified within this group are high and it would be recommended that further research be carried out to investigate and control the sources of this pressure. As identified within the research, scores were

higher for anxiety, somatic symptoms and social dysfunction rather than severe depression. However the impact of poor mental wellbeing cannot be underestimated.

Although the study aimed to research groups of workers including individuals with less physical jobs driving cars, this was not achieved in the current study. Thus focusing future work on this population will inform further in relation to different potential sources of stress and physical activity at work.

7 GUIDANCE FOR MANAGERS OF REMOTE AND MOBILE WORKERS

A separate guidance note has been prepared for managers and supervisors of those involved in remote and mobile working. This is a stand alone document available in leaflet form.

8 ACKNOWLEDGEMENTS

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APPENDIX A DATA EXTRACTION FORM

Date of Data Extraction	
Author	
Title	
Source	
Institution	
Reviewer Information	
Notes	
Study Characteristics	
Verification of study eligibility Correct Population, interventions, outcome, study design	
Population Characteristics	
Methodological Quality of the Study	
Interventions	

Outcomes/Outcome Measures

Analysis

Quality of Evidence

Please circle opinion of evidence from this study

- *** Strong Evidence
- ** Moderate Evidence
- * Limited or contradictory evidence
- No scientific evidence

Other comments

APPENDIX B STRUCTURED INTERVIEW PRO FORMA



*wellness of
mobile
workers*

Interview Schedule

Age

Male/Female

Job Title _____

How long have you been in your current job?
Years Months

How long have you been remote working?
Years Months

Hours of working (OFFICIAL)
Hours per week

HOURS WORKING (UNOFFICIAL)
Hours per week

Time away from home or office base weekly
Hours per week

Hours of driving per week
Hours per week

Average mileage per week
Miles

Hours of working in vehicle
Hours

Work equipment used in vehicle

How they use equipment in vehicle – sit at steering wheel/specific workstation

How many times do you have contact with your manager per week?

How is this contact made?

How many times do you have contact with colleagues?

How is this contact made?

What does your work involve (sedentary/manual/light/physical)?

Do you enjoy work?

Do you have any sources of pressure from work?

(Cue words)
ORGANISATIONAL
PEOPLE
EQUIPMENT
TASK
CONTROL
DEMANDS
TRAVELING
UNCERTAINTY
DANGEROUS SITUATIONS

What do you enjoy about your job?

Do you have a second job?

Your Vehicle

Saloon Car

Hatchback

Small van

Transit van

Lorry

Other _____

Is your vehicle regularly checked?

Is your vehicle regularly safety inspected?

Are you supplied with emergency equipment, for example, water, blankets, torch

Do you have any comfort or discomfort issues when driving your vehicle?

Do you have any comfort or discomfort issues when working in your vehicle?

Do you use in-car entertainment, please describe

Do you use any gadgets in your car, for example, blue tooth phone, SAT-NAV, please describe

Have you been a victim or road rage?

Any additional comments by participants

APPENDIX C QUESTIONNAIRE SURVEY



The IOM is carrying out research into the health and well being at work of mobile workers. This questionnaire asks you about aspects of your health, the type of work you do and the vehicles and equipment you use at work. It is essential to the success of the research that as many people respond to the questionnaire as possible, and we are grateful for your participation.

The questionnaire is made up of a number of validated scales and you are asked to complete each question by circling or ticking the relevant answer. It is important that you attempt to answer all questions. The questionnaire has been designed to protect your anonymity and to ensure the results remain confidential to the research team. Before any data reaches the public domain it will be anonymised and summarised.

Please return the completed questionnaire directly to the research team in the reply-paid envelope enclosed.

There are two types of question found on the questionnaire, and examples of these are shown below:

Example 1. (ring the appropriate response)

Been feeling well and in good health?

Better than usual

Same as usual

Worse than usual

Much worse than usual

Example 2. (tick the appropriate response)

	Never or almost never	3 or 4 times per year	Once a month	Once a week	More than once per week
Eyes water	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Itchy eyes or skin	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ringing in ears	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION A: About how your health has been of late and how you feel

We would like to know if you have had any medical complaints and how your health has been in general, over the last few weeks. Please answer all the questions by circling the answer which best applies to you. Remember that we want to know about present and recent complaints, not those that you have had in the past

1. Have you recently . . .

Been feeling well and in good health?	Better than usual	Same as usual	Worse than usual	Much worse than usual
Been feeling in need of a good tonic?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling run down and out of sorts?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that you are ill?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been getting pains in your head?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been getting a feeling of tightness or pressure in the head?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been having hot or cold spells?	Not at all	No more than usual	Rather more than usual	Much more than usual

2. Have you also recently . . .

Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
Had difficulty staying asleep once you are off?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been edgy and bad tempered?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been getting scared and panicky for no good reason ?	Not at all	No more than usual	Rather more than usual	Much more than usual
Found everything getting on top of you ?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling nervous and strung-up all the time?	Not at all	No more than usual	Rather more than usual	Much more than usual

3. Have you recently . . .

Been managing to keep yourself busy and occupied?	More so than usual	Same as usual	Rather less than usual	Much less than usual
Been taking longer over things you do?	Quicker than usual	Same as usual	Longer than usual	Much longer than usual
Felt on the whole you were doing things well?	Better than usual	About the same	Less than usual	Much Less Well
Been satisfied with the way you carry out a task?	More satisfied	Same as usual	Less than usual	Much less capable
Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less so than usual	Much less useful
Felt capable of making decisions about things?	More so than usual	Same as usual	Less so than usual	Much less capable
Been able to enjoy your normal day-to -day activities?	More so than usual	Same as usual	Less so than usual	Much less than usual

Although the last questions are personal, it is important that you answer them to allow the questionnaire to be analysed fully.

4. Have you recently...

Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that life is entirely hopeless?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that life is not worth living?	Not at all	No more than usual	Rather more than usual	Much more than usual
Thought of the possibility that you might make away with yourself?	Definitely not	I don't think so	Has crossed my mind	Definitely have
Found at times you couldn't do anything because your nerves were so bad?	Not at all	No more than usual	Rather more than usual	Much more than usual
Found yourself wishing you were dead and away from it all?	Not at all	No more than usual	Rather more than usual	Much more than usual
Found that the idea of taking your own life kept coming into your mind?	Definitely not	I don't think so	Has crossed my mind	Definitely have

If you any of these questions have upset you or made you concerned about how you feel at present, you could get help from your own GP, from your Occupational Health department, or by contacting Dr Joanne Crawford who is running this research project

SECTION B: Common symptoms

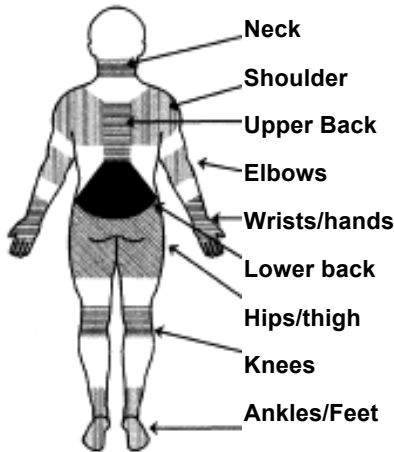
Several common symptoms or bodily sensations are listed below. Many people have experienced most of them at one time or another. We are interested in finding out how common each symptom is among mobile workers.

5. Please show how frequently you experience each symptom below by ticking the most relevant box.

	Never or almost never	3 or 4 times per year	Once a month	Once a week	More than once per week
Eyes water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Itchy eyes or skin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ringing in ears	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temporary deafness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lump in throat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Choking sensations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sneezing spells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Running nose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Congested nose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bleeding nose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asthma or wheezing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coughing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Out of breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swollen ankles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chest pains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Racing heart	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cold hands / feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leg cramps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Difficulty sleeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toothaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upset stomach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indigestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heartburn or gas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abdominal pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diarrhoea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swollen joints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stiff or sore muscles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Never or almost never	3 or 4 times per year	Once a month	Once a week	More than once per week
Headaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling pressure in head	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot flushes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dizziness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feel faint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Any numbness / tingling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Twitching of eyelid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Twitching other than eyelid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hands tremble or shake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stiff joints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sore muscles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sore throat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sunburn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nausea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Back pains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sensitive or tender skin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Face flushes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tightness in chest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin breaks out in rash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acne or pimples on face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acne / pimples other than face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sweat even in cold weather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strong reactions to insect bites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constipation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Haemorrhoids / Piles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION C: Musculoskeletal Health



In this picture you can see the approximate position of the parts of the body referred to in the questionnaire. The tables below ask about any pains you have had in those body-areas.

Please answer by ticking the appropriate box for each body-area. You may be in doubt as to how to answer, but please do your best anyway.

Note that the questionnaire is to be completed even if you have never had trouble in any part of your body.

	Had trouble e.g. ache, pain, or discomfort		Been prevented from carrying out normal activities		Seen a nurse, doctor or physio because of:		How many days trouble have you had in the last 12 months (please tick)	
	No	Yes	No	Yes	No	Yes		
Neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Shoulders <input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Upper Back	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Elbows <input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Wrists / Hands <input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Lower Back	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Hips / Thighs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Knees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day
Ankles / Feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days	<input type="checkbox"/> 8-28 days
							<input type="checkbox"/> 30 days plus	<input type="checkbox"/> every day

6. In the last 12 months, have you . . .

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	Injured this body-part through an accident		Needed to change jobs / duties because of pain		Needed to cut down activity at home because of pain		How many days have you been unable to work because of pain in the last 12 months	
	No	Yes	No	Yes	No	Yes	No	Yes
Neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Shoulders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Upper Back	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Elbows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Wrists / Hands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Lower Back	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Hips / Thighs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Knees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day
Ankles / Feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 30 days plus	<input type="checkbox"/> 8-28 days <input type="checkbox"/> every day

7. Have you ever...

8. In the past 7 days, have you ever.....

	Had trouble e.g., ache, pain or discomfort	
	No	Yes
Neck	<input type="checkbox"/>	<input type="checkbox"/>
Shoulders <input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/>	<input type="checkbox"/>
Upper Back	<input type="checkbox"/>	<input type="checkbox"/>
Elbows <input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/>	<input type="checkbox"/>
Wrists / Hands <input type="checkbox"/> Left <input type="checkbox"/> Right	<input type="checkbox"/>	<input type="checkbox"/>
Lower Back	<input type="checkbox"/>	<input type="checkbox"/>
Hips / Thighs	<input type="checkbox"/>	<input type="checkbox"/>
Knees	<input type="checkbox"/>	<input type="checkbox"/>
Ankles / Feet	<input type="checkbox"/>	<input type="checkbox"/>

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SECTION D: Fatigue

The following questions are designed to measure if you have been feeling tired, fatigued, or had a general feeling of being 'run-down' over the last few weeks.

9. Please complete all of the questions as accurately and as clearly as you can by circling the response that is the most appropriate to you for each question.

Do you have problems with tiredness?	Less than usual	No more than usual	More than usual	Much more than usual
Do you need to rest more?	Less than usual	No more than usual	More than usual	Much more than usual
Do you feel sleepy or drowsy?	Less than usual	No more than usual	More than usual	Much more than usual
Do you have problems starting things?	Less than usual	No more than usual	More than usual	Much more than usual
How energetic do you feel?	Much more energetic than usual	More energetic than usual	No more energetic than usual	Less energetic than usual
How much strength do you have in your muscles?	Much more strength than usual	More strength than usual	No more strength than usual	Less strength than usual
Do you feel weak?	Less weak than usual	Same as usual	More weakness than usual	Much more weakness than usual
Do you have difficulty concentrating?	Less difficult than usual	No more difficult than usual	More difficult than usual	Much more difficult than usual
Do you make slips of the tongue when speaking?	Less slips than usual	No more slips than usual	More slips than usual	Much more slips than usual
Do you find it difficult to find the correct word?	Less difficult than usual	No more difficult than usual	More difficult than usual	Much more difficult than usual
How is your memory?	Better than usual	No worse than usual	Worse than usual	Much worse than usual

SECTION E: General well-being

10. The following questions assess your current opinion with regard to yourself and those around you.

	Very good	Good	Neither good nor bad	Bad	Very bad
How has your physical health been lately?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How do you consider your mental health at the moment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How do you feel about yourself at the moment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How are your relationships with your friends at the moment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Where applicable, how is your relationship with your partner at the moment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION F: About you

11. Are you: Male Female
12. What is your date of birth? Day Month Year
13. Have you ever smoked as much as one cigarette a day (or one cigar a week or an ounce of tobacco a month) for as long as a year? Yes No
14. Do you smoke now? Yes No

SECTION G: About your job

15. What is your current job title? _____
16. What company do you work for? _____
17. What region (county) do you work in? _____
18. How long have you been in your current job? years months
19. How long have you been a mobile worker? years months
20. How many hours are you contracted to work per week? hours

21. How many hours do you actually work per week? hours
22. How many hours do you spend at a home or office base in a typical week? hours
23. What times do you work? (please tick the one that applies best)
- Day shift Night shift Rotating shifts
- Other (please describe) _____
24. How many times do you have contact with your line manager in a typical week? times
25. How is contact made with your manager? (please tick all that apply)
- Face-to-face Mobile phone E-mail None
- Voice mail
- Other (please describe) _____
26. How many times do you have contact with your colleagues in a typical week? times
27. How is this contact with colleagues made? (please tick all that apply)
- Face-to-face Mobile phone E-mail
- Voice mail
- Other (please describe) _____

SECTION H: About your vehicle and driving

28. What type of vehicle do you drive at work? (please tick all that apply)
- Saloon car Hatchback Estate car
- Small Van Transit van Lorry
- Other (please describe) _____
29. How many hours do you spend driving in a typical week? hours
30. What is your average mileage in a typical week? miles
31. Are you comfortable when driving? Yes No
32. Can you adjust the seat in the vehicle to sit comfortably? Yes No

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W M W

33. How many hours do you spend working in your vehicle per week? hours
34. Do you have any discomfort issues when working in your vehicle? Yes No
35. What equipment do you use in your vehicle? (Please tick all that apply)
- Laptop Blackberry Sat Nav
 Mobile phone PDA
 Other (please describe) _____
36. If “No”, where do you principally work in your vehicle (please tick the one that applies)
- Driver’s seat Rear seats Passenger seat
 Other (please describe) _____
37. Which emergency equipment do you routinely carry in your vehicle (Please tick all that apply)
- Drinking water Irrigation water Blankets Flares Shovel
 Flashlight Map Batteries
 Other (please describe) _____
38. Have you ever been the victim of “Road Rage”? Yes No
39. If “Yes” – how many times have you been subjected to Road Ragewhile working? times
40. Have you ever been the victim of assault while on the road or working? Yes No
41. If “Yes” - How many times have you been assaulted while on the road or working? times
42. Have you had equipment stolen from your vehicle while on the road? Yes No
43. If “Yes” - How many times have you had things stolen while on the road? times
44. Please rate the following statements by ticking the relevant box.

Always Sometimes Never

Are rest breaks scheduled into your working day?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are you able to take rest breaks during your working day?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you have access to healthy food during your working day?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are you able to choose where you work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are you able to choose at what times you work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can you easily access information about safety at work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you have any concerns about personal safety at work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can you easily access occupational health at work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can you easily access training programmes at work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Where applicable, do you have sufficient time for family life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is it easy to balance work and family life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does your work have a positive impact on family life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you have freedom to choose how you do your tasks on a daily basis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you have to make decisions without consulting your manager?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel you need to consult with your manager before making important decisions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel that your managers are checking up on you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have any additional comments please add them in the box below

Please return the questionnaire to the research team in the freepost envelope provided

Thank you for your help and your time

Dr Joanne Crawford
 Senior Consultant Ergonomist
 Institute of Occupational Medicine
 Research Avenue North
 Riccarton
 Edinburgh
 EH14 4AP

Tel 0131 449 8037

Email Joanne.crawford@iom-world.org Fax 0870 850 5132

Questionnaires courtesy of: © Dr David Goldberg, 1982; Pennebaker, J.W. 2000; Kuorinka, I. 1987; Lindholt, J.S. 2002; Chalder, T 1997



May 2009

Dear Sir or Madam

The Health and Wellbeing of Mobile and Remote Workers

Thank you for agreeing to take part in the survey of the health and wellbeing of mobile and remote workers. There is very little information available to help develop policies for health and wellbeing of mobile and remote workers and the questionnaire survey aims to address this by collecting information from a cross-section of individuals who work in this way.

When you have completed the questionnaire can you please place it in the envelope provided and seal it. All questionnaires are returned directly to the researchers. Although we ask for some personal information from you, we do not need to be able to identify individual people. **Thus your answers will be anonymous and remain confidential to the team research team.**

On completion of the study, summarised data will be returned to your companies. Again this information will **not** identify individual respondents but will be a summary of responses from you and your colleagues.

If you have any questions about this research study, you can contact Joanne Crawford at the address given below:

*Dr Joanne Crawford, Institute of Occupational Medicine, Research Park North, Riccarton, EDINBURGH EH14 4AP, Tel: 0131 449 8037, Fax: 0870 850 5132, E-mail: Joanne.crawford@iom-world.org
Web: www.iom-world.org.uk*

Thank you in advance for your help with this research study.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Joanne Crawford', is written over a faint, light blue circular stamp.

Dr Joanne Crawford
Principal

Investigator



Information Sheet

You are invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish. If there is anything that is not clear or if you would like more information, please contact the Researcher carrying out the Project. Her details are available at the end of the information sheet.

What is the research study about?

Currently there is very little research available regarding the well-being of individuals who work on their own and away from a work or a home base for the majority of their working time. Such workers include Sales Representatives, Delivery Drivers, and Technical Staff who are isolated and working remotely “on the road” for different operational reasons, as well as many other different jobs.

As a group of workers, there is little information available to identify the impact on individuals who have minimal face-to-face contact with their managers or colleagues. This study intends to find out what the exact areas of concerns may be for this group of workers using a two-stage approach. Firstly, a series of fact-finding interviews will be carried out with a cross-section of remote and isolated workers. Secondly, information obtained from the interviews will be used to develop a large-scale questionnaire survey to identify the psychological, physical and operational factors that affect people who work remotely and on their own.

Who is taking part in the study?

This stage of the study involves a questionnaire survey of participants who work away from a work or home base for the majority of their working week. We are asking a cross-section of individuals in a variety of jobs to take part in this survey to identify what issues remote and isolated working may present to them. This is an anonymous and confidential questionnaire to identify if there are particular work or health issues for the individual, the equipment used by people in their working day and what benefits there are in this type of work. All questionnaires will be returned directly to the research team.

What are the benefits?

The study will identify factors relevant to remote working including health, safety, ergonomics, the home/work interface and psychosocial well being. Benefits from this study will be clear recommendations for the development of policies for managing remote and isolated workforces.

What are the risks?

The researchers do not see any risk to individual participants taking part in this study and we therefore state it to be a “minimal risk” study.

What are the alternatives?

There are two main alternatives in the study, firstly that the study is not carried out at all. Consequently there will be no further knowledge generated about remote and isolated workers. Secondly, participants could be interviewed. The study would take much longer to carry out, confidentiality issues would be raised by this method and it may not produce results from a wide cross-section of workers.

What if I do not want to take part?

It is up to you to decide whether to take part in the study or not. If you do decide to take part in the survey then please keep this information sheet. We would like you to complete the attached questionnaire. We do not ask participants to sign a consent form, as we want to maintain your anonymity and confidentiality. If you do decide to take part, you are free to withdraw at any time without giving a reason.

What happens to the information?

Each questionnaire will remain confidential and no identifying information is included on it. Only the research team will see any interview data. Before any data reaches the public domain, it will be anonymised and summarised. This means that no individual details will be known.

What happens now if I decide to take part?

If you agree to take part, we would like you to complete the enclosed questionnaire. This will take approximately 15 minutes to complete on your own and in privacy.

Who is funding and organising the research?

The research has been funded by the British Occupational Health Research Foundation (BOHRF) and carried out by the Institute of Occupational and Environmental Medicine, Division of Primary Care, Public and Occupational Health, School of Medicine, The University of Birmingham. The BOHRF have evaluated the methods we wish to use and support the work and the methodology we have proposed.

Further information/clarification

If you have any further queries regarding the research you can contact the Principal Investigator of the research team between normal office hours, 9.00 am to 5.00 pm, or outside these hours there is an answer phone. The contact details are below.

Dr Joanne Crawford
Institute of Occupational Medicine
Research Avenue North
Riccarton
Edinburgh
EH14 4AP

Telephone 0131 449 8037
Fax 0870 850 5132
Email: Joanne.crawford@iom-world.org

Thank you for reading the information

APPENDIX D BREAKDOWN BY REGION OF RESPONSES FROM COMPANY A

Region	Number
Berkshire	1
Buckinghamshire	2
Cambridgeshire	1
Cheshire	1
Cumbria	1
Devon	1
Dorset	1
East Sussex	1
Essex	1
Essex	1
Hampshire	2
Hendon	1
Hertfordshire	1
Kent	2
Lancashire	1
Lincolnshire	1
London	5
Midlands	2
Norfolk	3
North East England	1
Northern Ireland	3
Shropshire	2
South East	1
Scotland	11
South West	1
Suffolk	1
Surrey	2
Teeside	2
UK	1
Wales	3
West Country	1
West Sussex	1
Wiltshire	1
Yorkshire	3

APPENDIX E PHYSICAL HEALTH DATA

Data from the PILL questionnaire

Symptom	Never or almost never	3 to 4 times per year	Once a month	Once a week	More than once a week
Eyes water	107	50	34	24	26
Itchy eyes or skin	89	51	30	38	33
Ringing in ears	143	40	24	10	24
Temporary deafness	204	15	8	3	11
Lump in throat	171	42	17	3	7
Choking sensations	200	27	6	2	5
Sneezing spells	83	71	41	24	21
Running nose	51	105	37	23	25
Congested nose	54	98	38	23	28
Bleeding nose	200	28	9	3	1
Asthma or wheezing	204	20	7	3	6
Coughing	81	104	24	17	14
Out of breath	124	60	22	18	15
Swollen ankles	219	14	2	1	5
Chest Pains	156	55	13	6	9
Racing heart	154	49	15	12	11
Cold hands/feet	119	55	19	17	31
Leg cramps	139	46	22	17	17
Difficultly sleeping	68	50	29	38	54
Toothaches	182	41	10	4	5
Upset stomach	98	90	30	15	7

Indigestion	101	59	44	19	15
Heartburn or gas	81	62	52	19	25
Abdominal pain	147	56	20	9	7
Diarrhoea	99	95	31	10	5
Swollen joints	178	32	15	9	6
Stiff or sore muscles	58	83	32	28	38
Headaches	71	82	45	20	22
Feeling pressure in head	131	52	26	12	20
Hot flushes	179	29	19	4	11
Chills	162	49	15	6	8
Dizziness	158	47	15	14	7
Feel faint	172	45	12	6	6
Any numbness/tingling	135	40	26	17	22
Twitching of eyelid	128	61	38	7	7
Twitching other than eyelid	198	24	8	7	4
Hands tremble or shake	185	31	6	9	10
Stiff joints	84	56	35	23	41
Sore muscles	65	68	42	21	44
Sore throat	102	112	20	4	4
Sunburn	196	39	3	3	1
Nausea	164	54	17	2	4
Back pains	56	73	43	19	47
Sensitive or tender skin	149	41	20	8	22
Face flushes	188	29	15	4	6
Tightness in chest	164	48	13	6	8

Skin breaks out in rash	178	41	11	7	4
Acne or pimples on face	177	43	7	6	5
Acne pimples other than face	193	33	5	3	6
Boils	213	20	3	2	3
Sweat even in cold weather	160	40	15	11	15
Strong reaction to insect bites	200	32	5	2	2
Constipation	186	40	8	3	3
Haemorrhoids/piles	194	30	3	6	8