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On-call work scheduling: A multi-method analysis of psychological effects  
and moderators

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## **Abstract**

On-call working is a relatively new form of work scheduling in many occupational settings. For a large proportion of employees, being on-call is not an option but an integral component of the job. Essentially, utilising this type of work scheduling is often far less expensive for employers than providing full shift-work cover during out of hours, even when on-call workers receive recompense for such working (Mabon, 1995).

However, research into the negative outcomes of on-call working is extremely limited, especially in relation to other forms of work scheduling such as shift and night-work. Where research into on-call working has been conducted, it has primarily centred around the medical professions, with such studies predominantly focusing on the areas of stress, sleep deficits and personal safety. Moreover, research into gaining an understanding of operational practices, the effects and personality moderators of on-call working remains sparse. Hence, the aim of this thesis is to further explore the negative effects of working on-call in relation to recovery (or lack of), fatigue and stress. In addition by examining the personality traits of desirability for control, risk taking and trait anxiety it may be possible to establish those for whom this type of work scheduling may be particularly detrimental. Therefore the work presented in this thesis attempts to address these issues to see if there are any effects on on-call worker's state of well-being, whilst taking into account aspects of personality, uses a multi-method approach in its investigations.

A series of four studies were carried out to investigate these issues. The first examines the operational practices and outcomes of on-call working in a group of medical professionals using a qualitative methodology. The second continues to investigate operational practices across a range of occupations using a survey

methodology, which incorporates a series of personality moderators to examine the role of individual differences as mediators of the possible effects of working on-call. The third study begins to investigate the impact of shift type within two distinct on-call working professions. It uses both diary and questionnaire methodology to establish differences across shift type and the mediating role of personality as a predictor of any possible negative effects. The final study continues to investigate the possible consequences of on-call working across shift type using a psychophysiological approach via diaries and saliva cortisol samples.

These studies highlight the complexity and diversity of on-call work schedules and indicates that no two on-call schedules are the same, as each is specific to the requirements of the service. It indicates that there are many areas of concern for the health and well-being of on-call workers, especially in relation to lack of recovery, stress, mental well-being, and burnout particularly when on-call called and when on-call not called. Specifically, nearly all of the ratings for the on-call not called were different to those when at rest.

Moreover, the saliva cortisol results indicate that being on-call and not called out is the most stress provoking shift type, contrary to EU ruling (European Working Time Directive 2004). Analysis of the personality measures also revealed that trait anxiety and coping styles are significant predictors of strain. Similarly, different coping styles and social support are key factors and moderators in the ability to cope with the unpredictable nature of on-call.

## **Chapter 1 Work Scheduling**

### **1.1 Summary**

On-call working is a rapidly expanding type of work scheduling (Nicol & Botterill, 2004). This is arguably due to its status as a cheaper option to shift-work. Furthermore, its prevalence is an effect of the evolving nature of employment in the UK, from a factory based economy to that of one based on services and the need for 24 hour 7 day a week operations. Essentially, little is known, or indeed understood about this relatively new form of work scheduling, which takes many different forms. The common theme however is that workers who have to undertake such duties must be ready to respond when called upon.

This chapter aims to examine working schedules outside of what is generally considered normal working hours (i.e. 9am to 5pm). It begins by outlining long working hours and continues by discussing on-call working research that has been conducted, which is the main topic of this thesis.

However, despite the prevalence of on-call work scheduling there is a general lack of research into on-call working and its effects, but there is a vast amount of literature on the closely related area of shift-work. Hence, this chapter also reviews shift working and the detrimental effects associated with such work scheduling as it may offer further insights into the possible effects of on-call working. Therefore the first two chapters of this thesis will discuss the research to date regarding these issues as follows:

#### **1.1.1 Chapter 1 Work Scheduling**

This chapter focuses on work scheduling and begins by discussing the literature relating to *on-call working* as the central issue of the thesis. It continues by detailing further relevant background research including similar forms of working from which to gain an understanding of the possible outcomes for on-call workers. Therefore, chapter



one aims to provide an understanding of the issues surrounding on-call work scheduling either directly via on-call research or indirectly through research into other forms of work scheduling.

### **1.1.2 Chapter 2 Effects of Work Scheduling**

This chapter discusses the literature relating to the *effects* of different types of work scheduling. It begins by detailing the most common complaint of work, that of fatigue. It then continues by discussing recovery or lack of recovery as an indicator of fatigue. Finally, this chapter concludes by highlighting stress as both a factor in fatigue and lack of recovery.

## **1.2 Long Working Hours**

### **1.2.1 Introduction**

One of the most basic components of occupational exposure is time spent at work, as it structures all other aspects of daily life (Johnson & Lipscomb, 2006). Indeed the working structure of an individual's life has profound significance not only whilst at work but also when they go home. Hence, long working hours have and will continue to be of enormous concern for the health and well-being of working people (Bosch, 1999). Over a hundred and fifty years ago the 16 hour working day and 6 day working week were commonplace in factories (Weightman, 2003). Since such times there have been widespread changes to working hours, in both length and structure. Moreover, throughout the latter part of the 19<sup>th</sup> century working hours gradually declined (Bosch, 1999). But this trend has not continued and over the last three decades the number of workers working long hours has greatly increased with many workers working in excess of 50 hours per week (Khun & Lozano, 2006).

This is due in part to economic, cultural, institutional, and legal factors as each of these contribute greatly to the trends in working hours (Caruso et al., 2006). Essentially, this trend is especially pronounced among the highly skilled professions (Khun & Lozano, 2006) and, is due in part, to a move from the production of goods and a factory based economy to a largely service based workforce (Johnson & Lipscomb, 2006).

Not surprisingly, the increase in working hours and structure are among the most important aspects of occupational exposure to an array of many work related psychological, physical and social deficits. Moreover, the increasing need for round-the-clock operations may carry substantial human and economic burden from job-related health deficits and loss of productivity (Kerin & Carbone, 2003).

In recognition of this, an increasing body of research has found that long working hours may have serious consequences for an individual's health and safety and the safety of others (Kecklund, 2005; Grosch, Caruso, Rosa & Sauter, 2006). For example, long working hours have been associated with motor vehicle crashes (e.g. Horne & Reyner, 1999; Barger et al., 2005) and medical performance errors (Landrigan et al., 2004). Furthermore, there is research evidence which suggests that working long hours can lead to sleep deprivation, and includes associated risks of illness and injury that are further exacerbated by both high workload and shift-work (e.g. Akerstedt, 2003; Costa, 2003; Knutsson, 2003; Durmer & Dinges, 2005; Akerstedt, 2007). Nevertheless, data from the Health and Safety Executive indicates that work related accidents and injuries in the past twenty-four months are at an all time low. This suggests that even in the current economic downturn, when it is highly likely that employees are working significantly more hours to make ends meet/cover for employees who may have been laid off, the incidence of accidents at work related injury have not increased, contrary to the findings of these studies.

However, in addition to the issues associated with working outside of, what are considered normal working hours, there is also increasing evidence that indicates *extended* working hours are associated with negative effects on employee health and well-being (e.g. Spurgeon, Harrington & Cooper, 1997; Spurgeon, & Cooper, 2000; Harrington, 2001; Raediker, Janßen, Schomann & Nachreiner, 2006). Specifically, research indicates that there is a link between overtime and significant health deficits, which include cardiovascular disorders including coronary heart disease (e.g. Hayashi, Kobayashi, Yamaoka & Yano, 1996; Virtanen et al., 2010), poor general health (Ettner & Grzywacz, 2001), stress (Maruyama & Marimoto, 1996), and musculoskeletal discomfort (Lipscomb, Trinkoff, Geiger-Brown & Brady, 2002).

Similarly, it has been argued that working long hours acts both directly as a stressor, by increasing the demands on an individual when attempting to maintain performance levels, and indirectly, by increasing time spent in the workplace in which the worker is exposed to further sources of workplace stress (Spurgeon et al., 1997). In addition, several studies have discussed long working hours in relation to a range of potential stressors indicating their effects on psychological well-being, e.g. hours worked and mental and physical exhaustion (Oppenheim, 1987; Daniels & Guppy, 1995), long working hours and family problems (Duffy & McGoldrick, 1990), overtime working and psychological distress (Ezoe & Moromoto, 1994).

The above paragraphs undoubtedly outline the significance of working outside of 'normal' hours, as well as the threats associated with extended working hours - Clearly, working on-call could be argued to be categorised under both of these 'headings', as on-call workers also work in opposition to their natural body rhythms when responding to call-out after completing their normal working hours. However, examination of the research literature relating specifically to on-call reveals that this research has yet to be directly conducted. Therefore, a thorough examination of this literature is considered appropriate here.

## **1.3 On-call Working**

### **1.3.1 The prevalence of On-call Work Scheduling**

As discussed above, working hours and schedules have been reviewed for a variety of work patterns however; one such work scheduling has received very little attention. On-call work scheduling occurs in an array of occupations including doctors, midwives, physiotherapists, mental health nurses, police and fire officers, airline pilots, ship engineers, HM coastguard, RLNI, utility workers, information technologists, and media personnel (Nicol & Botterill, 2004; Earle & Reid, 2007). As the term suggests, on-call

working has been literally defined as “ready to respond” (Medterms). Hence this form of work scheduling is frequently used to provide 24 hour cover, 7 days a week in many settings including hospitals and emergency services in order to deal with critical situations, where the volume of work does not necessarily warrant full shift cover (Nichol & Botterill, 2004). For many employees within these professions, being on-call is not an option but an integral component of the job. Essentially, utilising this type of work scheduling is often far less expensive for employers than providing full shift-work cover during out of hours, even when on-call workers receive recompense for such working (Mabon, 1995). However on-call work patterns can have considerable implications for employees and effect interactions with both family and friends (Berger, 1999). How on-call working effects those who undertake it will now be discussed.

### **1.3.2 Effects of On-call Working**

Research into the effects of on-call working is extremely limited, especially in relation to other forms of work scheduling such as long working hours, shift and night-work, and overtime work. The research which has been carried out to date has been specifically concentrated within the medical profession and, for the most part, remains sparse. It has been focused on the areas of Junior Doctors (e.g. Firth-Cozens, 2003), Anaesthesiology (Linfords et al., 2006), General Practitioners (e.g. Appleton, House & Dowell, 1998), organ transplant co-ordinators (Smithers, 1995), and Dentists (e.g. Murray, 2000). These studies have been devoted almost entirely to the areas of stress, sleep and personal/family safety, with very little attention being paid to other areas of work or social demands, combined with on-call working.

Essentially, these studies indicate that the on-call employee must plan their lives around their on-call schedule, often limiting outside work activities so as not to interfere with their on-call schedule (Nichol & Botterill, 2004). In addition, on-call working periods curtail interactions with family and friends (Berger, 1999). Furthermore,

reported stress levels are high when home life is interrupted, thus the juxtaposition between work and home become a perpetual stressful event.

While research within the domain of medicine is sparse, research outside of this domain has received even less attention. Nevertheless, within this small body of research, results indicate that on-call working has impacted on well-being in French utility workers (Imbernon, Warret, Roitg, Chastang & Goldberg, 1993), difficulties in getting to sleep and remaining asleep in railroad operators in the USA (Pilcher & Coplen, 2000), and reduced sleep quality in Swedish ships' engineers (Torsvall & Akerstedt, 1988). Therefore, further exploration of on-call working, and the possible effects it may have on employees, across all occupational groups who have on-call scheduling as part of their contract of employment, would seem appropriate to further corroborate or dismiss these initial findings.

More recently, a study investigating well-being combined with the social implications of on-call working in information technology workers reported a decrease in well-being during the on-call work schedule (Bamberg & Funck, 2006). The most notable finding in this research indicated that the impact of on-call working was greater when the employee had completed a normal day's work and was then scheduled to undertake on-call duties that evening, in comparison to being scheduled to work the weekend on-call. In addition, although general activities during the on-call work were not generally affected, there were differences in household activities, which were found to be reduced during the on-call period. Of further interest here were that the differences in well-being, which were more pronounced during normal work days than at weekends.

Furthermore, this research reported that the impact on well-being remained the same irrespective of being called in to work during the on-call period. Importantly, this

study highlights the concerns that having on-call work scheduling as part of an individual's job may have detrimental implications for the employee's well-being, whether or not they are called out during that on-call working period. This may be due in part to difficulties in falling asleep and staying asleep whilst on-call (Pilcher & Coplen, 2000).

Indeed, research examining sleep in shift workers found no improvements in sleep behaviour during the shift worker's rest days, which was attributed to the rostering of on-call working periods being included in their rest days (Rosa, Colligan & Lewis, 1989). Therefore the confounding effects that this had on such individuals were unlikely to be restorative and consequently could not be considered the same as true rest (Williamson, Gower & Clark 1994). Essentially, the un-predictive nature of the on-call schedule may also generate a great deal of stress, as home life is interrupted and the on-call worker has to shift roles and adopt their professional persona at any time during an on-call period (Nicol & Botterill, 2004).

A similar picture has also been reported by Lindfors et al., (2006), in which they investigated on-call stress in a group of Finnish anaesthetists. They noted that exhaustion, irritation, yawning, sleep disturbances, feeling cold, memory disturbances and headaches were the most frequent symptoms reported whilst working on-call. In addition they found significant differences between genders, noting that the women who took part in the study had on average 9% more symptoms than the men. However, the stress symptoms experienced during an on-call period but when not called out have to-date not been investigated. Furthermore, one stress factor that is often overlooked when conducting research within the medical professions is that compared to other professions they are responsible for human beings rather than "objects" (Caplan, Cobb, French, Harrison & Pinneau, 1975). This particular study highlights that there is a need

to investigate further the full implications of on-call working for medical professionals, especially when we consider these are the very people on whom we rely for expert medical care. Thus it is possible that such individuals are not performing at their optimum levels due to the extended working hours they are expected to work. Therefore, the issue of performance and the ability to work at the optimum level during on-call work scheduling will now be discussed.

### **1.3.3 On-call and Performance**

It is well documented that night-shift work is associated with performance deficits during night-shifts (e.g. Akerstedt, Czeisler, Dinges & Horne, 1994; Akerstedt, 2003). Such decrements increase the risk of accidents and injury, a risk that is exemplified by those in the medical professions who often face extended duration on-call (Smith, Cullnan & Eastman, 2008). Evidence suggest that the frequency of these extended duration shifts has been linked to higher risk of fatigue-related medical errors and a higher risk for motor vehicle crashes/near misses during the commute home (Barger et al., 2005; Barger et al, 2006). Indeed, in a study investigating the optimum working hours, including on-call periods, it was reported that attentional failures during night work were far greater when the individual had had less than 2 hours sleep in the preceding 24 hours (Lockley et al., 2004).

Looking more specifically at on-call working, research carried out in a gastroenterological surgical unit examined the laparoscopic surgical skills of 14 trainee surgeons after one night on-call. They found impairment of surgical dexterity which they attributed to fatigue (Grantcharov, Bardram, Funch-Jensen & Rosenberg, 2001). Conversely, not all studies have found the same accuracy impairment after a night on-call. Indeed DeMaria, McBride, Broderick and Kaplan (2005) found that the speed and accuracy of surgeons laparoscopic skills following a night of call improved rather than



experiencing a deterioration in performance as Grantcharov et al found. However, a study of interns working on-call indicated high levels of medical mistakes when being monitored by more senior physicians (Landrigan et al., 2004). It was only when rest conditions improved by limiting work to 16 consecutive hours and a maximum of 60 hours per week that such medical errors decreased. Further, it has been indicated that fatigue related to on-call working was the second largest reported cause of medical mistakes (Wu, Folkman, McPhee & Lo, 2003) and 37% of British physicians thought that long working hours impaired medical safety (Wilkinson, Tyler & Varey, 1975).

In general it is not surprising that daytime performance due to fatigue is associated with significant social, financial and human cost (Durmer & Dinges, 2005): As on-call workers sleep is often interrupted and workers often report difficulty in falling asleep and staying asleep whilst on-call, it is intuitive that the performance levels of such workers may be compromised. Add to this the reported detrimental effects on health and the curtailment of familial and social interactions; it is not unreasonable to determine that on-call working may pose serious consequences for the health and well-being of on-call workers. However, without further exploration into this much under researched area of work scheduling the true scope of the impact that on-call has on the individual will remain unknown.

#### **1.3.4 On-call Working Summation**

There is currently a limited amount of research focusing on the impact of on-call working, which is apparent from this literature review. Hence it is not unreasonable to assume that the effects of on-call working across occupations warrant further investigation. The necessity to examine the diversity of on-call working in a number of occupational groups will further facilitate a greater understanding of the impact that this type of work scheduling. This is especially significant when we consider that the

number of employees, for whom on-call work scheduling is a contractual obligation, is rapidly expanding.

Therefore, as further research is greatly needed regarding on-call working it is necessary to draw on research that is akin to on-call working, namely shift-work. Essentially, the on-call worker is effectively working under an extended shift, albeit for the most part at home waiting to be called. Hence it would seem appropriate to investigate the full implications of shift-work in order to obtain a research foundation from which to begin to explore and gain an understanding of the intricacies of on-call working. It is also of crucial importance to understand and determine what the long-term effects of on-call working are for those who have to undertake these duties. Therefore, this chapter will now discuss in detail shift-work and its effects on the individual in terms of fatigue and performance. It will examine individual differences and scrutinize the health and psychosocial consequences of working non-optimal hours.

## **1.4 Shift-work**

### **1.4.1 Introduction**

The earliest documented interest in shift-work was that of Ramazzini (1713) in which he noted his concerns for bakers, who worked at night and tried to sleep during the day. Whilst still a medical student, Ramazzini's attention was drawn to the diseases that workers suffered, so he focused his attention to workers health after graduation, visiting workplaces and documenting and discussing their illnesses with the employees (cited in Franco & Franco 2001). Whilst in his post as chair of theory of medicine the courses he taught were solely dedicated to the diseases of workers, and it is for this reason he is considered, by many the father of occupational medicine (Franco & Franco, 2001).

However, it was the advent of the industrial revolution which first led to many people working long hours. This continued until reformative legislation curtailed the worst aspects of our factory based economy. Today, throughout Europe approximately one in five workers are employed on-shift-work which involves some form of night work (Harrington, 2001). Similarly, in the UK, shift-work is common with some 20% of the workforce being engaged in some form of shift-work, including those who work permanent nights (Costa, 2003). Fifty years ago the shift worker was likely to be factory based, but there is now increasing demand for services, both business and pleasure that has extended to traditionally “white collar” occupations (Harrington, 2001). For example, occupations such as fire-fighters, police officers, information technology workers, the medical professions including nurses and other hospital personnel, and those working in some manufacturing industries are required to work shifts; however, this list is not exhaustive. The reason for this growth in shift working is that, many companies, organisations and services require 24 hour cover during which employees are required to work part of that period.

In view of this requirement the frequency of shift-work varies greatly depending on both the size and nature of the organisation or service concerned, with shifts typically consisting of either 8 or 12 hours (Loudoun, 2008). Similarly, the prevalence of shift-work has increased considerably over the past fifty years, resulting in this sizable minority of the workforce carrying out a wide variety of shift-working systems (Folkard & Hill, 2002). The adverse effects of which, from both a health and social point of view, are reasons for attrition in the workplace (Hall & Wakeman, 1999).

For example, research has indicated that shift-work, and in particular night shifts, interrupt sleep patterns (Kuhn, 2001). These interruptions are argued to stem from working in opposition to the body’s normal circadian rhythms i.e. the sleep/wake cycle. These natural circadian rhythmic functions include body temperature, respiratory rate,

urinary excretion, cell division and hormone production, all of which are modulated by exogenous factors comprising light-dark cycle, social climate and work schedules (Harrington, 1994). In addition to these exogenous factors, circadian rhythms also consist of an endogenous component that is regulated by an internal clock located in the hypothalamus and it is argued that the system is optimal when these two components complement each other and work in harmony (Toates, 2001). However, when workers are expected to work at night and sleep during the day the exogenous and endogenous factors work against each other (Folkard, 1990). This disruption to circadian rhythms has a number of implications for the shift-worker and those who work long hours such as health effects, familial and social interactions and efficiency of performance (Akerstedt, 1990).

As such, there is evidence to suggest that shift-work and in particular night-shifts, may have adverse influences for the health and well-being of the individual worker (e.g. Akerstedt, 2003). Hence, shift-work has been implicated in aggravating and exacerbating existing medical conditions, (Scott, 2000). Undeniably, studies investigating the health implications of working shifts have highlighted an increased risk of cardiovascular, gastrointestinal and reproductive dysfunctions, (Harrington, 1994; Nurimen, 1998). Moreover, several studies have reported an increased risk of some cancers (Davis, Mirick & Stevens, 2001; Hansen, 2001; Fu & Lee, 2003; Kubo et al., 2006).

Consequently, there are many problems associated with shift working and each will be discussed commencing with the biology of circadian rhythms.

#### **1.4.2 Shift-work and Biological Circadian Rhythms**

Firstly, the health implications of working shifts stem mainly from working in opposition to the body's normal circadian rhythms. Circadian comes from the

combining of two Latin words *circa* meaning about and *dia* meaning day, and refers to the bodily rhythms that vary throughout the day in a periodic fashion (Kuhn, 2001). Indeed, all living organisms have a physiologic system that is cyclic in nature (Winget, De Roshia, Markley & Holley, 1984). In humans, many of the bodily functions exhibit circadian rhythms, these include body temperature, respiratory rate, urinary excretion, cell division, hormone production and more recently bone growth (Harrington, 2001). Many of these systems provide for internal stability, whilst at the same time enabling the organism to interact with the external environment, including responding to changes within that environment. This process, known as entrainment, is effectively the matching of the endogenous circadian rhythm to environmental timing cues (Kuhn, 2001).

Effectively, most circadian rhythms have both an endogenous component and an exogenous component (Whitehead, Thomas & Slapper, 1992). The endogenous component is regulated by an internal clock located in the supra-chiasmatic nuclei (SCN) situated in the frontal hypothalamus (Bear, Connors & Paradiso, 2001). Currently, the SCN is deemed the most important structure maintaining the circadian rhythm, but there may also be other structures, such as the pineal gland, that are important in sustaining the timings of the physiological systems (Brown, 1990). The exogenous component is composed of various time clues called *zeitgebers*, (from the German for ‘time givers’) the most powerful of which is the light/dark cycle (Burgess, Sharkey & Eastman, 2002). From the retina there is a direct neural tract connected to the SCN so that light and dark act as powerful stimuli to assist in entrainment (Brown, 1990). In turn entrainment is assisted by *zeitgebers* the most important of which is the light-dark cycle that influences our sleep-wake cycle.

### **1.4.3 Shift-work Sleep and Disturbed Circadian Rhythms**

Of all the circadian rhythms, the most dramatic is that of the sleep-wake cycle as it is the most obvious, and its disruption is the most distressing (Kuhn, 2001). Primarily, it is important to understand that sleep is a significant factor in restitution (Meijer, Groos & Rusak, 1986), with both homeostatic and circadian influences simultaneously affecting sleep (Akerstedt, Kecklund & Gilberg, 2007). As such, the neural processes, which control alertness and sleep, create an increased sleep tendency and a diminished ability to function during the early morning hours (circa 2-7am) and to a much lesser extent, during the mid-afternoon (circa noon – 5pm), (Mitler et al., 1988). Hence, one of the major complaints of shift workers is that their daytime sleep, between their night shifts is disturbed. To this end, many cite environmental noises, but it seems probable that the most likely cause of disturbed day sleep is that it is taking place at an inappropriate phase of the endogenous timing system (Folkard & Hill, 2002). Therefore, without the individual's circadian rhythm adjusting itself to night work, their day sleep will be greatly reduced compared to that of their normal night sleep. As such, the typical day sleep of shift-workers is between one to four hours shorter than normal night sleeps, which is largely due to a reduction in Stage 2 and rapid eye movement (REM) sleep, rather than in the deeper slow wave sleep (Folkard & Hill, 2002). There is also increasing evidence that neurobiological factors play a part in the regulation of sleep and wakefulness. Many recent research studies have confirmed this theory using both subjective and objective measures (e.g. Lammers-van der Holst, Van Dongen & Kerkhof, 2006; Van Dongen, 2006; Santhi, Horowitz, Duffy & Czeisler, 2007; Smith, Cullnan & Eastman, 2008).

With this in mind it is not surprising that increased sleepiness and high levels of fatigue are a regular occurrence in many shift-work settings (Jay, Dawson, Ferguson & Lamond, 2008). Research has consistently shown that such feelings are particularly

prevalent during the night (e.g. Paley & Tepas, 1994; Harma, Sallinen, Ranta, Mutanen, & Muller, 2002; Ingre, Keckland, Akerstedt & Keckland, 2004; Takahashi et al., 2008). Hence, it follows that those who must work at night, and sleep during the day, pit the endogenous and exogenous factors against each other, and thus suffer the consequences, for example sleepiness. Consequently, principally due to the influence of the body clock, night workers will show a cumulative sleep deficit over successive night shifts, which can only be partly restored on their rest days (Akerstedt, 1985).

Such problems occur because the circadian rhythm is relatively stable, and although it can be entrained to a new timing of environmental clues, this takes time (Wever, 1979). Both homeostatic and circadian influences simultaneously affect sleep. Thus creating, in the individual, a kind of time lag during which they may feel out of phase with the environment. The term used to describe this time lag is *desynchronosis* or jet/shift lag as it is more commonly referred to (Wegmann & Klien, 1985). This desynchronosis, results in a multitude of physical symptoms, which include: poor mood, gastrointestinal distress and fatigue to name but a few (Costa, 2003). But undoubtedly the effects of *desynchronosis* are most notably felt in the form of fatigue.

#### **1.4.4 Effects of Shift-work: Alertness and Fatigue**

Throughout the last century, a significant accumulation of research has established the existence of latent occupational health and safety risks associated with sleep loss and fatigue (Dorrian, Roach, Fletcher & Dawson, 2006). Indeed, it is well documented that most shift workers have occasional disturbances of sleep and approximately one third report feeling fatigued (Akerstedt, 1988). However, a recent study found no significant relationship between extended working hours and fatigue irrespective of contractual hours i.e. shift type (Beckers et al., 2007).

Conversely, research has highlighted that feelings of fatigue in shift workers can often persist throughout the whole shift and often spilled over into the following day (Leung, Chan, Ng, & Wong, 2006). Moreover, nurses reported struggling to keep awake, exhaustion and stress at work during one in three shifts (Dorrian et al., 2008). This may be due in part to the type of shift system, as research has highlighted that the 12-hour shift system increases the potential for fatigue (Rosa, 1995).

Further, research evidence suggests that sleep is most likely to be diminutive prior to shifts that commence early in the morning (Roach, Reid & Dawson, 2003). Such disadvantages have been reported to be of particular importance for 12-hour night shifts (Smith, Folkard, Tucker & Macdonald, 1998). Indeed, studies have also noted that the 12-hour shift has detrimental effects on sleepiness and fatigue, which impacts on recovery and health (e.g. Kecklund, Ekstedt, Akerstedt, Dahlgren & Samuelson, 2001; Baulk, Fletcher, Kandelaars, Dawson & Roach, 2009).

However, not all studies have reported the same findings (e.g. Mitchell & Williamson, 2000). This may well be attributable to the type of shift-work undertaken. For example more physically demanding shift-work may be significantly more fatiguing than mentally taxing shift-work (Costa & Sartori, 2007). In line with this proposition is the evidence from laboratory studies which have demonstrated that both complexity and workload can influence the extent to which a task is affected by sleep loss and fatigue (Dorrian et al., 2006). Most notably, Dorrian et al., suggest that as sleep loss continues performance is increasingly variable, creating a state in which the individual cannot be characterized as either fully awake or asleep. Therefore, despite considerable variation between individuals and across different types of shifts, sleep loss is a major effect of shift-work (Akerstedt, 1990).



Furthermore, research has highlighted that sleep loss and fatigue may constitute higher order cognitive deficits such as memory (Harrison & Horne, 2000). Evidence to support this theory has been found in rail crash investigations during which work-related fatigue has been identified as a contributing factor (Pearce, 1999). Indeed, more recent research investigating this phenomenon found that increases in fatigue produced increases in frequency and duration of attentional lapses (Dorrian et al., 2006). Similarly, investigations into the adverse effects of sleep deprivation indicate four distinct deficits have been highlighted: executive functions (Harrison & Horne, 1998); temporal memory (Harrison & Horne 2000); attentional processes (Kim et al., 2001); and working memory (Drummond, Gillin, & Brown, 2001).

There is also research evidence which suggests that drivers with high levels of fatigue may be more likely to engage in risky behaviour and that sleepiness affects decision making and risk taking (McLean, Davies & Thiele, 2003). Hence, not surprisingly, research has indicated that the main effects of shift-work are fatigue and safety (Smith et al., 1998). Undeniably, these detrimental effects may be both acute, affecting, for example alertness, and chronic, for example long term fatigue (Smith et al., 2005). Indeed, research into rail accidents globally have alluded to work-related fatigue (e.g. Pearce, 1999) and an ability to sustain vigilance (Doran, Van Dongen & Dinges, 2001) as contributing factors. Thus individuals are most vulnerable to the consequences of fatigue, which in itself has been found to be associated with increased risk of errors, accidents and injuries (Barger et al., 2005). However, research suggests that fatigue may be more likely to manifest itself in terms of a reduction in efficiency, and given the complex nature of fatigue, effects on performance may be manifold (Dorrian et al., 2001).

### **1.4.5 Shift-work and Performance**

Interest in performance decrements associated with long hours of work was first observed in munitions workers in the First World War. These studies highlight that reducing hours of work down to 50-55 hours per week resulted in an improvement in the quality and quantity of units produced (Vernon, 1920). However, since these studies were conducted there has been much research carried out into the comparability of working conditions and performance between shifts.

Within a clinical context, research examining the differences in performance across day and night shifts in anaesthesiology revealed that night shift residents, who had been awake for more than 16-hours, displayed marked differences in task performance and mood (Cao et al., 2008). In general, it is also well documented that work efficiency during the night is not the same as during the day (Costa, 1996; Costa, 2003), with particular impact on impaired productivity and safety (Folkard & Hill, 2002). Equally, the consequences for numerous aspects of performance between shifts are also well documented (e.g. Folkard, 1996a), which suggests that the disruption of circadian rhythms in shift working individuals induces changes in alertness and cognitive efficiency. Further, evidence also suggests that sleep deprivation, such as changes in shift, is associated with cognitive impairment (Rouch, Wild, Ansiau & Marquie, 2005).

Therefore, it is not surprising that recent research has established that shift workers showed lower cognitive scores than workers who had never worked on-shift (Rouch et al., 2005). Their findings report significant differences in processing speed and selective attention. They conclude that the lower cognitive functioning they observed was not due to sleep disorders but to circadian rhythmic desynchronisation. Indeed, research from both field and laboratory studies indicate that disruption of

circadian rhythms elicit short-term effects on cognitive performance (e.g. Folkard & Monk, 1979; Winget et al., 1984; Rogers, Spencer, Stone & Nicholson, 1989; Folkard, 1996b; Folkard, Akerstedt, Macdonald, Tucker & Spence, 1999). Essentially, there is little doubt regarding the existence of the effects, which result from the adverse repercussions on cognitive performance whilst working abnormal work hours (Rouch et al., 2005).

Undeniably, on average, variable shift workers are significantly more likely to complain about loss of concentration and are considerably more dissatisfied with their own work performance (Fido & Ghali, 2008). This is not surprising when we consider that shift-work disrupts both cognitive and physical performance (DeVries-Griever & Meijman, 1987). In addition, the effects of working conditions and sleep loss on cognitive performance indicate that working before 6am or after 10pm on the previous day were significantly associated with poor cognitive performance (Ansiau, Wild, Niezborala, Rouch & Marquie, 2008). Moreover, it was established that the number of hours sleep did not mediate these effects.

Indeed, Akerstedt et al., (2007) carried out a number of studies in which they reported that shift-work affects sleep and sleepiness and that the level of disturbance may have implications for safety and performance. These research studies indicated a sharp increase in accidents; long eye closure durations i.e. long blinks, side variability in the driving pattern and subjective sleepiness. Further, in a recent review it was noted that sleep-deprived caregivers, in a nursing home setting, provide a decreased quality of care (McCurry, Logsdon, Teri & Vitiello, 2007).

However, fatigue and inadequate sleep have also been implicated in motor vehicle accidents (e.g. Lyznicki, Doege, Davis & Williams, 1998; Akerstedt, Peters, Anund & Kecklund, 2005); aviation accidents (e.g. Samel et al., 1997; Mohler, 1998);

and are a significant cause of medical errors (e.g. Ahmed & Fecik, 1999). Indeed there have been many major catastrophes outside of normal working hours, for example Three Mile Island, Chernobyl, Exxon Valdez, the space shuttle Challenger and Buncefield, to name but a few, all happened in the early hours of the morning and all were, essentially, mistakes made by workers who had been on-shift for a long time. It is clear from such post disaster research investigations, and further on-shift studies that job performance is low during most of the night shift, particularly around 3am (Folkard & Hill, 2002). Furthermore, the early morning hours are associated with a five-to-six-fold increase in driving accidents, whether sleep related or not (Akerstedt, Kecklund & Horte, 2001). Hence disturbed sleep is not only related to restitution but also to performance and accidents (Meijer et al., 1986).

Moreover, shift-work and night work are considered key risk factors as workers are exposed to an increased risk of accidents whilst at work (Folkard & Tucker, 2003). Indeed, work injury is an important cause of morbidity and mortality, principally whilst working at night, during shift-work or during the commute home (Driscoll et al., 2004). This is especially notable in industries requiring heavy manual work such as trades, the construction industry, plant and machine operators, agriculture and fisheries workers and long distance lorry driving (Health and Safety Executive). Research investigating injuries within these occupational groups highlights a range of individual and lifestyle factors that are associated with increased risk of work injury, which include age, obesity, smoking, alcohol or substance abuse, sleep disorders, sleep complaints, and excessive day/night-time sleepiness, all of which may contribute to the general health and well-being of shift workers (e.g. Froom, Melamed, Kristal-Boneh, Gofer & Ribak, 1996; Ulfberg, Carter, Gislason, Talback & Edling 1996; Lindberg, Carter, Gilason & Janson, 2001).

That said, more recent research suggests that the incidence of work injury among shift workers occurs independently of such individual, lifestyle or occupational factors, and cite rotating shift patterns as a reason for such injuries (Fransen et al., 2009). However, research has demonstrated, overwhelmingly, that fatigue is the principal contributing factor to reported mistakes and injuries, and has the greatest impact on health and well-being not just for those who undertake shift-work but also for others around them and under their care (e.g. Cooper, Newbower & Kitz, 1984; Nocera & Khursandi, 1998; Akerstedt, 2007).

Consequently, the negative impact of shifts on work outcomes includes a higher frequency of accidents and absenteeism (Costa, 1996; Fido & Ghali, 2008). Hence, as a significant segment of the working population is involved in shift-work this higher frequency also has implications not only for performance but also productivity as noted earlier. Fully understanding these implications is most important when we consider that approximately one in four of all hospital personnel work non-traditional hours (Wilson, 2002). This is particularly significant, not only for shift-work but also on-call working, as research has shown that the increase in error rate on a vigilance task at the end of a 12-hour shift for infrequent stimuli suggests that extra time on-shift may impede performance for out of the ordinary occurrences (Mitchell & Williamson, 2000). With on-call situations being out of the ordinary occurrences, where an employee is on-call following the completion of a normal days shift and is called out to attend an emergency, as is often the case, the implications of Mitchell and Williamson's findings could have serious consequences for such employees and patients.

It has also been suggested that there is a possible link between job characteristics and how these might affect cognitive efficiency the following day in relation to their effects on sleep (Ansiau et al., 2008). Similarly, Pavard, Vladis, Foret & Wisner (1982)

found a negative correlation between mental load during the late evening and the length of subsequent sleep. More recently, research investigating the mediating effects of working conditions on cognitive performance failed to find significant results (Ansiau et al., 2008).

However, aspects within the individual may well have played a key role in mediating these differences. Essentially, the possibility that an individual has the ability to withstand or cope with the variation in working patterns that shift working requires. For example, as people age there is a greater likelihood that sleep will be disturbed due to unintentional awakening from sleep (Smith et al., 2005). As such this and other factors within the individual, which can influence adjustment to shift-work, have been identified.

#### **1.4.6 Shift-work and Individual Differences**

One of the most pertinent aspects to shift-work research is the study of personality psychology in the form of Morning type “larks” and Evening type “owls”, often referred to as circadian typology (e.g. Natale, Martoni & Cicogna, 2003).

The Morningness-Eveningness dimensions and personality traits have been investigated by numerous researchers over the past forty years, including the development of many questionnaires to measure the two types (e.g. Kerkhof, 1985; Tankova, Adan & Buela-casals, 1994; Caci, Robert & Boyer, 2004). The two types are so called due to the aspects of personality to which they pertain, in that, “larks” are individuals who wake early, are refreshed on waking, and go to bed early in the evening, in contrast “owls” have difficulty getting up, are tired on waking and stay up late into the night.

Evidence for the physiological bases of the two personality types has been established in research investigating the acrophase of body temperature, with Morningness types reaching this phase between 1-3 hours earlier than Eveningness types (Natale & Alzani, 2001). Similarly, acrophases of cortisol levels have been found to occur earlier in Morningness types (Kudielka, Federenko, Hellhammer & Wust, 2006). Morningness-Eveningness has also been associated with month of birth (Caci, Robert, Dossios & Boyer 2005), and season of birth (Natale & Adan, 1999).

With regards to performance, the performance of extreme Morning types will deteriorate over much of the day, whereas those with Evening type will improve (Folkard & Hill, 2002). For example in a study of hospital nurses, Morningness was found to be the primary important individual factor decreasing sleep length following night shifts, while in morning shifts Morningness was related to better sleep (Harma, Ilmarinen & Knauth, 1988a). Similarly, recent research examining air traffic controllers Morningness-Eveningness type found that Evening types presented more flexible sleep habits and slept significantly less than Morning types, however regardless of circadian typology, night-shifts generally produced a decrease in daily activity (Cicogna, Martoni & Natale, 2003). Likewise, Smith et al., (2005) highlighted that Morningness in shift-workers was linked to greater levels of drowsiness at night, while Eveningness led to better daytime sleep quality.

Conversely, it could be argued that this is of limited practical significance as typically only 5% to 10% of study participants are pure Morning-Evening types (Ashkenazi, Reinberg & Motohashi, 1997). Indeed, research investigating circadian type and its influence on performance, subjective alertness and well-being was not found to be significant (Petru, Wittmann, Nowak, Birkholtz & Angerer 2005). These

studies indicate that is likely that many individuals may not be pure Morningness or Eveningness types but a varied mixture of the two.

Similarly, of the myriad of studies that have been carried out to identify other aspects of the individual that may modulate adaptation to shift-work, Folkard, (1987) suggests that a way forward may be to select individuals who are naturally more inclined to tolerate shift-work. However, longitudinal research that has been carried out to investigate the possibility of tolerance has not produced convincing results (Natale et al., 2003). Moreover, while research suggests there are many factors that may influence tolerance to shift-work there is no clear evidence that the same factors apply to all types of shift (Tamagawa, Lobb & Booth, 2007). One possible reason for the complexity of the findings may be due in part to age - a factor most cited as decreasing shift-work tolerance (Harma, 1996). Indeed there is evidence to suggest that both age and longer shift-work experience are independently related to poorer sleep (Akerstedt & Torsvall, 1981). It may also be due to differences in shift workers circadian activities and sleep as these are strongly influenced by the timing of their shifts (Kawada, 2002). Essentially, Kawada postulates that older morning shift workers slept significantly longer than younger workers and concludes that sleep onset time in morning and evening shift workers becomes earlier with aging. This may be due in part to changes in mood and negative affect as both have been shown to relate to shift-work intolerance (Parkes, 2002). It is clear that such symptoms are very frequent among some shift-workers (Kogi, 1996).

However, more recently it has been recognised that individual factors interact with working conditions to create complex relationships between shift-work performance and individual differences. Specifically, individuals working in jobs that have higher mental involvement and autonomy maintain their ability to perform at the



optimum level. Their performance remains fairly static and high over the years.

Conversely, where the work is more of a physical nature the opposite is found (Costa & Sartori, 2007). Costa and Sartori, further propose that gender and working hours appear to interact in influencing work ability, especially in more physically demanding jobs, with females experiencing stronger effects of physical shift work.

An explanation of these gender effects can be found in the known differences in the body clocks of men and women (e.g. Folkard & Hill, 2002), with women typically requiring around 90 minutes more sleep than men (Oginska & Orginski, 1990).

Consequently, research suggests that women who work shifts report higher levels of sleepiness whilst on-shift (Spurgeon, 2003). Indeed there have also been many studies that suggest that shift working women have a higher absenteeism rate than their male counterparts and more frequently report chronic fatigue and psychoneurotic, digestive, and circulatory complaints (e.g. Oginska, Pokorski & Oginski, 1993; Costa & Sartori, 2007). However the health complaints of shift workers are not just limited to women.

#### **1.4.7 Shift-work and Health Problems**

Health and well-being are undoubtedly the most widely and extensively researched factors linked to shift-work. Medical interest for such problems started between the first and second World Wars, with research increasing greatly over the decades (Costa, 1996). Fundamentally, it has been established in this plethora of research into shift-work that the body's circadian rhythms are affected, which leads to physiological disturbances. The primary important physiological problems associated with shift-work and night shifts is that eating and sleeping phases are disrupted or changed from their natural circadian rhythm (Harrington, 2001). Therefore, it is important to understand that sleep is a significant factor in restitution (Meijer et al., 1986).

Indeed sleep duration has been found to play a key role in heart health (Mullington, 2009). Effectively, employees who are engaged in shift-work are prone to a multitude of physical disturbances (Barnes-Farrell et al., 2008). In particular, shift and night-shift work are associated with an increased incidence of cardiovascular dysfunction and heart disease (Boggild & Knutsson, 1999; Knutsson & Boggild, 2000; Yadegarfar & McNamee, 2009), gastrointestinal disturbance (Scott, 2000; Knutsson, 2003), cancer (Davis et al., 2001; Hansen, 2006; Kubo et al., 2006; Viswanathan, Hankinson & Schernhammer, 2007; Chung, Wolf & Shapiro, 2009; Wise, 2009), and reproductive dysfunction (Nurimen, 1998; Knutsson, 2003).

One particular concern is the reported effect of artificial light when working at night and the risk of developing breast cancer (Davis et al, 2001). Interestingly, this research has been replicated by many scientists from ten different countries and all reached the same conclusion that artificial light at night stimulates breast cancer growth by suppressing melatonin, a key hormone that helps regulate the sleep wake cycle (Wise, 2009). The results of these studies highlight a considerable risk to women's health, which is especially significant when we consider that in many of the healthcare professions shift working is an integral component of the job, e.g. nursing. There is also research evidence to suggest that women who work shifts experience menstrual cycle disturbances, and hormonal changes (Lin, Kripke, Parry & Berga, 1990; Harlow & Ephross, 1995). Recent reports have also linked shift-work with impaired immune function and an increased risk of miscarriage, low birth-weight and prematurity (Harrington, 2001).

However, the detrimental effects of shift and night-work are not just limited to physical health as research has indicated that it may also lead to a decline in psychological well-being (Bohle & Tilley, 1989; Scott, Monk & Brink, 1997; Barnes-

Farrell et al., 2008). Indeed, mental health problems are considered a major problem in the working population and have been implicated as a leading cause of sickness absence and work disability (De Raeve, Kant, Jansen, Vasse & van den Brandt, 2009).

Therefore, it is not surprising that research has indicated that poor mental health is associated with an increased risk of leaving a shift-work job (van Amelsvoort, Jansen, Swaen, Van den Brandt & Kant, 2004). Similarly, where the employees need for greater recovery was a cause for concern they were more likely to reduce their working hours or change jobs within the company in order to reduce or eliminate psychological distress (De Raeve et al., 2009). Moreover, recent research highlights that shift-work characteristics account for a significant decrease in general psychological and physical health and well-being (Barnes-Farrell et al., 2008).

However, it is important to acknowledge that the health outcomes of shift-work may take many years to manifest themselves especially in those who remain in shift-work for a long time (Costa, 1996). This may be due, in part, to different levels of (mal)adaptation and (in)tolerance (Costa, 1996). However, recent research indicates that it is the severity, rather than the number of health complaints that changes with increasing shift-work exposure (Barnes-Farrell et al., 2008). Support for this theory has been reported in research investigating the documented health complaints of former shift-workers (Koller, 1983).

Furthermore, it has also been determined that a number of factors also contribute to the health consequences of shift-work on shift workers. For example Waage et al., (2009) reported that the organisation of the shift pattern, coping strategies used by the individual, and the psychological demands and control of the work situation play a mediating role in contributing to the health consequences of shift-workers. Essentially, there is even research evidence to suggest that lack of sleep due to shift-working

reduces immune function and increases susceptibility to the common cold (Cohen, Doyle, Alper, Janicki-Deverts & Turner, 2009).

Indeed, there is a general consensus in those in the research community examining the effects on well-being and health that shift-work is essentially bad for such workers health (Rutenfranz, Haider, & Koller, 1985). As discussed above the effects observed are many and varied and include reported disruptions to not only physical and psychological problems but also task performance and social functioning (Scott, 1990). In essence, the biological pathway discussed here accounts for only half of the possible accountability for ill health in shift working. The other half has been attributed to the social pathway in which the social consequences of working shifts may lead to health problems via desynchronisation and the psychosocial consequences of work-family conflict.

#### **1.4.8 Shift-work and Psychosocial Consequences**

The rising prevalence of shift-work in many occupations has resulted in an increasing number of individuals becoming desynchronised from their social environments (Smith et al., 2005). Fundamentally, it is widely accepted that the negative effects of shift-work occur due to a disparity between altered sleep-wake cycles, internal circadian rhythms and community rhythms of business, social recreational and domestic activity (Costa, 2003). Hence, the effects of shift-work on shift workers and their families and communities are well documented (e.g. Wedderburn, 1967; Gadbois, 1981; Nachreiner, 1998; Perry-Jenkins, Goldberg, Pierce & Sayer, 2007). Understandably, it is not surprising that shift-work can therefore, lead to social marginalisation.

Essentially, shift workers often experience considerable disruption to family and social activities because many of these take place during the day or early evening,

usually when the shift worker is either at work, asleep or trying to sleep. Basically, shift workers are required to work and sleep at times that conflict with normal social and biological patterns (Loudoun, 2008). Working shifts may lead to social isolation and an erosion of social support primarily due to shift working schedules that are at odds with social routines (Haines, Marchand, Rousseau & Demers, 2008). Indeed, society expects people to do their sleeping at night, and additionally expects community and family interaction to take place during the evenings and at the weekend. This creates problems for shift workers and results in contact with family members often occurring at inopportune times. Specifically, inter-role conflict arises when work and family roles are incompatible, with participation in one role being made more difficult by participation in the other (Greenhaus & Beutell, 1985).

Similarly, family members may have to rearrange routines such as mealtimes, when household chores are done, and children may have to be kept quiet in order for the shift worker to acquire their restitution. Hence, research evidence suggests that children of shift workers have a higher incidence of emotional problems than those of day workers (Barton, Aldridge and Smith, 1998). More recently, research has highlighted that shift-work schedules have a negative impact on relationship stability, especially for couples with children (Presser, 2000). In addition, there is also growing evidence to suggest that shift workers have an increased risk of divorce and children with anxiety and behavioural problems (Pisarski et al., 2006). In essence, shift-work schedules are associated with relationship stress and work-family conflict (e.g. Kingston & Nock, 1987; Simon, 1990). This work family conflict is usually defined as occurring when the emotional and behavioural demands of work and non-work roles are incompatible (Carlson, Kacmar & Williams, 2000). Hence, shift-work is a possible source of work-to-family conflict as it produces time-based and strain-based conflict (Haines et al., 2008).

For the shift workers themselves research has indicated that disturbed sleep and the nocturnal lifestyle which accompanies shift-work may affect psychosocial well-being by disrupting social relationships (Barton, Folkard, Smith, & Pool, 1994). Thus, research indicates that working fixed nights made separation or divorce six times more likely in men who had been married for less than five years (Perry-Jenkins et al., 2007). For women married for more than five years with at least one child the figures are equally disturbing in that they are three times more likely to experience separation or divorce (Perry-Jenkins et al., 2007). In addition, both shift working mothers and fathers report significant increases in relationship conflict across the first year of becoming a parent (Glen, 1990; Perry-Jenkins et al., 2007). There is also evidence to suggest that shift-work affects the family system (Brayfield, 1995). Therefore, shift-work can have negative implications for family relationships, parenting and spousal relationships irrespective of gender.

Conversely, research suggests that the burden of balancing family and work reduces with age in women and their subjective health indices improve (Baker, Roach, Ferguson & Dawson, 2004). Whereas, the same cannot be said for men as they demonstrate a marked deterioration in health as they age (Oginska et al., 1993). That said, recent studies indicate that women experience higher work-family conflict than do men (e.g. Behson, 2002; McElwin, Korabik & Rosin, 2005; Cinamon, 2006; Haines et al., 2008). However, work-family conflict has itself been identified as a stressor that may lead to work, family and health consequences (Bellavia & Frone, 2005). This may be due to shift-work itself, in that it could be considered a structural variable, which supersedes the dynamics of one's social identity (Haines et al., 2008).

Hence, a mismatch from the pressures of work and the family produce tensions that may result in a stress manifestation in the form of depressive symptoms (Haines et al., 2008). Indeed research clearly points to an association between shift-work and ill

health and depression (Totterdell, 2005) and it is highly probable that work-family conflict is complexly related to such health deficits. Evidence in support for work-family conflict as an antecedent to health deficits has been found in longitudinal research that reported depressive symptomatology among employed parents (Frone, Russell & Cooper, 1997). Further, in a national sample of dual-career couples, work-family conflict was positively associated with depression (Hammer, Cullen, Neal, Sinclair & Shafiro, 2005).

Research studies also indicate that stress, distress, anxiety, tension, hypertension, an assortment of physical symptoms, emotional exhaustion and burnout are some of the health consequences implicated in work-family conflict (e.g. Wiersma, 1990; Frone, Russell & Cooper, 1992; Frone, Russell & Barnes, 1996; Grandey & Cropanzano, 1999; Matthews, Del Priore, Acitelli & Barnes-Farrell, 2006; Haines et al., 2008). Hence, work-family conflict literature clearly establishes an association between work demands and employee well-being (Rice, Frone & McFarlin, 1992; Haines et al., 2008).

This can be extrapolated further by gaining an understanding of the restrictive nature of shift-work on leisure activities. Essentially, social and leisure activities often have to be curtailed to accommodate domestic chores such as banking or shopping in order to fit such everyday jobs around shift working (Loudoun, 2008). In addition, shift workers are far more likely to take naps during leisure hours or use rest days to catch up on sleep in an attempt to increase the time they spend with their families (Orginska et al., 1993). Interestingly, there is evidence to suggest that 12-hour shifts have a negative impact on leisure and family life and under such shift conditions greater recovery time is required leading to an erosion of free time during rest days (Kundi et al., 1995).

Similarly, psychosocial factors such as positive support from family and friends combined with work satisfaction and perceptions of work demands and physical effort have also been linked to sleep quality, physical symptoms, fatigue and experience of stress in shift workers (Akerstedt et al., 2002). In addition the social outcomes of exposure to shift-work in the nursing profession have been shown to have a considerable negative impact on nurses, and in particular critical care nurses (Totterdell & Spelten, 1995; Wilson, 2002). As such, both national and international research investigating nursing proposes that shift-work is unattractive to many nurses and should therefore no longer be accepted as an inevitability of working as a nurse (Dwyer, Jamieson, Moxham, Austen & Smith, 2007). However, previous research into shift-work has indicated that a dislike for shift working is not just limited to nurses, and in an 'ideal world' many shift workers would like to give up shift-work (Oginska et al., 1993). This aversion to shift-work has been implicated in an association between the strain of night-work, health concerns and as cause of disruption to family and social life (Kogi, 1985). Therefore, as work and family represent the central structure of adult life the impact of one on the other must not be considered lightly. Specifically, the considered best fit between work and family life may well function as a crucial link through which conditions at work affect the quality of life and vice versa (Frone et al., 1992). As such the implications of not just the psychosocial consequences but all of the discussed effects of shift-work are now drawn together in a discursive summation of the implications that these issues may have for the on-call worker.

#### **1.4.9 Shift-work Summation**

As previously discussed, shift-work can act as a trigger by matching conflicts between endogenous rhythms and social synchronizers with demanding working conditions, and it impedes on family and social life (Costa, 2003). The main physiological consequence of such work scheduling is the disruption of circadian



rhythm, which as noted earlier in this chapter can have deleterious effects on sleep patterns leading to fatigue, health, performance and social consequences.

The adverse effects of shift-work and night-work, specifically their impact on physical, mental and social well-being, are globally accepted as unfavourable. Indeed such working conditions have implications for normal circadian rhythmic function, sleeping and eating, performance which leads to accidents and errors, disruption to family and social relations and general physical and psychological health and well-being, all of which have a high economic and social cost for the individual and the society within which they belong (More Ede, 1993).

Likewise, on-call is very similar in nature, in that although the employee is at home after completing their day's work they are still working against their endogenous rhythms and social synchronizers due to the fact that they could be called out at any time. The very character of on-call working means that at any point during the time they leave work to the time they start their next working day, they could be, and are often, called back into work (Earle & Reid, 2007). Therefore, it would seem plausible that all of the effects detailed in these shift-work sections could have a significant impact on the on-call worker and their families. However, the exact nature of the effects of on-call work would clearly depend on the structure and type of on-call that is carried out. For example, on-call in which workers are hardly ever called out would have a very different impact on circadian rhythms to a worker who is highly likely to be called out.

In order to help such employees cope with the potentially harmful effects of working such shifts and on-call it would seem most appropriate to investigate fully the implications therein and, where possible offer alternative working designs in order to alleviate the known disruptions to mental, physical, familial and social well-being as highlighted in shift-work research. As such to further underline the negative

implications of work scheduling the following chapter will discuss the effects of work on the individual beginning with fatigue, and continuing with its subsequent consequences i.e. failure to recover from work, which may lead to stress and or distress/anxiety.

Although the literature reviewed in this chapter is intended to create a platform on which to build the research programme, it must be acknowledged that there may be flaws or limitations to the research discussed, as all of the research literature is field research and none are randomised or controlled experiments.

## **Chapter 2 Effects of Work Scheduling**

### **2.1 Summary**

Undeniably the subject of work scheduling is of great importance to the field of occupational health research. Hence, examining the impact of on-call working should also be a justifiable concern within this field. However, before the empirical work is discussed, it is considered important to examine the wider literature - While chapter one has outlined the shift-work literature with regards to effects and consequences of working non-optimal hours, the wider literatures of fatigue, recovery and stress are considered to be an important foundation on which to design the empirical work and provide a theoretical framework for considering the findings. Therefore this chapter outlines the literature relating to fatigue, from subjective tiredness and acute impairments in performance, to more serious deficits such as accidents and major catastrophes. It continues by discussing elements related to fatigue including recovery, and stress by providing a detailed description of the recovery process and stress-related issues. This chapter highlights the complex cyclic processes of fatigue, recovery and stress in that one often leads to another and so forth.

## **2.2 Fatigue**

### **2.2.1 Introduction**

The history of fatigue research is well established in the literature, almost from the inception of psychology as a science, throughout the last century and continuing to date. A primary focus of this work has been the focus on impairments associated with the working day (e.g. Dorrian, Hussey & Dawson, 2007; Ebbinghaus, 1897; Hancock & Desmond, 2000; Takeyama, et al., 2005; Thorndike, 1900; Winch, 1911; Strong, 1915; Poffenberger, 1928).

Similarly, research conducted into the theoretical measurement of the fatigue construct also began to take shape throughout the last century (e.g. Dodge, 1913; Ash, 1914; Bills, 1937). In 1918, during the First World War, an Industrial Fatigue Board was set up to investigate the possibility of developing an objective test for fatigue. It was during these investigations that Muscio, (1921) concluded that it was not possible to find an adequate basis to define fatigue, and suggested that, as such, the term should be banished from scientific discussion.

Essentially, it is this very statement that has plagued much of the research endeavours to the point that no agreed definition of fatigue has been reached, or indeed exists. But the presence of subjective tiredness and impairments in work performance are key elements that researchers have all encompassed as conceptualisations of fatigue. Similarly, bound up within this conceptualisation is the breadth of the definition of fatigue, in that there is an assumption that it is multi-dimensional, as asserted in much of the research literature (e.g. Bartley & Chute, 1947; Cameron, 1973; Hockey & Meijman, 1998). Indeed, the distinction that fatigue incorporates an array of distinct related states has been postulated - nevertheless the lack of agreement as to just how many different types of fatigue should be encapsulated has yet to be agreed. What has

been established is that fatigue is a common phenomenon for all workers, irrespective of cultural influences and occupation (Leung, Chan & He, 2004). It is not only directly perceived, but also personal and cumulative; arising from underlying conflicts, and it may appear suddenly and disappear just as quickly (Bartley & Chute, 1947).

Furthermore, this gradual and accumulative process of fatigue can be broadly divided into two distinct categories mental and physical fatigue (Leung et al, 2004). That said, it is not uncommon to observe further distinctions between a range of other types of fatigue such as emotional and sleep-related fatigue (Earle, 2004). Each of these have been defined in many different ways, but the following descriptions outline the most frequent conceptualisations.

The term mental fatigue is used to describe the deterioration of mental performance following exercise of mental or physical activity. This has been theoretically conceived as a deficit in the cognitive-energetic control mechanisms in the management of mental task demands (Broadbent, 1979). Whereas physical fatigue is a result of a reduction of performance in the muscular system; localised at the neuromuscular junction (Chaffin, 1973). This is considered to be a central response to the physical activity, associated with an aversion to further physical effort (Hockey, 1997). As for the term emotional fatigue or 'burnout' it applies to the wearying effect of working under trying conditions; essentially, performing psychologically disagreeable tasks (Stokes & Kite, 2003). These first three types of fatigue are similar in that they are a central response to an (over) activity within a particular domain. The resulting state is then characterised primarily by an aversion to further similar effort/activity (Holding, 1983). A slightly different category of fatigue is sleep-related fatigue, which is associated with deficits in sleep due to not obtaining the optimum level of sleep and thereby restitution (Hockey & Meijamn (1998).

However, within the field of occupational psychology, mental fatigue is the dominant type of fatigue, (although this is not always recognised explicitly in the literature). This is fatigue following task performance and the demands that given tasks impose on the individual (Ahsberg, 2000). With regard to effects on performance, mental fatigue has most often been identified with a reduction in work effectiveness on extended or demanding mental work (Welford, 1968). That said, there is evidence to suggest that reported subjective fatigue and a decline in work outputs are only weakly related (Hockey, 1997).

In summary, fatigue is often a gradual and accumulative process, categorised and manifested in both physical and mental states such as feelings of weariness, reduced alertness, and a decline in mental performance (Leung et al., 2004). With regards to on-task effects, the degradation in performance levels (during work periods) is considered to be at least partially dependent on the length and intensity of preceding work hours (Meijman, 1997). This issue has obvious implications here for the study of on-call working, which clearly impacts on both the number of hours work, and the intensity of work carried out: On-call workers often work extended working hours (both called-out and not-called) and on-call periods are often characterised by emergency situations which have an intensity beyond that ordinarily experienced.

As a result of such observations, understanding the effects of this type of work scheduling will help to provide insights into the possible consequences of on-call working, and indicate what on-call workers may also encounter within the remit of their work schedule. Therefore the literature detailing the observed effects of fatigue on workers in general and that of those who work long hours, overtime and shift/night-work will now be discussed.

### **2.2.2 Fatigue Effects in Relation to Work Scheduling**

Investigations into fatigue and long working hours indicate that such work-shifts can essentially take two broad forms; either as scheduled compressed work weeks, where workers do 10 or 12 hour shifts including both day and night shifts, and unscheduled long work-shifts such as overtime. Although both are very different in nature each has a common element that of inducing fatigue. However, the source of fatigue (and potentially the 'type' of fatigue) is different following different types of shifts e.g. night shifts are more likely to incorporate mental fatigue, from extended working hours, with sleep-related fatigue, from working in opposition to circadian rhythms (as discussed in Chapter 1).

Moreover, while fatigue at work is clearly a common normal everyday occurrence for many employees, where severe fatigue is present it not only affects the person's performance in their specific occupational setting but also has broader reaching implications for their home life (Beurskens et al, 2000). Furthermore, when fatigue is severe or long term it may lead to sick leave and work disability through burnout (Leiter & Schaufeli, 1996). It is a subjective sensation together with emotional, behavioural, and cognitive components (Berrios, 1990).

Undeniably, it has long been recognised that fatigue is both pervasive and a major issue, as it poses demanding problems for the design of work (Hockey & Meijman, 1998). When work design is not optimal, fatigue is likely to increase and so does the risk of human error and accidents (Durmer & Dinges 2005) and decreased safety, particularly when individuals feel fatigue sufficiently enough to fall asleep (Torsvall & Akerstedt, 1987; Torsvall, Akerstedt, Gillander & Knutsson, 1989; Kecklund & Akerstedt, 1993).

It is a particular concern in various work environments, such as hospitals, where doctors and other professions allied to medicine work long hours (Spurgeon & Harrington, 1989). Especially significant are their on-call schedules as this form of work scheduling is an integral component of the job and often constitute working in excess of 24 to 36 hours (Gaba & Howard, 2002). As such there is compelling evidence that clinician fatigue may lead to ineffective care and adverse patient outcomes (e.g. Gaba & Howard, 2002; Weinger & Ancoli-Israel, 2002). In such instances research studies suggest that recurrent partial sleep deprivation can lead to impairment (Dinges et al., 1997).

Hence where clinician fatigue is present it is most probably due to sleep deprivation, and as sleep is a homeostatic process with amount of previous sleep contributing to or diminishing subsequent levels of alertness (Weinger & Ancoli-Israel, 2002), it is possible that on-call workers performance may be impaired. Indeed it has been suggested that following a difficult night on-call, psychomotor performance may be impaired to the extent equivalent to or greater than is currently acceptable for alcohol intoxication (Dawson & Reid, 1997).

Furthermore, there are many other professions whose work hours are often long and involve early mornings and night shifts (Fletcher & Dawson, 2001; Roach, Reid, & Dawson, 2003). In such instances, the general relationship between irregular hours, shift/night-work and fatigue are well documented (e.g. Rosa & Colligan, 1988; Bohle & Tilley, 1989; Rosa & Bonnet, 1993; Rosa, 1995; Smith et al., 2005; Son, Kong, Koh, Kim & Harma, 2008). Indeed research has established that shift workers typically obtain less sleep and sleep that is of poorer quality than day workers (Kogi, 1982; Rutenfranz, 1982; Naitoh, Kelly & Englund, 1990; Scott & LaDou, 1990).



Subsequently it follows that when fatigue is observed then fatigue, sleepiness and performance loss will increase with the number of hours worked (Rosa, 1995).

Thus the function of sleep generally serves to aid recovery from previous wakefulness and to help prepare for functioning during subsequent wake periods, it is likely that those who work long hours i.e. overtime, on-call, and shift/night workers are not fully afforded such restitution. Therefore the resulting state of such workers will be one of extreme fatigue requiring extra effort on behalf of the worker to combat such feelings (de Croon, Sluiter, Blonk, Broersen & Frings-Dresen, 2004).

Nonetheless it must also be documented that there is evidence to suggest that working shifts may not have any adverse effects, including fatigue, on the health and well-being of some individuals, and that some individuals prefer shift-work to other forms of work scheduling (Colligan & Rosa, 1990). However, the insurmountable evidence to the contrary suggests that working outside of what are considered 'normal' working hours is generally detrimental to the majority of workers' health and well-being, which must not be underestimated (Costa, 1997). Furthermore, recent research revealed a strong relationship between fatigue and health complaints (Ku & Smith, 2010). Consequently, recent research evidence has identified deficits in sleep (sleep of less than 5 hours per night) as a factor in the development of hardening of the arteries, a precursor to heart disease King et al., 2008).

Furthermore, most physical illnesses are associated with fatigue, specifically arthritis, anaemia, asthma and emphysema (Chen, 1986). In studies investigating post infectious fatigue it has been noted that premorbid psychological symptoms are associated with a greater risk of subsequent fatigability (Straus, 1988). This indicates that underlying psychological states induced by fatigue may increase susceptibility to further fatigue and its subsequent subjective symptomatology.

In addition to direct health outcomes, it has been proposed that fatigue may also relate to forms of subjective stress and distress (Mathews & Desmond, 1998). Mathews and Desmond also reported that fatigue symptoms were substantially correlated with feelings of tension and unhappiness that may lead to work-induced stress and burnout (Maslach & Jackson, 1981). Indeed, where there is a continuous depletion of resources, it is argued that this will lead to the negative load effects of fatigue, and in the absence of recovery, to exhaustion, loss of function, and physical and mental impairment (Sonnentag & Zijlstra, 2006).

Similarly, there is research evidence that suggest that overtime work with longer shifts may combine with fatigue to double the complication of a lack of recovery time (Rosa & Bonnet, 1993). Therefore, where insufficient recovery time is not afforded to those who work long hours, shift/night-work and on-call working it is possible that the stresses and strains of the day will spill-over into the following day, resulting in extreme fatigue, requiring extra effort (de Croon, Sluiter, Blonk, Broersen & Frings-Dresen, 2004). In this vein, Rosa (1995) highlights that unscheduled overtime is more disruptive as it exacerbates the difficulty in organising sleep and recovery. Thus the concept of recovery must also be included as a discussion point in the current Chapter, as it has a clear role in the development of longer-term fatigue. Hence the theory of recovery will now be discussed.

## **2.3 Recovery**

### **2.3.1 Introduction**

To date, the majority of psychological research into the health and well-being of employees has primarily focused on the negative effects of workplace stressors and the impact they have on psychological and physical health. Research has shown that such stressful working conditions are associated with potentially harmful

psychophysiological reactions such as elevated catecholamine excretion levels (Evans & Carrère, 1991). Further, psychophysiological activation, as documented in the sustained activation theory (Knardahl & Ursin, 1985), states that this activation response enables the individual to react successfully in a stressful situation. However, where this activation persists, health problems may appear, especially when the psychophysiological response is prolonged (Knardahl & Ursin, 1985).

Conversely, the process of recovering from workplace stressors must also be considered equally important, and as such, it has recently been receiving more attention (e.g. Sonnentag & Bayer, 2005; Sonnentag & Krueger, 2006; Sonnentag & Zijlstra, 2006; Demerouti, Taris & Bakker, 2007; Sonnentag & Fritz, 2007; Sonnentag, Binnewies & Mojza, 2008). Indeed the need for recovery reflects the extent to which workers feel they have problems recovering from work-related fatigue, after the working day/week has ended (de Croon, Sluiter, Frings-Dresen, 2003).

That said, the need for recovery is not a new concept having first been introduced, albeit in a slightly different format, by Glass and Singer in 1972, in which they noted the carry over effects of exposure to prolonged stress, akin to those experienced during the working day, that leave the employee in a state of post work irritability. Subsequently, over the past 30 years numerous studies have investigated employees work and out of work experiences. However, it was Meijman in 1989 who first coined the term recovery when referring to the period immediately after the working day's cessation. Extending this initial research, researchers revealed that when there is insufficient recovery after work, i.e. sustained activation occurred, extra effort has to be exerted at the beginning of subsequent working days in order to redress the suboptimal psychophysiological state, thereby preventing performance breakdown (Meijman, Mulder, Van Dormolen & Cremer, 1992).

This recovery concept has been further expanded by a plethora of researchers in the 1990's and early 21<sup>st</sup> century (e.g. Totterdell, Spelten, Smith, Barton & Folkard, 1995; Sluiter, Van der Beek & Frings-Dresen, 1999; Sluiter, Frings-Dresen, Van der Beek & Meijman, 2001; Jansen, Kant & van den Brandt, 2002; de Croon et al., 2003; Sluiter, de Croon, Meijman & Frings-Dresen, 2003). The implications of such research will now be discussed in relation to the lack of recovery and the effects therein.

### **2.3.2 Lack of Recovery and Impact on Well-being**

Recovery or the lack of, as a concept has been defined in literature as the process by which an individual's functioning returns to its pre-stressor levels, and in which strain is reduced (Craig & Cooper, 1992). Thus, it can be deduced that recovery is a process through which the negative effects of stressful work conditions may be reduced or even eliminated. Where this process does not occur or if the individual feels that they are insufficiently recovered from the working day they will find it difficult to relax or concentrate (Demerouti et al., 2007).

Hence, recovery from fatigue and stress at work has been deemed one of the most important factors influencing the physical and mental condition of an employee (De Vries-Griever, 1992; Sluiter et al., 2003). Furthermore, researchers have often referred to the lack of recovery when explaining why work stressors elucidate poor well-being resulting in health problems (e.g. Meijman & Mulder, 1998; Sluiter, van de Berk & Frings-Dresen, 1999; Sonnentag & Bayer, 2005).

As such, researchers have demonstrated that the need for recovery after work (presence of strain), and lack of recovery from this strain is associated with health complaints (Van der Beek, Meijman, Frings-Dresen, Kuiper & Kuiper, 1995; Sluiter et al., 1999; Elders & Burdorf, 2001). Thus, the accumulative effects of the lack of recovery may result in long-term sickness absence (Sluiter et al., 1999). For example,

research investigating the effects of work characteristics on the need for recovery in Dutch coach drivers found that the need for recovery after work is a strong predictor of reported health complaints (Sluiter et al., 1999).

In addition, studies investigating long-term sickness absence have highlighted that sickness absence is a predictor of psychosomatic health problems (Kristensen, 1991). Moreover, it has been proposed that it is a precursor of serious morbidity (Marmot, Feeney, Shipley, North & Syme, 1995). Indeed, research investigating the influence of musculoskeletal health complaints, such as low back pain and neck pain, indicate that such decrements in physical health appear to increase when sickness absence is prolonged (Kristensen, 1991). These same results have been found in research into burnout and depression (Hensing, Alexanderson, Allebeck & Bjurulf, 1998).

Hence it is not surprising that research implicates lack of recovery is a strong predictor of such health complaints (Sluiter, Frings-Dresen, Van der Beck & Meijman, 2001). Therefore, the need to recuperate from work-induced fatigue determines an employee's ability to cope with stress at work, the consequence of which results in a decline in health and well-being, leading to illness and absence from work (de Croon et al., 2003). More specifically, high levels of *need* for recovery, in the post work period, have a greater impact on sickness absence caused by mental health problems (Bourbonnais & Mondor, 2001). This is important when considering that the Maastricht Cohort Study on fatigue revealed that some degree of need for recovery was found in nearly all of the employees (Jansen et al., 2002). Therefore, the ability to recover, defined as the period of time an individual needs to return to normal or pre-stressor levels of functioning (Craig & Cooper, 1992), is essential in order to maintain physical and psychological well-being. This process typically takes place during the period after

work, usually the evening (Sonnentag & Zilstra, 2006). Hence, recovery as a process of improvement at the end of a working day will now be discussed.

### **2.3.3 Recovery as a Process of Improvement**

In addition it should also be recognised that the need for recovery will be determined by work-related factors such as workload (Akerstedt et al., 2002), shift work (Haines, Marchand, Rousseau & Demers, 2008), overtime work (Saito, 1999) and, of particular importance here, on-call working (Nicol & Botterill, 2004; Earle & Reid, 2007), as the period immediately following the working day, is frequently the time during which the on-call period of working commences (Earle & Reid, 2007). Therefore if, as empirical evidences suggests (Meijman et al., 1992; Totterdell et al., 1995), the more intensive the working day has been then the longer it will take the individual to unwind during the post work period. Thus, when demands do not cease but are continuously exerted on the individual, recovery may not occur (Sonnetttag, 2001). Subsequently, it follows that it is highly unlikely that recovery will take place for those employees who are on-call after completing a day's work.

That said, although the process of recovery has typically been deemed to take place after the work period, primarily in the evening, research has highlighted that affect experienced in one life domain often spills over into the other domain (Edwards & Rothbard, 2000). This over-spill is particularly evident in the form of low psychological detachment from work during the evening (Sonnetttag et al., 2008). It has been suggested that low psychological detachment from work could be replenished when the employee is no longer confronted with the demands of work; as such it has been proposed that the weekend could provide such respite (Fritz & Sonnetttag, 2005). Indeed, research has highlighted that sleep, mood and social satisfaction had a tendency to be worse on the first rest day following work shifts as compared with subsequent rest

days (Totterdell et al., 1995). This research suggests that, for the measures of sleep, mood and social satisfaction, recovery from the previous shift was still absent by the end of the first rest day. Totterdell et al., (1995) also reported that some of their well-being measures on the first rest day were considerably worse following a night shift.

This is especially important when we consider that some on-call workers are expected to work a normal day's work and then cover on-call that evening, returning to work the following day, possibly unrecovered. As Totterdell et al., (1995) acknowledge "*the amount of time needed for recovery from work seems to depend on the adaptive costs of the work. Night work, for example, seems to require additional time for recovery....*" (pp. 55). As such the need for consecutive time off has been reinforced by research into recovery processes (Totterdell et al., 1995).

However, it is not just the length or amount of respite time that matters, so much as the *quality* of the respite that has been purported to play an important role in the recovery process (Westman & Eden, 1997). Interestingly, research has shown that it is not even necessary to be in one's own home in order for recovery to take place (Sonnentag & Natter, 2004). This research demonstrated there were no differences in subjective well-being between the locations of home or whilst away, neither immediately after work nor at bedtime. This is especially significant when we consider that psychological detachment from work is positively associated with positive mood and low fatigue at bedtime (Sonnentag & Bayer, 2005). Therefore, as a concept, recovery must be regarded as the opposite to the process of strain (Sonnentag & Natter, 2004).

Hence, aspects of the job itself, in the form of job demands and job control must also be included as predictors of the need for recovery, as job characteristics impact on the individual's need for recovery (de Croon, Sluiter, Blonk, Broersen & Frings-Dresen,

2004). Job demands include time pressures, long working hours, role ambiguity and situational constraints (Sonnentag & Zijlstra, 2006), some of which are key factors in an on-call working period. Therefore, it follows that an employee's exposure to such demands requires activity; in the form of effort that has to be expended in order to meet with those demands.

It is well documented that this effort expenditure draws on an individual's resources (e.g. Hockey, 1996), and may lead to a depletion of resources resulting in fatigue where there is perceived absence of control (Hockey & Earle, 2006). In addition, longitudinal research has established that the stresses of demands and control within the workplace predicted the onset of fatigue (Bültmann, Kant, Van den Brandt & Kasl, 2002). Where the situation is more demanding and higher or longer lasting; the greater the need for a sustained level of activity, therefore more resources will need to be consumed. When the drain on these resources exceeds resource capacity, the resulting effect will be fatigue, experienced in both physiological responses and in disturbances of mood (Carayon & Zijlstra, 1999).

Where there is continuous depletion of resources this will lead to the negative load effects of fatigue, and in the absence of recovery lead to exhaustion, loss of function, and physical and mental impairment (Sonnentag & Zijlstra, 2006). Indeed, recent longitudinal research found support for the motivational and health impairment processes assumed in the job demands-resources model, in which they reported that such health impairments may involve severe mental health problems, namely depression, as a long term outcome (Hakanen, Schaufeli & Ahola, 2008). As a result it has to be assumed that individuals who are exposed to highly demanding work situations must have a greater need for recovery than those who have not been exposed to these situations (Sonnentag & Zijlstra, 2006). This is particularly important as in an



on-call period the on-call worker is predominantly dealing with emergency situations, for example when a Fire Officer is called to oversee a major incident or a paediatrician is called into the hospital to deal with a very sick child.

Indeed, de Croon et al, (2004) noted that employees who display increased occupationally induced need for recovery must exert additional effort in the form of increased psychophysiological activity during the next working day to cope with the demands of the job. If these demands are exceptionally high, need for recovery after work requires additional effort the following day. This in turn impacts on the day after and the day after that, resulting in a cyclical build up of prolonged fatigue, which then in turn leads to burnout or emotional exhaustion (O'Driscoll & Cooper, 2002).

Similarly, epidemiological research has highlighted the relationship between fatigue, psychological distress and emotional exhaustion (Beurskens et al., 2000). Therefore, as the daily demands draw on and deplete the employee's resources this may lead to strain, which can result in a decline in health and performance (Schaubroeck, Jones & Xie, 2001). However, as noted earlier, in addition to job demands job control also has role to play in the need for recovery (Sonnetag & Zijstra, 2006).

As it implies, job control suggests a degree of autonomy in terms of deciding one's working strategy, including when to take a break. It can be exercised at different levels and over various aspects of the job (Ganster, 1989; Jackson, 1989; Johnson, 1989; Kasl, 1989). Having more control over the job increases feelings of personal control and is critical in determining stress outcomes (Sainfort, 1990). Indeed, where individuals have high job control they are able to switch to a less demanding tasks when they feel overtaxed (Sonnetag & Zijlstra, 2006).

Conversely, when job control is low and individuals have little or no opportunity to switch from demanding tasks, they have to exert a higher level of effort in order to continue (Karasek & Thorell, 1991). Thus, spending extra effort in such a way leads to specific load reactions in the individual (Meijman & Mulder, 1998). These load reactions include physiological, behavioural, and subjective responses (Sonnentag, 2001). Consequently, the need for recovery will increase (Sonnentag & Zijlstra, 2006).

As such, research has argued that respite and recovery experiences are important to protect workers' health and well-being (Westman & Eden, 1997; Sonnentag, 2001), be it during the evening, at the weekend or whilst on annual leave. Thus recovery is clearly paramount to the health and well-being of employees. Hence exploring the recovery experiences and processes of on-call workers will add to the general health and well-being representation of such workers that is being explored in this thesis, in order to understand the implications that surround this much under researched form of work scheduling. Indeed of particular relevance is the relationship between fatigue, recovery and stress as effects of work scheduling. Therefore, as each of these elements form a greater understanding of the impact that work scheduling has on the individual, the intricacies that surround work and stress will now be discussed.

## **2.4 Stress**

Stress is without doubt one of the most researched areas within the field of psychology. Throughout the centuries a vast accumulation of academic literature has been amassed. Therefore, considering the volume of research into stress, it is virtually impossible to provide a concise review of all the literature within the parameters of this thesis. As such the following introduction and sections of stress health and well-being and work scheduling will provide a short indication of the complexities that surround the stress phenomenon in relation to the main theme of this thesis.

### **2.4.1 Introduction**

The beginning of the 20<sup>th</sup> century saw an emergence of the notion of functionalism, in essence the early concerns regarding work performance in relation to fatigue (Cooper & Dewe, 2004). These first investigations into fatigue and the use of the term ‘stress’ to describe the breakdown between work/human/social interactions were the inception of what is now more commonly known as the psychosocial explanations of illness.

During this time, an array of stress models were reported, described, tested and re-tested. These models of stress varied in many ways, not only in their definition of stress but also in their differing emphasis regarding the physiological and psychological factors associated with stress, and moreover, in their description of the relationship between the individual and their environment. It was also during this time that, within the social and biological sciences the word ‘stress’ had begun to be used as a means to describe a possible cause of ill health and mental disease (Bartlett, 1998).

Indeed as stress research gained momentum, the switch between common themes to distinctive approaches and paradigm shifts is all apparent. Furthermore, when considering the history of such distinctive approaches and events that led up to such theories, there is often a zeitgeist conducive to its inception (McGrath, 1970). For example, it has been suggested that Descartes’ work on the relationship between mind and body could be construed as the impetus for the introduction of the concept of stress into the emerging field of psychology (Cooper & Dewe, 2004).

Most notably, stress research developed in two predominantly separate strands, namely physiology and psychology (Mason, 1975a). Indeed Cannon, a physiologist, believed that physiological processes accompany emotional experience; hence many stress historians credit him as the founding father of stress (Newton, 1995). The work of

Cannon introduced the notion that our bodies are made of unstable material, and only through a process known as “*homeostasis*” (p.24) would the coordinated physiological processes maintain a steady state (Cannon, 1939). Indeed, it has been proposed that the concept of stress would not be necessary without the theory of homeostasis (Doublet, 2000). As such, theories of stress that followed to some extent relied on some form of homeostasis or compensatory activity (Cooper & Dewe, 2004).

That said, the term stress has progressively developed over a period of well over several hundred years, probably even centuries (Cassidy, 1999). It has even been suggested that the word may be derived from the Latin *stingere* (to draw tight) (Cox, 1978). As a defined concept it is believed to have been imported from Hooke’s Law (1676), written in Latin *ut tension, sic vis* literally means *as extension, so force*, more commonly generalised as *stress is proportional to strain*. This analogy that the body is similar to that of a machine spawned the theory that just as a machine is subject to general wear and tear so too is the body in the form of the stresses and strains of life (Selye, 1956).

As Selye himself described “*disease is not just suffering, but a fight to maintain the homeostatic balance of our tissues, despite damage. There must be some element of stress here, at least in the sense in which the engineer speaks of stress and strain in connection with the interaction of force and resistance*” (p.12). This account of the structural damage of the body, and the use of the terms ‘stress, strain and worry’ used to explain the medical effects of work and life, soon became commonly discussed in the early part of the last century (Hinkle, 1987). Hence, stress can be defined as a process, by which the natural (homeostatic) rhythms of body are disrupted by anything in the outside world that has the ability to cause this disruption (stressor), e.g. grief (death of a spouse). Moreover, stress can be further differentiated between acute stress such as an

exam or chronic stress such as job stress (Ogden, 2004). In addition researchers have also differentiated between stress that is harmful and damaging (distress) and stress that is positive and possibly beneficial (eustress) (Ogden). Further, as a concept stress has, over the past decades received immense interest (Doublet, 2000).

Indeed, by the 1950's the stress concept had been well and truly established as an academic mode of study and was also firmly rooted within the field of psychology (Cooper & Dewe, 2004). As such there are few areas of psychology that have received more attention than that of stress (Kaplan, 1983). To this end there is an immense amount of literature regarding the belief that stress is a major factor affecting people's lives both physically and mentally (Hobföll, 1989). The literature demonstrating such effects will now be briefly discussed.

#### **2.4.2 Stress Health and Well-being**

The idea that stress can influence health and well-being has a long history (Bartlett, 1998). It has been suggested that stress is a threat to both physical and psychological well-being (Cox, 1978). However, the severity of the stress reaction highlights the range and depth of disturbance in biological, physical and social functioning that may be initiated by stressful situations (Lazarus, 1966). Indeed, work stressors often affect people's life and health not only at work in terms of efficiency but also outside work (Sonnetag & Jelden, 2009).

Hence, research has indicated that stressful work conditions are linked to psychological strain (de Croon, Sluiter, Blonk, Boersen & Frings-Dresen, 2004). Understandably, epidemiological research endeavours have indicated that chronic work stress or adverse psychosocial work conditions are prospectively related to different adverse health outcomes (Bellingrath, Weigl & Kudielka, 2009). Indeed, research indicates that stress is considered a risk factor for stroke (André-Petersson, Engström,

Hagberg, Janzon & Steen, 2001; Truelsen, Nielsen, Boysen & Grønþæk, 2003; Tsutsumi, Kayaba, Kario & Ishikawa, 2009; Puttonen, Harma & Hublin, 2010); high blood pressure (Rau, 2006); heart disease (Kivimäki et al., 2009; Allessøe, Hundrup, Thomsen & Osler, 2010); reduced immune functioning (Fang et al., 2008; Boscolo, 2009); depression (Melchior et al., 2007); and cancer (Kuper, Yang, Theorell & Weiderpass, 2007). There is also evidence to suggest that stress may be directly linked to migraine attacks (Köhler & Haimerl, 1990); and an increased risk of diabetes in men (Eriksson et al., 2008). Furthermore, associations have been reported between work stresses, fatigue and sleep disturbances (Thorsteinsson & Brown, 2009) which in themselves may be a contributing factor towards the negative outcomes of the stress response.

Indeed, sleep disturbances have been associated with a range of physical and mental health problems (Edéll-Gustafsson, Kritz & Bogren, 2002; Akerstedt, 2006). Research has also indicated that both long and short duration of sleep are significant predictors of death (Cappuccio, D'Elia, Strazzullo & Miller, 2010). Undeniably, many studies have indicated that sleep disturbances are often the perceived causes of occupational stress (e.g. Urponen, Vuori, Hasan & Partinen, 1988; Ancoli-Israel & Roth, 1999). It has also been noted that rather than the specific job requirements, it is the perceived difficulty or stress that is related to sleep troubles (Marquie, Foret & Queinnec, 1999; Akerstedt et al., 2002). Moreover, research has demonstrated that there is a close relationship between self-rated stress and self-rated sleep quality (e.g. Boulos & Terman, 1998; Owen & Arendt, 1992).

Furthermore, sleep in itself is crucial for the restoration of the individual as it is most likely to play a pivotal role in detachment and recovery from work (Tucker, Dahlgren, Akerstedt & Waterhouse, 2008). Indeed, as noted in the recovery section of

this chapter, psychological detachment from work during free time is crucial as it promotes recovery (Sonnentag & Bayer, 2005; Sonnentag & Fritz, 2007). However, when there is a breakdown in this process, recovery will not occur and load reactions will accumulate resulting in long-term negative effects on both health and well-being (Tucker et al., 2008). Consequently, the individual will experience greater demands the next day as they have to invest extra effort to maintain performance (Akerstedt et al., 2002).

Thus, inadequate opportunity for recovery results in an accumulation of stress leading to strain (Hobföll, 1998). Therefore, given the topic of this thesis, gaining an understanding of stress in relation to long working hours, night and shift-work may offer some indication as to the possible implications for on-call working. It is crucial to understand the nature of stress in relation to on-call working, its causes and how it affects individuals who undertake such forms of work scheduling, as there is very little research into this increasingly popular form of work scheduling. Therefore this chapter will now discuss the literature relating to stress and long working hours and different forms of work scheduling.

### **2.4.3 Stress and Work Scheduling**

Researchers investigating the health and well-being of shift-workers have raised serious concerns regarding the association between shift-work and depression (Smith, Folkard & Fuller, 2003; Totterdell, 2005). Indeed, stress, fatigue and musculoskeletal pain are the most frequently reported work-related health complaints of European workers (Paoli, 1997). Further, much of the research into working hours has concluded that psychological distress is common among employees with high strain jobs (e.g. Stansfeld, Fuhrer, Head, Ferrie & Shipley, 1997; Stansfeld, Fuhrer, Shipley & Marmot, 1999; Paterniti, Niedhammer, Lang & Consoli, 2002; Ferrie et al., 2006). Subsequently,

work induced fatigue is primarily experienced after the working day has ended and is only considered a problem if insufficient recovery time is offered between two periods of work (Brown, 1994).

As such, on-call working is one particular instance of insufficient time off between work periods, as the on-call worker is expected to carry out further duties on a call out basis. Such workers are often not afforded sufficient recovery between working periods and subsequently report higher levels of stress when on-call compared to a night off (French, McKinley & Hastings, 2001).

Hence, undeniably, the detrimental psychological effects of working nights and shift-work are well established in the literature (e.g. Bohle & Tilley, 1989; Scott, Monk & Brink, 1997; Barnes-Farrell et al., 2008). Indeed, stress, mental health and well-being have been implicated as a source of absenteeism and work disability in such working populations (De Raeye, Kant, Jansen, Vasse & van den Brandt, 2009).

However, conversely not all researchers report such decrements, as recent research found no such association between night shift-work and psychological distress (Lopes, Araya, Werneck, Chor & Faerstein, 2010). Nevertheless, the researchers note that these unexpected findings, with regard to the possible effect of night-shifts and psychological distress, may be confounded by the subjective measures of job strain or support at work. Indeed, there is a general agreement in the research community that the key features such as the desynchronisation of both circadian and social rhythms associated with night and shift-work account for significant decrements in psychological well-being (Barnes-Farrell et al., 2008). Similarly, studies also highlight that such work schedules are often linked to poorer mental function (e.g. Paterniti et al, 2006; Sekine, Chandola, Martikainen, Marmot & Kagamimori, 2006)., In addition,



research evidence suggests that shift-work and a long working week appear to be the main risk factors that contribute to sleep disturbances (Akerstedt et al., 2002).

Furthermore, shortened sleep following night-shift is the most likely cause for feelings of not being well rested (Akerstedt et al., 2002). Moreover, the quality of sleep is also important as evidence indicates that this is inferior in those who work on-call (Mencken, 1998). Hence it has been proposed that desynchronisation of the circadian system may be a contributing factor in repeated stress (Cho, Ennaceur, Cole & Suh, 2000). This is mostly due to a marked decrease in the quantity and quality of sleep that are the severe and pervasive consequences of desynchronosis (Akerstedt, 1990).

Similarly, research indicates that loss of sleep rather than long working hours are often the problems that precipitate decrements in both mood and performance (Arnetz, Akerstedt & Anderzen, 1990; Firth-Cozens, 1998). With regard to performance many research studies highlight that the quality of patient care can be severely affected by the stress levels of doctors (Firth-Cozens, 1993). Indeed, doctors suffer high levels of stress and depression, more than any other workers (Wall et al., 1997). Moreover, research indicates that men and women who work variable shifts have a higher incidence of job stress and emotional problems in comparison to men and women with fixed schedules (Gordon, Cleary & Parker, 1986). Hence, the findings of such studies emphasize the heavy psychological price paid by those who work erratic schedules (Khun, 2001).

#### **2.4.4 Summary**

Many of the studies discussed in this chapter are cohort, cross sectional or case controlled studies often referred to as observational studies. In many instances such studies are very often the only practicable method of researching various problems, especially in the fields of occupational psychology, health psychology and occupational

health psychology. For example when researching the health and well-being of shift workers a cross sectional study is often used to determine the prevalence of health deficits in such workers, as many of the studies within this chapter attest. Such studies are relatively quick and easy to conduct but do not permit a distinction to be drawn between cause and effect, hence they are only able to infer that there may be a relationship between the two. However, cohort, cross sectional and case control studies remain important because many research questions can be answered by this method and often, as in occupational health psychology, they are sometimes the only methods available. Similarly, carrying out a cross sectional study is the best way to determine prevalence and is very useful in identifying associations that can then be more rigorously studied using a randomised controlled study, where possible.

The distinction being made here in this chapter is that aspects of the job may increase the likelihood of a decline in health and well-being. However, research investigating such possible links between on-call and health are limited; therefore further research is necessary to establish any such links between a particular aspect of work scheduling that is increasing in prevalence, namely on-call working, and deficits in health and well-being.

With this in mind a programme of research was devised to investigate the implications of on-call work scheduling.

## **2.5 Plan of the Thesis**

This thesis investigates the implications of on-call working. It focuses on the psychological and physiological impact of on-call work on an individual's psychological well-being and considers the moderating effects of personality and organisational factors.

The investigative studies are divided into four chapters followed by a general discussion of the findings:

### **2.5.1 Chapter 3 Study 1**

Study one is a preliminary investigation into the complexities of on-call work scheduling. It uses a qualitative methodology to explore the 'lived' experiences of on-call workers; from an individual work/life perspective. It was designed to uncover what is expected of on-call workers with regard to their on-call schedule and how on-call working affects the workers and their families.

### **2.5.2 Chapter 4 Study 2**

Study two continues to explore the working experiences of on-call workers and the effects on workers and their families. Using a questionnaire methodology, it is designed to explore the different ways in which on-call work is organised, as well as individual differences in relation to aspects of personality. It also aims to further understand the detrimental effects of on-call working in relation to psychological well-being.

### **2.5.3 Chapter 5 Study 3**

Study three employs a diary and questionnaire methodology to further investigate the effects of working on-call. It focuses on two specific groups of on-call workers and examines the subjective differences between four different shift conditions to provide a greater understanding of the differences between normal working patterns and on-call work periods. It also attempts to examine the moderating effect of different personality components on the outcomes of the different shifts.

#### **2.5.4 Chapter 6 Study 4**

Study four represents a culmination of the work presented in this thesis. It employs a psychophysiological approach to investigate on-call work scheduling and its effects. It mirrors the diary methodology employed in study 5, but obtains biological indicators of salivary cortisol to enhance this examination of on-call work scheduling and its effects.

#### **2.5.5 Chapter 7 General Discussion**

Chapter seven provides a summary and general discussion of the findings of this thesis. This chapter concludes with a discussion of the implications of the findings of the effects of on-call working.

#### **2.5.6 Summary**

The research programme detailed above has been designed to build on the research relating to on-call working in an attempt to further explicate the possible detrimental psychological effects of working such type of work schedules. In examining recovery, fatigue, mood, stress and health combined with specific personality traits it is hoped that the studies designed in this thesis will provide a clear picture of the decrements in psychological well-being that on-call work schedules may elucidate, and where aspects of personality will increase or decrease the likelihood of such outcomes.

## **Chapter 3 Study 1**

### **3.1 Summary**

Study 1 investigates on-call working practices in a group of medical professions. Using a qualitative methodology it examines their working practices and their lived experiences of on-call work scheduling. The purpose of this study was to gain a comprehensive understanding of how medical professionals experience on-call working. Of particular interest were the individual scheduling of on-call, and each exacting on-call work pattern within each of the chosen medical specialities. This issue has not previously been studied across a range of professions and the study reported here aims to begin to cover this gap.

Hence, the aim of this chapter is to document any differences in on-call work scheduling, what these differences are, and the impact these may have on individuals to get a sense of what it means to work on-call from both a practical and psychological perspective. Furthermore, this study will be used to generate a platform of research questions which will help guide and shape the subsequent chapters of this thesis.

The analysis of the texts from the interviews resulted in a number of themes that will be reported in 2 parts. Part 1 is comprised of the information gained from a basic content analysis with the goal of extracting practical information about on-call working. This section focuses on how on-call works in this sample of participants; coping; perceived expectations when on-call; and outcomes of on-call. Part 2, which follows on takes a different approach to analysing the information, this adopts an established qualitative method of IPA, with the goal of understanding the subjective experiences of on-call working.

The IPA analysis generated a number of themes. One of the common themes was its intrusiveness into family and social life, essentially curtailment of a 'normal' life

outside of work whilst on-call. Many of the participants described their lack of input into the scheduling of their on-calls, and notably had either been able to make recommendations for change or had offered recommendations that were largely ignored. All of the participants reported covering an on-call period after completing a normal day's work. However, whether they are called at home or contacted by bleep whilst in the hospital, they are all very often called more than once in any given on-call period, to which each of the participants attest.

This study highlights the complexity and diversity of on-call work schedules across professions within this group sample. It indicates that no two on-call schedules are the same, as each is specific to the requirements of the service across professions and disciplines. It also highlights areas of concern for the health and well-being of workers who work such shifts.

# **Study 1 Preliminary investigation into on-call operational practice across a range of medical professionals**

## **3.2 Introduction**

In order to begin to understand the special conditions that surround on-call working a study was designed to examine the operational practice of a range of medical professionals. A range of medical professionals was chosen as many studies suggest that sources of stress among doctors differ not just according to the type of work but also according to their speciality (Burbeck, Coomber, Robinson & Todd, 2002; Coomber et al., 2002; Sutherland & Cooper, 2003). The fact that such jobs involve caring for humans has been considered particularly stressful and as such there is a need for increasing research on stress in the health care professions (Antoniou, Cooper & Davidson, 2008).

Study 1 uses a qualitative interview-based methodology to investigate on-call practices across a range of medical professions. Of particular interest were the individual on-call schedules, and each exacting on-call work pattern within the chosen medical specialities. This issue has not previously been studied across a range of professions and the study reported here aims to begin to cover this gap. Therefore, to understand the likely complexities of the mechanisms that surround on-call working practice, and given that research in this area is limited, a qualitative methodology was identified as the most effective means of investigating these questions. It is also proposed that this methodology would generate hypotheses and methods for further research, thereby creating a platform on which to build a line of enquiry. The main advantages of using qualitative methods have previously been the subject of reviews (Pope & Mays, 1995; Buston, Parry-Jones, Livingston, Bogan and Wood, 1998; McMillan, 2009). There is an increasing awareness in health sciences regarding the

potential of qualitative research to address questions that quantitative research is unable to satisfactorily answer (McMillan, 2009). As such, qualitative methods should be an essential component of health services research, not only because they provide access to areas not amenable to quantitative research, but because they provide qualitative description, deemed a prerequisite of quantitative research, particularly in areas that have received little attention (Pope & Mays, 1995).

Indeed, although previously mentioned quantitative studies have contributed to our understanding of on-call, they have provided only limited insight into the belief systems and underlying psychological factors of the on-call worker. Consequently, using a qualitative methodology will allow the participants to discuss the diverging complexities and mechanisms that surround their on-call work without the constraints and rigidity of a structured questionnaire. Therefore, this research aims to offer insights into the adverse effects of on-call working by unravelling the practices that surround on-call and the meanings that such employees attach to their perceptions, actions, beliefs and values. This is of particular value as no such studies have focused on these aspects in relation to on-call working.

### **3.3 Current operational practice**

To date investigations into the evolving and diverging complexities of working on-call have yet to be fully explored. While the research community has very limited knowledge and understanding of the issues related to on-call working, some organisations in the field have recognised the problematic nature of this type of work scheduling. For example a recent audit has been carried out to investigate the on-call practices in the neuroradiology department at Newcastle General Hospital. It revealed that although working practices had recently changed to accommodate increasing CT scan requests during out of hours, by moving responsibility for requesting imaging from



the neuroradiologist to the neuroradiographer it was envisaged that this would reduce the on-call workloads of the radiologists. However this change was not for the better and actually increased the on-call workload of the neuroradiologists by 122% (Mukerji, Wallace & Mitra 2006). Similarly, a field study investigating the experiences of psychiatric senior house officers' (SHO's) on-call practices, and their experiences during on-call periods, recommended that changes should be made to improve their working lives so that the SHO's feel less isolated during out of hours cover (Callahan, Hanna, Brown & Vassilas 2005).

So, while there is some evidence of the need to improve both the work-load and working lives of on-call workers qualitative data detailing the 'lived' experiences of on-call workers working practices has not been previously gathered. But it is possible to draw on qualitative literature that has previously explored aspects of clinical practice to gain an understanding of work experiences within the medical profession. As such it has been documented that morale among general practitioners is a current cause for concern in the United Kingdom, with some citing increasing workload and patient demand as areas of work strain (Huby et al., 2009).

Similarly, in a study exploring difficulties at work from anaesthetists' own perspective revealed a number of experiences regarding difficulties at work (Larsson, Rosenqvist & Holmstrom, 2007). These difficulties included: anaesthesia is inherently difficult, anaesthetists sometimes have to make difficult decisions, the work is often difficult because of hard working conditions, and other doctors do not respect anaesthetists. However, Larsson et al., most interesting finding was that experienced anaesthetists used two different strategies for handling difficult situations at work, namely problem solving in situations such as complicated medical cases and during work overload, and appraising difficult situations by converting them from threats to

challenges. To this end, understanding how people think is a core component of qualitative research, which provides a means of making sense of how individuals make sense of the world around them (Smith, Goodwin, Mort & Pope, 2006).

Subsequently these qualitative studies conclude: improving partnership arrangements could be considered a key intervention with further research needed to evaluate different approaches (Huby et al., 2009); implications for training and in-house stress management programmes at a generic and gender specific level in Greek hospitals and further research into increasing individuals' coping mechanisms, including identifying environmental sources of stress (Antoniou et al., 2008); senior anaesthetists are able to reconcile their work, its difficulties and problems, gaining access to such coping strategies might help junior anaesthetists (Larsson et al., 2007). In using qualitative methods to explore on-call it is hoped that further research recommendations like these can be made, and conclusions for improving on-call working practice may be highlighted. By using qualitative methodology as a means of investigating on-call we can begin to make sense of this particular type of work scheduling, including the effects it may have on those who have this shift type as part of their contract of employment.

Therefore, in order to begin to understand the psychological implications of working on-call, one must first explore what is expected of the on-call worker in terms of their chosen specialty and the working practices therein.

### **3.4 Rationale and Aims**

Study 1 has been designed to begin to unravel the operational practices and the impact that these may have across a range of medical professionals. As such, the aim of this study is to investigate the views between the participants' on-call practices and their personal perception of its effects on them as individuals, from an idiographic

phenomenological perspective. The qualitative study employed Interpretative Phenomenological Analysis (IPA) (Smith, 2004) as a means of analysing the data.

Having been developed specifically within psychology, IPA offers a systematic approach to understanding the “lived” experiences of the participant (Smith & Osborn, 2008). Effectively, IPA’s interpretative approach is concerned with understanding the meanings that people attach to their actions, beliefs and values. IPA is an experiential qualitative approach to research in applied psychology, particularly relating to matters of psychological well-being, with an idiographic focus. It aims to offer insights into how an individual in a given context, makes sense of a given phenomenon. As the key to understanding an individual’s perspective of on-call work scheduling IPA is considered the most appropriate qualitative form of analysing the participant’s transcripts.

IPA is the most appropriate qualitative approach to analysing the data in this study as it allows for purposive sampling, in that participants are invited to take part in the research study because they can offer the researcher some meaningful insights into the topic of the study. Specifically, participants in an IPA study are expected to have certain experiences with one another. Hence an IPA study shows how something is understood in a given context.

Therefore, this method of enquiry is especially relevant, when we consider that the aim of this study is to explore the operational practices and the specific meaning, experience, and events that on-call working holds for medical professionals. Through this idiographic in-depth analysis the participants’ personal on-call working experiences combined with their individual perceptions, actions, beliefs and values will be examined.

## **3.5 Method**

### **3.5.1 Participants**

The interviews were carried out over a period of one month and involved 5 medical health professionals, 4 female and 1 male. The participants represent a cross section of medical health professionals and comprised an anaesthetist, an ophthalmologist, a paediatrician, junior doctor and physiotherapist. This sample was chosen in order to access a broad range of experiences across professions that would encompass experience at different levels. Participants ranged in age between 25-49 years, with a mean age of 35 years. Three of the participants are married and two are single. All the participants work solely within the NHS in the North of England. The participants' names were anonymised in order to protect their identity.

Departmental ethical approval was sought and secured for the study, and the appropriate consent, briefing and debriefing forms were administered and completed. The participants were known to the author, and were approached and informed of the study and asked if they would consider taking part. As five or six participants have sometimes been recommended as a reasonable sample size (Smith & Osborn, 2008) this study's sample size was fixed at five. However, as Smith & Osborn (2008) point out "with IPA the emphasis is on the detailed analysis of each case and therefore sample sizes are usually small" (p. 521).

### **3.5.2 Procedure**

The data was collected through semi-structured interviews which took place in the familiar surroundings of each of the participants own homes. This was done to make the participants feel comfortable, and facilitate a relaxed atmosphere in which they could talk freely about their on-call scheduling, and how it affects them as individuals. The semi-structured interviews were directed by the on-call questions (see Appendix 1).

The on-call questions were generated following an initial unstructured interview with a physiotherapist. During the interview sessions the participants were encouraged to talk freely regarding their on-call working practices. The interview sessions were then digitally recorded and transcribed verbatim.

The data was then analysed using IPA methodology. This began with an interpretative reading of the 1<sup>st</sup> participant's transcript, in which initial notations of the text were made in the left hand margin. The transcript was then read through a further 3 times in order to make sure the notations adhered to what the participant was actually saying. These notations were then translated into emergent themes or concepts, whilst also allowing for the emergence of other themes and concepts. These were then recorded in the right hand margin. A thorough examination of the emerging themes and concepts then took place. The results formed the super-ordinate themes and concepts for the 1<sup>st</sup> participant, which were then put into a table that included the instances where the supporting theme or concept can be found in the transcript. This process was then repeated for each of the 5 participants' transcripts.

When the analysis had been completed for each of the 5 participants, the analysis of themes and concepts were compared to establish patterns across participants as IPA stipulates. These were then documented and can be found in appendix 2 along with each individual participant's analysis of themes. The transcription data, emergent themes, concepts and the tables of themes were then audited by a Chartered Psychologist in order to make sure they were representative of the original interview transcripts and thereby grounded in the data.

### **3.5.3 Ethics**

Ethical approval was sought from the University of Hull Psychology Department's Ethics Committee and as there were no issues regarding deception or risk the study was

given a '*normal*' classification. In line with the ethical guidelines set out by the British Psychological Society (BPS) the participants were briefed on what was expected of them if they decided to take part in the study. They were informed that their participation in the study was voluntary and that they were able to withdraw their participation at anytime, even retrospectively and details of whom to contact should they wish to withdraw. They were informed that their data would be anonymised to protect their identity. They then signed to acknowledge their informed consent to take part in the research. Once the interview had taken place each of the participants were then provided with an explanation of the study. They were then asked if they had experienced any difficulties during the interview and if they were comfortable with the questions and the answers they had provided.

### **3.6 Results**

Analysis of the texts from the interviews resulted in a number of themes that will be reported in 2 parts. Part 1 will report on the analysis based around the questions in order to gain a better understanding of the participants' on-call operational practice within their specialty and to form a base for future investigations. Part 2 will focus on the Interpretive Phenomenological Analysis of the text in order to reveal their individual perceptions, actions, beliefs and values within the context of on-call working.

It is important to point out that there is an assumption within qualitative research that the researcher is an integral component of the research process. Therefore understanding me, as the instrument of the qualitative process, is important and relevant to the interview/data collection procedure. I have a background in Human Resources, from an Absence Management perspective. As such I have a great deal of experience in long-term sickness absence, through anxiety and depression, in council employees within various departments, which included Social Workers who had on-call aspects to

their work schedules. As someone with “an inside knowledge” of individual’s who have suffered, psychologically, with their work load/on-call schedules I was able to fully participate in the research study, thus minimising the distinction between the participant and myself as the researcher and instead focus on what the participant was revealing through the transcribed data. Therefore it is important to point out that the analyst in an IPA study must suspend their own beliefs and perceptions and instead focus on grasping the experiential world of the participants taking part in the study.

### **3.6.1 Results Part 1**

Part 1 is comprised of the information gained from a basic content analysis with the goal of extracting practical information about on-call working. This section contains how on-call works in this sample of participants; coping; perceived expectations when on-call; and outcomes of on-call. Part 2, which follows on takes a different approach to analysing the information. This adopts an established qualitative method of IPA, with the goal of understanding the subjective experiences of on-call working.

Part 1 of the results will now be described in detail using the questions as guide to understand the participants’ experience of their on-call operational practice and its effects.

### **3.6.2 How on-call works in this sample of participants**

The results of this study will first discuss the intricacies of on-call working within this group sample. It will include how often the participants are expected to be on-call, whether they are called at home or expected to stay in the hospital. It will also detail how their pay is structured in terms of on-call payments and establish whether they were consulted regarding their on-call rota or if there is an opt out of on-call working. When reporting the details of the participants’ responses excerpts of their transcripts will be used to verify the results.

Each of the participant's on-call schedules are very different, and there is no standard on-call shift pattern (see table 1). All of the participants reported that they are on-call at least one night per week, after completing a normal day's work, with the exception of Evlyn, (ophthalmologist) whose on-calls are condensed into one full week including the weekend every nine weeks.

In addition to the one night a week, each of the participants are required to be on-call at weekends (see table 1). The participants reported that when they are on-call they go home after completing their days work and are then on-call for the rest of the evening/weekend. They are then either paged or contacted on their mobile phones when they are needed for an emergency, with the exception of the Eliza, (junior doctor) who remains in the hospital for the on-call period and is contactable by bleep.

The participants' all reported that they were often called more than once in any given on-call period and that the work that they carried out was predominantly the same as their normal daily work, but that it was at the clinical emergency end of the work spectrum.

Participant	Profession	Age	No. years worked on-call	On-call schedule
1. Anita	Anaesthetist	47	22 years	1 night per week and 1 weekend in 7½ (Fri 6pm – Mon 9am).
2. Evlyn	Ophthalmologist	40	15 years	1 full week in 9 (Mon 9am – to the following Mon 9am).
3. Eliza	Junior Doctor	25	3 months	1 night per week and 1 weekend every 2 weeks.
4. Peter	Paediatrician	49	24 years	1 night per week and 1 weekend in 6 (Fri 6pm – Mon 9am).
5. Jill	Physiotherapist	29	8 years	1 night per week and shares weekend on-calls every week.

*Table 1. Participant demographics and on-call scheduling.*

In terms of payments Anita, Evlyn, Eliza and Peter stated that payment for being on-call was part of their salary irrespective of how long they are called out for or how many times per call out period. However Jill, (physiotherapist) stated that



physiotherapists are paid £10 for being on-call (but not called out). When they are called out they are paid time and a half from the time they leave their home to the time they arrive back.

Finally for this section of the results the participants reported whether or not they had been consulted regarding their on-call rota and whether they have the option to opt out of on-call. Two of the participants, Anita and Peter reported having involvement in drawing up the rota with Peter being responsible for organising, devising and disseminating it within paediatrics. However, Evlyn detailed that when she joined her department as a consultant she had no option but to join the on-call rota too, even though she works part-time, (70% of a full-time post) she is still expected to work a full on-call week, including the weekend. Both Eliza and Jill reported that it was part of their contract, and in Eliza's case she had to sign a contract to say that she would agree to do on-call. In terms of being able to opt out of on-call, all of the participants reported that it was part of the job and therefore opt out was not available.

The results will now continue by documenting the explored factors between the participants' on-call, and their personal perception of its effects. It will begin by examining how they perceive their on-call in terms of what is expected of them.

### **3.6.3 Restrictiveness of on-call**

One account of the expectations that surround on-call can be found in Anita's transcript of how she feels about having on-call aspects to her job. In it she describes how she feels about working on-call and the constraints that it places on her life, of refusing invitations to dinner parties so as not to spoil the evening for anyone. Here we see the pervasiveness of working on-call in the lives of those who have to work such shifts.

Anita: *“Being invited to a dinner party and being on tenter hooks because you know that if you get called out it will ruin their evening. So I would never accept an invitation of that sort”.*

Similarly, Evlyn describes how restrictive being on-call is in that she feels that she cannot do “anything” because she has to be available. She describes not being able to go out for a meal or going out for a drink because she is on-call. The way Evlyn describes it she is unable to continue with her normal everyday life and is constrained by her on-call duties.

Equally Peter describes how he perceives the pervasive nature of his on-call, and how this affects his and his family’s lives. It restricts and constrains him from been able to carry out normal family duties, such as taking his children to school or somewhere else. Peter notes that his whole life ‘revolves around his on-calls’ and in order for him and his family to accept the constraints on-call puts on his life outside of work, he has to make sure that his whole family know his on-call schedule. Effectively his whole family are curtailed by his on-calls. This is particularly damaging to his family life when we consider that he is not available for normal family interactions one night per week and then for a full weekend every six weeks.

Jill and her colleagues try to overcome the restrictiveness of being on-call by occasionally going on the ‘works night out’ taking the pager with them. She recognises that it is not ideal but counterbalances this with the fact that if they didn’t they would feel that they were missing out. As they all share the weekend on-call and therefore have some responsibility for its cover it is understandable why they choose to take such risks.

The results will now detail how each participant copes with having on-call aspects to their working schedule.

### **3.6.4 Coping and Support**

In response to the question of coping these issues arose regarding coping and support. It is interesting that each of the participants view coping in very different terms. In order to understand just how each one perceives their own ability/inability to cope each one will be discussed in detail.

#### **3.6.4.1 Coping through the support of others**

Anita reports that her main coping mechanism is the support of those around her both at work and at home. Although she recognises that in job terms it is down to her, she does acknowledge that she is there to offer support to those below her so that they can cope. Effectively, she has accepted that she has to cope with whatever on-call may bring, this includes supporting those around her.

*Anita: "I suppose if my husband is at home, that is very helpful in terms of being able to relax and also having very good friends in the village who will either pop round or invite you round knowing that it's quite likely that you'll get disturbed but actually not minding".*

Here we see the extent for the need for social support during an on-call period. Without this network of support, relaxation, and the ability to unwind with both husband and friends who accept the disruption of on-call, her ability to cope would be reduced.

Similarly, Evlyn highlighted social support as a factor but in a positive sense feels that she has support to cope with on-call through her training and the team around her in general. This she feels helps her cope with 'virtually everything' and where she cannot cope she has the support of the rest of the team to refer the patient on to. Nevertheless, she does acknowledge that she has to mentally prepare as a means of coping. In addition she also acknowledges the importance mutual team support and likes to keep things amicable and pleasant but above all tries to not to convey stress, so as to maintain their confidence, in essence people skills.

By taking each day as it comes and staying positive she is able to cope with her on-call week. Eliza on the other hand reports that she copes with the help and support of the senior house officer (SHO) or registrar. They often help her in practical ways by for example taking blood samples from patients. She feels that she has plenty of people to support her. She also notes that it is important to get something to eat to sustain her through the on-call, and tries to get half an hour to sit down although this is not always possible.

#### **3.6.4.2 Coping – getting on with it**

Peter is less positive about support with the workplace and focuses on the fact that there are no official mechanisms that can offer help to doctors in coping with their on-calls or daily working life. He points out that they do have debriefing sessions for the work that is done in the accident and emergency department, but that this is not intended for individual doctors to air their problems. It is down to the individual paediatrician to seek help from their GP when they can't cope.

However he notes that they do provide counselling for junior doctors, nurses and patients when needed. He views coping as an individual process not in sharing or airing your views, thoughts or concerns with others. He believes that if you need help you seek help, otherwise he just gets on with it. This is particularly interesting when we consider that his whole family's life is put on hold whilst he is on-call, he is completely entrenched in his work during this time and carries the burden of coping on his own.

Finally, Jill feels she now has the appropriate training to cope with working on-call, although she reports that when she was first put on-call she didn't. However now she feels confident in the knowledge, skills and experience she has developed since being put on the on-call rota to cope. The most helpful thing to Jill is having her on-call criteria with her, so that she can refresh her memory, for example acceptable blood

gasses. Again Jill is someone who views coping as a self capability and confidence issue rather than a process which requires others to support her.

These are two difference coping styles which may influence the impact of on-call. The impact of this individual difference will be explored in detail in chapters four and five.

We will now examine in detail how each participant reports what they find most stressful or a strain whilst working on-call

### **3.6.5 Outcomes of on-call**

The outcomes of on-call are reported in terms of the various effects of carrying out such duties beginning with sleep disruption.

#### **3.6.5.1 Sleep Disruption**

It is interesting to note that three of the participants report elements of stress and fatigue as an effect of on-call working. Anita's account of sleep disruption whilst working on-call explains just how difficult it can be:

*Anita: "I think probably, disturbed sleep actually. The most stressful thing is the worry of getting back to sleep and functioning, functioning normally. I think it is partly because you come back and you're churning through things in your mind and often because, I mean often the situations have been either clinically difficult or often you get called in because relationships between patients and staff or relatives and staff are breaking down... "*

This excerpt demonstrates the disruptive nature of on-call working the major implication of which is sleep deprivation. It also highlights that once woken the on-call worker finds it difficult to get back to sleep especially if they have had to go into the hospital, as when they return home they replay or relive the events that have just taken place. This clearly has knock on effects from a clinical perspective. However, it is not just the clinical elements of the on-call situation that Anita finds difficult. As she

describes situational difficulties that also affect sleep patterns, as the following extract demonstrates:

Anita: *“ In the summer when you come home at half past three its light and the birds are tweeting and you just can't get to sleep. But I think probably as you get a bit older, I'm sure that compared to ten years ago I don't get back to sleep as quickly as I used to. That's probably partly as you get old your sleep patterns aren't so good are they”?*

Evlyn describes how she is often called late at night, midnight or early in the morning and then having to go to work in the morning to work a full day ‘the kids to sort, and going in tired’ sums up her thoughts.

### **3.6.5.2 Family Disruption**

Peter describes how it used to affect, not only his sleep patterns but also those of his family:

Peter: *“It's got an impact on family life. For example in training previously the senior registrar has to do on-calls from home. And the hospital had my home phone number, in those days we hardly had mobiles. So the phone would ring in the middle of the night, everybody would be disturbed and woken up and they would have trouble going back to sleep and of course I had to attend the call. So as soon as I got a mobile in the late 1990's none of the switchboard have my home number”.*

There is a real sense of regret expressed in the above extract culminating in the earliest chance that Peter had to redress this problem he seized it, preventing further disruption to his family. Indeed all of the participants reported the disruptive nature of on-call with regard to their family and their social life.

### **3.6.5.3 Frustrations, Decisions, Overwhelming Situations**

Anita describes the worry and frustration of dealing with junior doctors who are on the scene of clinical emergencies, and from whom she should receive the call out:

Anita: *“I think to some extent you do replay and worry quite a bit sometimes about the junior doctors, because they obviously get very upset if they can't cope or whatever. Some of them just even get upset because they have to ring you, because they've come from cultures to ring someone senior is seen as loss of face or because they are not good enough. So I suppose I worry about those”.*

This extract encapsulates the frustration and distress that the medical profession faces when they are unable to cope with clinical difficulties and the complexity of issues which face the consultant on-call. It also highlights that for some junior doctors [refers to doctors below consultant level and includes senior house officers and registrars] having to call their consultant is seen as a sign of weakness, leading to a possible lack of self esteem and low self efficacy.

Peter also talked about his work being stressful in terms of the decisions that have to be deal with on-call or during normal working hours:

Peter: *“Difficult decisions, particularly, let's say for example if a child is brought in who has been deliberately harmed. Those are the most difficult. There is police involvement, social workers, you have to get statements form the parents, identify the injuries, get a report prepared it is enormous work. Often things end up many months down the line in court where you have to give statement and evidence in person. That's enormously stressful. Whereas straight forward medical conditions, we probably feel more comfortable with. Other stressful ones are when a child is found dead, like cot death or something; you've got very distraught parents. Again very difficult to deal with”.*

Here Peter describes the more difficult cases he can be faced with during an on-call period or during normal hours, which must be considered significant in light of the recently reported case of 'baby P'. He recounts the difficult decisions he has to make regarding patients and the consequences of those decisions for all those involved. This excerpt highlights the strain that paediatricians face, especially in light of many of such recent, highly publicised child abuse cases.

Finally, Jill found her on-call most stressful when she was first put on the rota; she felt she was put on the rota before she was ready and before she had completed the relevant aspects of the job. During her first on-call shift following the initial training period Jill reported that she saw five patients that night and although she coped she reported being overwhelmed by the situation.

### **3.6.6 Happy with on-call Schedule/what would you do differently**

The thoughts and feelings of the participants as to how satisfied they are with their on-calls and what they would change are very varied indeed. Therefore each has been reported in turn commencing with Anita.

*Anita: "I would say that in terms of what I achieve I am always satisfied because mostly I'm able to defuse a situation or sort a situation out. In terms of the calls we get I am much less satisfied. I think a lot of it is actually down to panic situations. And a lot of the time you get called in and you think I shouldn't get called, I shouldn't really be needing to go in for this. And you go and your usually right... Actually being there out of hours and at strange times of the day and night is actually very satisfying too because it does give the staff quite a lift to see you".*

When asked if she would change anything she reported that she is 'actually very happy' with her on-call within the constraints of the resources available, however, she notes that this is a shared responsibility and that they all work together within these constraints. It was felt that to go into the politics of lack of resources etc within the health service was not appropriate to this study and therefore exploration of this area was not pursued.

However, Evlyn does not share Anita's sentiments, she could be described as seeing it as a necessary evil:



*Evlyn: "I put up with it, because playing the team bit; you're supporting your team of doctors, the consultants that you're with. And you sort of find things that you kind of have to accept that you have to do in a rotation with them. So you just have to get on with it".*

She puts up with it because she has a contractual obligation and wants to support her fellow colleagues in sharing these rotations. However, when asked what she would do differently she was quite clear on what she would change as she believes that working mums should have the option to opt out of on-call. She feels that by offering better incentives such as better pay, or being paid by the number of calls they receive would be a fairer system, especially for those who would like the extra money. Evlyn's comments here are especially poignant as understanding the necessities of the service is something that those who carry out the work are, probably best placed to answer, especially when devising schedules and rotas for working on-call.

However as Eliza is new to on-call, she didn't really have any ideas of what to do differently, but she believes it will take her quite some time to get used to it. Although she was not looking forward to one aspect of on-call as she will have to carry the arrest bleep and for her that is a 'scary prospect'. When asked what she meant by the arrest bleep she clarified by saying that she meant the cardiac arrest bleep and that within a few weeks she would have to cover this on-call too.

Although Peter reports he is very happy with his on-call, and feels that it is not so much of a struggle he is not so happy with dealing with hospital managers when the children's wards are short of nurses and difficult decisions have to be made at hospital management level. He notes that such problems in the middle of the night during a call out are especially frustrating and time consuming. This aspect for Peter is the most prominent aspect of on-call working that he would change if it were possible, although he does not offer an alternative means of rectifying the situation.

Conversely, Jill discusses the satisfying aspects, in terms of what she can offer the patients such as reassurance, control and management of their own condition. She believes that she can offer the patient ownership of the condition, which for her is a satisfying aspect of the job and something she believes no one else in the medical team who is supervising the case can offer. However, when asked what Jill would do differently she was very clear and concise as she believes the initial training they are given before they are put onto the on-call rota should be changed to cover all aspects of the required relevant rotations within her speciality. She believes that shadowing a more senior physiotherapist on the on-call rota would be of huge benefit.

The results will now document the final question that relates to their thoughts and perceptions surrounding what they believe are the most important aspects of on-call working.

### **3.6.7 Most important aspects of on-call working**

The participants were asked what they thought were the three most important aspects of on-call working. Their responses are so diverse that they will be discussed individually beginning with Anita. Her responses indicate that she tries to keep everything in perspective as she understands that it is a part of her life but not her whole life. She recognises the need to 'unload' and share what she experiences as a means of coping with clinical situations and inter-team relationships. Having good relationships and valuing inter team/patient relationships are important to her.

Eliza notes the three most important aspects of on-call working are time management, keeping her energy levels up by making sure she gets something to eat and drink and making sure she sticks to her routine when dealing with a patient.

However for Peter the most important aspects are being reliable, managing problems and generally management skills.

Finally Jill reports that the most important aspects of on-call working for her are being prepared, making sure she is well rested and being confident about the decisions she makes.

### **3.6.8 Results Part 2**

Following the reading and analysis of the transcripts a table of themes was constructed (see appendix 3). These themes were then clustered into five super-ordinate themes comprising personal conflict and concerns of on-call, acceptance of the need for on-call, achievements/pluses of on-call, responsibility and support during on-call, the results of which will now be discussed.

### **3.6.9 Personal conflict**

All of the participants discussed the difficulties they experience whilst on-call. These effects reported varied from being annoyances to completely invading the participants' lives. They particularly emphasised the fact that they spend a significant proportion of time being available to be called in at anytime during their particular on-call shift (see table 1). The repercussions of which make their working day followed by an on-call period intense, as there are instances where they have been called out more than once during their on-call shift and then have to return to work the following day. This is particularly significant when we consider that all of the participants have on-call schedules following their normal working hours at least one night per week, which means, for them at least one night a week, and in some cases a whole week, they are unable to carry out their usual familial/social commitments. The following two extracts sum up their feelings regarding having to be available:

Anita: “... having to make a significant proportion of our lives sort of totally available to be called in”.

Evlyn: “... to be called in whenever, it’s work intensity”.

All of the participants report the negative effects that on-call working has on their broader life outside of work. To illustrate these points, highlights from each of the participants’ transcripts will be detailed below beginning with Anita.

Anita: “You know you just can’t plan anything outside Hull when you’re on-call, you can’t, you’ve got to be contractually within 30 minutes of the hospital but I’d feel bad if I was any more than 15 to 20 minutes. I would never go to the cinema or a theatre or anywhere that I would sort of potentially have a noisy bleep and have to get up. I can’t do, plan to do things in church in the leadership style, you could maybe do passive things. I wouldn’t go and do much shopping in case you got halfway through the till and your bleep went off and you had to leave and dump all your shopping. So it makes a massive, massive difference”.

Anita’s account sums up the life-invasive nature of on-call working. She talked about the contractual requirements in terms of how far from the hospital she is allowed to live. She also feels that she is even unable to do simple tasks like shopping or take part in church services. The restrictiveness of Anita’s on-call means that everyday tasks that most of us take for granted are limited for those on whom we rely for medical attention. Similarly, in Evlyn’s account of how it affects her life:

Evlyn: “It’s just being in two places at the same time. I think because of the family as well as job and house and everything to balance. And with my husband being out, you know, at work, and if our timetables clash or he is on-call and I’m on-call. He does a Thursday on-call and say I was also on that same Thursday and we both have to go out. I suppose that would be quite stressful, and I suppose we’d have to take the kids in”.

She describes the difficulties of juggling her job, children, home and husband’s job as he is also a consultant and has on-call responsibility. When asked if she had ever had to take the children in with her she replied, in a tone that was almost a whisper, that

she had done so when they were much younger and she was more junior. It was as if she did not want to audibly and publicly acknowledge that she had had to do something that no other mother would have to do or ever imagine doing, especially when we consider that most of her on-calls are in the middle of the night. Here we can observe that the effects of on-call working have an impact not only on the lives of those who have to work such shifts but also their children as well.

Eliza reports the effect it has on her weekends and holidays including how it is not always easy to make plans or change them. Jill too highlights how it affects her social life, but as we noted earlier she sometimes attends the works night out even though she is on-call as the others in her party would understand. She admits that this is not an ideal situation but if she did not take such risks she would never be able to go out or socialise with friends and colleagues. Such curtailment of a 'normal' life outside of work is something that on-call workers are not afforded, and as a consequence their ability to separate their work life from life outside of work is heavily impeded.

Finally, Peter describes the effects of on-call on mealtimes and not being able to sit down and eat a meal with his family properly without disturbances or without having to rush through tea to get back to the hospital.

*Peter: "...another example is tea because I'm on-call sometimes we have to rush through tea because I have to get back to hospital".*

Eating in such circumstances may in fact contribute to the complex interaction of factors which impact on his physical health.

For all of them this means that their lives outside of work are curtailed or put on hold while each of them deal with the various telephone calls for advice and the call outs when they have to attend a patient. This theme continues in that each of the

participants talk about the sacrifices that they have to make during their specific on-call periods, in that they are unable to conduct their normal life outside of work, as the next excerpt highlights:

*Eliza: “You have to time your life around them a bit and if it clashes with something, you have to decide whether the thing you want to do outside of work is important enough to try and swap the on-call shift”.*

Similarly, all of the participants discussed the restrictions, they feel, on-call working puts on their lives. This curtailment of carrying on with their lives outside of work makes even the simplest of tasks, such as shopping and mealtimes with the family, very problematic.

### **3.6.9.1 Personal conflict - Psychological Hit**

Throughout the interviews most of the participants related how they feel regarding having on-call aspects to their working life in terms of it being like a physical hit, using words like “clobber” as Anita does and “*psychological build up*” referring to a psychological preparation, or getting right in one’s head the week before as Evlyn suggests. It was also described by Anita as being “*likened to hell*”, in which connotations of torture and all manner of horrors are conjured up to emphasise the feelings and impact that on-call working has.

### **3.6.9.2 Personal conflict – Concerns for on-call service**

In addition to these feelings the participants also talk about the worries they have whilst working on-call. These range from worrying about patients and colleagues to worries about their own abilities to deal with patients effectively in emergency situations whilst on-call, as the following excerpts from Eliza and Jill highlight:

*Eliza: “... in medical on-call you have to carry the arrest bleep... as soon as I start getting that I think that will be quite scary”.*

*Jill: "... I was put on-call before I was ready... so I found that quite difficult and I did say that at the time.... I was not as confident as I would have liked to have been".*

It is not surprising that with such concerns many of the participants discussed the difficulties they had in detaching from work and switching off once they had gone home after a call out. As Anita describes:

*Anita: "I think it's partly because you come back and you're churning through things in your mind, I mean often the situations have been clinically difficult..."*

Finally for this theme the participants talked about the fatigue they experience whilst on-call some cite the inability to switch off as a precursor to their tiredness, others the intensiveness of the work load whilst on-call, however they all describe it as tiring, both a mentally and physically demanding source of fatigue, as Peter indicates:

*Peter: "... it's a huge physical and mental effect, being on-call is even physically demanding, it's tiring sometimes".*

The results will now continue with the super-ordinate theme of the participants' acceptance of the shared responsibility when on-call.

### **3.6.10 Shared Responsibility**

All of the participants discussed their on-call working schedules in terms of "we do" or "we are" highlighting that they see their on-call schedules as a shared experience in that all of their colleagues have to work and cover the same periods when it is their turn. Examples of which are as follows:

*Anita: "Our on-call rota for the maternity hospital is shared between 7 full-time consultants and 1 part-time consultant".*

*Evlyn: "We start on-call from Monday 9am and we finish the following Monday".*

*Eliza: "We have a five week block where we're doing a lot of nights".*

*Peter: “We have to do our share of on-call work”*

*Jill: “The week days on-call nights are shared out between your group”.*

This indicates that they recognise it is a shared experience in that they are all expected to cover the same specific on-call periods. However, when they relate what is expected when they are on-call this changes to that of ownership in that they change the way they describe it to terms such as “I do” or “I have to”, thereby acknowledging that they are very much on their own in specific on-call situations.

### **3.6.11 Support**

Finally, during call outs they all recognise the support of other colleagues on shift at that time especially those who have to make the call to get the on-call worker into the hospital. Their experiences are however very different, in that it depends who makes the call and their level of expertise, as the following excerpt demonstrates:

*Anita: “Quite often at night I’ll just get a phone call saying you need to come quickly they need you such and such a place, and when you say “what’s it all about” they say “I don’t know they just told me to ring”.*

Whereas others recognise the support of other departments, senior house officers and the nursing staff as the following example indicates:

*Peter: “We get the support of the accident and emergency doctors, the intensive care doctors and we have very well trained nurses”.*

*Eliza: “It’s quite good there is always a senior house officer and registrar on-call too so there is plenty of people to support us”.*

The excerpt highlights that the medical on-call worker often attends a call not knowing what situation they are going into. This must to make preparation for what is



in store virtually impossible the repercussions of which can only add to their rumination once the call has been attended.

Similarly, Anita also acknowledges that she is often the source for providing support to her more junior colleagues:

*Anita: "I am the support, to help the person, so I help support the junior doctor who is there".*

The participants also acknowledge the importance of the team around them and the support that they have from the team in general, as these next excerpts highlight:

*Evelyn: "We've got a good team generally I'd say".*

*Jill: "So if you want to discuss something with a senior in your team they might be around but you would have access to other physiotherapists and a lot of other services".*

The results will now continue by reporting the findings of the fourth superordinate theme of acceptance of the need for on-call.

### **3.6.12 Acceptance of the need for on-call**

All of the participants related how they accepted that they were contractually obligated to carry out on-call work schedules as Anita, Peter and Jill describe:

*Anita: "that's what my contract is"*

*Peter: "It's part of the job, there are not options at this stage".*

*Jill: "It is just the fact that it is part of your contract and you have to provide the service".*

All of them agreed that in their medical specialism it was part of the job that they make a commitment to the team to take a share in undertaking on-call duties. However they do not all like the way in which working on-call was delivered to them for example Evelyn and Eliza describe:

*Evlyn: "As soon as I joined the department as a consultant ... everyone was rotating a week each so I just joined in that rota, there was no option to decline it. I would have liked to decline because I am part-time... but I still have to do full-time on-call".*

*Eliza: "... and so we were given some information on what our on-calls would be like and that we had to sign up to say that we would agree to do that".*

For both Evlyn and Eliza there is some resentment in the fact that they were not given options or even allowed to work a part-time on-call schedule. However, all of the participants recognise that there is a medical need and often urgency for their medical skills after hours.

The results will continue with the fifth and final super-ordinate theme that of achievements/pluses of on-call work scheduling.

### **3.6.13 Achievements/pluses of on-call**

For all of the participants achieving a positive outcome and making a difference to a patient's life are the most positive aspects of being on-call. From the transcripts Anita sums up their collective feelings:

*Anita: "I think being able to achieve, seeing a good outcome achieved is incredibly satisfying and very positive, whether it is actually putting right a clinical situation or whether it's actually just being able to support and encourage".*

Similarly, they all related how they feel that they are a calming influence to both patients and junior colleagues when called into an emergency.

## **3.7 Discussion**

### **3.7.1 How on-call works in this sample of participants**

This study highlights the complexity and diversity of on-call working across professions within this group sample. It indicates that no two on-call schedules are the

same, as each is specific to the requirements of the service across professions and disciplines. As such perhaps further investigation of a group of one or more specific disciplines might be conducive in gaining further understanding of on-call operational practice and its effects.

All of the participants reported covering an on-call period after completing a normal day's work. However, whether they are called at home or contacted by bleep whilst in the hospital, they are all very often called more than once in any given on-call period, to which each of the participants attest. The effects of which, as this study has shown include interrupting social and familial interactions and sleep loss. These findings are in line with research into the impact of on-call work schedules which indicate that the on-call employee must plan their lives around their on-call schedule, often limiting outside work activities so as not to interfere with their on-call schedule (Nichol & Botterill, 2004). In addition, research has highlighted that on-call working periods curtail interactions with family and friends (Berger, 1999). Similarly, research into on-call working and sleep patterns highlighted the difficulties in getting to sleep and remaining asleep in railroad operators in the USA (Pilcher & Coplen, 2000),

Payment for working on-call is varied in this group sample and predominantly comprises a supplement paid as part of their monthly salary. The exception to this is physiotherapy in which Jill reported that they receive a non-call-out rate of £10 and time and a half, from leaving their home to returning, when called out. As previous research indicates, utilising this type of work scheduling is often far less expensive for employers than providing full shift-work cover during out of hours, even when on-call workers receive recompense for such working (Mabon, 1995).

Finally in this section the participants reported on whether they had been consulted regarding their on-call rotas including the option to opt out of on-call working

altogether. Interestingly only two of the participants', Anita and Peter reported being consulted or involved in drawing up the rota. In Anita's case she described how she and her colleagues got together to change their on-call week of working, to the present rota. This involves them working on-call one night a week each and covering the weekend on a rotational basis between the 7½ of them. Peter however is solely responsible for organising, devising and disseminating the paediatric on-call rota. As such he provides all of his colleagues with a provisional rota and asks for feedback before finalising it. Therefore it can be deduced that in paediatrics within this hospital the paediatricians are consulted regarding their on-calls. The rest of the participants reported that it was part of their job/contract to cover on-call. All of the participants reported that on-call working was part of their jobs and opting out has never been a viable option, as it places more strain on colleagues.

This would suggest that on-call workers in this sample have, to some extent a lack of job control. As job control indicates it includes a degree of autonomy in terms of deciding one's working strategy, including when to take a break. Having more control over various aspects of the job increases feelings of personal control and as such has been deemed critical in determining stress outcomes (Sainfort, 1990). Hence, where individuals have high job control they are able to switch to a less demanding tasks when they feel overtaxed (Sonnetag & Zijlstra, 2006). As the on-call workers in this sample have little or no control over their on-call work schedule they are unable to exercise this due to the emergency nature of the medical call out.

Therefore, when job control is low and individuals have little or no opportunity to switch from demanding tasks, in order to continue they have to exert a higher level of effort (Karasek & Thorell, 1991). Thus, spending extra effort in such a way leads to specific load reactions in the individual (Meijman & Mulder, 1998). These load

reactions include physiological, behavioural, and subjective responses (Sonnetag, 2001). As the participants in this sample report that in addition to lack of job control they are often called out several times a night, as research suggests their need for recovery will, as a result, increase (Sonnetag & Zijlstra, 2006). Hence, gaining an understanding of health and well-being in on-call workers is therefore warranted.

### **3.7.2 Restrictiveness of on-call**

One of the most striking accounts of the expectations that surround on-call can be found in Anita's transcript. In it she describes just how constraining on-call working is in that she refuses invitations to dinner parties so as not to "spoil the evening for anyone". This clearly demonstrates the pervasive nature of on-call working, in that it curtails enjoyment of everyday things that most of us take for granted. Similarly, Evlyn describes how she feels that she cannot do anything because she is on-call and has to be available. Again she notes the restrictive nature of on-call in that she feels that she cannot go out for a meal or a drink. Peter too reports the pervasiveness, in that it also affects his family's life, restricting and constraining him from carrying out normal family duties. Whereas, Jill tries to overcome the difficulties of being on-call by continuing to socialise with work colleagues.

However, she does admit that this is not an ideal situation but she recognises that if she did not take such steps she would probably never go out. She also noted that she is not alone in her behaviour, in that her colleagues also do the same. Clearly the behaviour exhibited when on-call is not the same compared to rest days, and there are obviously restrictions on the activities of on-call workers during such rest periods. Understandably, research has argued that respite and recovery experiences are important to protect workers health and well-being (Westman & Eden, 1997; Sonnetag, 2001), be it during the evening, at the weekend or whilst on annual leave.

Moreover, empirical evidence suggests that it is not just the amount of leisure time, but the quality of the respite experience that plays the most important part of the recovery process (e.g. Westman & Eden, 1997; Fritz & Sonnentag, 2005). Hence, attending social events with colleagues when on-call, although not ideal must be considered such an experience for the general well-being of on-call workers. However, as previous research has recommended, changes should be made to improve the working lives of on-call workers during out of hours cover (Callahan et al., 2005).

### **3.7.3 Coping and Support**

All of the participants reported coping in with on-call in very different ways. Anita views mutual social support as her mainstay in coping with her on-calls, whether it is her providing the support or receiving it. Similarly, the social support she receives from her husband and friends is helpful to her as it enables her to relax. Likewise Eliza reports that she is able to cope with the help and support of the SHO and registrar. Whereas, Evlyn relies heavily on her training and the team around her as a coping mechanism.

However, she does admit that she finds it helpful to say positive and take each day as it comes. For Peter, coping is something that you either do or you don't as there is nothing officially set up at his level of seniority to help in this process. Therefore if he needs help coping he would have to seek help from his own GP. As the participants all cited different aspects of coping and how they view coping it would seem appropriate to further examine coping mechanisms in on-call workers.

Finally, Jill relies heavily on her training to help her cope with on-call working. Although she does admit that when she was first put on the rota she feels she was not ready to cope with the demands.

In essence, many of the coping mechanisms adopted by the participants in this study are aspects of the COPE (Carver, Scheier & Weintraub, 1989) further investigation using this scale may therefore be of benefit when exploring the coping strategies of on-call workers. Indeed as recent research has highlighted further research into understanding and increasing individuals' coping mechanisms may be of benefit (Antoniou et al., 2008).

### **3.7.4 Outcomes of on-call**

Interestingly, Anita, Evlyn and Peter all report elements of fatigue as an effect of on-call working. This is especially significant when we consider that research has indicated that shift work and in particular night shifts interrupt sleep patterns (Kuhn, 2001). Hence it seems that the reported disruptions to sleep during on-call working are very similar or the even same as those in shift and night-work. These interruptions stem mainly from working in opposition to the body's normal circadian rhythms i.e. the sleep/wake cycle, which is very much an aspect of on-call working. This is experienced by Anita when she described finding it more difficult to get to sleep when it was light, and has found this has increased with age. It may also be due to rumination or '*churning things over*' that the participants indicated they often find themselves doing after they have returned home following a call out. Indeed research has highlighted that lack of sleep has been considered a stressor and being stressed (or in this case rumination) makes it harder to sleep (Sapolsky, 2004).

Furthermore, there is compelling evidence that clinician fatigue may lead to ineffective care and adverse patient outcomes (e.g. Gaba & Howard, 2002; Weinger & Ancoli-Israel, 2002). Hence where clinician fatigue is present it is most probably due to sleep deprivation, and as sleep is a homeostatic process with amount of previous sleep contributing to or diminishing subsequent levels of alertness (Weinger & Ancoli-Israel,

2002), it is possible that on-call workers performance may be impaired. As Evlyn described following a busy night on-call she reports going into work the following day *'tired'*.

Moreover, where severe fatigue is present it not only affects the person's performance in their specific occupational setting but also has broader reaching implications for their home life (Beurskens et al, 2000). Indeed such disruptions were reported by both Evlyn and Peter. Evlyn described how she had once had to take her children into the hospital with her when she was called out and Peter described that call out disrupts family times such as eating meals together.

### **3.7.5 Happy with on-call Schedule/what would you do differently**

When asked whether they were happy with their on-call schedule and what they would do differently their thoughts and ideas were very interesting indeed. Although two reported being very happy with their on-call the rest of the participants did not and indicated that they put up with it.

In relation to what they would do differently there were a number of thoughts and ideas that emerged. These included giving people an opt out clause, better supplements and therefore an incentive to do on-call and running initial training programmes differently so as to facilitate and understanding of what is expected or encountered when on-call. Indeed as research has highlighted there are increasing numbers of women entering the medical profession therefore, working conditions for hospital doctors need to change, if women are to be retained within the medical profession (Levinson & Lurie, 2004).



### **3.7.6 Most important aspects of on-call working**

Finally the participants reported what they thought were the three most important aspects of on-call working. These varied greatly and included keeping things in perspective, having a means for unloading, inter-team relationships, mutual team support, people skills, prioritising, keeping up energy levels, having a set routine, being reliable, able to manage problems, management skill, being prepared, well rested and being confident. These diverse sets of aspects are as different as the individuals who undertake on-call working. Therefore exploring individual differences within on-call workers may be of benefit.

### **3.7.7 Discussion Part 2**

The discussion will now explore the second part of the results beginning with the first super-ordinate theme of personal conflict.

### **3.7.8 Personal conflict**

In this realm participants related how they felt regarding having on-call aspects to their working life words like “*clobber*” and “*psychological build up*” referring to a psychological preparation, or getting right in one’s head the week before, it was also described as being “*likened to hell*”, in which all manner of horrors are brought to the imagination. Such phrases as these are not difficult to understand when we consider the exceptional conditions that on-call workers are expected to work under.

Indeed, the most frequently reported negative effect of on-call working was the impact that it has on life outside of work. These effects varied considerably, from being annoyances to completely invading the participants’ lives. Each of the participants’ describe how they are restricted in many different ways, these include being contractually within 30 minutes of the hospital, never going out to the cinema or theatre, taking part in church activities, holidays, weekends away, doing everyday tasks such as

shopping and having to balance family life, mealtimes and arrangements. The participants reported that all of these everyday practices are just impossible to do whilst on-call. These findings are particularly disturbing when we consider that in anaesthesia previous research has highlighted that the work itself is often difficult (Larsson et al., 2007), therefore living and working under such constraints can only add to their stress/distress.

Similarly, many studies suggest that sources of stress among doctors differ not just according to the type of work but also according to their speciality (Burbeck et al., 2002; Coomber et al., 2002; Sutherland & Cooper, 2003). These differences can clearly be seen in the results from the intensity of the work, to trying to be in two places at the same time, with what is essentially being at work, whilst also when not called being at home with the family must be a cause of conflict for the on-call worker.

Moreover, as previous research has documented such jobs that involve caring for humans and as a profession are considered particularly stressful in their own right (Antoniou, Cooper & Davidson, 2008). To further compound the stress already experienced such individuals are expected to cover out of hours in addition to their normal working hours. Again much of the research into working hours has concluded that psychological distress is common among employees with high strain jobs (e.g. Stansfeld, Fuhrer, Head, Ferrie & Shipley, 1997; Stansfeld, Fuhrer, Shipley & Marmot, 1999; Paterniti, Niedhammer, Lang & Consoli, 2002; Ferrie et al., 2006).

It subsequently follows that work induced fatigue is primarily experienced after the working day has ended and is only considered a problem if insufficient recovery time is offered between two periods of work (Brown, 1994). As the results of this study indicate insufficient recovery time occurs often following a night on-call. Therefore further investigation into stress and burnout and recovery processes in on-call workers

would increase our knowledge of the possible deficits in both physical and psychological well-being.

The discussion will now explore the participants' results in relation to the participant's shared responsibility and support.

### **3.7.9 Shared Responsibility and Support**

The participants very much saw the on-call schedule as a shared responsibility, however when it came to undertaking the on-call shift it was a different response in that they saw it as their responsibility. There was a sense of acceptance or ownership of that period of work and all that it entailed. As for support they very much valued the team and especially the person who would communicate the need to attend the emergency, as when no explanation was offered it made the situation they were about to go into very difficult to prepare for.

The discussion will now continue with the participants understanding of the acceptance of the need for on-call.

### **3.7.10 Acceptance of the need for on-call**

The participants accepted that they had a contractual obligation to undertake on-call working schedules and understood that it was part of the job. However for some of them it was not necessarily the fact that they knew they had to undertake on-call duties but the fact that they had no control over how and when they had such duties. As only some of the participants reported such differences further investigation into on-call workers need for control would provide evidence for such differences.

### **3.7.11 Achievements/pluses of on-call**

The only positive aspects that were reported were achieving a good outcome and making a difference to a patient's life. Bearing in mind that the participants reported

that the work that is predominantly undertaken whilst on-call is emergency work, it is not surprising that they would cite achieving a good outcome as a positive aspect. However, there are further implications that must be considered here as there is a possibility that there is a need to be needed or an element of thrill seeking on the part of the on-call worker, which therefore requires further investigation.

### **3.8 Conclusive Summary**

As discussed in the introduction, on-call as an area of research has received little attention. As such this study has only just begun to scratch at the surface of this complex and diverse area of working pattern. As this study has only highlighted diversity across disciplines, it would seem appropriate to investigate the experiences of one or more groups of professions, to decipher both intra and inter disciplinary on-call operational practice and its effects.

Indeed further investigation into on-call working must continue in order to fully understand the complexities of this much under researched working aspect. In addition to continuing to research on-call within the medical field, comparisons with other on-call working groups would also help provide an insight into the individual differences within on-call working.

Although this study has highlighted areas where on-call has impacted on psychological wellbeing, many questions still remain unanswered. To this end more controlled research that includes both subjective and objective measures would provide better evidence regarding the effects of on-call working. As this study suggests, with the very disruptive and limiting nature of on-call working it is not surprising that such workers, their families and their social lives suffer due to such working schedules. However, the continuing research in this thesis will further examine the magnitude of

these effects and other factors, such as the role of individual differences whilst carrying out such working practices.

## **Chapter 4 Study 2**

### **4.1 Summary**

Study 2 continues to investigate on-call working practices. It uses a survey methodology to adopt a broader focus on the range of working practices, combined with measures to assess the outcomes of such working. It also investigates the moderating factors of personality.

The central aim of this chapter is to continue to document the differences in on-call work scheduling across a range of occupations and provide an initial look at what the impact of this type of work scheduling may be. It will assess the differences between occupations and on-call schedules and examine the outcomes across occupations. In addition it will examine the moderating factors of specific aspects of personality and coping styles on such outcomes, again across occupations.

The results are split into 3 parts, with Part 1 reporting the results of the statistical analysis of operational procedures and practices, including attitudes, impact, coping and affect from the on-call questionnaire. Part 2 will focus on the outcomes measured by the GHQ, RS and MBI and finally Part 3 will take an individual differences approach and report the findings of the personality moderators.

The analysis of this survey provides further evidence for the complexity and diversity of on-call work schedules across professions and occupations. Again it indicates that no two on-call schedules are the same across occupations, and even within occupation. However, it highlights that there are many areas of concern for the health and well-being of on-call workers, especially in relation to lack of recovery, stress, mental well-being, and burnout. It indicates that personality is a moderator of coping with the demands of on-call working. Similarly, different coping styles and social

support are key factors and are also important moderators in the ability to cope with the unpredictable nature of on-call.

## **Study 2 Cross occupational survey of operational on-call practice including outcomes and moderating factors**

### **4.2 Introduction**

For many employees across a range of professions being on-call is not an option but an integral component of the job. Essentially, utilising this type of work scheduling is often far less expensive for employers than providing full shift-work cover during out of hours, even when on-call workers receive recompense for such working (Mabon, 1995).

However, as previously noted, research into the outcomes of on-call working is extremely limited, especially in relation to the vast literatures associated with other forms of work scheduling such as shift and night-work. Where research into on-call working has been conducted, it has primarily centred around the medical professions, with studies predominantly focusing on the areas of stress, sleep deficits and personal safety.

Therefore continuing to investigate on-call working across a range of occupations may provide greater insights into this much under researched form of work scheduling. One issue worthy of attention is gaining an understanding of employee input into the formation of on-call work schedules. This has a two-fold outcome for on-call workers in the form of attitudes to work and reducing the negative effects of work. Hence, it has been proposed that if workers are permitted to participate in the design of their shift systems then attitudes to work should be improved, which in turn can ameliorate the negative consequences of shift working (Kecklund, Eriksen, Akerstedt, 2008).

In addition to the issue of employee involvement, there are a whole range of outcomes and moderators that warrant further investigation. These moderators include



aspects of personality and coping style and outcomes include ability to cope, general health and well-being. However, the factors stated above are obviously complex and interrelated. For example a great deal of occupational and health psychology stress literature has highlighted that the lack of job control can often be a source of strain in many occupations (Karasek, 1979; Spector, 1986; Coomber et al., 2002; Firth-Cozens, 2003). Having job control is viewed as an important means to reduce work pressure and ultimately work stress (Van Der Doef & Maes, 1999).

However, our personal desire for control has also been conceptualised as a personality characteristic that determines our behaviour both inside and outside of work (Wood & Bandura, 1989). This would suggest that personal control of our work/outside of work environments has a strong component of individual differences. Indeed it has been argued that the ability to exercise control over the environment is an intrinsic need, and this need for control appears to vary considerably between individuals (Burger & Cooper, 1979).

Similarly, compression of the working week has been found to be favourable for employees as it leads to longer periods of time off, thereby affording greater control of and an increased opportunity for domestic and social interaction during leisure time (Smith, Folkard, Tucker & Macdonald, 1998). Study 1 highlighted that lack of control and opportunities for domestic and social interaction are curtailed during on-call periods. Hence, examining the subjective responses of on-call workers in relation to their desire for control and their perceived recovery experiences following the working day would provide evidence in support for these theories both inside and outside of working hours.

In addition to the personality variable of control, study 1 also highlighted further individual differences which could be conceived as moderating factors of the impact of

on-call working. One such issue is some form of thrill seeking. Indeed, as research over the past forty years suggests, individuals high in sensation seeking are more likely to enjoy the thrill of risky environments (Zuckerman & Kuhlman, 2000). Bearing in mind that on-call working is predominantly at the emergency end of the scale (within a given occupational role), it is possible that individuals who are high in sensation seeking might cope better with the unpredictable nature of on-call work.

In summary, by establishing an individual's desired level of control and other aspects of personality such as sensation seeking it may be possible to predict those for whom certain aspects of their working schedule may precipitate the detrimental effects of job stress or job strain or a decline in general well-being, especially in an on-call situation. Hence, using an assessment of control and sensation seeking scales as moderators alongside other measures of well-being including recovery after work could provide evidence of any such impact.

A survey method was chosen due to the ease of recruiting large numbers of participants over the short-term. Hence, this survey study was designed to continue to examine the differences in operational practices and to investigate the questions raised from the interview study regarding the moderators and outcomes of on-call work scheduling. Thus the following measures of: the on-call questionnaire developed from study 1 in this thesis; Desirability of Control (Burger & Cooper, 1979); the COPE (Carver, Scheier & Weintrub, 1989); MBI (Maslach & Jackson, 1986); Sensation Seeking Scale (Zuckerman, Kolin, Price & Zoob, 1964); The General Health Questionnaire 12 item scale (Goldberg & Williams, 1991); and The Recovery Scale (Schaufeli & Van Dierendonck, 1999) were included in the survey to address these questions and issues.

### **4.2.1 Study Research Questions and Aims**

This study has a broad range of research questions, which can be grouped under the following headings.

- How does the participant's on-call work compare to their normal work, is it the same or different?
- How is the participant's on-call shift system organised?
- What are the participant's attitudes to working on-call?
- What are the effects of occupational group, on gender and age?
- How do on-call workers rate their ability to cope with on-call working?
- What is the impact of on-call working on family and social life?
- What are the effects of on-call working on health and well-being?
- Does personality play a role in these effects?

## **4.3 Method**

### **4.3.1 Design**

This study used a survey method to ascertain each participant's subjective rating for a series of questionnaires. The participants were provided with detailed instructions on how to complete each questionnaire including whom to contact if further clarification was required. The dependent variables were the participant's responses to the on-call questions of: how long they have worked on-call; is their on-call work the same as their normal work; are they required to work on-call after completing a normal day's work; do they work on-call at weekends; would they like to give up on-call working; is giving up on-call socially acceptable in their department/organisation; where they consulted regarding their on-call schedule; did their input have any influence; do they worry about decisions they make when on-call; how do they feel about working on-call; how do they cope with the mental and physical demands of on-

call; how does on-call affect their family and social interactions, sleep and diet, GHQ, Recovery scale and MBI. The independent variables being tested were occupation, age, gender, caring responsibilities, coping with mental and physical demands, how long they had worked on-call, was on-call the same or different to their normal work, were they consulted regarding their on-call structure, did this input have any influence and did they worry about the decisions they make when on-call and the subscales of the COPE. In addition the significance of personality moderators will be tested and comprise the DV's of the questions from the on-call questionnaire regarding how they feel about working on-call and how they cope with the mental and physical demands of on-call, and the personality moderators of desirability of control, risk taking and coping style, were the IV's. All of these measures are described below in the measures section.

### **4.3.2 Measures**

The questionnaires used in this survey can be found in appendix 4. Details of the scales and information of their on-call working via the on-call questionnaire will now be described.

#### **4.3.2.1 Demographic and Operational On-call Work Factors and the On-call Questionnaire**

The participants provided information on occupation, gender, age and status. This information was gathered to establish the impact of such factors in relation to on-call working so that the impact of gender, for example, could be examined. They also provided more detailed information about their work schedules and on-call working practices, including the perceived impact that on-call working has on their lives outside of work. This information was captured in the on-call questionnaire, which was developed and revised from the questions and data in the interview study, as a tool to further explore on-call work scheduling.

The bespoke on-call questionnaire (see appendix 4) comprised 18 items that included: 1) I have – no children, young children living at home, older children living at home, older children living away; 2) Do you have any other caring responsibilities (e.g. elderly relative), yes, no; 3) How long have you worked on-call, 0-1 year, 1-2 years, 3-5 years, 5-10 years, 10+ years; 4) In relation to your normal work is the work you do on-call, the same, similar, slightly different, very different; 5) Do you cover an on-call shift after completing a normal day's work, yes, no;

6) How frequently does this happen, occasionally (once per month), quite often (about once per fortnight), regularly (about once per week), very frequently (more than once per week); 7) Do you work weekends on-call, yes, no; 8) Which of the following best describes your feelings towards your on-call work, I really enjoy it, I can live with it, I really don't like it; 9) Overall how well do you feel you cope with the mental demands (e.g. memory, problem solving, concentration) of your on-call, 1. Not at all well. 2. A little. 3. Somewhat. 4. Fairly well. 5. Very well; 10) Overall how well do you feel you cope with the physical demands of your on-call – this uses the same scale as mental demands.

11) In an 'ideal world' would you like to give up on-call working, yes, no; 12) Within your department is opting out of on-call an available option, yes, no; 13) Within your department, is opting out of on-call a socially acceptable option, yes, no, n/a; 14) To what extent do you feel your on-call work affects your life out side of work a) with regards to your family, b) your social life, c) your sleep patterns, d) with regard to your diet (snacking etc), all from a scale of: very negatively, a little, it has no impact, it has a positive impact; 15) Have you, at anytime been consulted regarding on-call organisation or structure, yes, no; 16) If 'yes' did your input have any influence: yes, no; 17) Do you worry about the decisions you have to make when on-call: never, sometimes, always;

18) If you are unable to do your on-call (e.g. due to illness) are you responsible for finding your own replacement: yes, no.

#### **4.3.2.2 Desirability of Control**

As control was an emerging theme from the interview study, the Desirability of Control scale (DC), (Burger & Cooper, 1979) was included. This assess an individual's need for control and it is envisaged that this will provide a basis from which to assess whether those with a high desirability for control find the unpredictable nature of on-call work scheduling more difficult than those with a low desirability.

The DC (see appendix 4) is a 20 item scale with 5 reverse items, and was designed to measure an individual's need for control using a 7 point scale of 1 '*this statement does not apply to me at all*' and 7 '*this statement always applies to me*'. It has a reliability coefficient of  $r = .75$  and as discriminant validity of  $r = -.19$  with the Rotter Internal-External Locus of Control Scale (Rotter, 1966) indicating that the DC and Rotter IE were measuring different concepts, and is therefore deemed a reliable measure of desire for control.

#### **4.3.2.3 Coping**

The interview study highlighted many different aspects of coping and how each participant viewed coping. As a consequence, two different measures of how individuals cope with their on-call work schedules were included. An initial assessment of the participants' perceived ability to cope both mentally and physically with their on-call schedules was included in the on-call questionnaire (see appendix 4). These were bespoke scales that asked: "*Overall how well do you feel you cope with the mental demands (e.g. memory, problem solving, concentration) of your on-call from a scale of 1= "not at all well, 2= a little, 3= somewhat, 4= fairly well, 5= very well"*"; and overall

how well do you feel you *cope with the physical demands of your on-call*”, which uses the same scale as mental demands.

In addition the COPE (Carver, Scheier & Weintraub, 1989) was included in order to provide further support for coping styles and the ability to cope with on-call working. This 60 item questionnaire comprises 15 subscales which include active coping, planning, seeking instrumental social support, seeking emotional social support, suppression of competing activities, turning to religion, positive reinterpretation and growth, restraint coping, acceptance, focus on and venting of emotions, denial, mental disengagement, behavioural disengagement, alcohol/drug use and humour.

The COPE (see appendix 4) uses a 4 point scale of 1= “*I usually don’t do this at all*; 2= *I usually do this a little bit*; 3= *I usually do this a medium amount*; and 4= *I usually do this a lot*”. It has an internal consistency (Cronbach’s alpha) of  $r= 0.6$  for the full scale and a reliability of between 0.42 and 0.89 for the different subscales and is therefore deemed a reliable measure of coping styles.

#### **4.3.2.4 Sensation Seeking**

The Sensation Seeking Scale (SSS) (Zuckerman, Kolin, Price & Zoob, 1964) was included to investigate the possibility that this type of personality may be a contributing factor for ability to cope or in aiding resilience. This 34 item questionnaire (see appendix 4) measures: Sensation seeking (sensitivity to internal sensations) – thrill sensation seeking, social sensation seeking, visual sensation seeking and antisocial sensation seeking. Within each of the 34 items are two statements lettered A and B for example question 1 statements are: A. I would like a job which would require a lot of travelling. B. I would prefer a job in one location. (See appendix 4 for the full questionnaire). The male and female scales of the SSS both have moderate reliability  $r= .68$  and  $r= .74$  and is therefore deemed a reliable measure of sensation seeking.

#### **4.3.2.5 General Health Questionnaire (GHQ 12)**

The general health questionnaire was included to investigate the health status and well-being of the on-call workers. This widely used questionnaire is a measure of psychological stress/distress. The 12-item GHQ (Goldberg & Williams, 1991) consists of 12 items (see appendix 4), each one assessing the severity of a mental health problem over the past few weeks using a binary scoring method whereby the two least symptomatic answers score 0 and the two most symptomatic answers score 1 (i.e. 0-0-1-1). The minimum GHQ-12 total score was 0 and the maximum GHQ-12 total score was 12. It has a reliability coefficient (Cronbach alpha) of 0.82 to 0.86 and is therefore considered a reliable measure of health.

#### **4.3.2.6 Recovery**

Previous research indicates insufficient recovery time often occurs following a night on-call. Therefore, a measure of subjective recovery was incorporated into the questionnaire, to investigate the subjective recovery experiences of on-call workers. The Recovery Scale (RS) (Schaufeli & Van Dierendonck, 1999; English version taken from de Croon et al., 2003) was incorporated to increase our understanding of the possible deficits on-call workers may be subjected to due to lack of recovery. The recovery scale (see appendix 4) is an 11 item scale that requires either a “yes” or “no” answer to each of the questions, with none of the items being reversed. It has test re-test reliability (Chronbach’s alpha) of  $r= 0.80$  and is therefore deemed a reliable measure of recovery,

#### **4.3.2.7 Burnout**

The Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1986) was included to provide further evidence of deficits in on-call workers well-being. The MBI (see appendix 4) is a 22 item scale which comprises 3 subscales of emotional exhaustion, depersonalization and personal accomplishment. The emotional exhaustion subscale



assesses feelings of being emotionally overextended and exhausted by one's work. The depersonalization subscale measures and unfeeling and impersonal response to the recipients of one's services/care/treatment/instruction. The personal accomplishment subscale assesses feelings of competence and successful achievement in one's work with other people. It uses a 6 point scale with 0= "*never*"; 1= *a few times a year or less*; 2= *once a month or less*; 3= *a few times a month*; 4= *once a week*; 5= *a few times a week*; 6= *every day*". It has an internal consistency of (Cronbach's alpha)  $r = 0.70$  and is therefore deemed a reliable measure of burnout.

### **4.3.3 Participants**

The participants were selected to represent a broad cross-section of on-call workers, to continue to ascertain the breadth of on-call operational practices and begin to understand its effects. Initially the design of the study included 10 occupations, however, NHS ethical clearance within some occupational divisions took longer than was practical to secure and therefore 3 occupations were excluded, those were Midwifery, Mental Health Nursing and Radiology.

The final study sample consisted of 194 participants in total, 123 (63.4%) males and 71 (36.6%) females, with an age range of 21-60, from 7 different professions: The professions comprised 37 (19.1%) Fire Officers, 32 (16.5%) Police Officers, 41 (21.1%) Physiotherapists, 20 (10.3%) HM Coastguard, 22 (11.3%) Anaesthetists, 28 (14.4%) Prison Officers and 14 (7.2%) Information Technology Engineers. The gender and age distribution within each profession can be found in table 2 below.

Profession	Gender		Age Group				
	M	F	21-30	31-40	41-50	51-60	60+
Fire Officers	37 30.1%			6 15.4%	28 35.4%	3 9.4%	
Police Officers	15 12.2%	17 23.9%	3 8.1%	9 23.1%	13 16.5%	7 21.9%	
Physiotherapists	4 3.3%	37 52.1%	31 83.8%	6 15.4%	6 3.8%	1 3.1%	
HM Coastguard	19 15.4%	1 1.4%		3 7.7%	9 11.4%	5 15.6%	3 42.9%
Anaesthetists	14 11.4%	8 11.3%		7 17.9%	5 6.3%	7 21.9%	3 42.9%
Prison Officers	22 17.9%	6 8.5%	3 8.1%	7 17.9%	16 20.3%	2 6.2%	
IT Engineers	12 9.8%	2 2.8%		1 2.6%	5 6.3%	7 21.9%	1 14.3%

Table 2. The participant's age and gender within each profession.

The participants were also asked to record their status, whether they had children or other caring responsibilities, again details of which can be found in table 3.

Profession	Status				Caring Responsibilities		
	Single	Married/Co-habiting	Divorced	Other	Children	No Children	Other
Fire Officers	2 7.7%	34 21.9%	1 9.1%		31 25.4%	6 8.3%	3 15.8%
Police Officers	4 15.4%	26 16.8%	2 18.2%		25 20.5%	7 9.7%	
Physiotherapists	15 57.7%	26 16.8%			5 4.1%	36 50.0%	2 10.5%
HM Coastguard		20 12.9%			14 11.5%	6 8.3%	3 15.8%
Anaesthetists	3 11.5%	17 11.0%	2 18.2%		15 12.3%	7 9.7%	8 42.1%
Prison Officers	2 7.7%	20 12.9%	4 36.4%	2 100%	19 15.6%	9 12.5%	3 15.8%
IT Engineers	12 7.7%	2 18.2%			13 10.7%	1 1.4%	

Table 3. The Participant's status and caring responsibilities within each profession.

#### **4.3.4 Materials**

Each participant was given a survey booklet that contained the on-call questionnaire, DC, COPE, MBI, SSS, GHQ and RS (see appendix 4) to complete at their leisure. Once they had completed the survey they returned it to the researcher.

#### **4.3.5 Procedure**

Three hundred and fifty surveys, 50 per occupational group were distributed to the various organisations who had agreed to take part in the study. The targeted occupations were Anaesthetists, Physiotherapists, Fire Service, Police, Coastguard, Information Technology workers and Prison Officers. Following a presentation to the participants in each organisation outlined what was expected of them the participants were personally handed their survey booklets.

They were informed; by myself that their participation would involve the completion of a survey booklet that contained seven questionnaires and that once they had completed it they could return it to the university in the Freepost envelope. They were directed to look through the questionnaires to familiarise themselves with what was required when completing each questionnaire and informed that it should take approximately 12 minutes to complete the survey.

#### **4.3.6 Ethics**

Ethical approval was sought from the University of Hull Psychology Department's Ethics Committee and as there were no issues regarding deception or risk the study was given a '*normal*' classification. In line with the ethical guidelines set out by the British Psychological Society (BPS) the participants were briefed on what was expected of them if they decided to take part in the study. They were informed that their participation in the study was voluntary and that they were able to withdraw their participation at anytime, even retrospectively and details of whom to contact should

they wish to withdraw. They were informed that the survey data would be anonymised to protect their identity. They then signed to acknowledge their informed consent to take part in the research. Once they had completed the survey the group were then provided with an explanation of the study and asked if they had experienced any difficulties completing the survey by their line manager, which was then fed back to the researcher.

## **4.4 Results**

### **4.4.1 Data Cleansing and Statistical Analyses**

A total of 245 questionnaires were returned, 51 were unusable (they were either incomplete (n= 34) or completed incorrectly (n= 17) of which 7 were from the Fire Officers, 17 from the Police Officers, 6 from the Coastguard, 9 from the Anaesthetists and 12 from the Prison Officers. The raw data from all measures were entered into SPSS and reduced into each relevant scale scores or single index means. The Desirability of Control, COPE, MBI, SSS and GHQ scale scores were calculated for each participant. In all analyses effects were accepted as significant at  $P < .05$  level. The results section which follows will be split into 3 parts, with Part 1 reporting the results of the statistical analysis of operational procedures and practices, including attitudes, impact, coping and affect from the on-call questionnaire. Part 2 will focus on the outcomes measured by the GHQ, RS and BMI and finally Part 3 will report the findings of the personality moderators.

The results will now continue by reporting the procedures and practices of the participant's on-call scheduling, beginning with how long the participants have been carrying out on-call duties, i.e. tenure.

## 4.4.2 Part 1

### 4.4.2.1 Procedures and Practices: Tenure of On-call

Analysis began by establishing how long the participants within each occupational group had worked on-call. As indicated in table 4 and figure 1,11 of the fire officers have worked on-call for more than 10 years, with 8 between 5-10 years, 7 between 3-5 years, 9 between, 1-2 years and only 2 for less than 1 year. In the police officers 3 have worked on-call for more than 10 years, with 11 for between 5-10 years, 9 between 3-5 years, 3 between 1-2 years, 6 for less than 1 year. In the physiotherapy group 7 have worked on-call for over 10 years, 7 between 5-10 years, 18 between 3-5 years, 5 between 1-2 years and 4 for less than 1 year. In the coastguard group 8 have worked for more than 10 years, 4 for 5-10 years, 4 for between 3-5 years, 3 for 1-2 years and only 1 for less than 1 year. For the anaesthetists 19 have worked for more than 10 years and only 3 for between 5-10 years.

Finally, the participants in the prison officers group reported that 6 have worked on-call for more than 10 years, 6 for between 5-10 years, 9 between 3-5 years, 6 between 1-2 years and only 1 for less than 1 year. Finally, the IT engineers, 8 have worked on-call for more than 10 years, 2 for between 5-10 years, and 4 for between 3-5.

Profession	Number of Years Worked On-call				
	0-1yrs	1-2yrs	3-5yrs	5-10yrs	10+yrs
Fire Officers	2 5.5%	9 24.3%	7 18.9%	8 21.6%	11 29.7%
Police Officers	6 18.6%	3 9.4%	9 28.1%	11 34.4%	3 9.4%
Physiotherapists	4 9.8%	5 12.2%	18 43.9%	7 17.1%	7 17.1%
HM Coastguard	1 5.0%	3 15.0%	4 20.0%	4 20.0%	8 40.0%
Anaesthetists				3 13.6%	19 86.4%
Prison Officers	1 3.6%	6 21.4%	9 32.1%	6 21.4%	6 21.4%
IT Engineers			4 28.6%	2 14.3%	8 57.1%

*Table 4. How long the Participants' have worked on-call within each profession.*

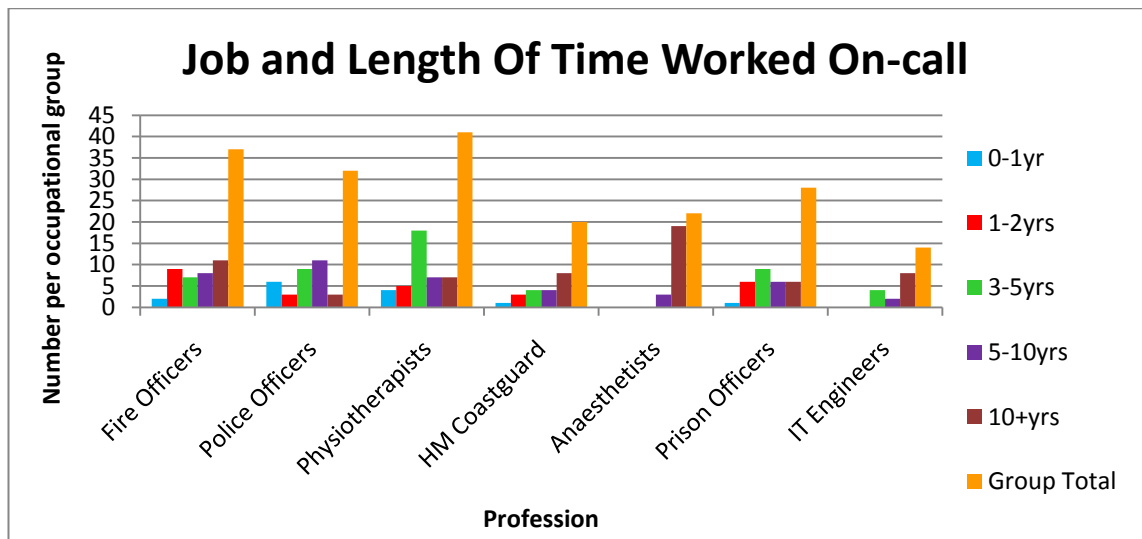


Figure 1. Graph showing on-call tenure within each profession.

The descriptives continued by establishing on-call tenure between genders. As highlighted in table 5 and figure 2, 62 of the participants have worked on-call for more than 10 years, comprised of 45 of the males and 17 of the females. Whereas there are 41 participants with between 5-10 years on-call tenure comprised of 26 of the males and 15 of the females. There are 51 participants with 3-5 years on-call tenure comprised of 29 of the males and 22 of the females. Within the 1-2 years on-call tenure group there are 26 participants comprising 16 of the males and 10 of the females. Finally, there are 14 participants with less than 1 years on-call tenure comprising 7 of the males and 7 of the females.

	Number of Years Worked On-call				
	0-1yrs	1-2yrs	3-5yrs	5-10yrs	10+yrs
Males	7	16	29	26	45
	5.7%	13.0%	23.6%	21.1%	36.6%
Females	7	10	22	15	17
	9.9%	14.1%	31.0%	21.1%	23.9%

Table 5. How long the participants' have worked on-call between genders.

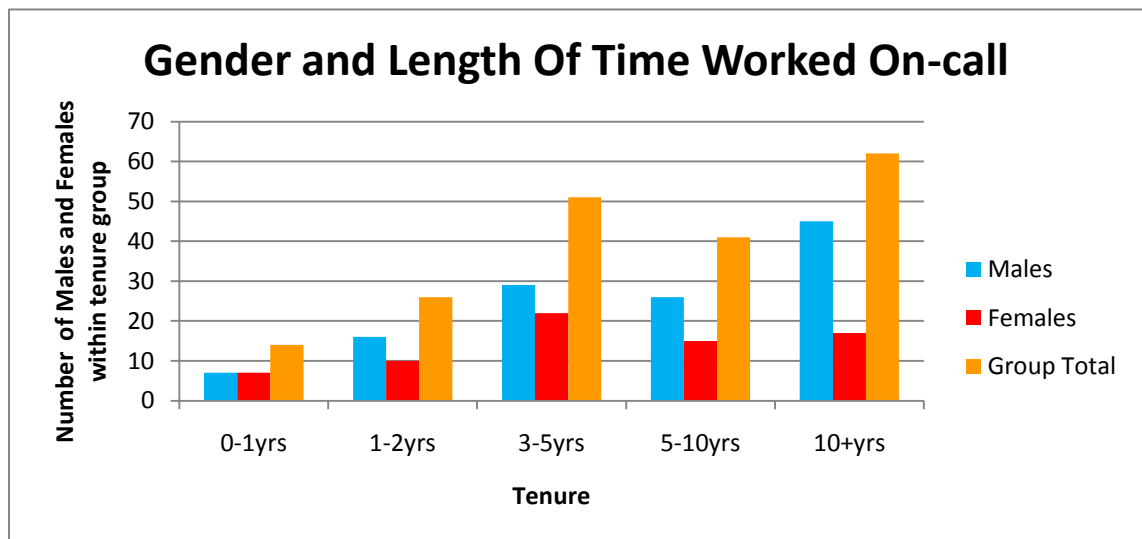


Figure 2. Graph showing gender within each on-call tenure group.

The descriptives of age and on-call tenure revealed that 62 of the participants had more than 10 years on-call tenure, with 8 of those aged between 31-40, 25 between 41-50 years, 22 between 51-60 years, and 7 were over 60+ years, as highlighted in table 6 and figure 3. There are 41 of the participants in the on-call tenure group with between 5-10 years tenure, with 8 of those being aged between 51-60 years, 18 between 41-50 years, 8 between 31-40 years, and 7 between 21-30 years.

The on-call tenure group of between 3-5 years tenure contained the second highest number of participants with 51 of which 2 were aged between 51-60 years, 16 between 41-50 years, 14 between 31-40 years, and 19 between 21-30 years. The on-call tenure group with between 1-2 years tenure comprises 26 of the participants, 14 of which are aged between 41-50 years, 6 between 31-40 years, and 6 between 21-30 years. Finally, there are 14 participants with less than 1 years on-call tenure, 6 of which were aged between 41-50 years, 3 between 31-40, and 5 between 21-30 years.

Age Groups	Number of Years Worked On-call				
	0-1yrs	1-2yrs	3-5yrs	5-10yrs	10+yrs
21-30	5 13.5%	6 16.2%	19 51.4%	7 18.9%	
31-40	3 7.7%	6 15.4%	14 35.9%	8 20.5%	8 20.5%
41-50	6 7.6%	14 17.7%	16 20.3%	18 22.8%	25 31.6%
51-60			2 6.3%	8 25.0%	22 68.8%
60+					7 100.0%

Table 6. How long the participants' have worked on-call between genders.

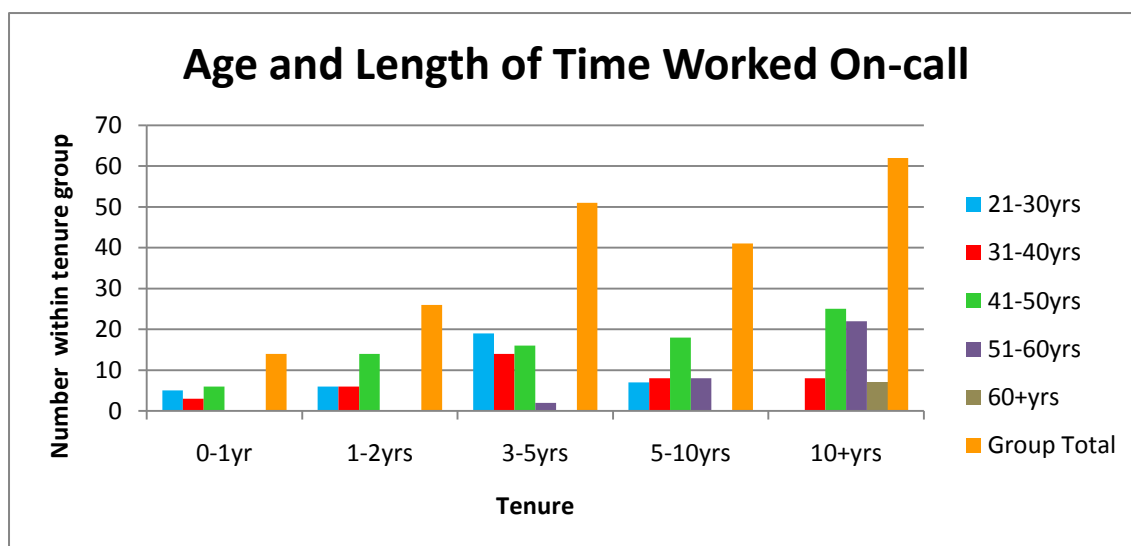


Figure 3. Graph showing age group within each on-call tenure group.

The results will continue by reporting any differences between their normal daily work and what is expected of them when they undertake on-call work.

#### 4.4.2.2 Procedures and Practices: Differences between Daily Work and On-call Work

The analysis continued by establishing the differences or similarity between the participants' normal daily work and work that they undertake whilst on-call. The results (see table 7 and figure 4) indicate that 15 of the fire officers undertake work that is very different to that of their normal daily work, 8 that is slightly different, for 8 the work is



similar, and for 6 it is the same. The police officers again 15 conduct work outside of their normal type of working, 7 do slightly different work, 5 do work that is very similar, and 5 work that is the same as their daily work. In the physiotherapists group 22 carry out work on-call that is very different to their normal daily work, 6 do slightly different work, 10 the work is similar, and 3 it is the same.

The coastguard participants reported that 6 undertake duties that are very different from their normal daily work, 5 do slightly different work, 5 do work that is similar, and 4 work that is the same as their daily work. In the anaesthetists 7 carry out work that is very different, 7 do work that is slightly different, 7 do work that is similar, and 1 conducts work that is the same as their daily work. In the prison officers 4 undertake duties that are very different to their normal daily work, 11 do work that is slightly different, 7 do work that is similar, and 6 work that is the same. Finally, none of the IT engineers reported carrying out work that was different to their normal daily work, 1 carried out duties that are slightly different, 8 do work was similar, and 5 work that is the same as their daily work.

Profession	<u>On-call Work in Relation to Normal Work</u>			
	Same	Similar	Slightly Different	Very Different
Fire Officers	6 16.2%	8 21.6%	8 21.6%	15 40.5%
Police Officers	6 18.2%	5 15.2%	7 21.2%	15 45.4%
Physiotherapists	3 7.3%	10 24.4%	6 14.6%	22 53.7%
HM Coastguard	4 20.0%	5 25.0%	5 25.0%	6 30.0%
Anaesthetists	1 4.6%	7 31.8%	7 31.8%	7 31.8%
Prison Officers	6 21.4%	7 25.0%	11 39.3%	4 14.3%
IT Engineers	5 35.7%	8 57.2%	1 7.1%	

*Table 7. Daily work compared to on-call work within professions.*

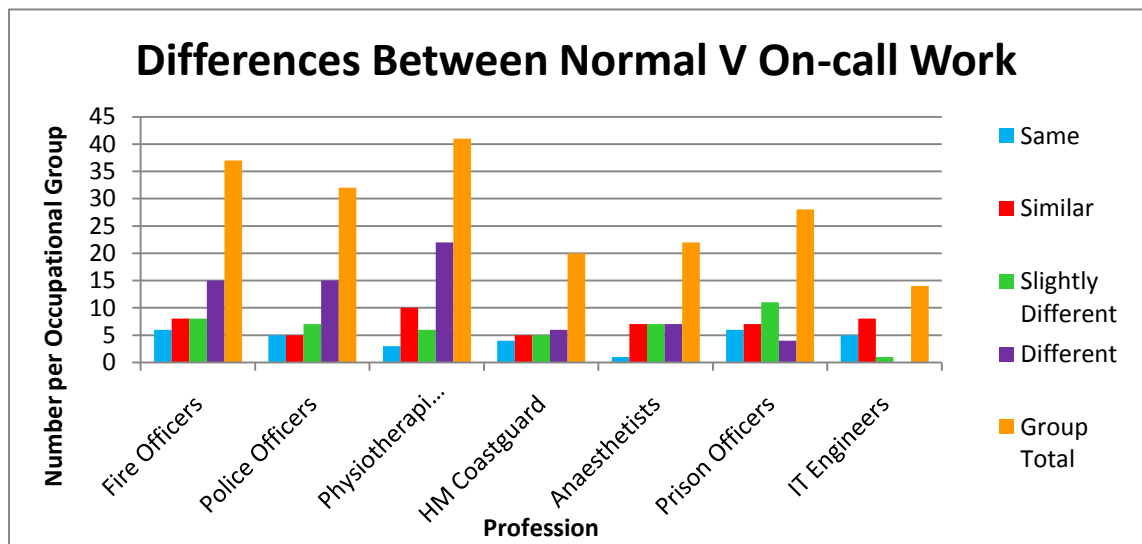


Figure 4. Graph showing differences between daily work and on-call work within professions.

The results will now continue by reporting on the on-call working scheduling or cover that the participants in this study are expected to provide.

#### 4.4.2.3 Procedures and Practices: On-call Cover

The participants were asked to report whether they were required to carry out on-call duties after completing a normal day's work. The results presented in table 8 and figure 5 indicate 170 of the overall participants are expected to carry out on-call duties after completing a normal days work with only 24 not required to. The fire officers reported that 35 were expected to carry out on-call duties after completing a normal days work, with only 2 not being required to do so. The police officers expected to work on-call following their daily work were 22 with 10 not expected to carry out such duties. This is the highest set of participants within the study sample who are not expected to cover on-call duties after the working day is over.

All of the physiotherapists are expected to cover on-call duties following completion of their normal working day. The physiotherapists are the only occupational group within the study sample that all reported the requirement to work such on-call schedules, with the rest of the occupational samples containing some participants who

were not expected to provide this type of cover. The coastguard reported that 18 are expected to cover, while only 2 are not required. The anaesthetists reported that 20 cover on-call after their daily work, and only 2 are not required to. Within the prison officers 22 are expected to provide cover whilst 6 are not. Finally, the IT engineers reported that 12 are required to provide cover following completion of their normal working day, whilst only 2 are not required.

Profession	Yes	No
Fire Officers	35 94.6%	2 5.4%
Police Officers	22 68.8%	10 31.2%
Physiotherapists	41 100.0%	
HM Coastguard	18 90.0%	2 10.0%
Anaesthetists	20 91.0%	2 9.0%
Prison Officers	22 75.6%	6 24.4%
IT Engineers	12 85.7%	2 14.3%

Table 8. Professions expected to cover on-call after completing a normal days work.

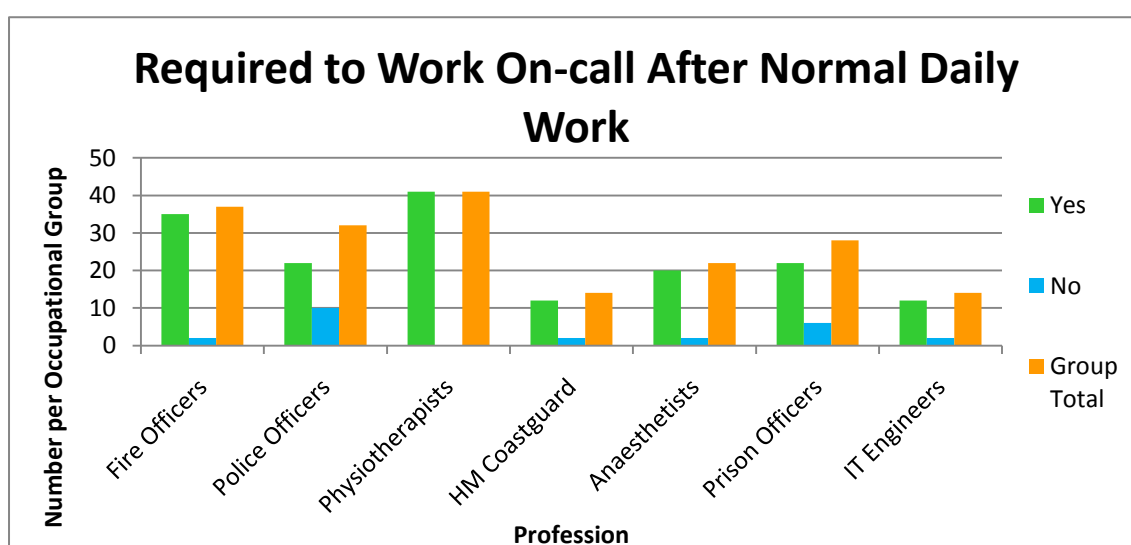


Figure 5. Graph showing number of participants expected to work on-call after completing a normal day's work.

Finally in this results section the participants were asked to report whether they were expected to cover weekends on-call. The results (see table 9 and figure 6) show that 185 of the participants are expected to provide on-call cover at the weekend with only 9 reporting that they are not expected to cover the weekend. The participants in the coastguard, anaesthetists and IT engineers occupational groups all reported that they are required to provide on-call cover at the weekend.

However, the fire officers reported that 36 are expected to cover the weekend and only 1 participant not providing cover. The police officer participants reported that 28 (87.5%) provide weekend cover and 4 are not required to. Again the police officers have the largest number of participants who do not have to provide weekend on-call cover, as also reported in the on-call work following their normal daily work.

Finally the prison officers reported that 25 are expected to provide weekend cover, whilst just 3 are not expected to provide such cover. Again the prison officers have the second highest number of participants that do not provide weekend on-call cover, the same as when covering on-call following completion of their normal days work.

Profession	Yes	No
Fire Officers	36 97.3%	1 2.7%
Police Officers	28 87.5%	4 12.5%
Physiotherapists	41 100%	
HM Coastguard	20 100%	
Anaesthetists	20 91.0%	2 9.0%
Prison Officers	25 89.3%	3 10.7%
IT Engineers	14 100%	

*Table 9. Professions expected to cover on-call at the weekend.*

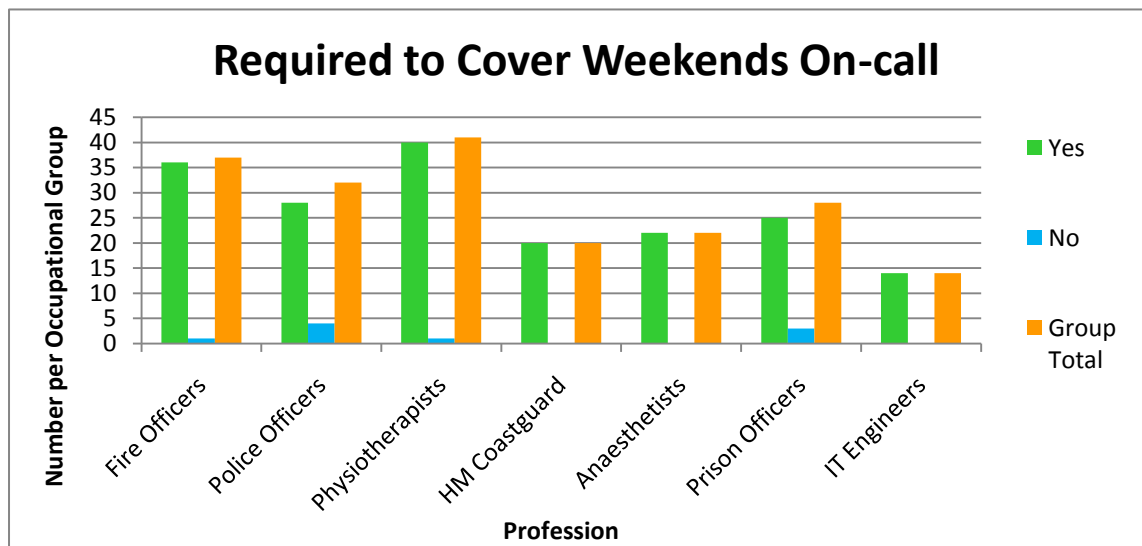


Figure 6. Graph showing number of participants expected to cover on-call over the weekend.

The results will now continue by reporting the penultimate section of operational practices beginning with the availability of opting out of on-call working and whether this is a viable option.

#### 4.4.2.4 Procedures and Practices: Opt Out of On-call and Acceptability

The participants were asked to report whether they would like to give up on-call working. The results (see table 10 and figure 7) show that 104 of the participants would like to give up on-call working, whereas 90 would not like to give up. The physiotherapists occupational group has the highest number of those who would like to give it up 37 compared with only 4 who would not like to.

However the opposite is true for the fire officers in that a higher number of participants would not like to give up on-call working 23 compared with 14 who would like to give it up. This pattern is the same for both the police officers 21 and 11 respectively, and prison officers 17 who would not like to give it up and 11 who would like to give it up.

Finally, there are an equal number of the coastguard who would like to give it up 10 and 10 who would not like to give it up. Whereas in the IT group 9 would like to give it up compared with 5 who would not.

Profession	Yes	No
Fire Officers	23 62.2%	14 37.8%
Police Officers	21 65.6%	11 34.4%
Physiotherapists	37 90.2%	4 9.8%
HM Coastguard	10 50%	10 50.0%
Anaesthetists	20 91.0%	2 9.0%
Prison Officers	17 60.7%	3 39.3%
IT Engineers	9 64%	5 35.7%

Table 10. Within profession number of participants who would like to give up on-call working.



Figure 7. Graph showing number of participants who would like to give up on-call working.

The participants were then asked to report if they were *able* to opt out of on-call working. The results (see table 11 and figure 8) show that 142 of the participants

reported that opting out of on-call working was not an option in their place of work. The occupational group that had the highest reported opt out availability were the police officers 22, compared with 10 officers for whom it was not an option.

The only occupational group who all reported it was not an option were the anaesthetists with all 22 participants reporting that it was not available. Similarly, the physiotherapist participants reported that for 36 it was not an option, with only 5 reporting that it was an option. This pattern was the same for the fire officers 23, coastguard 18, prison officers 22, IT engineers 11 opt out not available. With 14 fire officers, 2 coastguard, 5 prison officers and 3 IT engineers reporting that it was available.

Profession	Yes	No
Fire Officers	23 62.2%	14 37.8%
Police Officers	21 65.6%	11 34.4%
Physiotherapists	36 87.8%	5 12.2%
HM Coastguard	18 90%	2 10.0%
Anaesthetists	22 100.0%	
Prison Officers	22 78.6%	6 21.4%
IT Engineers	14 100%	

*Table 11. Within profession availability for opting out of on-call.*

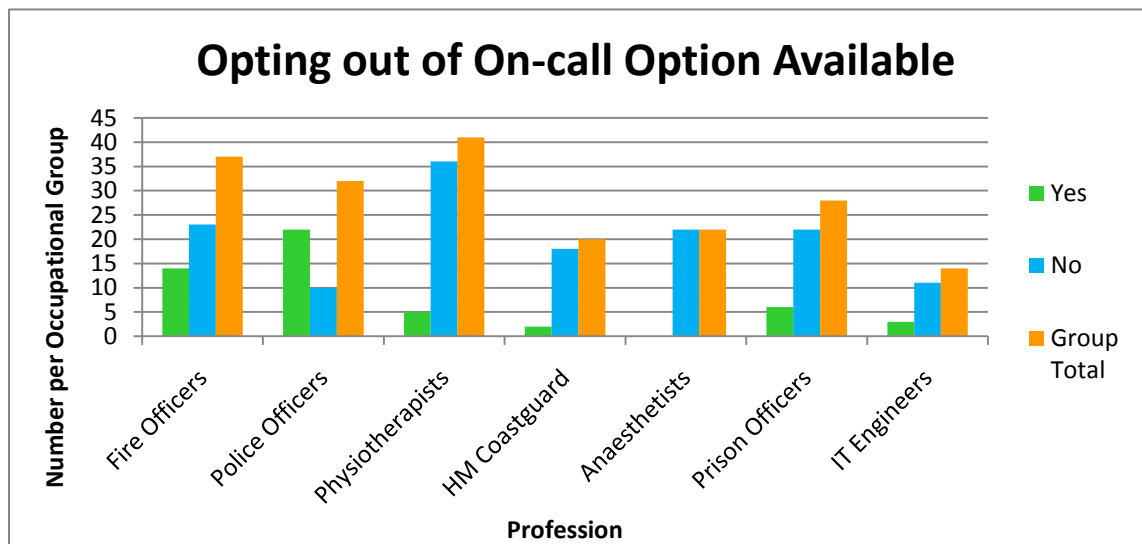


Figure 8. Graph showing number of participants for whom opting out is an available option.

Finally in this section of the results the participants were asked if opting out of on-call was socially acceptable in their department. The results (see table 12 and figure 9) show that 158 participants reported that opting out of on-call working was not socially acceptable within their department, with 36 reporting that it is acceptable. The occupational group that had the highest number of participants that reported it was socially acceptable were the police officers 18, with 14 reporting that it was not acceptable.

Conversely, the only occupational group who all reported that it was not acceptable were the anaesthetists with all 22 expressing the unacceptability within their department. For the rest of the occupational groups 30 fire officers, 37 physiotherapists, 19 coastguard, 24 prison officers and 12 IT engineers all reported it being socially unacceptable. With 7 fire officers, 4 physiotherapists, 1 coastguard, 4 prison officers, and 2 IT engineers reporting that in their department it was acceptable.



Profession	Yes	No
Fire Officers	30 80.0%	7 20.0%
Police Officers	18 56.3%	14 43.7%
Physiotherapists	19 46.3%	22 53.7%
HM Coastguard	24 86%	4 14.0%
Anaesthetists	22 100.0%	
Prison Officers	22 78.6%	6 21.4%
IT Engineers	14 100%	

Table 12. Within profession opting out of on-call socially acceptable.

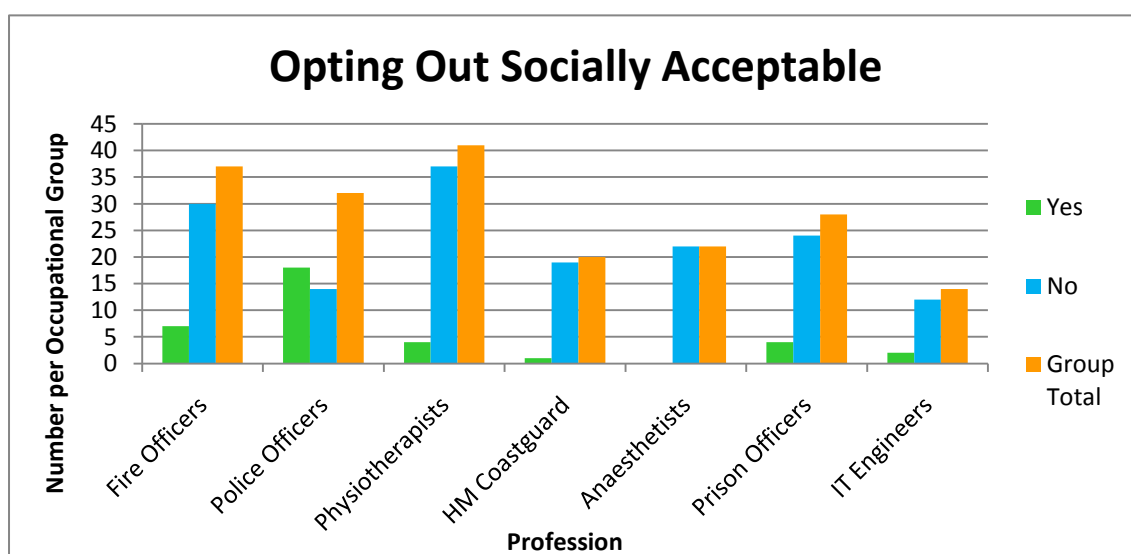


Figure 9. Graph showing social acceptability of opting out.

The procedures and practices section of the results and the findings of whether the participants were consulted regarding the organisation and structure of their on-call working practices, i.e. on-call work schedule, will now be reported.

#### 4.4.2.5 Procedures and Practices: Consultation Regarding On-call Work

##### Schedule

The participants were asked to report if they had been consulted regarding the organisation and structure of their on-call work schedule. The results (see table 13 and figure 10) show that 136 of the participants had not been consulted regarding the organisation and structure of the on-call work schedule, with 58 reporting they had been consulted. The occupational group with the highest number of participants that had been consulted were the physiotherapists 14, closely followed by the prison officers 13.

Conversely, the fire officers 28, physiotherapists 27, and the police officers 25 had the highest number of participants who were not consulted regarding their on-call schedule's organisation and structure. With just 9 of fire officers and 7 police officers who were consulted. The coastguard 17, anaesthetists 15 and IT engineers 9 reporting that they were not consulted, and 3 coastguard, 7 anaesthetists and 5 IT engineers who were consulted.

Profession	Yes	No
Fire Officers	9 24.3%	28 75.7%
Police Officers	7 21.9%	25 78.1%
Physiotherapists	14 34.1%	27 65.9%
HM Coastguard	3 15%	17 85.0%
Anaesthetists	7 31.8%	15 68.2%
Prison Officers	13 46.4%	15 53.6%
IT Engineers	5 36%	9 64.3%

*Table 13. Within profession numbers consulted for input into on-call schedule.*

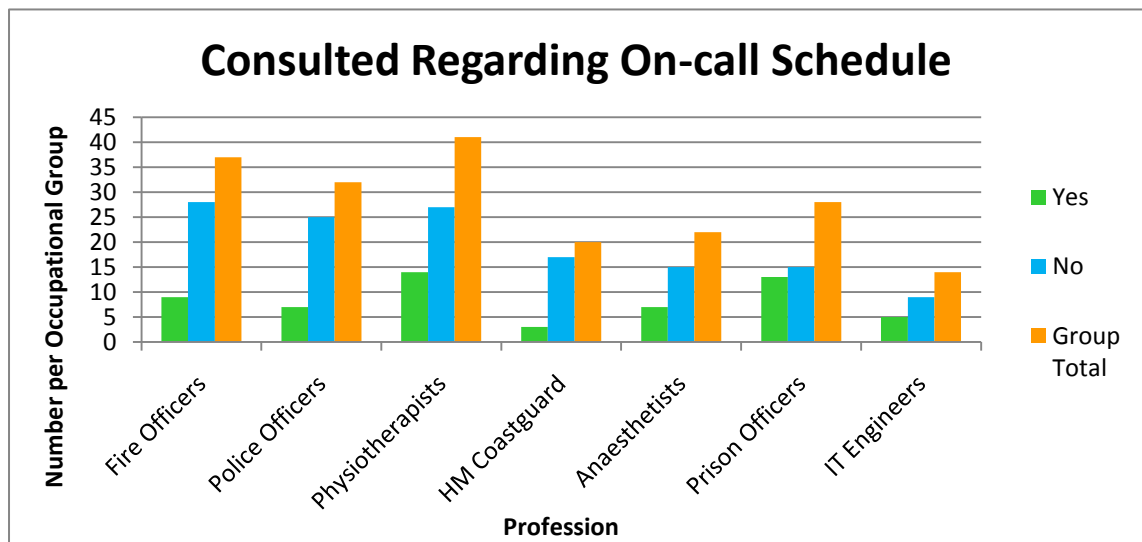


Figure 10. Graph showing whether the participants had been consulted regarding their on-call work schedule.

The results will now continue by reporting the findings of whether their input into the formation of the on-call working schedule and its organisation and structure. The results (see table 14 and figure 11) show that just 36 of the participants had an influence on their on-call working schedule, with 29 reporting that their input had not had any influence. The occupational group with the highest number of participants whose input had an influence were the prison officers with 9, followed by 6 police officers, 5 IT engineers, 5 fire officers, 4 anaesthetists, 3 physiotherapists and 3 of the coastguards.

However, the participants who reported being consulted 11 physiotherapists, 6 fire officers, 5 prison officers, 4 anaesthetists, 2 police officers and 1 coastguard reported that their input had no influence.

Profession	Yes	No
Fire Officers	5 55.5%	4 44.5%
Police Officers	6 85.7%	1 14.3%
Physiotherapists	3 21.4%	11 78.6%
HM Coastguard	3 100%	
Anaesthetists	4 57.0%	3 43.0%
Prison Officers	9 69.2%	4 30.8%
IT Engineers	5 100%	

Table 14. Within profession did their input have any influence on on-call work schedules.

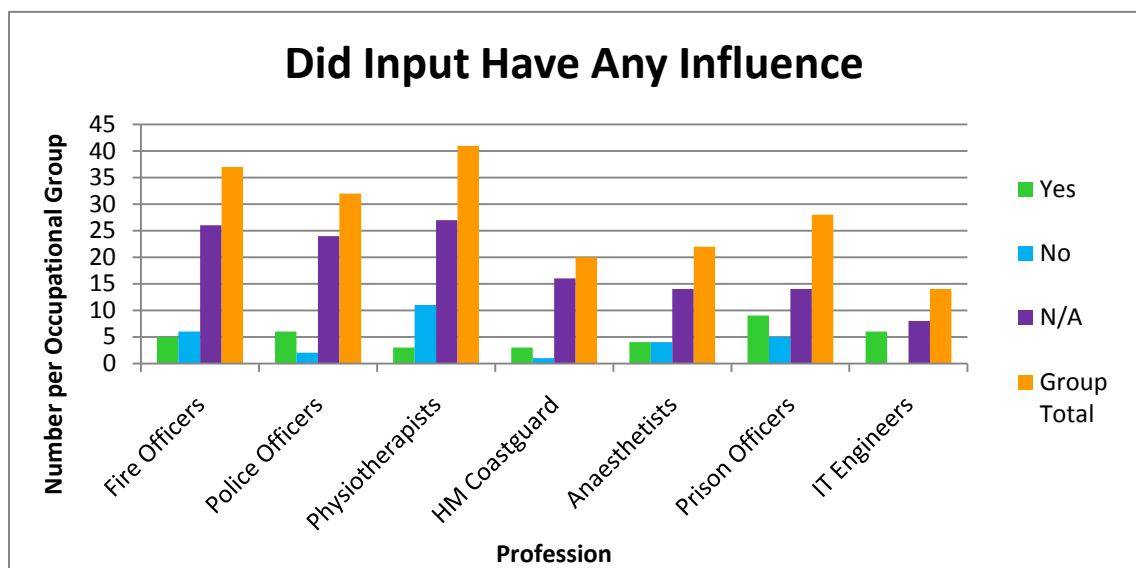


Figure 11. Graph showing whether the participants input had any influence.

Finally, the following section will report whether they worried about the decisions that they make whilst working on-call. The results (see table 15 and figure 12) show that 19 of the participants always worry about the decisions they make when on-call, with 130 reporting worrying sometimes and 45 reporting that they never worry.

The occupational group that contain the highest number of participants who ‘always worry’ about the decisions they make whilst working on-call are the physiotherapists with 10 followed by the anaesthetists 3, the police officers 2, coastguard 2 and prison officers 2. None of the fire officers or IT engineers reported always worrying about the decisions they make when on-call.

The occupational group that contain the highest number of participants who ‘sometimes worry’ are the physiotherapists with 29, followed by the fire officers with 24, then the police officers with 20, followed by 19 prison officers, 16 anaesthetists, 13 coastguard, and finally 9 in the IT group.

The highest number of participants who ‘never worry’ about the decisions they make within each occupational group when working on-call are the fire officers with 13. The police officers report 10 never worry, with 7 prison officers, 5 coastguard, 5 IT engineers, 3 anaesthetists and 2 physiotherapists.

Profession	Worry About Decisions When On-call		
	Never	Sometimes	Always
Fire Officers	13 35.1%	24 64.9%	0
Police Officers	10 31.3%	20 62.5%	2 6.2%
Physiotherapists	2 4.9%	29 70.7%	10 24.4%
HM Coastguard	5 25.0%	13 65.0%	2 10.0%
Anaesthetists	3 13.6%	16 72.8%	3 13.6%
Prison Officers	7 25.0%	19 67.9%	2 7.1%
IT Engineers	5 35.7%	9 64.3%	0

*Table 15. Within profession do they worry about the decisions they make when on-call.*

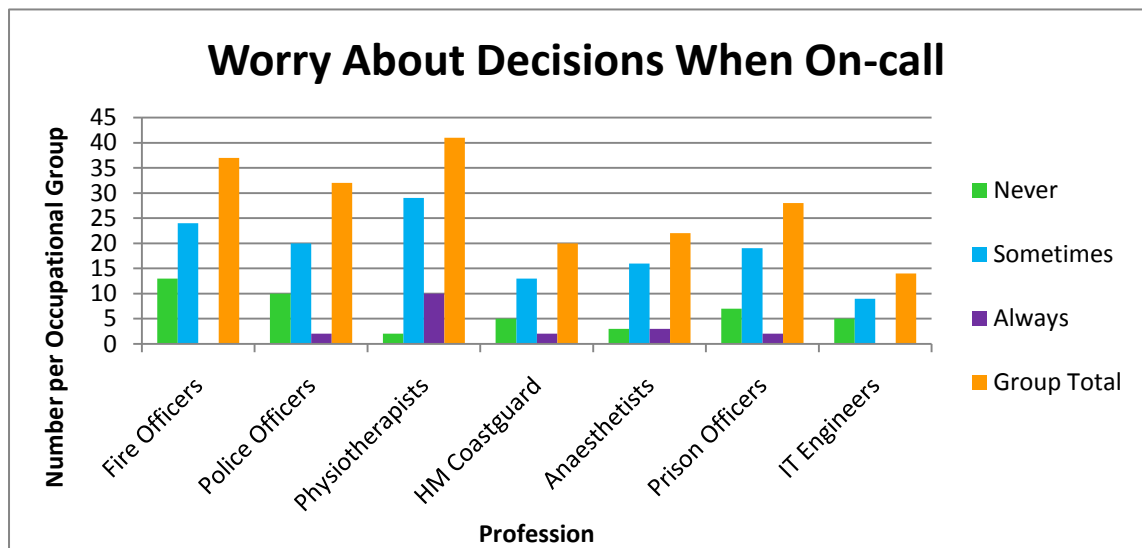


Figure 12. Graph showing whether the participants worry about the decisions they make when on-call.

The results will now report the findings of attitudes, impact and coping aspects of the on-call questionnaire.

#### 4.4.3 Attitudes, Coping and Effects of On-call

##### 4.4.3.1 Attitudes

The participants were asked to record how they feel about working on-call using a scale of dislike of 1 – 3, with 1 representing ‘I really enjoy it’, 2 ‘I can live with it’ and 3 ‘I really don’t like it’.

The data was analysed using a 5 (age group) x 2 (gender) ANOVA with dislike of on-call as the DV and age and gender as the IVs. The analysis presented in figure 13 revealed that there is a significant effect of gender on feelings towards on-call working  $F(1, 193) = 7.12, p < 0.01, r = .04$  with the females being significantly more negative in their dislike of on-call working than the males. There was also an effect of age on dislike of on-call working  $F(1, 193) = 3.44, p < 0.01, r = .07$  with the females in all age groups reporting greater dislike of on-call working than the males, however the interaction failed to reach significance ( $p = 0.09$ ).

The Tukey HSD post hoc test revealed significant differences in dislike of on call in the different age groups, with differences between age groups 21-30 and 31-40 ( $p < 0.01$ ), 21-30 and 41-50 ( $p < 0.001$ ), and 21-30 and 51-60 ( $p < 0.05$ ) have the greatest dislike of on-call. When carrying out the Bonferroni correction and adjusting the alpha value ( $\alpha = 0.001$ ) this difference between age groups remained significant for 21-30 and 41-50 ( $p < 0.001$ ), however 21-30 and 31-40, and 21-30 and 51-60 were no longer significant.

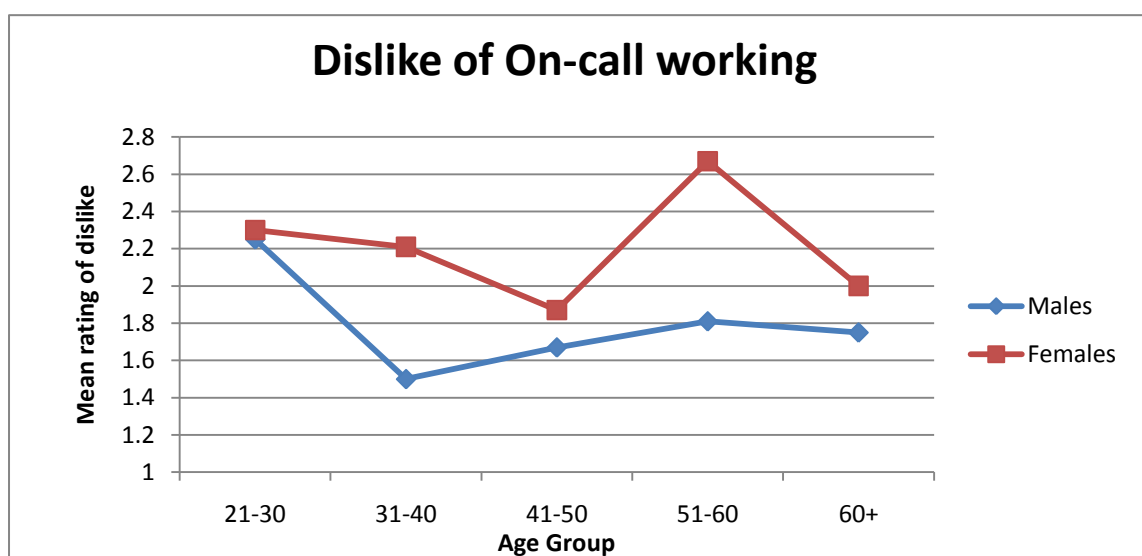


Figure 13. Graph showing dislike of on-call working.

Finally, the following section will report the findings of the *impact* on-call working has within each profession (see figure 14). The data was analysed using a one-way ANOVA with 7 professions as the IV and the DV being the participant's feelings towards their on-call. The analysis presented in figure 14 revealed a significant effect of profession  $F(1, 193) = 10.83, p < 0.001, r = .26$  with a Tukey HSD post hoc test revealing that the physiotherapists,  $p < 0.001$  have the most negative feelings toward their on-call working than any of the other occupational groups, ( $p > 0.05$ ). There were no significant differences between the other professions. When carrying out the Bonferroni correction and adjusting the alpha value ( $\alpha = 0.007$ ) this revealed that

physiotherapists are significantly more negative to on-call working than all of the other groups ( $p < 0.001$ ).

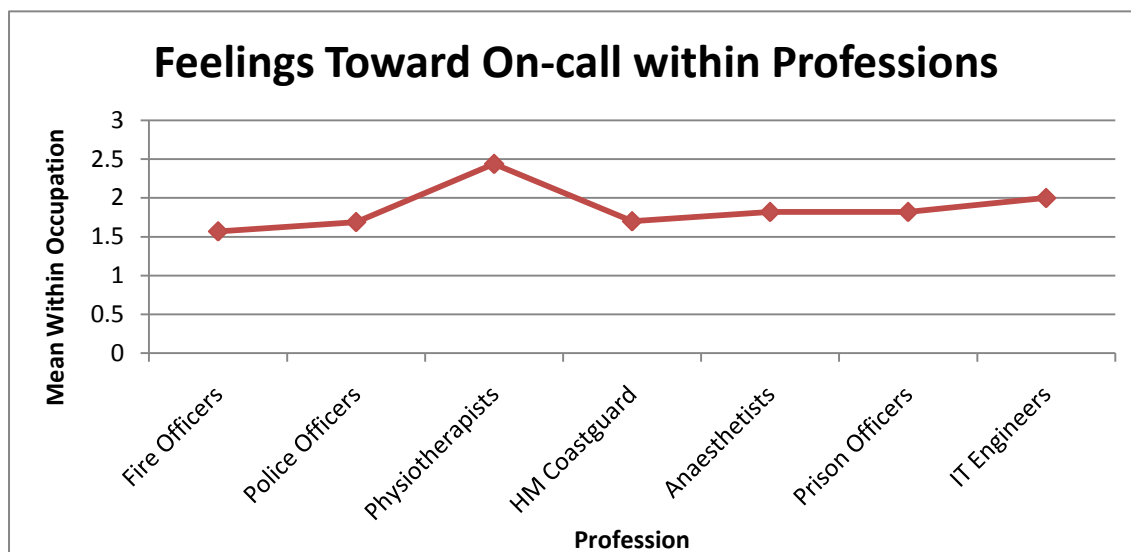


Figure 14. Graph showing feelings towards on-call in each profession.

#### 4.4.3.2 Coping

The participants were asked to report how they feel they cope with the mental and physical demands of their on-call from a scale of 1 – 5 with 1 being ‘not at all well’, 2 ‘a little’, 3 ‘somewhat’, 4 ‘fairly well’, and 5 ‘very well’ (a low score indicates they cope less well).

The data was analysed using ANOVA with coping with the mental demands and physical demands as the two DVs and age and gender as the IVs. The analysis revealed that there was no significant effect of age and ‘coping with the mental demands of on-call’. However, there was a significant main effect of gender on ‘coping with the mental demands of on-call’  $F(1, 193) = 5.78, p < 0.05, r = .03$  with males generally coping less well than the females (see figure 15). There was also no significant interaction between age and gender on coping with mental demands.



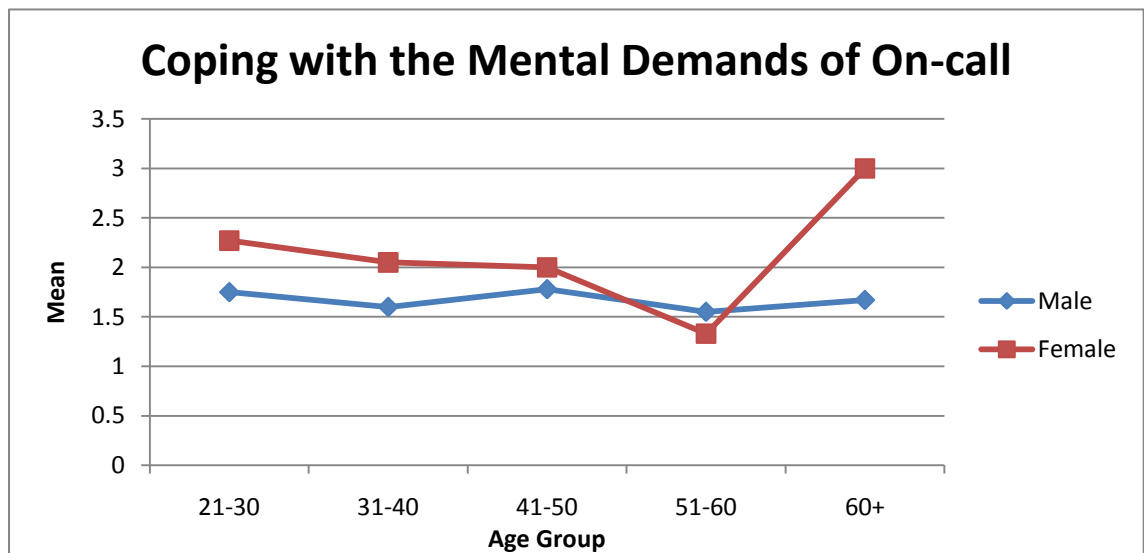


Figure 15. Graph showing gender and coping with mental demands of on-call working.

With regards to coping with the physical demands, the analysis revealed that there was no significant main effect of gender on coping with the physical demands of on-call working ( $p = 0.08$ ). There was also no significant main effect of age on coping with the physical demands and no interaction between age and gender. However, contrary to the impact of age on coping with mental demands of on-call working, the females in general find the physical demands of on-call more taxing with those aged over 60 especially finding the physical demands of on-call more taxing.

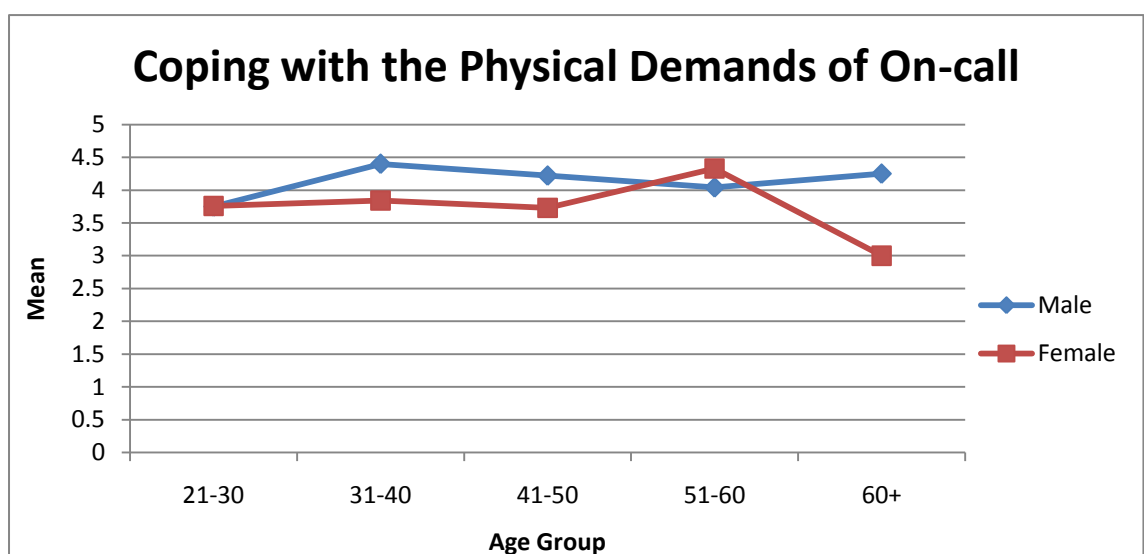


Figure 16. Graph showing gender and coping with physical demands of on-call working.

The following section will consider coping with the mental and physical demands across the seven professions. The data was again analysed using ANOVA with 7 (professions) as the IV and coping with the mental and physical demands as the two DVs. The analysis presented in figure 17 revealed that there was a significant effect of profession on coping with both mental and physical demands  $F(1, 193) = 5.21, p < 0.001, r = .14$  and  $F(1, 193) = 3.16, p < 0.01, r = .09$  respectively. Again the Tukey HSD post hoc test revealed that the physiotherapists reported coping least well with the mental ( $p < 0.001$ ) and physical ( $p < 0.01$ ) demands of on-call working than all of the other occupational groups. However, when analysing the data using the Bonferroni correction both coping with the mental and physical demands remained significant  $p = 0.001$ , and  $p = 0.01$ , when adjusting the alpha value ( $\alpha = 0.002$ ).

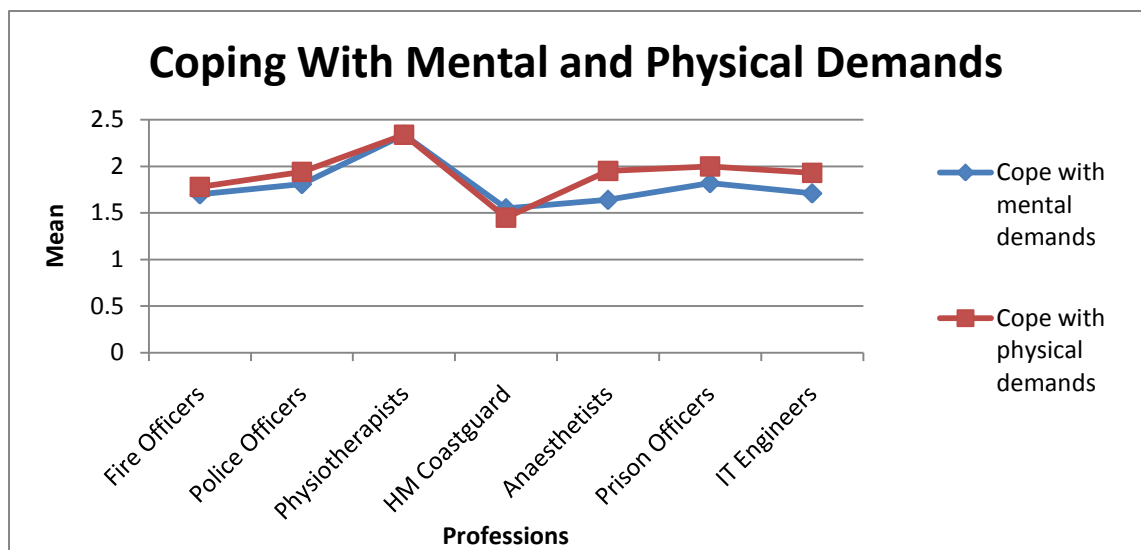


Figure 17. Graph showing coping with mental and physical demands of on-call working across professions.

The results will now consider how the participants' feel on-call work effects their lives outside of work

#### 4.4.3.3 Effects of On-call

The participants were asked to report how they feel they feel their on-call work affects their family life, social life, sleep patterns and diet. The data was analysed using

ANOVA with gender (2) and age group (5) as the IVs and the impact on family, social life, sleep patterns and diet as the DVs. The analysis presented in figure 18 for gender and figure 19 for age revealed that there was no main effect of gender or age on family, social life and diet. However sleep patterns and gender just failed to reach significance ( $p = 0.59$ ) with more females across all age groups and in particular the over 60's experiencing some disruption to their sleep patterns than males.

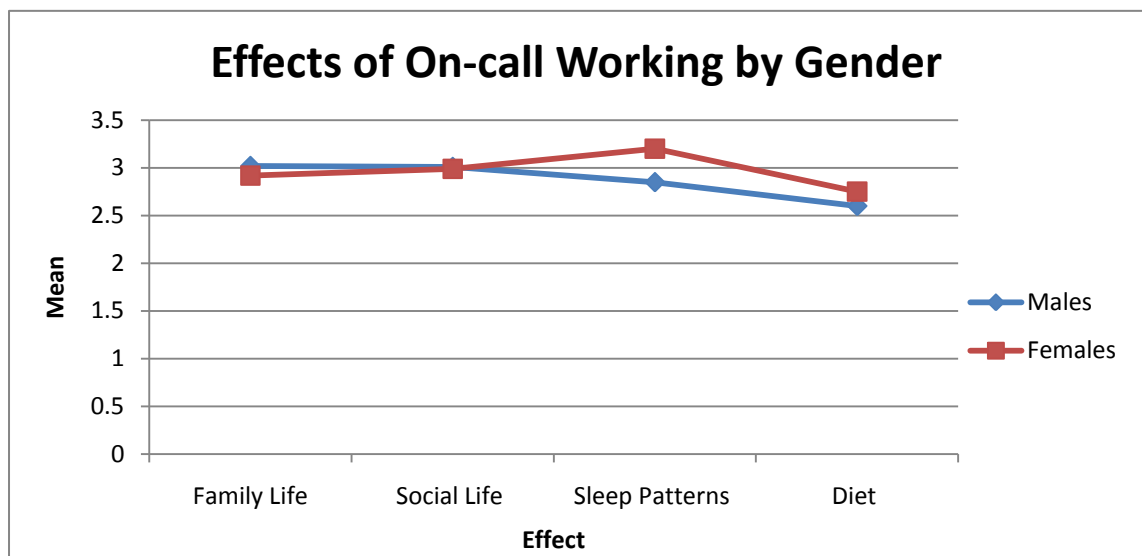


Figure 18. Graph showing the effects of on-call by gender.

Overall, the participants that reported a greater affect on family are females over 60 and males aged 21-30 although these differences were marginal. With regard to social life males are generally affected a little with females aged over 60 being affected very negatively. For affects diet females in all the age groups except 21-30 experience the negative impact of on-call working on their diet. When controlling for age there are no significant changes to the results and these observed differences are still present.

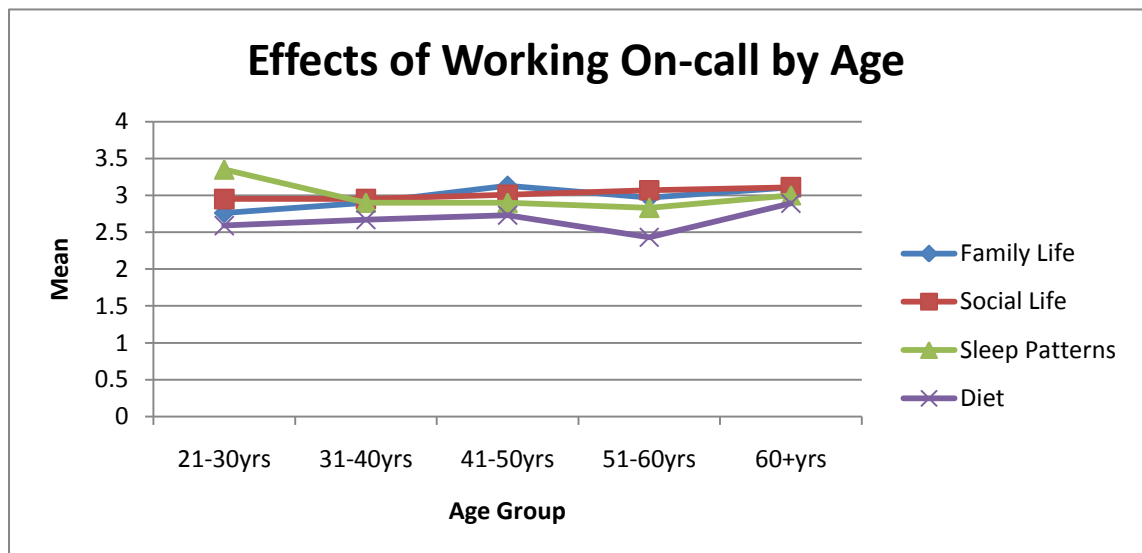


Figure 19. Graph showing the effects of on-call by age.

The results will now move onto part 2 which will document the impact of on-call working on general health, need for recovery and burnout.

#### 4.4.4 Part 2 General Health, Recovery, and Burnout

##### 4.4.4.1 The General Health Questionnaire

The participants were asked to complete the General Health Questionnaire (GHQ) as a means of measuring their current mental health status. A mean was calculated for each occupational group prior to analysing the data. Overall the prison officers have the highest group mean on the GHQ with the coastguard having the lowest (a high score indicates poor mental health). Between genders, both the male and female prison officers have the highest mean and with the male anaesthetists and female IT engineers having the lowest.

Overall, from an age perspective, the prison officers in the 21-30 age group have the highest mean score on the GHQ which suggests they may be most at risk of issues with regard to mental health. The lowest mean GHQ score is the coastguard aged 31-40 years. Within each of the age groups the highest mean GHQ score are the prison officers in 21-30, the anaesthetists in 31-40, the prison officers in the 41-50, the fire officers in

the 51-60, and IT engineers in the 60+ group. This descriptive data suggests that there are concerns for the mental well-being of the prison officers in this study. Finally, overall on average the males have a higher GHQ mean than the females. A basic table containing the descriptive statistics are shown in table 16.

Profession	Group		Gender		Age	31-40yrs	41-50yrs	51-60yrs	60+yrs
	GHQ mean	SD	Male	Female	21-30yrs				
Fire Officers	2.81	3.5	2.81			2.67	2.64	2.67	
Police Officers	1.94	3.31	2.40	1.53	0.67	1.56	2.92	1.14	
Physiotherapists	2.05	3.78	2.50	2.00	2.13	2.00	2.00		
HM Coastguard	1.30	2.40	1.37			0.33	1.11	0.80	4.00
Anaesthetists	1.91	2.17	0.86	3.75		4.57	1.60		0.67
Prison Officers	2.71	4.02	2.73	2.67	3.33	1.14	3.38	2.00	
IT Engineers	2.14	4.52	2.50			2.00	0.80	3.43	2.00

*Table 16. GHQ descriptives of age and gender within profession.*

The results were analysed using the enter method in Multiple regression with GHQ mean score as the DV and 8 IVs: gender, age, how long they had worked on-call (q3), same or different to their normal work (q4), on-call after completing a days work (q5), consultation regarding on-call structure (q18, influence on structure (q19) and worry about decisions on-call (q20). These IVs were taken from the on-call questionnaire.

The multiple regression analysis of the GHQ questionnaire (DV) and the on-call questions 3, 4, 5, 18, 19, 20 revealed that the only question which had any predictive value for GHQ score was whether the participants had been consulted regarding their on-call structure, i.e. lack of consultation increased the likelihood of a decline in well-being. This was significantly related to their GHQ score  $r = .34$  ( $p < 0.05$ ) with 4.3% of the variability being accounted for by the predictor variable (see table 17).

	B	SE B	β
1 Constant	15.86	2.81	
Gender	-1.15	1.06	-0.09
Age	-0.32	0.47	-0.06
2 Constant	11.8	3.94	
Gender	-1.5	1.09	-0.12
Age	-0.64	0.55	-0.12
3. How long worked on-call	0.51	0.39	0.11
4. On-call work in relation to normal work	-0.32	0.4	-0.06
5. Cover on-call work after normal days work	-0.58	1.13	-0.04
18. Consulted regarding on-call work	4.37	2.05	.34*
19. Input have any influence	-1.74	1.18	-0.23
20. Worry about decisions made when on-call	1.12	0.83	0.12

\*  $p < 0.05$

*Table 17. Predicting General Health.*

#### 4.4.4.2 The Recovery Scale

The participants were asked to complete the Recovery Scale (RS) as a means of measuring their recovery from their working day. A mean was calculated for each occupational group prior to analysing the data. Overall the police officers have the highest group mean on the RS with the prison officers having the lowest (a high score indicates poor recovery in the post work period). Between genders, the males have the greatest need for recover, with the male police officers and female anaesthetists have the highest mean with the male prison officers and female prison officers having the lowest.

From an age perspective, the police officers in the 51-60 age group have the highest mean score on the RS (24.86), and the lowest mean RS score is the IT engineers aged 41-50 years (14.2). Within each age group the highest mean RS score are the police officers (18) in 21-30, the IT engineers (20) in 31-40, the coastguard (18) in the 41-50, the police officers (24.86) in the 51-60, and the anaesthetists (18.33) in the 60+ group. The results of the descriptives suggest that the police officers have on average the poorest recovery in the post work period. A basic table containing the descriptive statistics are shown in table 18.

Profession	Group		Gender		Age				
	RS mean	SD	Male	Female	21-30yrs	31-40yrs	41-50yrs	51-60yrs	60+yrs
Fire Officers	15.76	2.68	15.76			16.83	15.46	16.33	
Police Officers	18.41	8.68	19.73	17.24	18.00	17.89	15.38	17.16	
Physiotherapists	16.76	3.10	15.25	16.92	16.84	16.50	16.33	17.00	
HM Coastguard	17.90	3.12	17.89	18.00		19.00	18.00	17.80	16.67
Anaesthetists	17.73	3.49	17.14	18.75		17.71	17.60	17.57	18.33
Prison Officers	15.11	2.78	15.00	15.50	15.33	15.86	14.44	17.50	
IT Engineers	16.36	3.08	16.42	16.00		20.00	14.20	17.29	17.00

Table 18. RS descriptives of age and gender within profession.

The results were analysed using the enter method in Multiple regression with gender and age and the same IVs from the on-call questionnaire as used in the GHQ analysis.

The multiple regression analysis of the RS questionnaire (DV) and the on-call questions 3, 4, 5 and 18, 19, 20 (IVs) revealed that there are no significant predictors, but question 4 is the closest to predicting recovery: Whether the participant's on-call work is the same or different to their normal work with the RS score just failed to reach significance  $r = .14$  ( $p = 0.06$ ) as illustrated in table 19 (with 3% of the variability being accounted for by the predictor variable).

	B	SE B	$\beta$
1 Constant	13.25	2.16	
Gender	1.12	0.81	0.12
Age	0.55	0.36	0.13
2 Constant	11.74	3.05	
Gender	1.35	0.84	0.14
Age	0.7	0.43	0.17
3. How long worked on-call	-0.05	0.3	-0.16
4. On-call work in relation to normal work	0.59	0.31	0.14*
5. Cover on-call work after normal days work	-0.62	0.87	-0.05
18. Consulted regarding on-call work	1.74	1.59	0.18
19. Input have any influence	-1.09	0.92	-0.19
20. Worry about decisions make when on-call	-0.18	0.64	-0.02

\* $p = 0.06$

Table 19. Predicting Recovery.

#### 4.4.4.3 Burnout

The participants were asked to complete the Maslach Burnout Inventory (MBI) questionnaire as a means of measuring burnout. This is a 3 factor questionnaire, including emotional exhaustion, depersonalization and personal accomplishment. A mean was calculated for each occupational group within each factor prior to analysing the data. The results of emotional exhaustion will be reported first.

Overall the physiotherapists have the highest group mean on the MBI – emotional exhaustion (EE) with the anaesthetists having the lowest (a high EE score indicates higher emotional burnout). Between genders, the male physiotherapists and female IT engineers have the highest mean with the male anaesthetists and female coastguard having the lowest.

From an age perspective, the physiotherapists in the 51-60 age group have the highest mean score on the EE, and the lowest mean EE score is the coastguard aged 31-40 years. Within each age group the highest mean EE score are the prison officers in 21-30, the physiotherapists in 31-40, the physiotherapists in the 41-50, the physiotherapists in the 51-60, and both the coastguard and the IT engineers in the 60+ group. The results of the descriptives suggest that the physiotherapists have the greatest emotional burnout. Finally, overall the males have a slightly higher EE score than the females which suggests that there is very little difference in emotional burnout between genders in this participant sample. A basic table containing the descriptive statistics are shown in table 20.

Profession	Group		Gender		Age				
	E E mean	SD	Male	Female	21-30yrs	31-40yrs	41-50yrs	51-60yrs	60+yrs
Fire Officers	17.68	9.99	17.68			12.17	19.04	16.00	
Police Officers	16.78	10.16	16.67	16.88	12.33	17.00	20.08	12.29	
Physiotherapists	20.63	9.22	24.75	20.19	19.55	22.33	25.67	29.00	
HM Coastguard	16.35	9.71	16.84	7.00		8.33	13.44	23.00	22.00
Anaesthetists	12.05	4.67	12.14	11.88		12.57	13.80	11.29	9.67
Prison Officers	18.04	10.03	17.41	20.33	19.67	18.14	18.62	10.50	
IT Engineers	17.71	9.43	16.75	23.50		11.00	21.00	15.71	22.00

Table 20. Emotional Exhaustion descriptives of age and gender within profession.



The results were analysed using the enter method in Multiple regression with EE mean score as the DV and 8 IVs: gender, age, how long they had worked on-call (q3), same or different to their normal work (q4), on-call after completing a days work (q5), consultation regarding on-call structure (q18), influence on structure (q19) and worry about decisions on-call (q20). These IVs were taken from the on-call questionnaire.

The multiple regression analysis of the MBI questionnaire – emotional exhaustion (DV) and the on-call questions 3, 4, 5 and 18, 19, 20 (IVs) revealed that only question 4 has predictive value with the EE and therefore, whether the participants on-call work is the same or different to their normal work was significantly related to their EE score  $r = -.18$  ( $p < 0.05$ ) with 5.7% of the variability being accounted for by the predictor variable (see table 21). Specifically, this finding suggests that the more similar the on-call work to normal working, the lower the EE score.

	B	SE B	$\beta$
1 Constant	16.82	5.52	
Gender	1.16	1.7	0.06
Age	-0.27	0.75	-0.03
2 Constant	16.94	6.3	
Gender	0.5	7.73	0.03
Age	-0.46	0.88	-0.05
3. How long worked on-call	0.35	0.62	0.05
4. On-call work in relation to normal work	-1.57	0.65	-0.18*
5. Cover on-call work after normal days work	-0.73	1.8	-0.03
18. Consulted regarding on-call work	-2.99	3.27	-0.14
19. Input have any influence	2.49	1.89	0.21
20. Worry about decisions make when on-call	2.34	1.32	0.14

\*  $p < 0.05$

Table 21. Predicting Emotional Exhaustion (MBI).

The descriptives of the MBI - depersonalization (D) indicate that overall the prison officers have the highest group mean, with the anaesthetists having the lowest (a high D score indicates greater depersonalized burnout). Between genders, the male police officers and female prison officers have the highest mean with the male IT engineers and female anaesthetists having the lowest.

From an age perspective, the prison officers in the 31-40 age group have the highest mean score on the depersonalization (D), and the lowest mean D score is the anaesthetists (0.67) aged 60+ years. Within each age group the highest mean D score are the prison officers in 21-30, the prison officers in 31-40, the coastguard in the 41-50, the physiotherapists in the 51-60, and the coastguard in the 60+ group. The results of the descriptives suggest that the prison officers have the greatest depersonalization burnout. This is understandable bearing in mind they are working in prisons and are therefore set apart from 'normal society' during working hours. Finally, overall the males have a slightly lower D score than the females which suggests that there is very little difference in depersonalized burnout between genders in this participant sample. A basic table containing the descriptive statistics are shown in table 22.

Profession	Group		Gender		Age				
	D mean	SD	Male	Female	21-30yrs	31-40yrs	41-50yrs	51-60yrs	60+yrs
Fire Officers	5.95	5.47	5.95			3.50	6.64	4.33	
Police Officers	7.53	6.16	6.93	8.06	9.33	8.67	9.08	2.43	
Physiotherapists	7.10	4.83	7.25	7.08	7.10	6.00	11.33	1.00	
HM Coastguard	5.05	4.25	5.16	3.00		5.67	3.56	5.00	9.00
Anaesthetists	2.73	3.44	2.64	2.88		4.43	1.20	3.00	0.67
Prison Officers	10.25	5.92	9.73	12.17	11.67	13.00	9.81	2.00	
IT Engineers	4.07	3.5	4.08	4.00		4.00	6.80	2.43	2.00

Table 22. Depersonalisation descriptives of age and gender within profession.

The multiple regression analysis of the MBI questionnaire - depersonalisation (DV) and the on-call questions 3, 4, 5 and 18, 19, 20 (IVs) revealed that only question 3 has predictive value with the D and therefore, how long the participants have worked on-call for was significantly related to their D score  $r = -.18$  ( $p < 0.05$ ) with 3.7% of the variability being accounted for by the predictor variable (see table 23). This negative relationship suggests that the longer the participant's have worked on-call, the lower their level of depersonalisation.

	B	SE B	β
1 Constant	11.74	2.55	
Gender	-0.53	0.96	-0.05
Age	-1.24	0.42	-0.25
2 Constant	12.63	3.58	
Gender	-0.15	0.97	-0.01
Age	-0.67	0.35	-0.18
3. How long worked on-call	-0.78	0.35	-0.18*
4. On-call work in relation to normal work	-0.17	0.37	-0.03
5. Cover on-call work after normal days work	0.03	1.03	0
18. Consulted regarding on-call work	-0.6	1.86	-0.05
19. Input have any influence	-0.25	1.08	-0.04
20. Worry about decisions make when on-call	0.71	0.75	0.07

\*  $p < 0.05$

*Table 23. Predicting Depersonalisation (MBI).*

The descriptives of the MBI – personal accomplishment (PA) indicate that overall the physiotherapists (40.41) have the highest group mean with the prison officers having the lowest (a high PA score indicates personal accomplishment in one's job). Between genders, the male physiotherapists and female coastguard have the highest mean with the male anaesthetists and female prison officers having the lowest.

From an age perspective, the physiotherapists in the 51-60 age group have the highest mean score on personal accomplishment (PA), and the lowest mean PA score is the prison officers aged 21-30. Within each age group the highest mean PA score are the physiotherapists in 21-30, the physiotherapists in 31-40, the physiotherapists in the 41-50, the physiotherapists in the 51-60, and the IT engineers in the 60+ group. The results of the descriptives suggest that the physiotherapists experience the greatest personal accomplishment when at work. Finally, overall on average the males have a higher PA score than the females which suggests that there is again very little difference in personal accomplishment burnout between genders in this participant sample. A basic table containing the descriptive statistics are shown in table 24.

Profession	Group		Gender		Age				
	PA mean	SD	Male	Female	21-30yrs	31-40yrs	41-50yrs	51-60yrs	60+yrs
Fire Officers	34.11	5.19	34.11			34.5	33.71	37.00	
Police Officers	33.97	8.07	33.8	34.12	34.00	32.00	33.54	37.29	
Physiotherapists	40.41	5.36	40.50	40.41	39.87	41.50	42.33	45.00	
HM Coastguard	32.35	7.32	31.79	43.00		34.67	29.89	35.20	32.67
Anaesthetists	34.23	9.37	32.86	36.62		31.57	42.20	31.57	33.33
Prison Officers	32.11	8.49	33.05	28.67	28.00	31.71	32.00	40.50	
IT Engineers	36.50	6.99	37.42	31.00		33.00	32.00	40.29	36.00

Table 24. Personal Accomplishment descriptives of age and gender within profession.

The multiple regression analysis of the MBI questionnaire – personal accomplishment (DV) and the on-call questions 3, 4, 5 and 18, 19, 20 (IVs) revealed that gender and question 5 have predictive value with the PA and therefore, gender and whether the participants covered on-call periods following their normal days work were both significantly related to their PA score  $r = .24$  ( $p < 0.01$ ) and  $r = -.14$  ( $p < 0.05$ ) respectively with 4.1% of the variability being accounted for by the predictor variables (see table 25).

	B	SE B	$\beta$
1 Constant	29.68	3.61	
Gender	3.55	1.36	0.22*
Age	0.17	0.6	0.02
2 Constant	35.27	5.07	
Gender	3.79	1.4	0.24**
Age	0.16	0.71	0.02
3. How long worked on-call	-0.1	0.52	0.06
4. On-call work in relation to normal work	-0.1	0.52	-0.01
5. Cover on-call work after normal days work	-2.81	2.45	-0.14*
18. Consulted regarding on-call work	-3.55	2.64	-0.21
19. Input have any influence	1.01	1.52	0.1
20. Worry about decisions make when on-call	-0.07	1.07	-0.01

\*  $p < 0.05$  \*\* $p < 0.01$

Table 25. Predicting Personal Accomplishment (MBI).

The results will now move onto part 3 which will document the impact of the personality variables including sensation seeking and desirability of control attitudes to on-call working.

#### **4.4.5 Part 3 Personality as a Moderator of Attitudes to On-call**

##### **4.4.5.1 Sensation Seeking Scale and Desirability of Control**

The participants were asked to complete the sensation seeking scale (SS) and the desirability of control (DC) questionnaires as a means of measuring their personality traits of sensation seeking and need for control. The scores on these two scales were subjected to a median split with a score of 1 being given to those below the mean and a score of 2 to those above the mean.

The data were subjected to a 2 x 2 between groups ANOVA with attitude to working on-call as the DV and high or low SS and DC as the IVs. The ratings for how they feel about working on-call are 1 ‘I really enjoy it’, 2 ‘I can live with it’ and 3 ‘I really don’t like it’.

There was no significant main effect of sensation seeking on attitudes to on-call,  $F(1, 193) = 1.45, p > 0.05, NS$  and there was also no significant main effect of desirability of control,  $F(1, 193) = 0.13, p > 0.05, NS$ . There was also no interaction. The means and standard deviations presented in table 26 indicate that individuals high on sensation seeking enjoy on-call more than those with low sensation seeking, (however this failed to reach significance at the  $p = 0.05$  level).

	N	Mean	SD
Low Sensation Seeking	111	1.93	0.64
High Sensation Seeking	83	1.82	0.55
Low Desirability of Control	95	1.91	0.65
High Desirability of Control	99	1.86	0.57

*Table 26. Means and SD for Sensation Seeking and Desirability of Control*

However, the means in table 14 indicate that individuals high on desirability of control enjoy on-call more than those with a low desirability of control, but again this failed to reach significance at the  $p = 0.05$  level. Furthermore, the participants with high sensation seeking also enjoyed on-call more than those with low SS, but this again failed to reach significance.

#### **4.4.5.2 Sensation Seeking Scale and Desirability of Control with Coping**

The analysis continued with the personality variables of SS and DC, investigating their impact on coping with physical demands and coping with mental demands of on-call working. They were analysed using an ANOVA with *coping with the mental demands* and *coping with the physical demands* as the DVs and high or low SS and DC as the IVs.

The analysis presented in figure 21 indicate that there was no significant main effect of sensation seeking on coping with the mental demands of on-call,  $F(1, 193) = 0.34$ ,  $p > 0.05$ , NS. Again there was no significant main effect of the desirability of control on coping with the mental demands of on-call  $F(1, 193) = 2.91$ ,  $p = 0.09$ , NS.

There was also no significant main effect of sensation seeking on coping with the physical demands of on-call,  $F(1, 193) = 1.45$ ,  $p > 0.05$ , NS. There was also no significant main effect of desirability of control on coping with the physical demands of on-call working  $F(1, 193) = 1.10$ ,  $p > 0.05$ , NS. There was also no interaction between sensation seeking and desirability of control.

The results revealed that individuals high on SS and DC cope better with the mental demands of on-call working although the effect was not significant at the  $p = 0.05$  level. However, those with low DC go generally less well. A similar pattern emerged in the physical demands with high SS and DC cope better than those with a low SS and DC, again the results failed to reach significance.

#### **4.4.5.3 Coping Style as a Predictor of Coping with Mental and Physical Demands of On-call.**

The final section of the results will present the data regarding the individual difference of coping styles and the impact of this on ability to cope with the mental and physical demands of on-call working. Coping style was assessed using the COPE and ability to cope was assessed by questions 9 and 10 of the on-call questionnaire, which asked '*overall how well do you feel you cope with the mental demands (e.g. memory, problem solving, concentration) of your on-call*' and '*overall how well do you feel you cope with the physical demands of your on-call*'. Two Multiple Regression analysis were carried out, the first with *coping with mental demands* as the DV and the subscales in the COPE as the IVs and the second with *coping with physical demands* as the DV. For coping with mental demands, the multiple regression analysis revealed that seeking emotional social support  $r = -.24$  ( $p < 0.05$ ), focus on venting of emotions  $r = -.29$  ( $p < 0.001$ ) and humour  $r = -.21$  ( $p < 0.01$ ) within the COPE were significant the predictors of coping with mental demands of on-call working as indicated in table 27, with 21.2% of the variability being accounted for by the predictors. These coping styles were all negative predictors, which suggests that the more these coping styles were used, the less the participants reported coping with the mental demands of on-call working.

	B	SE B	$\beta$
1 Constant	4.81	0.42	
Active coping	-0.02	0.03	-0.06
Planning	-0.01	0.03	-0.03
Seeking instrumental support	0.04	0.03	0.17
Seeking emotional social support	-0.05	0.02	-0.24*
Suppression of completing activities	0	0.02	0.02
Turning to religion	0.02	0.02	0.06
Positive reinterpretations and growth	0.02	0.03	0.05
Restraint coping	0.02	0.03	0.06
Acceptance	0.03	0.02	0.11
Focus on and venting of emotions	-0.09	0.03	-0.29***
Denial	0.03	0.03	0.07
Mental disengagement	-0.03	0.03	-0.11
Behavioural disengagement	-0.01	0.03	-0.01
Alcohol/drug use	0.02	0.02	0.08
Humour	-0.05	0.02	-0.21**

\*\*\* $p < 0.001$  \*\*  $p < 0.01$  \* $p < 0.05$

*Table 27. Predicting Coping with Mental Demands.*

Finally, a Multiple Regression analysis was carried out to investigate coping with the physical demands from the on-call questionnaire as the DV and the subscales in the COPE as the IVs. The multiple regression analysis revealed that focus on venting of emotions  $r = -.25$  ( $p < 0.01$ ) within the COPE was a significant predictor of physical demands of on-call working as indicated in table 28, with 11.4% of the variability being accounted for by the predictor variable. This again suggests that those people who reporting the use of ‘venting’ also report a lower level of coping when working on-call.

	B	SE B	$\beta$
1 Constant	4.13	0.52	
Active coping	0.02	0.04	0.05
Planning	0	0.04	0
Seeking instrumental support	0.03	0.03	0.1
Seeking emotional social support	-0.04	0.03	-0.16
Suppression of completing activities	0.01	0.02	0.05
Turning to religion	0.01	0.02	0.03
Positive reinterpretations and growth	0.03	0.04	0.09
Restraint coping	0	0.03	0.01
Acceptance	-0.01	0.03	-0.03
Focus on and venting of emotions	-0.06	0.03	-0.25**
Denial	0.03	0.04	0.07
Mental disengagement	-0.05	0.03	-0.14
Behavioural disengagement	0.02	0.04	0.05
Alcohol/drug use	-0.02	0.03	-0.05
Humour	0	0.02	0.03

\*\*  $p < 0.01$

*Table 28. Predicting Coping with physical demands.*



## **4.5 Discussion**

### **4.5.1 Part 1 Procedures and Practices: Tenure of on-call**

The length of time participants have been working on-call is an indication that this form of work scheduling is a core part of their working hours in their chosen occupation. For example the majority of the participants have been working on-call for more than 3 years. In general the tenure across occupational groups within the sample suggests that on-call working has been a feature within each occupation for quite some time and is therefore most likely to continue.

### **4.5.2 Procedures and Practices: Differences Between Daily Work and On-call Work**

The differences between daily work and on-call work are particularly interesting in that the majority of the participants within each of the occupations carry out duties on-call that are different to their normal work, with the exception of the prison officers and the IT engineers. This is interesting as one could argue that working outside of normal working hours *and*, carrying out duties that are outside of normal work parameters could represent a 'double stressor'. Research suggests that there is a possible link between job characteristics and how these might effect cognitive efficiency the following day in relation to their effects on sleep (Ansiau et al., 2008). Hence, as many of the participants reported, not only do they carrying out duties that are different to their normal daily work, they also do this following a normal day's work, which further substantiates the possibility of 'double stressors'. Similarly, it has been argued that working long hours acts both directly as a stressor, by increasing the demands on an individual when attempting to maintain performance levels, and indirectly, by increasing time spent in the workplace in which the worker is exposed to further sources of workplace stress (Spurgeon et al., 1997). As long working hours and increased time

spent in the workplace are key features of on-call working the possible 'double stress' factor is highly likely.

This could compound the negative consequences that are already known regarding on-call working. For example it is already established in the literature that the unpredictable nature of on-call working may generate a deal of stress as home life is interrupted and the on-call worker has to shift roles and adopt their professional persona at any time during an on-call period (Nicol & Botterill, 2004). This can only be compounded when the work that they are about to go into is not their normal work thereby possibly adding to the stress. Interestingly this is one important difference between on-call working and standard shift-work, which has not currently been explored, gaining a greater understanding of the impact of such conditions would add value to the continuing investigations into on-call working.

#### **4.5.3 Procedures and Practices: On-call Cover**

The majority of the participants are expected to carry out on-call duties after completing a normal day's work with only 24 (6 fire officers, 12 police officers, 2 anaesthetists and 4 prison officers) not providing such cover. Essentially, carrying out on-call duties after completing a normal day's work seems to be a key feature of on-call working cover as highlighted in the interview study of this thesis, and again in the results of this study. Considering the discussion above regarding the joint impact of working at night, and working within unfamiliar parameters, this issue may add another level of complexity regarding the unique stressors of on-call working. Furthermore, there are two issues to consider here – first, is the issue of being called when already tired. This is a serious issue with regards to on-call performance when called out. Secondly, there is the further issue of recovery and the impact of being on-call on worker recovery.

Indeed, de Croon et al, (2004) noted that employees who display increased occupationally induced need for recovery must exert additional effort in the form of increased psychophysiological activity during the next working day to cope with the demands of the job. This is especially important when we consider that some on-call workers are expected to work a normal day's work and then cover on-call that evening, returning to work the following day, possibly unrecovered. Furthermore, previous research has established that recovery from work seems to depend on the adaptive costs of the work itself (Totterdell et al, 1995).

As such, researchers have demonstrated that the need for recovery after work (presence of strain), and lack of recovery from this strain is associated with health complaints (Van der Beek, Meijman, Frings-Dresen, Kuiper & Kuiper, 1995; Sluiter et al., 1999; Elders & Burdorf, 2001). Thus, the accumulative effects of the lack of recovery may result in long-term sickness absence (Sluiter et al., 1999).

All but 8 of the participants are expected to cover weekend's on-call. This is particularly interesting as The European Working Time Directive (2004) states that workers who are expected to cover on-call periods during the weekend the period will only be considered as working time if the on-call worker is called out. However, research has indicated that shift workers showed no improvement in sleep behaviour during their rest days, as they were expected to cover periods of on-call working during their rest days (Rosa et al, 1989). Hence, the scheduling of on-call schedules during weekends has been deemed unlikely to be restorative and therefore cannot be considered the same as true rest (Williamson et al, 1994). Further investigation regarding working on-call at weekends alongside measures that would provide indication of fatigue, stress and or strain would be beneficial in gaining a greater understanding of the intricacies of on-call working.

#### **4.5.4 Procedures and Practices: Opt Out of On-call and Acceptability**

With regards to the opportunities for opting out of on-call cover, the participants reported that just over half of them (104: 53.6%) would like to give up on-call. However, when they were asked if opting out an option within their department, 142 (73.2%) reported that it was not an option as on-call was an integral component of their job. However, the situation for the police officers was slightly different, - this group had the highest reported opt out availability which was starkly different to the anaesthetists, for whom opting out was not an option. Finally, the participants were asked if opting out was socially acceptable in their department. A total of 158 (81.4%) of the participants reported that opting out of on-call working was not socially acceptable within their department. This finding is consistent with the results of the interview study in which it was noted that even if the offer of opting out was made available, the participants felt they would be letting their colleagues down if they opted out.

#### **4.5.5 Procedures and Practices: Consultation Regarding On-call Work Schedule**

The participants reported that only 30% had been consulted regarding the structure and scheduling of their on-call rotas. They then reported that just 18.6% of those who had been consulted had actually had an influence on their on-call working schedule. The results of consultation are consistent with the findings of the interview study in that when the individual joined the service they were expected to also join the on-call rota and that they were contractually obligated to do so. Moreover, where on-call workers are permitted to make suggestions into the scheduling of their on-calls, these suggestions are largely ignored.

These results are interesting as recent research has highlighted that if workers are permitted to participate in the design of their shift systems then attitudes to work should

be improved, which in turn can ameliorate the negative consequences of shift working (Kecklund et al, 2008). Moreover, the clear links to the theoretical stress literature, suggest that having job control is viewed as an important means of reducing work pressure and ultimately work stress (Karasek, 1979; Van Der Doef & Maes, 1999).

The discussion will now continue by examining the results of procedures and practices regarding attitudes, coping and affects of on-call working.

## **4.5.6 Attitudes, Coping and Affects of On-call**

### **4.5.6.1 Attitudes**

The participants reported how they feel about working on-call with the results revealing that the females were significantly more negative in their dislike of on-call working than the males. These differences in gender may be due to, as noted earlier, the fatiguing effects of on-call working. Furthermore, as research suggests that there are differences in the body clocks of men and women (Folkard & Hill, 2002) with women typically requiring around 90 minutes more sleep than men (Oginska & Orginski, 1990). Consequently, women who work shifts report higher levels of sleepiness whilst on-shift (Spurgeon, 2003).

Similarly, the impact of age is different for males and females with females in all age groups reporting a greater dislike of on-call working than males, but the interaction did not reach significance. However, younger males aged between 21-30 have the highest negative attitude towards their on-calls.

Finally, the investigation of attitudes towards on-call working within occupational group indicates that physiotherapists have the greatest negative feelings toward their on-call work. This suggests that physiotherapy may be an interesting group for further investigation of on-call work scheduling.

#### **4.5.6.2 Coping**

The participants reported how they feel they cope with the mental and physical demands of their on-call work. Overall, 61% of the participants report that they cope with on-call working, 29% report that they do not cope at all well and only 1% report coping very well. The results further reveal that the females generally cope better with the mental demands of on-call than the males. The pattern was very different for physical demands as the males in general coped much better than the females.

Within occupation, the physiotherapists report coping significantly less well with the mental and physical demands of on-call working than any other occupational group. Furthermore, all of the occupations except physiotherapists and the coastguard report greater difficulties with coping with the physical demands of on-call than the mental demands.

The discussion will now continue by examining the results regarding effect on family, social life, sleep patterns and diet when working on-call.

#### **4.5.6.3 Effects of On-call**

The overall level of impact on sleep was greater for females than males. As noted in chapter 1 there are significant differences between the genders with regards to sleep. Most notably these gender effects can be found in the known differences in the body clocks of men and women (e.g. Folkard & Hill, 2002), with women typically requiring around 90 minutes more sleep than men (Oginska & Orginski, 1990). Consequently, research suggests that women who work shifts report higher levels of sleepiness whilst on-shift (Spurgeon, 2003) and many studies that suggest that shift working women have a higher absenteeism rate than their male counterparts, more frequently report chronic fatigue, and psychoneurotic, digestive, and circulatory complaints (e.g. Oginska, Pokorski & Orginski, 1993; Costa & Sartori, 2007).

In addition, to the females reporting having the greatest impact on sleep and there was an interaction between age and gender with females across all age groups experiencing some disruption to their sleep, especially in those over 60. The reported disruption to sleep whilst working on-call is consistent with previous research in which railroad operators reported difficulties in getting to sleep and remaining asleep (Pilcher & Coplen, 2000), and reduced sleep quality in Swedish ships engineers (Torsvall & Akerstedt, 1988). Such results were reported in study 1 where one participant described the difficulties of getting back to sleep following a call out as they ruminated or played back the events that have just taken place.

There was a widespread impact on many aspects of the life of on-call workers. There was an impact on family and social lives. Overall the participants report the negative effect on-call has on their family and social interactions. This result is in line with study 1 in which the participants who reported the impact that on-call had on family life, e.g. missing family mealtimes and taking one's children into the hospital when called out. Similarly, the participants in study1 described trying to re-schedule on-calls if they felt that the social event was worth the hassle, and going on works night out when on-call so as not to miss out on such events. These results are consistent with previous research in which it has been established that on-call working periods curtail interactions with family and friends (Berger, 1999).

In essence, shift-work schedules are associated with relationship stress and work-family conflict (e.g. Kingston & Nock, 1987; Simon, 1990). This work family conflict is usually defined as occurring when the emotional and behavioural demands of work and non-work roles are incompatible (Carlson, Kacmar & Williams, 2000). Hence, shift-work is a possible source of work-to-family conflict as it produces time-based and strain-based conflict (Haines et al., 2008). Finally, there is also growing evidence to

suggest that shift workers have an increased risk of divorce and children with anxiety and behavioural problems (Pisarski et al., 2006).

#### **4.5.7 Part 2 General Health, Recovery and Burnout**

Overall the prison officers have the highest GHQ group mean and the coastguard the lowest; however there is very little difference between all the occupational groups. Between genders the males report greater effects on well-being via the GHQ than the females. With regard to occupational group, both the male and female prison officers have the highest GHQ. With regard to age again the prison officers aged 21-30 and 41-50 have the highest group mean, anaesthetists in the 31-40, fire officers in the 51-60 and the coastguard in the over 60 years age group. This result suggests that most of the prison officers, experience some negative consequences from working on-call, which are indicative of the fatiguing effects as reported in study 1 when the participant described going into work tired. These results are consistent with previous research in which it was established that on-call working impacted on well-being (Imbernon, et al., 1993; Bamberg & Funck, 2006). Furthermore, there is also increasing evidence that indicates *extended* working hours are associated with negative effects on employee health and well-being (e.g. Spurgeon, Harrington & Cooper, 1997; Spurgeon, & Cooper, 2000; Harrington, 2001; Raediker, Janßen, Schomann & Nachreiner, 2006). As extended working hours are a key feature of on-call working, especially when called out, it is not surprising that there is some indication of a reported decline in well-being.

Moreover, it is particularly interesting that the multiple regression indicated that whether the participants had been consulted regarding their on-call work schedule had predictive value. Again this result indicates that providing workers with an opportunity to participate in the design of their shift systems can substantially reduce the negative consequences of shift working (Kecklund et al., 2008). Therefore further investigation



into the negative implications of on-call working, and how this impacts on such workers requires further exploration.

With regards to recovery overall the police officers were found to have a higher need for recovery indicating that they experience poor recovery in the post work period than any of the other occupational groups. Between genders the males were found to have a higher need for recovery than the females. again the male police officers have a higher need for recovery Within age groups the police officers in the 21-30 group report the lowest need for recovery, IT engineers in the 31-40, coastguard in the 41-50, police officers in the 51-60 and anaesthetists in the over 60 age group.

These results are particularly significant when we consider that nearly all of the participants reported covering on-call periods after completing a normal day's work. Therefore, where insufficient recovery time is not afforded to those who work long hours, shift/night-work and on-call working it is possible that the stresses and strains of the day will spill-over into the following day, resulting in extreme fatigue, requiring extra effort (de Croon, et al, 2004).

Moreover, the multiple regression analysis indicated that whether the participant's on-call work is the same or different to their normal work is predictive of their ability to recover from work. Hence, the significance of working outside of what are considered 'normal working hours' and the increased time spent in the workplace both further impact on recovery and psychological well-being. Therefore, recovery from fatigue and stress at work must be considered one of the most important factors influencing the physical and mental condition of an employee (De Vries-Griever, 1992; Sluiter et al., 2003). Indeed, researchers have often referred to the lack of recovery when explaining why work stressors elucidate poor well-being resulting in health problems

(e.g. Meijman & Mulder, 1998; Sluiter, van de Berk & Frings-Dresen, 1999; Sonnentag & Bayer, 2005).

In addition to the measures of recovery and mental health, the level of burnout was assessed. Overall, the physiotherapists have a higher degree of emotional burnout than any other occupational group with the highest mean score. Between genders the male participants have a higher EE score than females indicating that they have a higher degree of emotional burnout. Within age groups the prison officers aged 21-30 have the highest EE score, the physiotherapists aged 31-40, 41-50, and 51-60, with the coastguard having the highest score in the over 60 age group. This indicates that physiotherapists across most of the age groups have a higher degree of burnout than any other occupational group. The multiple regression analysis indicated that whether the participant's on-call work was the same or different to their normal work was predictive of emotional exhaustion with worry about decisions made when on-call showing differences in the mean, but the differences were not substantial enough to be significant within the current sample.

The results of emotional exhaustion are indicative of a lack of psychological detachment from work during free time, which as research indicates, is crucial as such periods promote recovery (Sonnentag & Bayer, 2005; Sonnentag & Fritz, 2007). However, when there is a breakdown in this process, recovery will not occur and load reactions will accumulate resulting in long-term negative effects on both health and well-being (Tucker et al., 2008). The result of which is an increased need to increase effort the following day to maintain performance (Akerstedt et al., 2002). Further research into the underlying factors of on-call which induce such responses is warranted.

The MBI depersonalisation (D) element revealed that the prison officers have the highest score on this aspect of the MBI. This may not be surprising considering the nature of their job. Furthermore, females were found to have a higher D than the males overall. The prison officers aged 21-30 and 31-40 have the highest EE score with the physiotherapists aged 41-50 and finally the coastguard aged over 60. Therefore, age was found to be a significant predictor of depersonalization. Finally, the length of time the participants have worked on-call (tenure) was also found to be a significant predictor.

Hence age is a significant predictor of depersonalisation along with how long the participants have worked on-call (tenure). However, other factors may also play a part in the depersonalising the recipients of care or services, as research investigating sleep-deprivation in caregivers, working in a nursing home setting, noted that there was a general decrease in the quality of care the greater the sleep deprivation (McCurry, Logsdon, Teri & Vitiello, 2007). As this study has already indicated, sleep loss is a concern for those who work on-call.

Finally, personal accomplishment (PA) of the MBI will be discussed. The results indicate that physiotherapists have the highest score on PA and females have a higher score than the males overall. Within age groups the physiotherapists in the 21-30, 31-40, 41-50 and 51-60 age group have the highest scores, with the IT engineers in the over 60. The multiple regression analysis revealed that gender was found to be a significant predictor of personal accomplishment and covering on-call work following a normal day's work. It is not surprising that the participants acknowledge the significance of personal accomplishment especially alongside covering on-call following a normal day's work. This finding is in line with study 1 in which the physiotherapist indicated she found making a difference in a patient's life one of the most satisfying aspects of her job, especially in the emergency situation of a call out.

The discussion will now continue with the findings of part 3 of the results regarding personality, ability to cope and coping styles and on-call.

#### **4.5.8 Part 3 Personality, as a Moderator of attitudes to on-call**

##### **4.5.8.1 Sensation Seeking Scale, Desirability of Control**

Sensation seeking was included in the questionnaire to investigate whether some aspects of personality make on-call working a more positive experience. The findings indicate that individuals high on SS enjoy on-call more than those who are low on SS, however, although interesting, these results were not significant. Similarly, those who are high on desirability of control (DC) do not find on-call working as taxing as those with a low DC. The participants who enjoy on-call the least are those who are low on both the SS and DC. This is most likely due to the unpredictable nature of on-call working, in that the individual has no control over whether they are called out during an on-call shift. Similarly, where the individual has a low sensation seeking personality they might be less likely to seek out the possible 'drama' of an emergency situation. However, attitudes to on-call working were not significant and SS and DC do not influence feelings towards on-call. These results indicate that in this sample the personality traits of sensation seeking and desirability of control have very little predictive value.

Finally, in the discussion section the results of SS, DC, coping and COPE will be discussed.

##### **4.5.8.2 Coping Style as a Moderator of Coping with Mental and Physical Demands of On-call**

The multiple regression analysis revealed that seeking emotional social support, focus on venting of emotions and humour were significant predictors of coping with the mental demands of on-call working. This negative relationship suggests that the ability

to cope with the mental demands of on-call working are not met by their coping style. Similarly, the multiple regression revealed that focus on venting of emotions was a significant predictor of coping with the physical demands of on-call working. Again this negative relationship suggests that the ability to cope the physical demands of on-call working are not met by their coping style. It is possible that this finding may be due to the special circumstances of this form of work scheduling, in that although the employees are at home technically they are at work, especially if they are called out or it may be a quirk of the study. Further investigation of this finding is therefore needed.

#### **4.6 Strengths, Limitations and Conclusive Summary**

Firstly, a strength of this study is that it comprised a large sample size and it provided a comprehensive picture of the extent to which on-call working is expected, exists and is compulsory for many occupations/workers. However the participants within each occupation were not equal and must therefore be considered a weakness of the study. Similarly, there were a large proportion of questionnaires that were not returned and a significant proportion that were not usable as they had not been completed or completed incorrectly. It is possible that many respondents did not complete the survey because it contained too many questionnaires. Equally the COPE scale proved to be one of the questionnaires that many found difficult as it asks questions that could be considered invasive (alcohol/drug taking). Indeed this was the questionnaire that many unusable ones had comments written on it.

This study has revealed that diversity of on-call working practices across occupations is intrinsically different and no one size fits all. This is true, even within occupation, as indicated by the physiotherapy sample. Similarly, the effects of on-call working are just as diverse across occupations. This study has highlighted that on-call

working impacts not only on the on-call worker but also on the families and social lives of such workers.

However, although this study has highlighted areas where on-call has impacted on many areas of health and psychological wellbeing, many questions still remain. Further exploration of the extent to which on-call may induce a decline in well-being must continue to be explored. Therefore, investigating on-call via daily measures, such as diaries, over a period of time will offer further insights into this much under researched form of work scheduling. In addition investigating the role of individual differences in assessing the likelihood of negative outcomes occurring would be of benefit in providing further insights into the intricacies of on-call working and its possible negative effects.

## **Chapter 5 Study 3**

### **5.1 Summary**

Study 3 continues to investigate on-call working and its effects using a diary methodology. Recording daily responses to a number of psychometric measures provides a day-to-day account of the effects of such work schedules. The diary study also includes a series of psychometric instruments to continue to investigate any possible personality moderating factors that may mediate such possible effects.

The aim of this chapter is to continue to investigate the effects of on-call work scheduling within two distinct occupations. It will assess the differences between these two occupations across different shift types on a number of strain related outcome measures.

The results are split into 2 parts: part 1 will report the findings from the diary measures, with a focus on the differences in strain variables following each shift type. Part 2 will focus on the personality measures of trait anxiety, desirability of control, mental toughness and the COPE subscales of seeking instrumental social support, seeking emotional social support, focus on venting emotions, humour and denial considering the moderating role of each of the strain variables.

The analysis of this study revealed significant differences between shift type on a number of the strain variables. Analysis of the personality measures also revealed that trait anxiety and coping styles are significant predictors of strain. This diary study has revealed the extent to which on-call working impacts on the health and well-being of on-call workers both physically and mentally in terms of fatigue and stress. The subjective rating of all the diary measures when on-call called was predominantly higher for both occupations indicating a decline in both psychological and physical

well-being. Similarly, nearly all of the ratings for the on-call not called were different to those when at rest.



## **Study 3 Investigation into the effect of shift type and the moderating factors of personality: A diary study**

### **5.2 Introduction**

Although the survey study provided an interesting insight into on-call work scheduling practices and attitudes, it cannot provide a direct comparison of the effects of the different shift types, on what occurs on a day-to-day basis in a person's working life. However this information can be obtained through diaries, by collecting daily reports of behaviours, attitudes, health and well-being (Larsen & Kasimatis, 1991). Hence, this is especially useful as daily events relate more to overall well-being (DeLongis, Hemphill & Lehman, 1992), which is of particular interest considering that on-call workers are expected to provide on-call cover after completing a normal day's work and at the weekend during rest days.

Similarly, Lazarus and Folkman (1986) suggest that gaining information from participants over a given time period is a better means for measuring and assessing stress and well-being, which again is a pertinent line of enquiry given the topic of this thesis. Therefore, including measures that would provide an indicator of stress and well-being such as fatigue and mood measured over a given period will further elucidate the possible negative effects of working on-call.

In addition, using the diary methodology is also a good way of assessing change especially considering the unpredictability of on-call working and as the participants record events daily as they occur, the diary lends itself to richer data.

A key issue within this area of investigation is the European working Time Directive (EWTD) (2004) which assumes that on-call workers are at rest when on-call but not called out. In using the diary method across the work conditions of normal working, on-call called out, on-call not called out and rest days it may be possible to

observe the impact of situational variables on the participant's subjective day-to-day recording. From this it will also be possible to observe any differences between being on-call and not called out versus true rest, to either substantiate or refute the ruling of the EWTD as previous research suggests there may be an element of waiting intention or anticipation of work (Heise, Gerjets & Westerman, 1997).

Hence, incorporating measures into the diaries that will provide further evidence of the subjective changes in well-being will be of enormous benefit in gaining an understanding of the effects of this much under researched form of work scheduling. Therefore, incorporating a measure of fatigue, mood, physical health and demands and opportunities will provide a means of measuring the outcomes of on-call work scheduling. Similarly, understanding the role of personality as moderating variables may indicate those who find on-call work scheduling particularly demanding.

Further, the survey study highlighted a number of concerns and issues for further investigation within physiotherapy on-call, and so including this work group in the current study would be a sensible starting point. Moreover, due to the high frequency with which on-call is utilised in hospital settings, continuing to study the impact of on-call on employees within a healthcare setting continues to be of utmost importance (Barnes-Farrell et al., 2008).

However, as the ethical procedure for conducting research within the National Health Service is a long drawn out process and is required for each proposed occupational group, only physiotherapist participants will be sought from the healthcare industry. Indeed, as accessibility is a key issue the second occupational group will be sought from an occupation that is more easily accessible. Therefore, the second occupational group included in this study will be a group of fire officers from the fire service.

### **5.2.1 Study Research Questions**

What are the subjective reported differences in state strain indices across the four different work/rest conditions of on-call work scheduling?

There is an argument for the difference between work (normal working and on-call working) and rest (on-call not called out and rest days) in that legally and by definition normal working and on-call working are both contractual aspects of the job role; in essence they are basically doing their job. However, the argument for rest is very different, in that when truly at rest i.e. not contractually obligated to work this is free time, but when on-call and not called out how does this affect the individual both in terms of true rest and expectancy of work? Hence it follows that examining these differences it may be possible to understand the implications of such scheduled on-call periods and their effects.

Finally, what role do personality moderators play in the ability to cope with the demands of on-call work scheduling? Assessing these alongside the measures in the diaries will further substantiate any possible effect of individual differences. Hence, the aim of this study is to examine the differences between shift types in relation to fatigue, mood, general health, demands/opportunities to establish which shift types may be detrimental to well-being. In addition it will also aim to establish aspects of personality that may increase the likelihood of decrements in well-being.

## **5.3 Method**

### **5.3.1 Design**

This study used a questionnaire and diary method to ascertain each participant's subjective rating for a series of questionnaires and a number of psychometric measures contained in the dairies. The participants were provided with detailed instructions on

how to complete the materials including who to contact if further clarification was required (see appendix 5). Completion of the diaries involved circling the appropriate number on each of the scales that best reflected their feelings regarding that item on that particular scale. The dependent variables were the diary outcome measures (fatigue, mood, physical health, demands and opportunities) and the scores on the questionnaires, with shift and job type as the independent variables.

### **5.3.2 Participants**

The participants represented two of the occupational groups from the survey study that warranted further investigation following the results of that study; Fire Officers and Physiotherapists. 50 participants initially expressed an interest in the study (25 fire officers and 25 physiotherapists), however, less than 50% (n= 22) returned their completed questionnaire booklets and diaries.

Therefore the study sample consisted of 22 participants in total and comprised 11 fire officers all of whom were males and 11 physiotherapists 1 male and 10 females.

Although there is a clear confound in gender in the participants, the implications of this will be discussed in section 5.6. The age range of the participants was 21- 60 years with an average age of 38 years.

### **5.3.3 Measures: Diaries**

The 4 diaries included the shift conditions of a normal working diary, on-call called out diary, on-call not called out diary and rest days diary, with each diary requiring 5 daily entries for each of the 4 shift conditions. Each diary contained the same measures, which included the State Fatigue Scale, The PANAS mood scale, the Physical health scale, and the demands/opportunities scale, which will now be described.

The State Fatigue Scale (Earle, 2004) comprises the subscales of mental fatigue, physical fatigue, emotional fatigue, sleep related fatigue, and boredom and a scale of 1-9 with 1 = strongly disagree and 9 = strongly agree. The fatigue scale was included as a measure in the diary as it is a key strain variable, closely linked with health, well-being, stress and lack of recovery, all of which have been previously indicated as negative outcomes of on-call working (e.g. Firth-Cozens, 2003; Linfords et al., 2006). The reliability of each of the subscales are as follows: mental fatigue (4 items) Cronbach's alpha 0.86; physical fatigue (2 items) Cronbach's alpha 0.82; sleep fatigue (4 items) Cronbach's alpha 0.90. The whole scale has a Cronbach's alpha coefficient of  $r = 0.93$ . It was therefore deemed a reliable measure of fatigue for use in this study.

The PANAS mood scale (Watson, Clark & Tellegen, 1988) and adapted version by (Hockey, Payne & Rick, 1996) assess depression, anxiety and fatigue on a polar scale with enthusiastic v miserable and depressed v optimistic for the subscale of depression, weary v lively and energetic v tired for the subscale of fatigue, and relaxed v tense and on edge v at ease for the subscale of anxiety. The mood scale was included in the diaries as both the unpredictability and the workload of on-call working has been shown to elucidate negative mood outcomes such as irritation (Linfords et al., 2006). Moreover, these outcomes are associated with a same day deterioration in both psychological and physiological well-being (Repetti, 1993). It has a Cronbach's alpha coefficient of  $r = .93$  and is therefore deemed a reliable measure of mood.

The physical health scale (Gervais, 2002) was incorporated to assess low level health complaints. This comprises a scale of 0-3 with 0 indicating not at all 1, a little and 2 a lot from range of physical symptoms including backache, chest twinges, cold/flu symptoms, drowsiness, eyestrain, feeling weak, problems of attention/concentration, difficulties in making decisions, forgetfulness/slips of the mind, lack of energy, light headedness, upset stomach, headaches, muscular pain and poor appetite will further

substantiate changes in psychological and physical well-being. It has a Cronbach's alpha coefficient of  $r = .84$  and is therefore deemed a reliable measure of health complaints.

In addition, research has implicated work demands and job control as further indicators of employee well-being (Wall, Jackson & Davids, 1992). Therefore incorporating the Demands and Opportunities scale (Karaseck, 1979) with a scale of 1 low – 9 high, and comprising mental, emotional and physical demands, and personal control and personal support will provide further evidence for changes in well-being. It has a Cronbach's alpha coefficient of  $r = 0.82$  and is therefore deemed a reliable measure of job control.

### **5.3.4 Measures: Questionnaire Booklet**

#### **5.3.4.1 Trait Anxiety**

The survey study indicated that many of the participants worried or sometimes worried about decisions they make when on-call. Whether this is attributable to on-call work scheduling or an aspect of personality requires further investigation. Therefore the personality moderator of Trait Anxiety (Spielberger, Gorsuch & Lushene, 1970) is used in this study to help provide evidence for those who may be susceptible to the negative effects of on-call working along with measures of shift type. It has a Cronbach's alpha coefficient of  $r = 0.87$  and is therefore deemed a reliable measure of trait anxiety.

#### **5.3.4.2 Desirability of Control**

As control appeared to be an emerging issue from the interview study, and the survey study indicated that there was an element of the need for control, the Desirability of Control scale (DC), (Burger & Cooper, 1979) was again included in study 3. As with the survey study it is envisaged that the DC will provide a basis from which to assess

the impact of high/low DC on coping with the unpredictable nature of on-call work scheduling. For a full description of this scale see chapter 4 section 4.3.2.2.

#### **5.3.4.3 Mental Toughness**

The questionnaire study revealed that not all of the participants reported negative feelings or impact of their on-call work. Therefore the question of why some individuals report such negative consequences is again a relevant question. Hence, establishing the participant's mental toughness using the Mental Toughness Questionnaire (Clough, Earle & Sewell, 2002) as a personality moderator may provide evidence of those for whom on-call working may be a favourable work schedule.

#### **5.3.4.4 Coping - COPE**

Both the interview and survey studies highlighted that coping style can be a significant indicator of the ability to cope with the demands of the on-call workers job. The COPE (Carver, Scheier & Weintraub, 1989) was again including in study 3, to further investigate the impact of coping styles. For a full description of this scale see chapter 4 section 4.3.2.3.

#### **5.3.5 Materials**

Each participant was given a questionnaire booklet that contained the Trait Anxiety, Desirability of Control, Mental Toughness and COPE questionnaires (see appendix 5) to complete at their leisure. They were also given a diary pack containing 4 diaries, comprising a diary for normal working, one for on-call called out work, one for on-call not called out and one for rest days. These required completing on a daily basis for a period of 5 days. However, although it is possible to collect 5 consecutive normal working days, owing to the unpredictable nature of on-call it is not possible to collect 5 consecutive day's work of on-call data, similarly by their nature rest days can only be

captured in 2 day blocks. Once they had completed the questionnaire booklet and diary pack they returned the coded booklet by freepost to the university.

### **5.3.6 Procedure**

Fifty questionnaire booklets and diary packs were distributed to the fire services (n=25) and physiotherapy departments (n=25) who had agreed to take part in the study. The participants were handed their questionnaire and diary packs by myself and informed that the study was part of a continuing investigation into on-call and its effects. They were informed that their participation would involve the completion of a questionnaire booklet containing four questionnaires and a diary pack containing the four diaries, comprising four conditions of shift including normal work, on-call called out work, on-call not called out and rest days.

They were instructed that once they had completed all of the questionnaires and the diaries they could return them to the university in the Freepost envelope provided. They were then directed to look through the questionnaires to familiarise themselves with what was required when completing each questionnaire and diary to familiarise themselves with the format. They were also informed that the questionnaire booklet should take approximately 12 minutes to complete with each diary entry taking 2 minutes.

Completion of the diaries involved circling the appropriate number on each psychometric scale that best reflected their feelings in each diary for each of the four shift types. In addition the participants completed the questionnaire booklet by circling or entering the appropriate number on each of the questionnaires.

### **5.3.7 Ethics**

Ethical approval was sought from the University of Hull Psychology Department's Ethics Committee and as there were no issues regarding deception or risk



the study was given a 'normal' classification. In line with the ethical guidelines set out by the British Psychological Society (BPS) the participants were briefed on what was expected of them if they decided to take part in the study. They were informed that their participation in the study was voluntary and that they were able to withdraw their participation at anytime, even retrospectively and details of whom to contact should they wish to withdraw. They were informed that their data would be anonymised to protect their identity. They then signed to acknowledge their informed consent to take part in the research. Once they had completed the data collection the group were then provided with an explanation of the study and asked via e-mail if they had experienced any difficulties completing the survey and diary packs.

## **5.4 Results**

### **5.4.1 Data Cleansing and Statistical Analyses**

A total of 22 questionnaires and diary packs were returned, all of which were usable. There were 11 from the Fire Officers and 11 from the physiotherapists. The raw data from all measures were entered into SPSS and reduced into each relevant score or subscale means, i.e. for each of the participant's 4 shift condition diaries a mean average was calculated for each of the subscale measures within each shift condition, thereby providing a mean average for each of the scales used for each participant's shift condition diary; the questionnaires were summed to provide a total for each of the questionnaires subscales (where appropriate). In all analyses effects were accepted as significant at  $P < .05$  level. The results of which will be split into 2 parts: part 1 will report the findings from the diary measures, with a focus on the differences in strain variables following each shift type; part 2 will focus on the personality measures of TA, DC, MTQ and COPE, considering the moderating role of each of the strain variables.

## 5.4.2 Part 1

### 5.4.2.1 Diary Study Measures: State Fatigue Scale

The component parts of the State Fatigue Scale revealed that Mental fatigue is the highest when on-call and called out in both the physiotherapists (*M* 5.19) and the fire officers (*M* 4.76). Whereas, mental fatigue is lowest when at rest in both physiotherapists (*M* 2.84) and the fire officers (*M* 3.31). However, not called out mental fatigue is slightly higher in both the physiotherapists (*M* 4.02) and the fire officers (*M* 4.17) than normal work, in the physiotherapists (*M* 3.96) and the fire officers (*M* 4.66). Essentially, on-call not called induces the same mental fatigue as normal work.

The Physical fatigue component part of the State Fatigue Scale revealed that physical fatigue is the highest when on-call and called out in both the physiotherapists (*M* 6.12) and the fire officers (*M* 4.92). Whereas physical fatigue is lowest when at rest in both physiotherapists (*M* 2.93) and the fire officers (*M* 3.49). However, not called out physical fatigue is slightly higher in the physiotherapists (*M* 4.69) than normal work (*M* 4.5) but the fire officers normal work is slightly higher (*M* 4.44) than on-call not called (*M* 4.08). Essentially, on-call not called induces the same physical fatigue as normal work.

The Emotional Fatigue component part of the State Fatigue Scale revealed that emotional fatigue is the highest when on-call and called out in both the physiotherapists (*M* 4.92) and the fire officers (*M* 4.57). Whereas, emotional fatigue is lowest when at rest in both physiotherapists (*M* 2.52) and the fire officers (*M* 2.90). However, not called out emotional fatigue is slightly higher in the physiotherapists (*M* 3.58) than normal work (*M* 3.33) but the fire officers normal work (*M* 4.04) is slightly higher than

not called out ( $M$  3.78). Essentially, on-call not called induces the same emotional fatigue as normal work.

The Sleep Related Fatigue component part of the State Fatigue Scale revealed that sleep related fatigue is the highest when on-call and called out in both the physiotherapists ( $M$  6.10) and the fire officers ( $M$  5.09). Whereas, sleep related fatigue is lowest when at rest in both physiotherapists ( $M$  3.16) and the fire officers ( $M$  3.99). However, not called out sleep related fatigue is slightly higher in the physiotherapists ( $M$  4.82) than normal work ( $M$  4.69) but the fire officers normal work ( $M$  4.77) is slightly higher than not called out ( $M$  4.31). Essentially, on-call not called induces the same sleep related fatigue as normal work.

The component parts of the State Fatigue scale were analysed using a 4 (shift type) x 2 (job) mixed design ANOVA beginning with the state fatigue subscale of mental fatigue. The ANOVA revealed (see figure 20) that there was a significant effect of shift type  $F(3,45) = 8.69, p < 0.001, r = .37$ , however there was no effect of job type ( $F(1,15) = 0.25, p > 0.05$ ) and no interaction ( $F(3,45) = 0.85, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in mental fatigue between normal work and rest day  $p < 0.01$ . There were also significant differences between shift type 2-on-call called out and rest day  $p < 0.001$ , with a key difference of on-call not called and rest not quite reaching significance  $p = 0.08$ . Normal work and on-call not called, normal work and on-call not called, on-call called and rest were not significantly different. However, when adjusting for the pairwise comparisons using a Bonferroni correction ( $\alpha = 0.008$ ) these differences in mental fatigue between normal work and rest day ( $p < 0.01$ ), and on-call not called and rest day ( $p < 0.001$ ) remained significant.

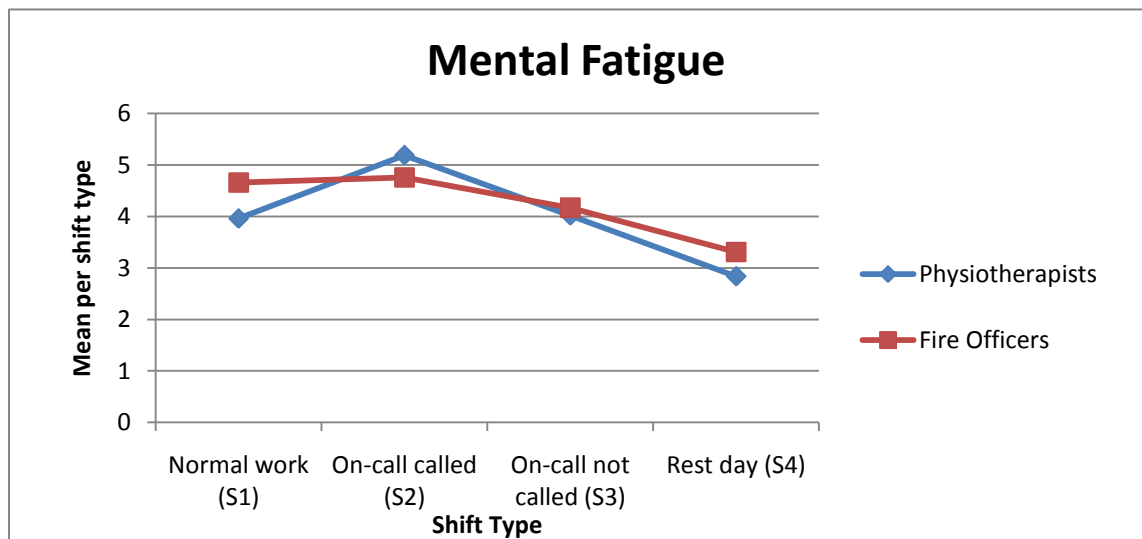


Figure 20. Graph indicating mental fatigue by shift and job type.

Further, the analysis revealed that the physiotherapists have a higher mental fatigue mean when on on-call called ( $M 5.19$ ) and on-call not called ( $M 4.02$ ) than when on normal work ( $M 3.96$ ) and rest ( $M 2.84$ ). A similar pattern is also observed in the fire officers, although the difference between means is not quite so pronounced, on-call called ( $M 4.76$ ) and on-call not called ( $M 4.17$ ) with normal work ( $M 4.66$ ) and rest ( $M 3.31$ ).

Analysis of the subscale of physical fatigue (see figure 21) indicated that there was a again a significant effect of shift type  $F(3,45) = 10.10, p < 0.001, r = .40$ , however there was no effect of job type ( $F(1,15) = 0.55, p > 0.05$ ) and no interaction ( $F(3,45) = 1.58, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in physical fatigue between shift type normal work and rest  $p < 0.01$  and there were also significant differences between shift on-call called and rest  $p < 0.001$ , but normal work and on-call called, normal work and on-call not called, on-call called and on-call not called, and on-call not called and rest were not significant. However, when adjusting for the pairwise comparisons using a Bonferroni correction with the adjusted alpha value ( $\alpha = 0.008$ ) the differences between normal work and rest ( $p < 0.01$ ), on-call called and

rest ( $p < 0.001$ ) remained significant but all other shift combinations again were not significant.

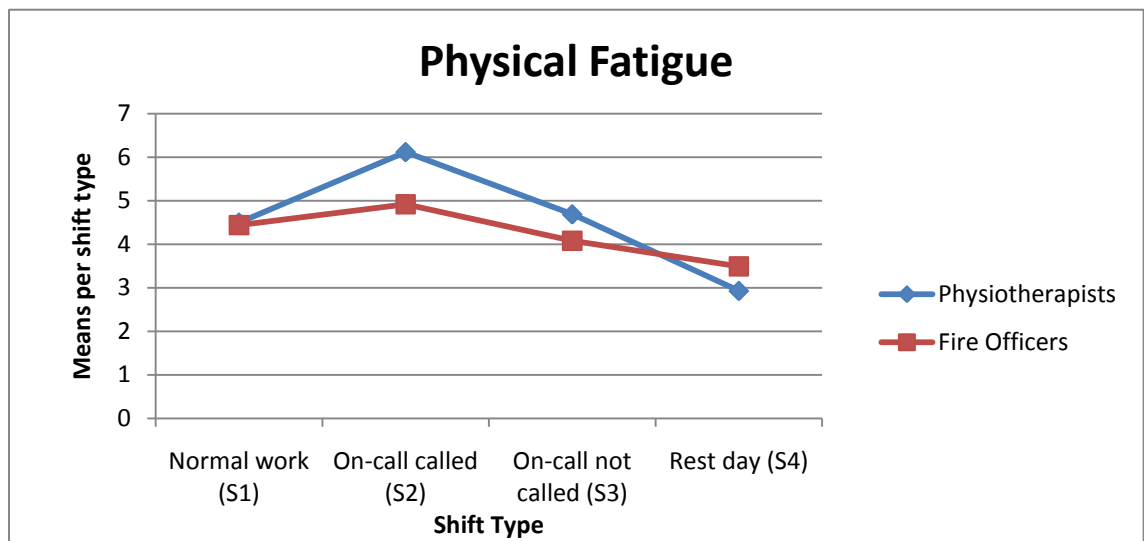


Figure 21. Graph indicating physical fatigue by shift and job type.

Further analysis revealed that the physiotherapists have a higher physical fatigue mean when on on-call called ( $M 6.12$ ) and on-call not called ( $M 4.69$ ) than when on normal work ( $M 4.50$ ) and rest ( $M 2.93$ ). A similar pattern is also observed in the fire officers, although the difference between means is not quite so pronounced and their physical fatigue rest is slightly higher than the physiotherapists, on-call called ( $M 4.92$ ) and on-call not called ( $M 4.08$ ) with normal work ( $M 4.43$ ) and rest ( $M 3.48$ ).

Analysis of the state fatigue scale continued with the subscale of emotional fatigue in which again the mixed design ANOVA revealed (see figure 22) that there was a significant effect of shift type  $F(3,45) = 10.44$ ,  $p < 0.001$ ,  $r = .41$ , however there was no effect of job type ( $F(1,15) = 0.03$ ,  $p > 0.05$ ) and no interaction ( $F(3,45) = 0.29$ ,  $p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in emotional fatigue between shift type normal work and rest  $p < 0.01$ , on-call called and rest  $p < 0.01$ , on-call not called and rest  $p < 0.05$ , with normal work and on-call called, normal work and on-call not called, on-call called and on-call not called being not significant.

However, when using a Bonferroni correction, adjusted alpha value ( $\alpha = 0.008$ ) the difference between normal work and rest and on-call called and rest remained significant  $p = 0.01$ , but on-call not called and rest did not reach significance. Of particular interest here is the on-call not called and rest difference, which shows that there is significantly higher emotional fatigue when on-call (not called out) than at rest, even though the participants are not at work in either of these conditions.

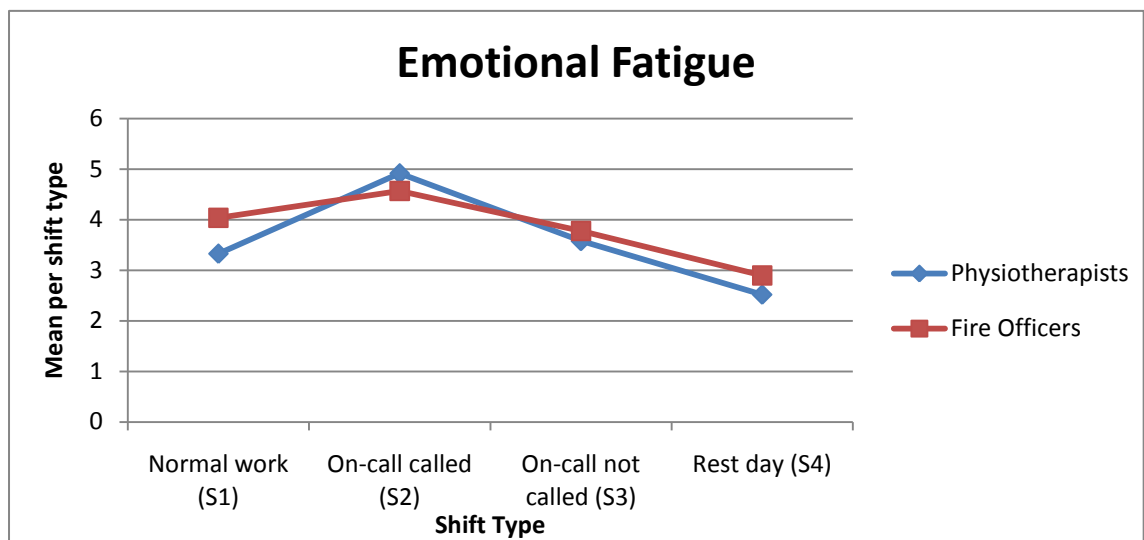


Figure 22. Graph indicating emotional fatigue by shift and job type.

Further analysis revealed that there was very little emotional fatigue difference between the means of the physiotherapists on on-call called ( $M 4.92$ ) than the fire officers ( $M 4.57$ ). The pattern is similar with rest but the fire officers report slightly higher emotional fatigue ( $M 3.78$ ) with physiotherapists ( $M 3.58$ ). Finally, the fire officers report marginally higher emotional fatigue in both normal work ( $M 4.04$ ) and rest ( $M 2.90$ ) than the physiotherapists normal work ( $M 3.33$ ) and rest ( $M 2.52$ ).

Analysis of the subscale of sleep related fatigue revealed (see figure 23) that there was again a significant effect of shift type  $F (3,45) = 9.64, p < 0.001, r = .39$ , however there was no effect of job type ( $F (1,15) = 0.09, p > 0.05$ ) and no interaction ( $F (3,45) = 2.19, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in

sleep related fatigue between shift type normal work and rest  $p < 0.05$ , on-call called and on-call not called  $p < 0.01$ , on-call called and rest  $p < 0.001$ , with normal work and on-call called, normal work and on-call not called, on-call not called and rest not significant. However, when using a Bonferroni correction, adjusting the alpha value ( $\alpha = 0.008$ ) revealed that normal work and rest were no longer significant ( $p = 0.05$ ) but on-call called and on-call not called ( $p < 0.01$ ), and on-call called and rest ( $p = 0.001$ ) remained significant.

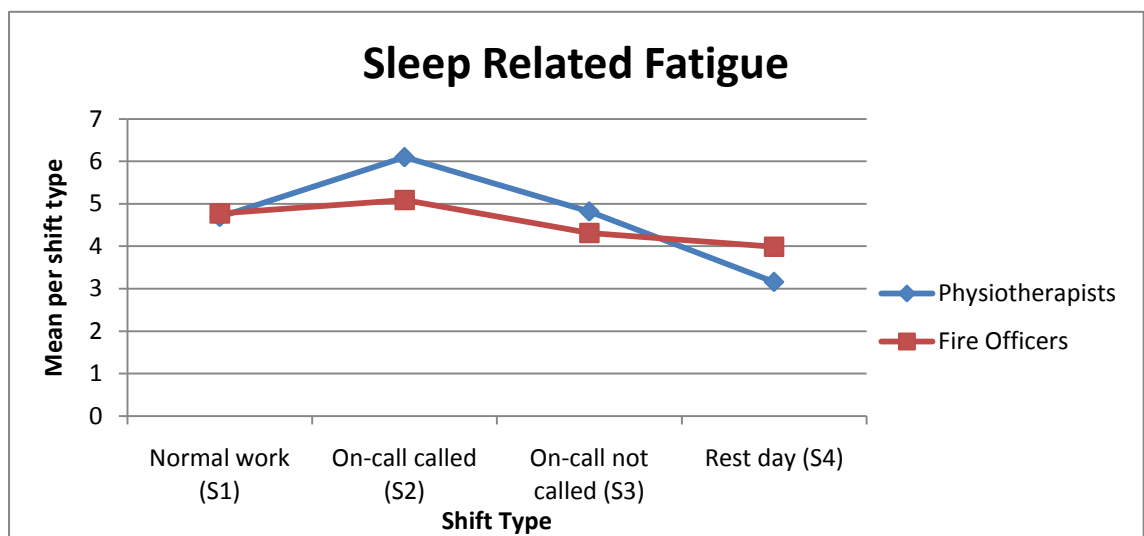


Figure 23. Graph indicating emotional fatigue by shift and job type.

Further analysis revealed that there was very little sleep related fatigue difference between the means of the physiotherapists on on-call called ( $M 6.10$ ) than the fire officers ( $M 5.09$ ). The pattern is similar with on-call not called with the physiotherapists ( $M 4.82$ ) reporting slightly higher sleep related fatigue than the fire officers ( $M 4.31$ ). Finally, the fire officers report marginally higher sleep related fatigue in both normal work ( $M 4.77$ ) and rest day ( $M 3.99$ ) than the physiotherapists normal work ( $M 4.69$ ) and rest ( $M 3.16$ ).

Finally it is worth noting that in all of the measures within the state fatigue scale the difference scores are in the same direction for all participants, i.e. all participants had a higher on-call not called scores than rest day scores.

The results will now continue by reporting the findings of the physical health measure in the diaries.

#### 5.4.2.2 Diary Study Measures: Physical Health Scale

The physical health scale was analysed using a 4 (shift type) x 2 (job) mixed design ANOVA. The ANOVA revealed (see figure 24) that there was a significant effect of shift type  $F(3,45) = 5.18, p < 0.001, r = .28$ , however there was no effect of job type ( $F(1,15) = 0.03, p > 0.05$ ) type and no interaction ( $F(3,45) = 1.30, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in physical health between shift type normal work and rest  $p < 0.05$ , on-call called and rest just failed to reach significance  $p = 0.06$ , with normal work and on-call called, normal work and on-call not called, on-call called and on-call not called, on-call not called and rest was not significant. However, when adjusting for the pairwise comparisons using a Bonferroni correction adjusting the alpha value ( $\alpha = 0.008$ ) these differences were not significant.

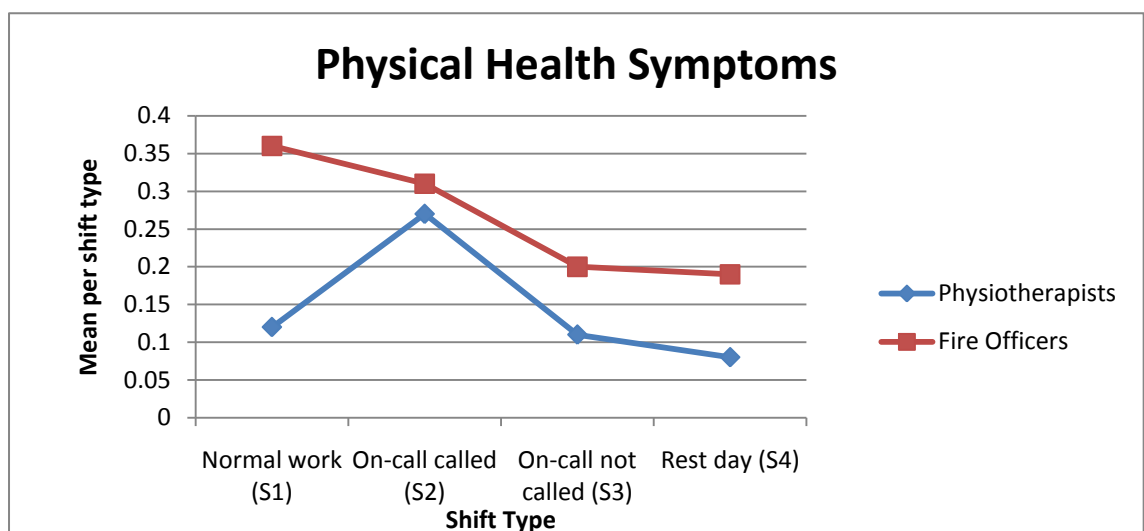


Figure 24. Graph indicating physical health symptoms by shift and job type.



Further, the analysis revealed that the fire officers have a higher mean for physical health symptoms on all shift types, normal work ( $M .36$ ), on-call called ( $M .31$ ), on-call not called ( $M .20$ ), rest ( $M .19$ ) than the physiotherapists ( $M .12$ ), ( $M .27$ ), ( $M .11$ ), and ( $M .08$ ) respectively. However these differences in physical health between physiotherapists and fire officers (job type) did not reach significance.

The results will now continue by reporting the mood scale beginning with depression.

#### **5.4.2.3 Diary Study Measures: Mood Scale**

The mood scale was analysed using a 4 (shift type) x 2 (job) mixed design ANOVA beginning with the mood subscale of depression. The ANOVA revealed (see figure 25) that there was a significant effect of shift type  $F(3,45) = 9.40, p < 0.001, r = .42$ , with a significant interaction  $F(3,45) = 3.21, p < 0.01, r = .20$ , however there was no effect of job type ( $F(1,15) = 0.23, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in depressive mood between shift type on-call called and rest  $p < 0.01$  with normal work and rest just failing to reach significance  $p = 0.07$ . All other shift type combinations were not significant. However, when adjusting for the pairwise comparisons using a Bonferroni correction ( $\alpha = 0.008$ ) the difference between on-call called and rest remained significant ( $p < 0.01$ ) but normal work and rest did not reach significance ( $p = 0.07$ ).

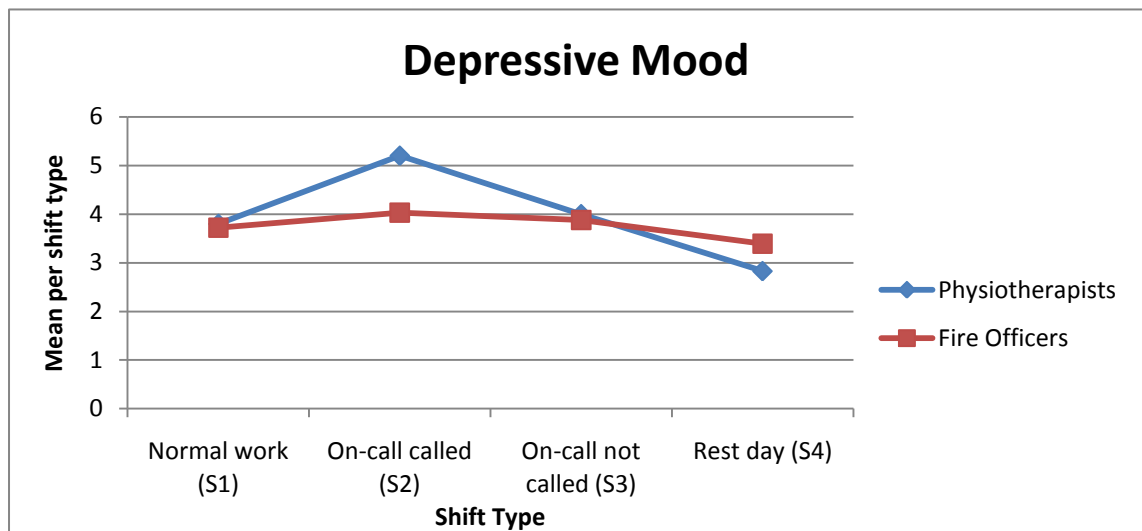


Figure 25. Graph indicating depressive mood by shift and job type.

Further, the analysis revealed that there is very little difference between the means of the fire officers and the physiotherapists with regard to their reported depressive mood whilst on normal work ( $M$  3.72) compared with ( $M$  3.80), on-call not called ( $M$  3.88) and ( $M$  4.00) respectively. However, the physiotherapists report slightly greater depressive mood whilst on on-call called ( $M$  5.20) compared with ( $M$  4.03) for fire officers. Conversely, the reverse is true for rest with the fire officers reporting marginally higher depressive mood ( $M$  3.39) compared with the physiotherapists ( $M$  2.83).

The results of the mood scale continue by examining the subscale of fatigue with the analysis revealing that (see figure 26) that there was a significant effect of shift type  $F(3,45) = 8.02, p < 0.001, r = .38$ , with a significant interaction  $F(3,45) = 3.18, p < 0.01, r = .20$ , however there was no effect of job type ( $F(1,15) = 0.09, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in mood related fatigue between shift type on-call called and rest  $p < 0.01$  with normal work and rest just failing to reach significance  $p = 0.08$ . All other shift type combinations were not significant. However, when adjusting for the pairwise comparisons using a Bonferroni correction ( $\alpha = 0.008$ )

the difference between on-call called and rest remained significant ( $p < 0.01$ ) and normal work and rest again failed to reach significance ( $p = 0.08$ ).

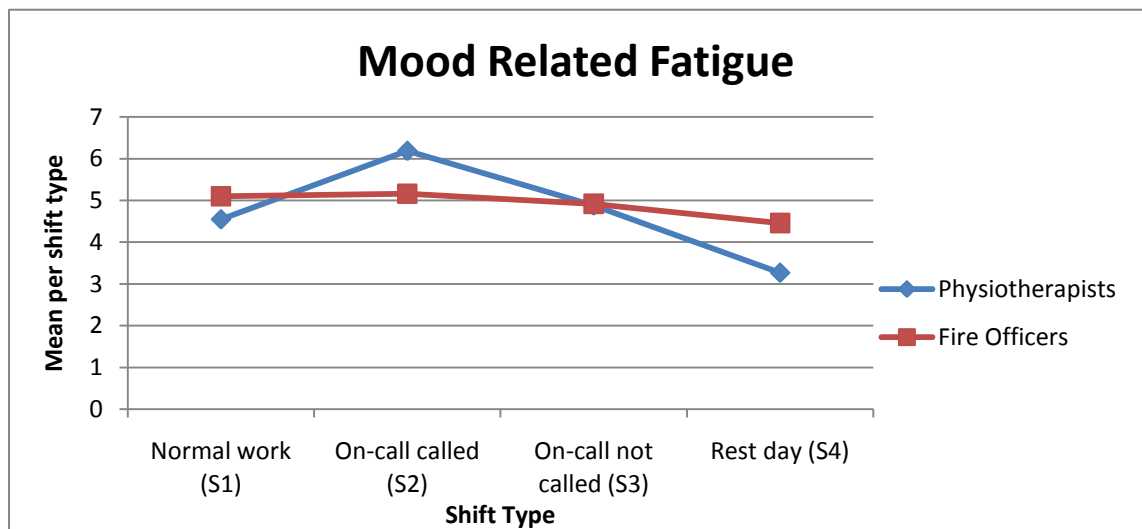


Figure 26. Graph indicating mood related fatigue by shift and job type.

Further, the analysis revealed that the fire officers have a higher mean rating on mood related fatigue on the shift types, normal work ( $M 5.10$ ) and rest ( $M 4.46$ ) than the physiotherapists ( $M 4.55$ ), ( $M 3.27$ ) respectively. However, the physiotherapists ( $M 6.19$ ) report greater mood related fatigue on on-call called than the fire officers ( $M 5.16$ ), with very little difference between both job types on on-call not called ( $M 4.88$ ) for the physiotherapists and ( $M 4.92$ ) for the fire officers.

Finally in the mood scale the results of the subscale anxiety with the analysis revealing (see figure 27) that there was a significant effect of shift type  $F(3,45) = 15.99, p < 0.001, r = .55$ , however there was no effect of job type ( $F(1,15) = 2.04, p > 0.05$ ) and no interaction ( $F(3,45) = 1.91, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in mood related anxiety between shift type normal work and rest  $p < 0.01$ , on-call called and rest  $p < 0.001$  and on-call not called and rest  $p < 0.001$  with normal work and rest just failing to reach significance  $p = 0.08$  but the difference between normal work and on-call not called was not significant. However,

when adjusting for the pairwise comparisons using a Bonferroni correction ( $\alpha = 0.008$ ) the difference between normal work and rest ( $p < 0.01$ ), on-call called and rest ( $p = 0.001$ ) remained significant, with normal work and rest again failing to reach significance ( $p = 0.08$ ). Again a key finding here is the significant difference between on-call not called and rest days.

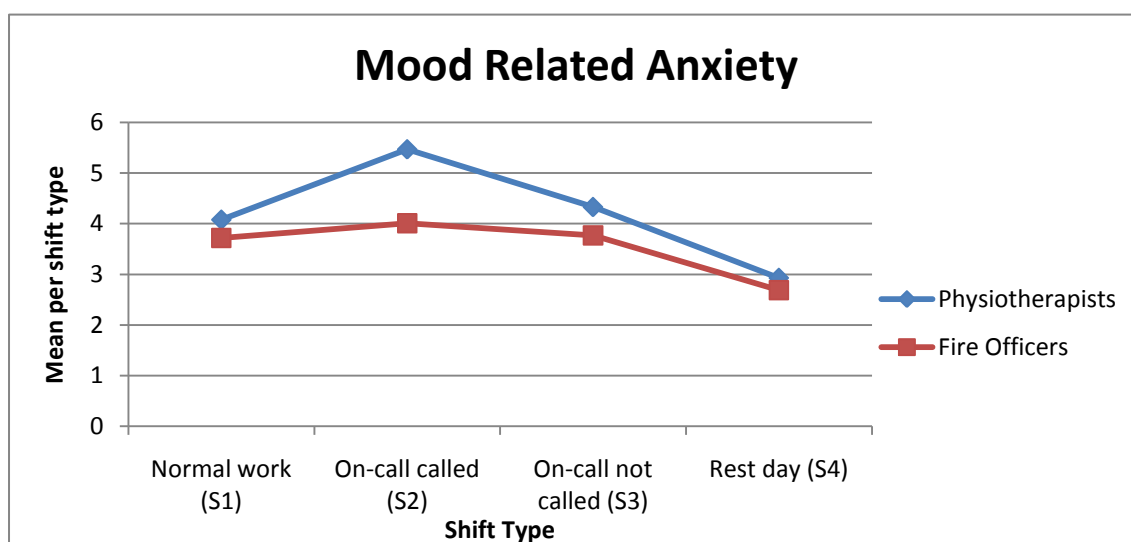


Figure 27. Graph indicating mood related anxiety by shift and job type.

The further analysis revealed that the physiotherapists normal work ( $M 4.08$ ), on-call called ( $M 5.47$ ), on-call not called ( $M 4.33$ ), and rest ( $M 2.93$ ) have a higher mean value on mood related anxiety on all shift types than the fire officers normal work ( $M 3.72$ ), ST2 ( $M 4.01$ ), on-call not called ( $M 3.77$ ) and normal work ( $M 2.69$ ) respectively.

#### 5.4.2.4 Diary Study Measures: Demands & Opportunities

The component parts of the demands and opportunities scale was analysed using a 4 (shift type) x 2 (job) mixed design ANOVA beginning with the subscale of demands. The ANOVA revealed (see figure 28) that there was a significant effect of shift type  $F(3,45) = 12.33, p < 0.001, r = .49$ , with a significant interaction  $F(3,45) = 4.01, p < 0.01, r = .24$ , however there was no main effect of job type ( $F(1,15) = 1.62, p$

>0.05). A post hoc Tukey HSD test revealed significant differences in demands between shift type normal work and on-call not called  $p < 0.001$ , normal work and rest  $p < 0.01$ , on-call called and on-call not called  $p < 0.001$ . All other shift type combinations were not significant. However, when adjusting for the pairwise comparisons using a Bonferroni correction ( $\alpha = 0.008$ ) these differences and the significance remained the same.

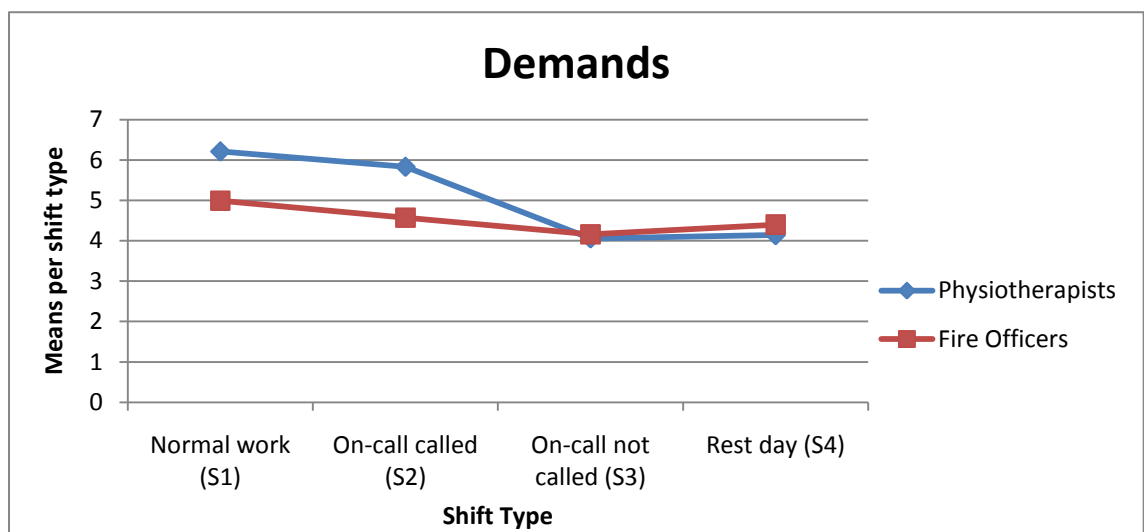


Figure 28. Graph indicating demands by shift and job type.

The analysis further revealed that the physiotherapists have a higher mean value on demands on the shift types, normal work ( $M 6.21$ ) and on-call called ( $M 5.83$ ) than the fire officers ( $M 4.99$ ), ( $M 4.57$ ) respectively. However, the fire officers, report marginally higher demands on on-call not called ( $M 4.16$ ) and rest ( $M 4.40$ ) than the physiotherapists ( $M 4.06$ ), ( $M 4.14$ ) respectively.

The analysis of the demands and opportunities scale continues by examining the subscale personal control with the analysis revealing that (see figure 29) that there was a significant effect of shift type  $F(3,45) = 3.42, p < 0.01, r = .21$ , however there was no effect of job type ( $F(1,15) = 0.15, p > 0.05$ ) and no interaction ( $F(3,45) = 1.14, p > 0.05$ ). A post hoc Tukey HSD test revealed significant differences in personal control

between shift type on-call called and on-call not called  $p < 0.01$  with normal work and on-call not called just failing to reach significance  $p = 0.08$ . All other shift type combinations were not significant. However, when adjusting for the pairwise comparisons using a Bonferroni correction ( $\alpha = 0.008$ ) the difference between on-call called and on-call not called ( $p < 0.01$ ) remained significant but again all other shift type combinations were not significant. The key finding here is that the level of personal control is slightly lower when on-call but not called and interestingly also when at rest. Although these differences are very small on the scale.

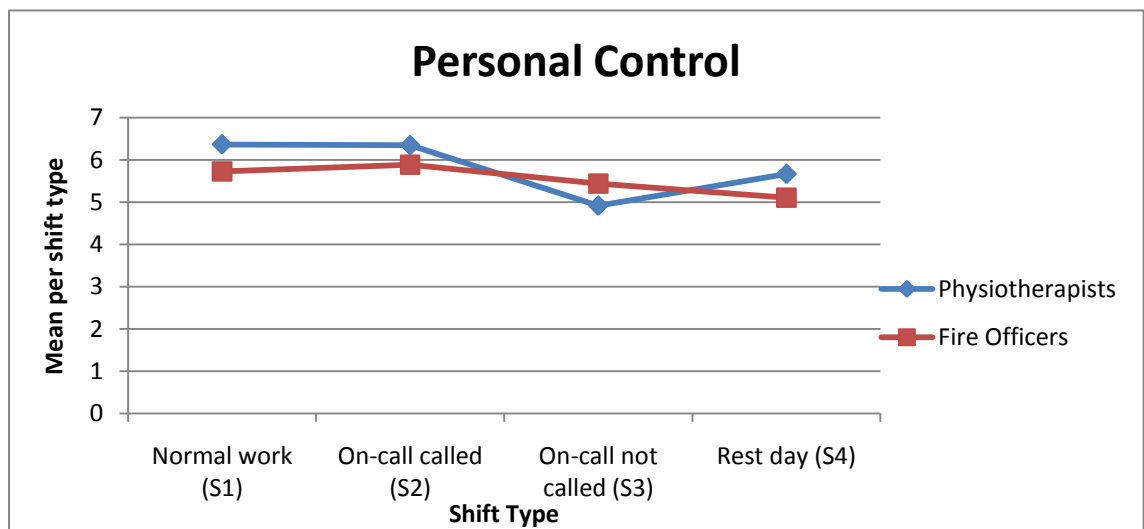


Figure 29. Graph indicating personal control by shift and job type.

The analysis further revealed that the physiotherapists have a higher mean value on demands on the shift types, normal work ( $M 6.37$ ), on-call called ( $M 6.35$ ) and rest ( $M 5.67$ ) than the fire officers ( $M 5.73$ ), ( $M 5.89$ ), and ( $M 5.11$ ) respectively. However, the fire officers, report marginally higher demands on on-call not called ( $M 5.44$ ) than the physiotherapists ( $M 4.92$ ).

Finally in the demands opportunities scale the results of the subscale of personal support analysis revealing that there was no significant effect of shift ( $F(3,45) = 2.17, p$

>0.05), no effect of job type ( $F(1,15) = 1.67, p > 0.05$ ) and no interaction ( $F(3,45) = 1.38, p > 0.05$ ).

However, the analysis revealed that the physiotherapists report greater personal support on shift types, normal work ( $M 6.63$ ), on-call called ( $M 5.85$ ), on-call not called ( $M 5.08$ ), and rest ( $M 6.37$ ) than the fire officers ( $M 5.09$ ), ( $M 5.83$ ), ( $M 4.72$ ), ( $M 5.09$ ) respectively.

Having investigated the impact of different shifts on the variable strain related variables, the results will now address the potential moderators of these relationships.

### **5.4.3 Part 2**

#### **5.4.3.1 Questionnaires: Personality Moderators as Indices of Strain**

Part 2 of the results will report the findings of the personality moderators combined with the diary measures of fatigue, mood, demands and opportunities, health, personal control and personal support. The data were subjected to some further reduction for this section of the analysis, to facilitate the investigation of the key variables: To investigate the true impact of on-call working, two new categories of variables were created. The difference between normal working mean and on-call work mean was considered to be the first key difference. This is referred to as *work* and compares the two working variables and the score was calculated by establishing the difference between these two means on each of the diary measures for each of the participants. The second key difference was that between on-call not called mean and rest day mean [referred to as *rest*] and this score was also calculated by establishing the difference between these two means on each of the diary measures for each of the participants. Again, both of these two conditions reflect the state of the participants following a day of not working, although one represents waiting to work and the other represents a standard day off.

### 5.4.3.2 Personality Moderators and Aspects of the State Fatigue Scale

The multiple regression analysis aimed to investigate whether any of the personality variables predicted the *work* mental fatigue. The personality variables included and TA, MTQ, DC, and the COPE subscales of seeking instrumental social support, seeking emotional social support, humour and denial. These COPE subscales were selected because the survey study revealed these were, predominantly the coping styles adopted by the on-call participants. Denial was also added as it is possible this further negative coping mechanism is used by on-call workers. Therefore further investigation of these coping styles was necessary to see if they were unique to the participants in the survey study or a feature of coping with on-call. The analysis revealed that none of the IVs had predictive value. This suggests that the difference in mental fatigue following the two distinct work shifts was not dependent on the tested personality variables (see table 29).

	B	SE B	$\beta$
1 Constant	7.185	9.63	
Trait anxiety (TA)	-0.06	0.91	
Mental Toughness (MTQ)	0	0.02	
Desirability of Control (DC)	-0.07	0.07	
COPE seeking instrumental social support	-0.07	0.35	
COPE seeking emotional social support	0.11	0.29	
COPE focus on venting emotion	-0.07	0.39	
COPE humour	-0.20	0.18	
COPE denial	0.45	0.64	

Table 29. Personality moderators that predict work mental fatigue.

The multiple regression analysis of *rest* mental fatigue revealed that the difference in mental fatigue following the two non-work shifts was influenced by Trait Anxiety  $r = .56$  ( $p < 0.01$ ), the COPE scale of seeking instrumental social support  $r = -.77$  ( $p < 0.01$ ), the COPE scale of seeking emotional social support  $r = .65$  ( $p < 0.05$ ) and the COPE scale of humour  $r = .53$  ( $p < 0.05$ ) see table 30.



The results indicate that the higher the trait anxiety the greater the difference between rest and on-call not called mental fatigue. Whereas, the variable of seeking instrumental social support indicates that the more the participants seek instrumental social support the less of a difference between rest and on-call not called mental fatigue. However, seeking emotional social support and humour indicate that higher the seeking emotional social support and humour the greater the difference between rest and on-call not called mental fatigue.

	B	SE B	$\beta$
1 Constant	-7.12	5.14	
Trait anxiety (TA)	0.10	0.04	0.56
Mental Toughness (MTQ)	-0.02	0.01	
Desirability of Control (DC)	0.05	0.04	
COPE seeking instrumental social support	-0.48	0.18	-0.77
COPE seeking emotional social support	0.32	0.15	0.65
COPE focus on venting emotion	0.16	0.27	
COPE humour	0.24	0.11	0.53
COPE denial	0.26	0.36	

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

Table 30. Personality moderators that predict rest mental fatigue.

The multiple regression analysis of *work* emotional fatigue revealed that the difference in emotional fatigue following the two non-work shifts was influenced by none of the personality variables (see table 31).

	B	SE B	$\beta$
1 Constant	7.09	9.56	
Trait anxiety (TA)	-0.06	0.09	
Mental Toughness (MTQ)	-0.06	0.07	
Desirability of Control (DC)	0	0.02	
COPE seeking instrumental social support	0.04	0.35	
COPE seeking emotional social support	0.01	0.29	
COPE focus on venting emotion	-0.05	0.39	
COPE humour	-0.21	0.18	
COPE denial	0.47	0.67	

Table 31. Personality moderators that predict work emotional fatigue.

The multiple regression analysis of *rest* emotional fatigue revealed that the difference in emotional fatigue following the two non-work shifts was influenced by none of the personality variables (see table 32).

	B	SE B	$\beta$
1 Constant	-11.81	5.67	
Trait anxiety (TA)	0.09	0.06	
Mental Toughness (MTQ)	-0.2	0.01	
Desirability of Control (DC)	0.08	0.04	
COPE seeking instrumental social support	-0.09	0.19	
COPE seeking emotional social support	0.08	0.18	
COPE focus on venting emotion	-0.1	0.28	
COPE humour	0.55	0.42	
COPE denial	0.17	0.12	

Table 32. Personality moderators that predict rest emotional fatigue.

The multiple regression analysis of *work* physical fatigue revealed that the difference in emotional fatigue following the two non-work shifts was influenced by none of the personality variables (see table 33).

	B	SE B	$\beta$
1 Constant	4.61	8.97	
Trait anxiety (TA)	-0.06	0.08	
Mental Toughness (MTQ)	0	0.02	
Desirability of Control (DC)	-0.05	0.07	
COPE seeking instrumental social support	0.12	0.32	
COPE seeking emotional social support	-0.13	0.27	
COPE focus on venting emotion	0.19	0.36	
COPE humour	-0.21	0.17	
COPE denial	0.4	0.63	

Table 33. Personality moderators that predict work physical fatigue.

Finally in the state fatigue measure, the multiple regression analysis of *rest* physical fatigue revealed that seeking instrumental social support  $r = -.89$  ( $p < 0.01$ ) and humour  $r = .62$  ( $p < 0.01$ ) within the COPE were significant predictors of the difference between physical fatigue following rests days and on-call not called days. As indicated

in table 34, the results show that the higher seeking instrumental social support the less of a difference between rest and on-call not called physical fatigue.

	B	SE B	$\beta$
1 Constant	-3.11	6.00	
Trait anxiety (TA)	0.08	0.06	
Mental Toughness (MTQ)	-0.01	0.05	
Desirability of Control (DC)	-0.01	0.01	
COPE seeking instrumental social support	-0.78	0.21	-0.89**
COPE seeking emotional social support	0.30	0.18	
COPE focus on venting emotion	0.34	0.30	
COPE humour	0.40	0.13	0.62**
COPE denial	0.39	0.45	

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

Table 34. Personality moderators that predict rest physical fatigue.

The results of the personality moderators and aspects of the mood scale will now be documented.

### 5.4.3.3 Personality Moderators and Aspects of the Mood Scale

The multiple regression analysis of the difference between depression following the two *work* shifts revealed that none of the IVs (TA, MTQ, DC, and the COPE subscales) had predictive value. However, the DC only just failed to reach significance  $p = 0.06$ . See table 35.

	B	SE B	$\beta$
1 Constant	5.98	5.56	
Trait anxiety (TA)	-0.01	0.05	
Mental Toughness (MTQ)	0.01	0.01	
Desirability of Control (DC)	-0.08	0.04	
COPE seeking instrumental social support	0.12	0.2	
COPE seeking emotional social support	-0.08	0.17	
COPE focus on venting emotion	0.02	0.23	
COPE humour	-0.06	0.11	
COPE denial	0.13	0.39	

Table 35. Personality moderators that predict work depressive mood.

The multiple regression analysis of the difference between depression following the two *rest* shifts revealed that seeking instrumental social support  $r = -.64$  ( $p < 0.01$ ), seeking emotional social support  $r = .45$  ( $p < 0.01$ ) and humour  $r = .26$  ( $p < 0.01$ ) within the COPE were significant predictors of *rest* depressive mood as indicated in table 36. The results show that the higher the seeking of instrumental social support the less of a difference between rest and on-call not called depression. However, seeking emotional social support and humour indicate that higher the seeking emotional social support and humour the greater the difference between rest and on-call not called depression.

	B	SE B	$\beta$
1 Constant	-0.38	5.18	
Trait anxiety (TA)	0.05	0.04	
Mental Toughness (MTQ)	-0.01	0.04	
Desirability of Control (DC)	0	0.01	
COPE seeking instrumental social support	-0.64	0.17	-1.31**
COPE seeking emotional social support	0.45	0.16	1.07**
COPE focus on venting emotion	-0.09	0.20	
COPE humour	0.26	0.09	0.76**
COPE denial	0.24	0.37	

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

Table 36. Personality moderators that predict rest depressive mood.

The multiple regression analysis of the difference between anxiety following the two *work shifts*, found that none of the IVs had predictive value in the current study.

See table 37.

	B	SE B	$\beta$
1 Constant	2.3	5.23	
Trait anxiety (TA)	0.01	0.05	
Mental Toughness (MTQ)	0	0.04	
Desirability of Control (DC)	-0.04	0.04	
COPE seeking instrumental social support	0.02	0.19	
COPE seeking emotional social support	-0.02	0.16	
COPE focus on venting emotion	-0.07	0.21	
COPE humour	-0.12	0.1	
COPE denial	0.6	0.37	

Table 37. Personality moderators that predict work anxiety.

Finally in the mood scale measure, the multiple regression analysis of the difference between *anxiety* following the two non work shifts revealed that seeking instrumental social support  $r = -.56$  ( $p < 0.01$ ) and seeking emotional social support  $r = .45$  ( $p < 0.05$ ) within the COPE were significant predictors of the difference between anxiety following the two rest shifts ( indicated in table 38). The results show that the higher the seeking of instrumental social support the less of a difference between rest and on-call not called depression. However, the higher the seeking emotional social support the greater the difference between rest and on-call not called anxiety.

	B	SE B	$\beta$
1 Constant	-1.88	6.03	
Trait anxiety (TA)	0.02	0.05	
Mental Toughness (MTQ)	-0.01	0.05	
Desirability of Control (DC)	0	0.01	
COPE seeking instrumental social support	-0.56	0.2	-1.2**
COPE seeking emotional social support	0.45	0.19	1.12*
COPE focus on venting emotion	0	0.23	
COPE humour	0.20	0.11	
COPE denial	0.48	0.44	

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

Table 38. Personality moderators that predict rest anxiety.

The results will now document the findings of the multiple regression analysis of physical health symptoms.

#### 5.4.3.4 Personality Moderators and Physical Health Symptoms

The multiple regression analysis of the difference between physical health following the two work shifts revealed that none of the IVs had predictive value. See table 39.

	B	SE B	$\beta$
1 Constant	-0.01	0.98	
Trait anxiety (TA)	-0.01	0.01	
Mental Toughness (MTQ)	0	0	
Desirability of Control (DC)	-0.01	0.01	
COPE seeking instrumental social support	0.01	0.01	
COPE seeking emotional social support	-0.02	0	
COPE focus on venting emotion	0.01	0.01	
COPE humour	-0.01	0.02	
COPE denial	-0.01	0.05	

Table 39. Personality moderators that predict work physical health.

Similarly, the multiple regression analysis of *rest* physical health symptoms and the predictive value of TA, MTQ, DC, and the COPE subscales revealed that none of the IVs had predictive value. However, seeking instrumental social support only just failed to reach significance  $p = 0.07$ . See table 40.

	B	SE B	$\beta$
1 Constant	-0.04	0.40	
Trait anxiety (TA)	0.01	0	
Mental Toughness (MTQ)	0	0	
Desirability of Control (DC)	0	0	
COPE seeking instrumental social support	-0.03	0.01	
COPE seeking emotional social support	0.02	0.01	
COPE focus on venting emotion	-0.02	0.02	
COPE humour	0.02	0.01	
COPE denial	0.01	0.03	

Table 40. Personality moderators that predict rest physical health.

## 5.5 Discussion

Although there is a huge confound in gender in the physiotherapist participants, it must be noted here that there was no effect of job type. Originally there were more male physiotherapists who agreed to take part in this study; however they never returned their questionnaires or diaries. Similarly, the male physiotherapist who did return his questionnaires and diaries had missing data in the diaries. However, the data he did provide was used in this study.

## **5.5.1 Part 1**

### **5.5.1.1 Diary Study Measures: State Fatigue Scale**

The results of component parts of the state fatigue scale will be discussed individually beginning with mental fatigue, followed by a short summation of the findings of the scale in relation to on-call working.

The results of shift type and mental fatigue indicate that the physiotherapists and fire officers report higher mental fatigue when on-call called out than the other shift type. This result indicates that on-call working gives rise to a much higher subjective mental fatigue response than any of the other shift types. However, the most interesting result is that of on-call not called out. Although this result did not quite reach significance it is worth noting that both groups report on-call not called out is not the same as true rest. Clearly, as research suggests, waiting intention or anticipation of work is having an effect on their ability to feel truly at rest (Heise et al., 1997). This must therefore be considered a key issue for on-call workers when they are on-call not called out, but are sat at home waiting for their phone/pager to ring.

A very similar pattern was found for the subscale of physical fatigue, again indicating that both the physiotherapists and fire officers report greater physical fatigue when working on-call called out than the other three shift types. The physiotherapists experiencing more physical fatigue when doing their normal work, on-call called out and on-call not called out than the fire officers, however this difference is not significant. Again, both occupations report greater physical fatigue when on-call not called than when at rest; however this result failed to reach significance.

As respiratory physiotherapy typically involves physical contact with the patients it is not surprising that the physiotherapists report greater physical fatigue when on-call. In addition, as study 1 found, in physiotherapy they typically have on-call shifts

following a normal working day. As physical fatigue is considered to be a central response to physical activity, and is associated with an aversion to further physical effort (Hockey, 1997) it is not surprising that physical fatigue is significantly greater when on-call in both occupations.

The results of the subscale of emotional fatigue indicate a similar pattern across both occupations and shift type as the previous subscales, with the highest reported emotional fatigue on on-call not called out; however the fire officers have a slightly higher mean rating on normal work but this did not reach significance. Moreover, again both occupations report greater physical fatigue when on-call not called than when at rest and this result reached significance, which suggests greater emotional fatigue is experienced when waiting to be called than when at rest. Furthermore, the emotional fatigue experienced when on-call but not called out is higher for physiotherapists when carrying out their normal duties, but is almost the same for the fire officers but again this difference was not significant. There is currently no evidence that raised levels of daily emotional fatigue do lead directly to burnout, but this may be a key factor in the development of this chronic condition and further longitudinal work could explore this relationship.

The subscale of sleep related fatigue again revealed that both occupations report greater sleep deficits when on-call called out than any of the other shift types. This is not surprising as study 1 highlighted many of the on-call workers are often called more than once in any given on-call shift. These call outs can and often occur in the middle of the night and early hours of the morning as the participants in study 1 reported. Again, the physiotherapists report greater sleep related fatigue when on on-call not called than when at rest, so simply waiting for a call may in fact disturb sleep. The fire officers also



report slightly higher sleep related fatigue when on-call not called than when at rest, however these differences failed to reach significance.

This is consistent with previous research into on-call working in which it was found that on-call workers typically had a difficulty in getting to sleep and remaining asleep when on-call (Pilcher & Coplen, 2000). It is also interesting to note that both occupations reported higher sleep related fatigue effects when working on-call called out shift type. These reported effects are well established in shift-work research, which indicate that shift workers typically obtain less sleep and sleep that is of poorer quality than day workers (Kogi, 1982; Rutenfranz, 1982; Naitoh et al., 1990; Scott & LaDou, 1990).

In summary the results of the state fatigue scale indicate that from the subjective rating for all of the subscales being on-call called out is predominantly reported as inducing greater fatigue for both occupations. However, the general pattern of results indicate that both the physiotherapists and fire officers are experiencing higher levels of fatigue when on-call called out (although this is only significant with regards to emotional fatigue). These results are in line with previous research in which the general relationship between irregular hours, shift/night-work and fatigue are well documented (e.g. Rosa & Colligan, 1988; Bohle & Tilley, 1989; Smith et al., 2005; Son, Kong et al., 2008).

Furthermore, the results of the shift type on-call but not called out indicate that fatigue is also an issue. Both the physiotherapists and fire officers report that on-call not called out is clearly not the same as being at rest, as the European Working Time Directive (2004) implies. What is even more disconcerting about these results are that recent research indicates recall of stressful work shifts may be perceived at a later time

as non-stressful due to possible time lags in reporting their experiences (Metzenthin et al, 2009).

Therefore, the results of the fatigue scale clearly indicate that on-call workers experience a decline in psychological and physical health and well-being both when on-call and called as well as some evidence that they are adversely affected when on-call and not called. Hence, research into the extent to which this occurs using objective measures would further substantiate the impact on psychological and physical health and well-being.

#### **5.5.1.2 Diary Study Measures: Physical Health Scale**

The results of the physical health scale indicate that the fire officers generally experience more health symptoms than the physiotherapists (but this difference was not significant in the current study). The fire officers also report more health symptoms when carrying out their normal duties than any other shift type but again this was not significant. Whereas, the physiotherapists report more health symptoms when on-call called out. However, both occupational groups report slightly more health symptoms when on-call not called than when at rest, although this failed to reach significance. Again this indicates that being on-call but not called out is not the same as being at true rest in terms of health symptoms.

Furthermore, as recent research highlights, there is a strong relationship between fatigue and health complaints (Ku & Smith, 2010). In addition the restrictiveness of on-call working in relation to out of work activities it is possible that on-call workers are more attentive to their own state as they are less active. Hence, on-call workers experience a decline in psychological and physical health when working on-call and are called out. Similarly, when on-call workers are on-call but not called this decline also occurs but to a lesser extent than when on-call.

### **5.5.1.3 Diary Study Measures: Mood Scale**

The results of the component parts of the mood scale will be discussed individually beginning with the mood subscale of depression, followed by a short summation of the findings of the scale in relation to on-call working.

The results of shift type and mood subscale of depression indicate that the physiotherapists experience greater depressive mood when working on-call called out shift type. Whereas the fire officers report a relatively similar mood across all shift types. However, again both occupations report a slightly higher depressive mood when on-call not called than when at rest and this was the only shift combination that reached significance in relation to mood.

These findings are interesting as research suggests that sleep, mood, and social satisfaction and recovery from the previous shift was still absent by the end of the first rest day (Totterdell et al., 1995). As on-call not called out is classed as rest, the compounding effects of the previous shift and then being on-call and not called indicate that improvements in sleep, mood, social satisfaction and recovery are less likely to occur. This is further substantiated by the earlier results of the fatigue scale in which both occupations report higher mental fatigue, physical fatigue, emotional fatigue and sleep related fatigue when on-call not called than when at rest.

The mood related fatigue subscale indicates that the fire officers report a relatively stable mood across all shift types. This is very different to the results of the fatigue scale in which the fire officers report higher levels of fatigue on normal work, on-call called and on-call not called than when at rest. However, the physiotherapists fatigue varies more across the shift types with them experiencing greater mood fatigue when on-call called out than any other shift type. The physiotherapists also report greater mood fatigue when on-call not called out than when at rest. Although there are

conflicting results regarding the mood subscale of fatigue and sleep related fatigue, it must be noted that although similar these two scales measure different aspects of fatigue. The subscale of fatigue here is a short overall tiredness measure, whereas the state fatigue scale examines the separate aspects of fatigue.

The subscale of anxiety revealed that the physiotherapists report greater levels of anxiety across all shift types compared to the fire officers, with the physiotherapists experiencing the greatest level of anxiety when on-call called. Whereas the fire officers report only slightly higher anxiety when on-call called out compared to normal shift and on-call not called. However, both occupations report higher anxiety when on-call not called than when at rest. Moreover, the anxiety experienced by both occupations when on-call not called is slightly higher than when carrying out their normal work. Clearly, there is some evidence that both occupations find being sat at home waiting to be called more anxiety provoking than when at work, although a larger sample size is required to be confident of these findings.

In summary the results of the mood scale indicate that both occupations experience slightly higher levels of anxiety, depression and negative affect whilst on-call called out. Bearing in mind the nature of on-call working and its unpredictability these results are not surprising. Also as research indicates, when there is a continuous depletion of resources, as there is when working on-call shifts this will lead to the negative load effects of fatigue, and in the absence of recovery, to exhaustion, loss of function, and physical and mental impairment (Sonnetag & Zijlstra, 2006). Furthermore, recent longitudinal research found support for the motivational and health impairment processes assumed in the job demands-resources model, in which they reported that such health impairments may involve severe mental health problems, namely depression, as a long term outcome (Hakanen, Schaufeli & Ahola, 2008). As a

result it has to be assumed that individuals who are exposed to highly demanding work situations, as is often the case in on-call shifts, must have a greater need for recovery than those not exposed to such situations (Sonnetag & Zijlstra, 2006).

Similarly, their experiences of differences in mood whilst on-call not called are very similar to those experienced when carrying out their normal daily work. Clearly, there is broad evidence here that being on-call but not called out is not the same as being at rest (although the findings are limited by the sample size). Hence, the implications for the psychological and physical well-being of on-call workers are noticeably compromised as the results of the mood scale demonstrate. Thus, further investigation could expand on this line of enquiry and adopt more objective measures to further investigate these changes.

#### **5.5.1.4 Diary Study Measures: Demands & Opportunities**

The physiotherapists report greater work demands than the fire officers on both normal work and on-call work. Interestingly, both occupations report very little difference between the demands of normal work and the demands of on-call called out. This suggests that while the workload may be very similar, the level of strain this work leads to is different.

With regard to personal control both the physiotherapists and fire officers report similar levels of control when carrying out their normal work and whilst on-call called out. However, the physiotherapists report slightly less control when on-call not called out than when at rest, but this difference is relatively small. Similarly, there is very little difference between these two shift types in the fire officers. However, having job control is viewed as an important means to reduce work pressure and ultimately work stress (Van Der Doef & Maes, 1999). Similarly, job control also has role to play in the need for recovery (Sonnetag & Zijlstra, 2006) and as this study has already highlighted

in the state fatigue scale recovery may not be taking place when on-call called or not called.

The results of subscale of personal support indicate that the physiotherapists have greater support when at work or on-call called out than the fire officers; however this difference may be due to level of seniority as fire officers are managerial level and in charge of departments or fire stations.

These results of demands and opportunities indicate that the similar levels are reported when on-call as when they are carrying out their normal duties. It therefore follows that when on-call workers have completed a normal day's work and then cover on-call these will impact further and lead to a decline in well-being. Further investigation is required to establish if this is occurring.

## **5.5.2 Part 2**

### **5.5.2.1 Questionnaires: Personality Moderators as Indices of Strain**

The personality moderators of trait anxiety (TA), mental toughness (MTQ), desirability of control (DC) and the COPE were analysed with aspects of the state fatigue scale, physical health and mood to examine whether these personality moderators would have any predictive value with regards to the impact of the different shift types.

### **5.5.2.2 Questionnaires: Personality Moderators and State Fatigue**

The results of the analysis of the difference between *work* and mental fatigue, emotional fatigue, physical fatigue and sleep related fatigue and trait anxiety, mental toughness, desirability of control, and the subscales of seeking instrumental social support, seeking emotional social support, focus on venting emotion, humour and denial did not have predictive value. However, this result may be due to the small sample size.

The results indicate that the impact of work on mental fatigue was predicted by trait anxiety, seeking instrumental social support, seeking emotional social support and humour. Therefore individuals high on trait anxiety will report a greater difference between being at rest and being on-call and not called out in relation to mental fatigue. As previously noted, this study has already established mental fatigue is higher when on-call not called out than when at rest. Thus individuals who have a higher propensity for anxiety may suffer the negative consequences of mental fatigue when working on-call than individuals with a lower propensity for anxiety.

With regard to seeking instrumental social support, individuals high on seeking instrumental social support will report a lower difference between being at rest and being on-call and not called out in relation to mental fatigue. Thus individuals who seek instrumental social support may not suffer the negative consequences of mental fatigue when working on-call as much as those who do not use this form of coping style. Therefore, this form of coping style may be of benefit in coping with the unpredictable nature of on-call working. However, individuals high on seeking emotional social support and humour will report a greater difference between being at rest and being on-call and not called out in relation to mental fatigue. Hence, individuals who have a seeking emotional social support and humour coping style may experience the negative consequences of mental fatigue when working on-call to a greater extent, than individuals with a lower seeking emotional social support and humour coping style.

The results indicate that the difference between rest and physical fatigue was predictive of seeking instrumental social support and humour. With regard to seeking instrumental social support individuals high on seeking instrumental social support will report a lower difference between being at rest and being on-call and not called out in relation to physical fatigue. Thus individuals who seek instrumental social support may

not suffer the negative consequences of mental fatigue when working on-call as much as those who do not use this form of coping style. Therefore, this form of coping style may be of benefit in coping with the unpredictable nature of on-call working. However, individuals high on humour will report a greater difference between being at rest and being on-call and not called out in relation to physical fatigue. Hence, individuals who have a humour coping style may experience the negative consequences of physical fatigue when working on-call to a greater extent, than individuals with a lower humour coping style.

The results indicate that the difference between rest and depression was predictive of seeking instrumental social support, seeking emotional social support and humour. With regard to seeking instrumental social support individuals high on seeking instrumental social support will report a lower difference between being at rest and being on-call and not called out in relation to depression. Thus individuals who seek instrumental social support may not suffer the negative consequences of depression when working on-call as much as those who do not use this form of coping style. Therefore, this form of coping style may be of benefit in coping with the unpredictable nature of on-call working.

However, individuals high on seeking emotional social support and humour will report a greater difference between being at rest and being on-call and not called out in relation to depression. Hence, individuals who have a seeking emotional social support and humour coping style may experience the negative consequences of depression when working on-call to a greater extent, than individuals with a lower seeking emotional social support and humour coping style. The results of this multiple regression have already been observed earlier in the results section.



### **5.5.2.3 Questionnaires: Personality Moderators and Aspects of Mood**

The results of the analysis of the difference between the *work* mood subscale of depression and the trait anxiety, mental toughness, desirability of control and subscales of the COPE indicated that none of the IVs had predictive value. However, the results of the *rest* mood subscale of depression and the IVs revealed that again subscales of the COPE: seeking instrumental social support, seeking emotional social support and humour were significant predictors of *rest* depressive mood. The on-call not called group have a greater need for seeking instrumental social support, with the rest group having a greater need for seeking emotional social support and humour.

The discussion will finally examine the results of the personality moderators and physical health symptoms.

### **5.5.2.4 Questionnaires: Personality Moderators and Physical Health**

#### **Symptoms**

The analysis of the difference between *work* physical health symptoms and the TA, MTQ, DC and the COPE subscales revealed no significant predictive value. Similarly, the results of the *rest* physical health symptoms and the IVs again revealed no significant predictive value.

### **5.5.2.5 Summary: Personality Moderators**

The lack of predictive value of the personality moderators of TA, MTQ and DC may be due to the small sample size, but it may simply be that these personality variables do not predict strain. However, COPE and aspects of coping do have an impact on strain outcomes particularly when observing the distinction between the two at home variables.

## 5.6 Strengths, Limitations and Conclusive Summary

Firstly, it must be noted that this study contained a relatively small sample size. Similarly, it contained an unequal distribution of males to females in the physiotherapist sample. That said there was no effect of job type in any of the statistical tests carried out. In addition although there was a distinct difference in the subjective responses between on-call not called and rest, the lack of significance between these two shift types may be due to the small sample size. However, the diary study indicates that on-call not called shift type is not the same as rest, which must be considered a strength of the study as daily diary measures relate more to overall well-being (DeLongis, Hemphill & Lehman, 1992). Hence, such reports are more valid when conducted on a daily basis, rather than one off retrospective reporting.

Consequently, this diary study has revealed the extent to which on-call working impacts on the health and well-being of on-call workers both physically and mentally in terms of fatigue and stress. The subjective rating of all the diary measures when on-call called was predominantly higher for both occupations indicating a decline in both psychological and physical well-being. Similarly, nearly all of the ratings for the on-call not called were different to those when at rest. The lack of significance between these two shift types may be due to the small sample size. It may also be due to possible time lags in reporting the experience of fatigue as previous research suggests (Metzenthin et al., 2009). Thus including some form of physiological measure of the stress response in the final study may offer further evidence in support the effects of on-call work scheduling.

As many of the component parts of the state fatigue scale revealed differences between shift and fatigue, further research is required alongside the objective measures as noted above. In addition the subscale of sleep related fatigue from the state fatigue

scale indicated deficits in sleep when on-call called out. Further investigation into the sleeping habits of on-call workers is therefore warranted.

Therefore, combining a diary measure with a biological measure of stress to continue to investigate the effects of on-call working would be of benefit in this much under research form of work scheduling.

## **Chapter 6 Study 4**

### **6.1 Summary**

Study 4 continues to investigate on-call working and its effects. Using a psychophysiological methodology it incorporates the biological indicator of saliva cortisol to measure the stress levels of the participants across 4 different shift types. The participants collected 3 samples of saliva in each shift type on 3 separate occasions. The participants also recorded their subjective responses to a number of measures contained in a diary after collecting each sample.

The saliva cortisol results indicate that being on-call and not called out is the most stress provoking shift type. However, the subjective reports regarding fatigue, mood, demands and opportunities and happiness levels all point to being on-call and called out as having the greatest negative impact. Of further key importance was the finding that, on-call not called out was rated as being different to at rest in that it was reported as eliciting very similar effects the participants normal work.

The results of this study indicate that The European Working Time Directive (2004) ruling for being on-call and not called is incorrect as this is clearly not the same as being at rest. However, taking into account the very small sample size, these findings should be considered as preliminary and tentative.

## **Study 4 Investigation into the effect of shift type and the moderating factors of personality: A psychophysiological pilot study**

### **6.2 Introduction**

The results of the diary study indicated differences between the shift types, with particular emphasis on on-call called, and to a lesser extent on-call not called, on all of the measures used. These differences highlight significant changes in the subjective reporting of psychological and physical health and well-being. Moreover, aspects of the fatigue scale indicate that both physical and sleep related fatigue following on-call called out is significantly different to carrying out their normal duties.

This result is particularly interesting as two recent research studies indicate that out of hours births are riskier (Field & Smith, 2010) and increases the risk of neonatal death (Pasupathy et al., 2010) than births during the day. These results have been ascribed to the variation in clinical care with no further explanation for this variation. However, as H. L. Mencken noted in 1998 *“Traditional approaches to the demands of patient care, relying on long periods of on-call and broken sleep are no longer sustainable”* (pp.1336). Furthermore, it is well established that there is still a high frequency with which on-call is utilised in hospital settings (Barnes-Farrell et al., 2008) and may therefore partly offer an explanation.

In addition, occupational stress has been recognised as problematic in health care workers (e.g. Robins, Cooper & Mayers, 1992; Firth-Cozens, 1993). Moreover, in the past decade, work stress has substantially increased across industrialised countries (Akerstedt et al., 2004) that not only results in absenteeism but also increases the risk of accidents/incidents at work (Grosch et al., 2006) or when travelling home from work (Barger et al., 2005).

Essentially, the causes of stress are complex and research suggests that loss of sleep rather than the hours of work themselves are substantive reasons for decrements in

mood and performance (Firth-Cozens, 1993). Moreover, individuals differ in their perceptions of stress and its appraisal (Fischer, Calame, Dettling, Zeier & Fanconi, 2000a) and often miss-report their perceptions as previous research attests (Metzenthin et al., 2009). However, the role of stress in its contribution to sleepiness and fatigue must also be considered.

As such, research investigating the sleep of merchant marine machine officers on-call reported that during the night on-call, but without being called out, the officers showed a significant reduction of sleep and efficiency of sleep stages 3 and 4 (slow wave sleep) (Akerstedt, Kecklund & Gillberg, 2007). Furthermore, sleep disturbances have been associated with a wide range of health problems (Rugulies, Norborg, Sørensen, Knudsen & Burr, 2009).

Indeed, research investigating sleep and metabolic indicators has demonstrated a link between restricted sleep and risk indicators for cardiovascular and metabolic disease, such as levels of cortisol, lipids and glucose (Akerstedt et al., 2007). However, other metabolic disturbances occur during restricted sleep as disruption to the body's natural circadian rhythm has the potential to induce physiological changes as recent research has established.

Indeed, research examining the relationship between cognitive performance, salivary cortisol levels and volume of the temporal lobe of two flight attendant groups with different jet lag recovery periods found significant correlations between lower cognitive performance, higher salivary cortisol levels and smaller volume of the right temporal lobe in the short-recovery crew. An important feature of this study is that it suggests a cumulative effect of exposure to chronic disruption of circadian rhythms on cognitive functions and the underlying cerebral structures (Cho, 2001). Moreover, these cognitive deficits became significant after only four years of transmeridian flying experience.

The implications of this study for on-call workers, especially in light of the findings of the diary study in relation to on-call not called out, is particularly interesting as even when such workers are not called activation and readiness to work is still taking place. Therefore to further substantiate these findings, the final study in this thesis has been designed to incorporate an objective measure of psychological and physical health and well-being, to provide evidence of activation at the biological level as well as via subjective reporting.

### **6.2.1 Study Research Questions**

What are the subjective reported differences across four shift conditions of normal working, on-call called out, on-call not called out and rest with regard to fatigue, mood demands/opportunities, happiness and sleep? Which of these shift conditions is the most stress inducing shift type with regard to levels of saliva cortisol? Hence the aim of this study is to establish, biologically, which, if any, of the shift types elicits the greatest stress response. In addition a further aim is to ascertain the differences between shift on the measures of fatigue, mood, demands/opportunities, and happiness levels in order to further substantiate which type of shift may possibly lead to a decline in well-being.

### **6.2.2 Use of Saliva Cortisol Rationale**

Cortisol is a glucocorticoid hormone released by the adrenal glands. It is vital for life and during times of stress in which it is secreted in higher amounts. These higher amounts are produced in response to hypothalamic-pituitary-adrenocortical activation where changes, triggered by stress, result in the production of increased levels of corticosteroids. The most important of these corticosteroids is cortisol, as it induces more changes within the individual, such as those discussed earlier in this chapter. Therefore, in measuring levels of saliva cortisol it may be possible to ascertain aspects

of an individual's work schedule that may be detrimental to physical and psychological well-being.

## **6.3 Method**

### **6.3.1 Design**

This study used daily saliva cortisol samples as a direct measure of the stress response and daily diary methodology to ascertain each participant's subjective rating for a series of psychometric measures contained in the dairies and cortisol levels from the daily saliva samples. The participants were provided with detailed instructions on how to complete each diary measure (see appendix 7) including whom to contact if further clarification was required. They were also provided with a comprehensive instruction sheet (see appendix 8) that explained how to collect to saliva and who they should contact if they required further clarification. The dependent variables were the diary measures (fatigue, mood, demands and opportunities, happiness, number of hours sleep in last 24 hours) with shift type as the independent variables.

### **6.3.2 Measures: Cortisol**

The previous measures used in this thesis to ascertain decrements in well-being have relied chiefly on self report measures. This study has been designed to incorporate the biological indicator of cortisol alongside such measures to compare cortisol profiles between shift types. It is well documented that cortisol (hydrocortisone, Compound F) has a circadian rhythm, with levels that peak early in the morning and reduce to much lower levels at night (Chernow,1987 ). However, during the stress response cortisol levels rise independently of circadian rhythmic function (Kreiger, 1975).

Therefore obtaining saliva samples at a set time of the day across shift types will provide an accurate profile of the individual's cortisol levels, and thereby indicate



which types of shift illicit the stress response. To avoid natural diurnal changes in cortisol levels, each saliva sample will be collected at 6pm in each condition. Normal evening levels of cortisol for males aged 31-50 are around 0.359µg/dL (Salimetrics, 2010). This time was chosen as it is the time that the fire officer's normal shift typically ends and would therefore provide a measure of cortisol level following completion of a normal shift. Furthermore, using the same time for collection of all the other samples would provide greater accuracy in individual differences in cortisol levels between shift types.

### **6.3.3 Measures: Diaries**

The diaries (see appendix 7) all contained the following psychometric measures:

The State Fatigue Scale (Earle, 2004) comprising the subscales of mental fatigue, physical fatigue, emotional fatigue, sleep related fatigue, and boredom and a scale of 1-9 with 1 = strongly disagree and 9 = strongly agree. The fatigue scale was again included as a measure in the diary as it proved a valuable assessment tool for both indicators of fatigue and the psychological decline in health and well-being in study 3. For a full description of this scale see chapter 5 section 5.3.2.

The PANAS mood scale (Watson, Clark & Tellegen, 1988) and adapted version by (Hockey, Payne & Rick, 1996) on a polar scale with enthusiastic v miserable and depressed v optimistic for the subscale of depression, weary v lively and energetic v tired for the subscale of fatigue, and relaxed v tense and on edge v at ease for the subscale of anxiety. The mood scale was again included in the diaries as it was valuable in providing an indication of the negative outcomes of on-call working in study 3. For a full description of this scale see chapter 5 section 5.3.2.

Similarly, Demands and Opportunities (Karaseck, 1979) with a scale of 1 low – 9 high and comprises mental, emotional and physical demands, and personal control

and personal support were again incorporated into the diaries as this scale provided further evidence for changes in well-being. For a full description of this scale see chapter 5 section 5.3.2.

The additional measure of The Subjective Happiness Scale (Lyubomirsky & Ross, 1997) was used as a tool to measure happiness as a counterbalancing positive measure comprising a scale of 1=not very happy to 7=very happy on 4 questions of right now I consider myself; compared to most of my peers, right now I would consider myself; some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you at this moment in time; some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterisation describe you at this moment in time? This scale was adapted from the original scale (see appendix 9) to change it from a trait to a state scale, i.e. how they felt right now. The results of the validation study will now be reported.

### **6.3.4 Validation of the Revised Happiness Scale**

A validation study was carried out to test the reliability and validity of the changed scale, using the new scale, The Oxford Happiness Scale (Hills & Argyle, 2002) and the POMS (McNair, Lorr & Droppleman, 1971), (see appendix 10 for questionnaires used in the validation study). Fifty psychology students, of the University of Hull took part in this validation study. This study revealed good evidence of reliability, with a Cronbach alpha value of  $r = 0.81$ . This is well within the recognised boundaries of acceptability ( $r > 0.7$ ).

The 4 items within the scale were significantly correlated with POMS item vigour (.33), tension (-.38), depression (-.41), and anger (-.30). However, there was no significant relationship with the Oxford Happiness Questionnaire (.19). This may be due

to the fact that the Oxford Happiness Questionnaire is a trait measure and is one of the reasons it was not used as a measure in the psychophysiological study. Further reasoning for utilising a different measure of happiness than the Oxford questionnaire is that with 27 items it was considered too long alongside the other subjective measures and the saliva collection.

Therefore, the revised questionnaire was considered a valid and reliable measure of state subjective happiness and was used in study 4.

Finally, the participants were asked to record how many hours sleep they had in the past 24 hours and quality of sleep on a scale of 1 = very poor to 9 = very good. This was used to assess how much sleep the participants had and the quality of that sleep across shift types.

### **6.3.5 Participants**

The participants comprised the occupational group of fire officers as ethical approval from health care workers was very difficult to secure. However, the Fire Service were very interested in the design of the study and agreed to the fire officers taking part. Initially in the design of the study there were to be a total of 6 participants but only 5 actually collected saliva samples. This level was set on the basis of practical funding, as the costs of more widespread cortisol assessments were beyond the practical limits of the current PhD. The 6<sup>th</sup> participant had to withdraw from the study, as he was taken ill with stress and anxiety well into the saliva and diary collection period. He has since been retired on the grounds of ill health.

Therefore the study sample consisted of 5 participants in total and comprised 5 fire officers all of whom were males. There were a total of 12 saliva samples per participant and 12 diary entries: 3 for each shift condition, which provided a total of 60

iterations. The age range of the participants was 35-50 years with an average age of 45 years.

### **6.3.6 Materials**

Each participant was given a 4 diary packs containing 3 diaries for each of the work conditions, 3 normal working, 3 on-call called out work, 3 on-call not called out and 3 rest days, which required completing on a daily basis for a period of 3 days in each condition. Also in these packs were the saliva collection tubes and an instruction sheet providing information on how to collect the saliva. They were also given a box containing an ice pack.

A Salimetrics saliva assay kit was also purchased to measure the levels of cortisol in the participant's saliva.

### **6.3.7 Procedure**

The participants were visited in their places of work and were each given the diaries and saliva collection tubes. They were informed that they were to collect 12 saliva samples (for method see appendix 8) in 4 different working conditions. Three samples, on 3 Wednesdays, after they had completed their normal duties i.e. at the end of their shift; 3 samples on 3 rest days; 3 samples on an on-call shift when they had been called out; and 3 samples when on an on-call shift but when they had not been called out. They were also asked to complete the diary for that particular shift (see appendix 7) after collecting each sample. Once they had collected their saliva sample they were asked to place it in the box provided and then place the box in their domestic freezer in order to preserve the sample. They were then informed that they should contact the researcher to arrange a suitable time to collect that sample and diary within the next few days to maintain sample quality.

As each of the saliva samples were collected they were taken to the university, under refrigerated conditions and placed in a freezer capable of reaching temperatures of minus 80 degrees centigrade.

Completion of the diaries involved circling the appropriate number on each psychometric scale that best reflected their feelings in each diary for each of the four shift types. The results of which will now be discussed.

### **6.3.8 Ethics**

Ethical approval was sought from the University of Hull Psychology Department's Ethics Committee and as there were no issues regarding deception or risk the study was given a '*normal*' classification. In line with the ethical guidelines set out by the British Psychological Society (BPS) the participants were briefed on what was expected of them if they decided to take part in the study. They were informed that their participation in the study was voluntary and that they were able to withdraw their participation at anytime, even retrospectively and details of whom to contact should they wish to withdraw. They were informed that the diary data and saliva samples would be anonymised to protect their identity. They then signed to acknowledge their informed consent to take part in the research. Once they had completed the diaries and saliva collection the group were then provided with an explanation of the study via e-mail and asked if they had experienced any difficulties completing the diaries or collecting their samples.

## **6.4 Results**

### **6.4.1 Data Cleansing and Statistical Analyses**

A total of 60 saliva samples and diary packs were collected from the fire officers, all of which were usable. The saliva samples were removed from the freezer and allowed to thaw out gradually. They were then prepared for analysis by a bio-

medical technician in the presence of the researcher. When the cortisol levels for each participant in each condition had been obtained they were entered into SPSS. The raw data from the diary measures was also entered into SPSS and reduced into each relevant score or means. In all analyses effects were accepted as significant at  $P < .05$  level.

The results will now continue by reporting the statistical analysis of the saliva cortisol levels and diary study measures.

#### **6.4.2 Saliva Cortisol and Shift**

The lowest through to highest cortisol levels across shift type are documented in table 20 and indicate the variability of cortisol levels within each shift type. There is very little variability between values normal working (difference of  $0.08\mu\text{g/dL}$ ), on-call called out (difference of  $0.08\mu\text{g/dL}$ ) and rest day (difference of  $0.05\mu\text{g/dL}$ ), but the difference between the lowest ( $0.04\mu\text{g/dL}$ ) and highest ( $0.29\mu\text{g/dL}$ ) values within the on-call not called out group is considerable at  $0.25\mu\text{g/dL}$ .

The participant's cortisol levels across each shift were analysed using a within subjects repeated measures ANOVA with 4 levels. The ANOVA revealed that there was no significant effect of shift type. However, although there was no significant effect of shift there was an effect size of  $r = .36$ , ( $F = 2.23$ ) indicating that there is good evidence that a larger sample size would have found a significant difference between the shifts. (see figure 30).

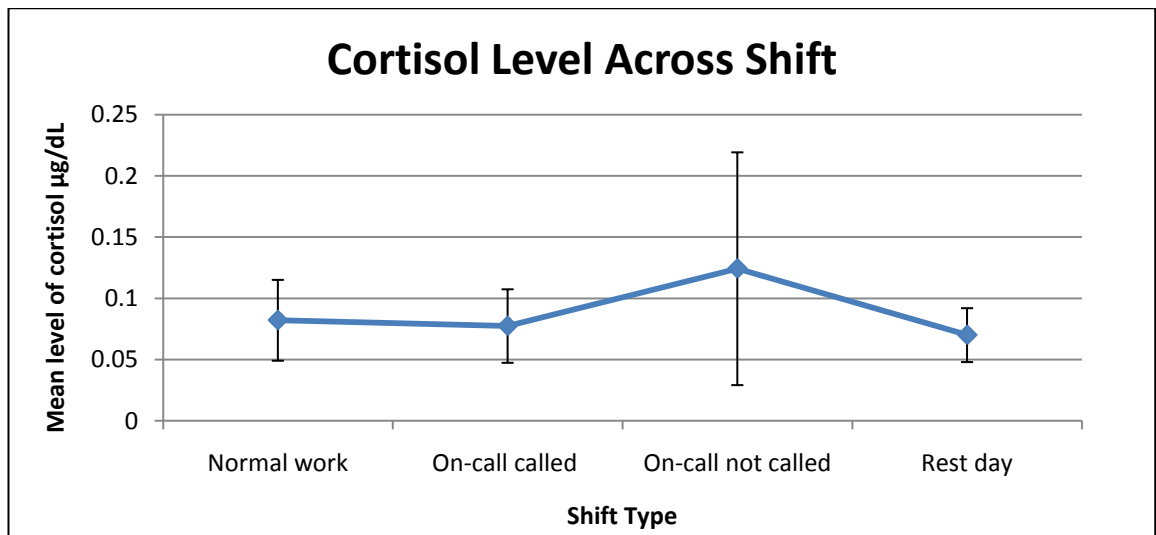


Figure 30. Saliva cortisol levels and standard deviation across shift type.

The results will continue by reporting the analysis of the diary study measures beginning with the state fatigue scale.

### 6.4.3 State Fatigue Scale

The component parts of the State Fatigue scale were analysed using a within subjects repeated measures ANOVA with 4 levels, beginning with the subscale of mental fatigue. As illustrated in figure 34, the highest level of mental fatigue is following the called out shift, and there is very little difference between the normal working and the not called shifts. The lowest level of mental fatigue is the rest day. The ANOVA revealed that the effect of shift type failed to reach significance  $F(3,12) = 2.69, p = 0.09$ . However, again there was an effect size of  $r = .40$  indicating again that there is an impact of shift type on mental fatigue (see figure 31).

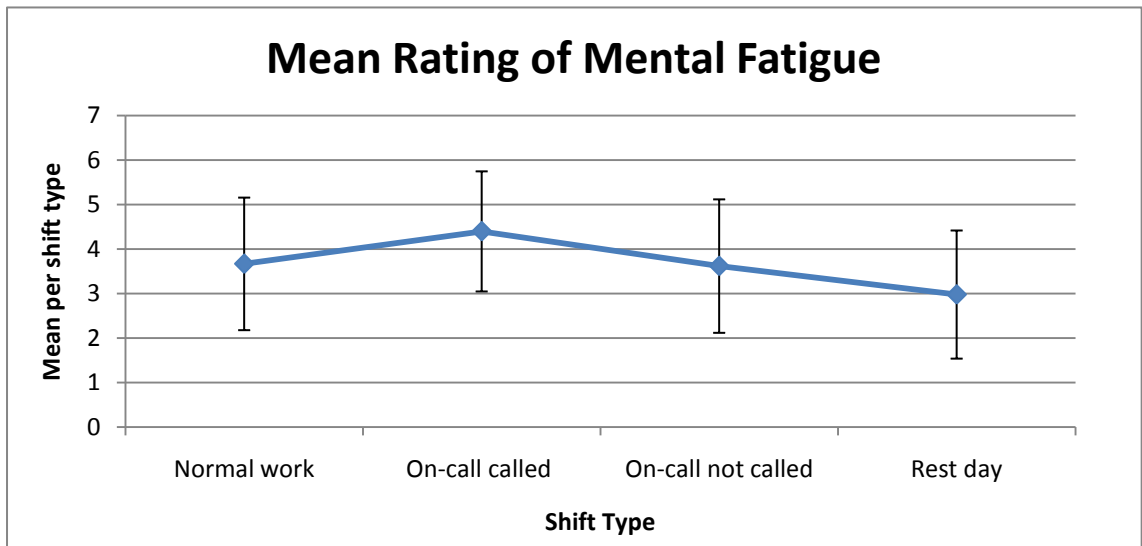


Figure 31. Mean rating of mental fatigue and standard deviation across shift type.

Analysis of the subscale of physical fatigue revealed that there was no significant effect of shift type ( $F(3,12) = 1.32, p > 0.05$ ) on this fatigue measure (See figure 325). Although there was no significant effect of shift type there are clearly differences in shift which can be observed. Interestingly in this measure, on-call not called and rest are both rated the same ( $M 3.8$ ) and induce less physical fatigue than normal work ( $M 3.2$ ) in this participant sample. However, on-call called out has the highest mean rating ( $M 4.4$ ) than all other shift types.

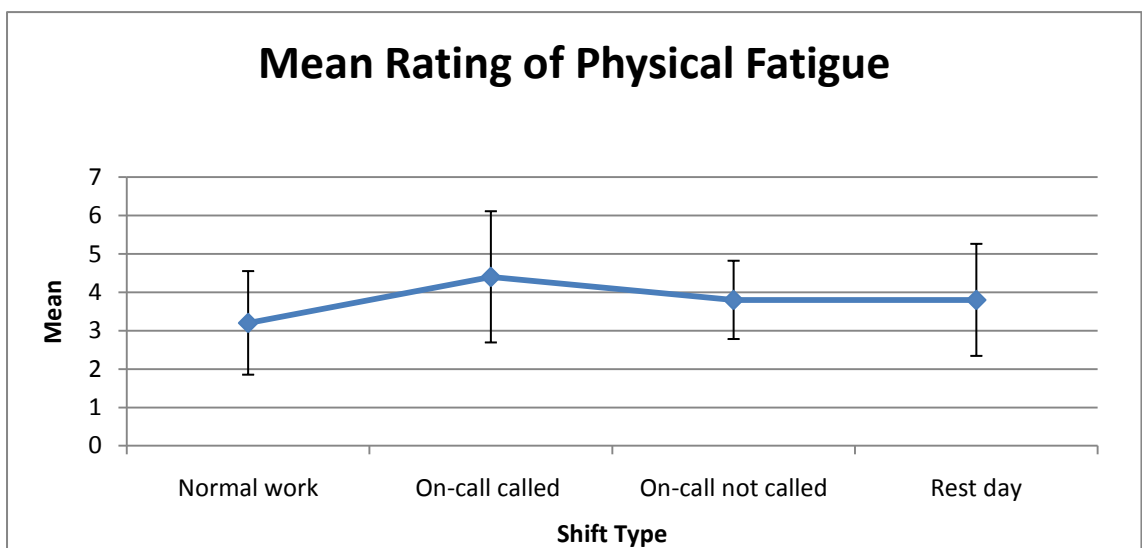


Figure 32. Mean rating of physical fatigue and standard deviation across shift type.



Analysis of the state fatigue scale continued with the subscale of emotional fatigue in which the within subjects design ANOVA revealed (see figure 33) a significant effect of shift type  $F(3,12) = 4.84, p < 0.01, r = .55$ . A Tukey HSD correction revealed significant differences in emotional fatigue between on-call called and on-call not called  $p < 0.05$  with all other shift combinations being not significant.

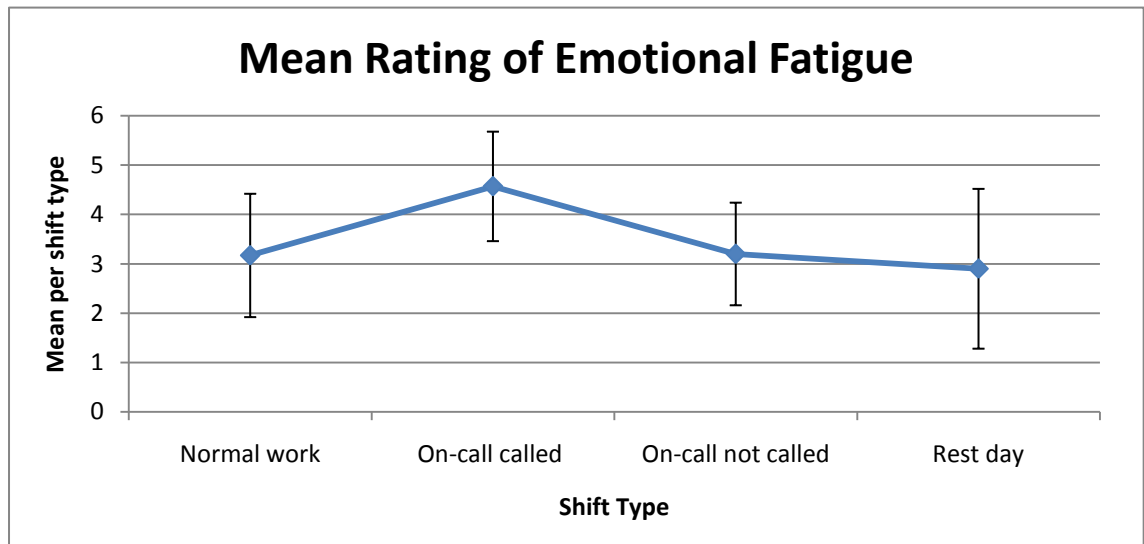


Figure 33. Mean rating of emotional fatigue and standard deviation across shift type.

Analysis of the subscale of sleep related fatigue revealed that there was no significant effect of shift type ( $F(3,12) = 2.37, p > 0.05, r = .37$ ) on this fatigue measure (See figure 34). Although there was no significant effect of shift type there is clearly differences in shift. Interestingly in this measure, on-call called ( $M 5.38$ ) and also (marginally) with on-call not called ( $M 4.1$ ) are both rated higher than normal work ( $M 3.95$ ) and  $3.8$ ) and suggest that greater sleep related fatigue is experienced when on-call shift in this participant sample.

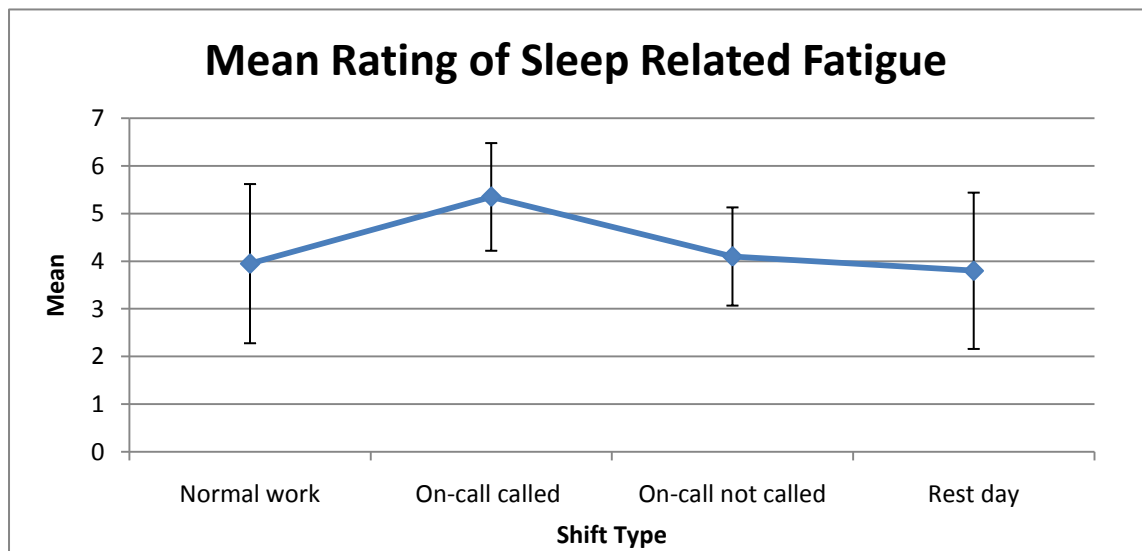


Figure 34. Mean rating of sleep related fatigue and standard deviation across shift type.

The results will continue by reporting the analysis of the mood scale.

#### 6.4.4 Mood Scale

The mood scale was analysed using a within subjects repeated measures ANOVA with 4 levels, with the mood subscale of depression, fatigue and anxiety. Again the results failed to reach significance, but the same reported differences between on-call and not called out and at rest were observed. See table 41.

	Depression		Fatigue		Anxiety	
	Mean	SD	Mean	SD	Mean	SD
Normal work	3.27	0.93	3.87	1.40	3.30	1.23
On-call called	3.83	0.91	5.10	1.56	4.40	0.76
On-call not called	3.17	0.66	4.33	0.91	3.83	0.81
Rest day	3.00	1.31	4.30	1.86	2.90	1.63

Table 41. Mean rating of mood subscales across shift type.

#### 6.4.5 Demands & Opportunities

The demands/opportunities scale was analysed using a within subjects repeated measures ANOVA with 4 levels, with the demands, control and support. Again the

results failed to reach significance, but the same reported differences between on-call and not called out and at rest were observed. See table 42.

	Demands		Personal Control		Personal support	
	Mean	SD	Mean	SD	Mean	SD
Normal work	4.71	1.33	5.47	1.71	5.40	2.49
On-call called	4.91	0.84	5.93	1.04	6.00	1.33
On-call not called	4.11	0.52	5.53	2.08	3.73	1.62
Rest day	4.60	1.12	4.93	2.52	5.20	1.43

Table 42. Mean rating of demands and opportunities across shift type.

### 6.4.6 Happiness Scale

The analysis of the happiness scale scores across each shift were analysed using a within subjects repeated measures ANOVA with 4 levels of shift. The ANOVA revealed that there was no significant effect of shift type. However, although there was no significant effect of shift there was an effect size of  $r = .34$ , ( $F = 2.03$ ) indicating that there is an association between shift type and level of happiness between shifts (see figure 35).

As indicated on figure 3, the mean scores on the happiness scale indicate that on-call called out ( $M 46.6$ ) has the lowest happiness rating, followed by on-call not called ( $M 51.6$ ). There is very little difference between the happiness scores whilst normal working ( $M 52.4$ ) and at rest ( $M 53.2$ ). However, it must be noted that overall there is very little difference between all scores on the happiness scale (range  $M 46.6$  through to  $M 53.2$ ).

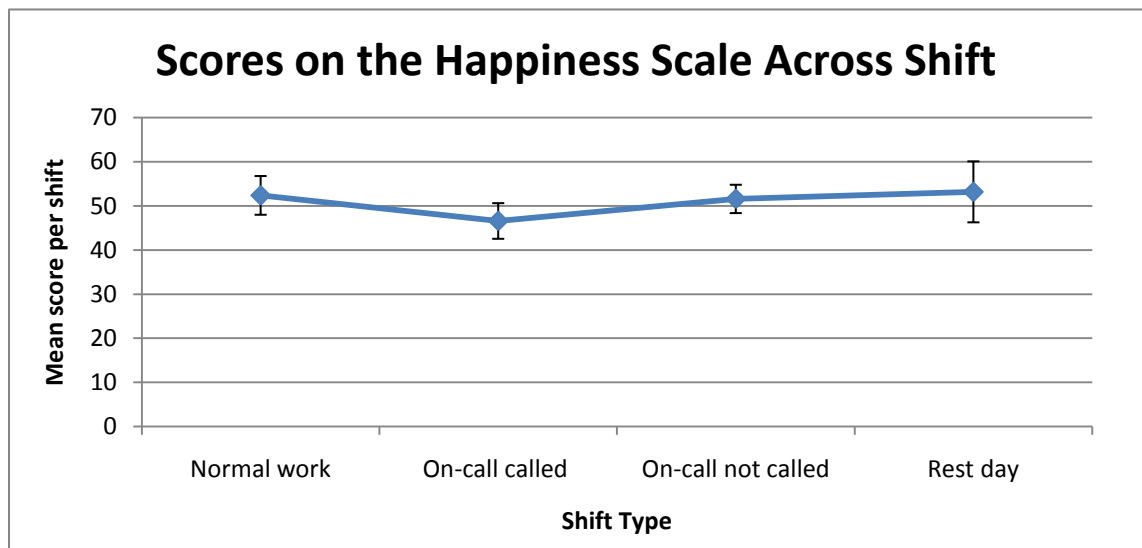


Figure 35. Happiness score and standard deviation across shift type.

The results will now document the findings of number of hours sleep the participant's have had in the preceding 24 hours prior to the shift in which the measures were taken.

#### 6.4.7 Number of Hours Sleep and Quality of Sleep

Analysis of the number of hours sleep revealed that there was no significant effect of shift type ( $F(3,12) = 0.77, p > 0.05$ ) on this fatigue measure (See figure 36). Although there was no significant effect of shift type, small differences in shift can be observed. Interestingly in this measure there is very little difference in sleep between on-call not called ( $M 7.2$ ) and rest ( $M 7.57$ ) suggesting there is very little difference in length of sleep between on-call not called and rest in this participant sample. However, on-call called out has the lowest mean rating of length of sleep ( $M 6.2$ ) than all other shift types.

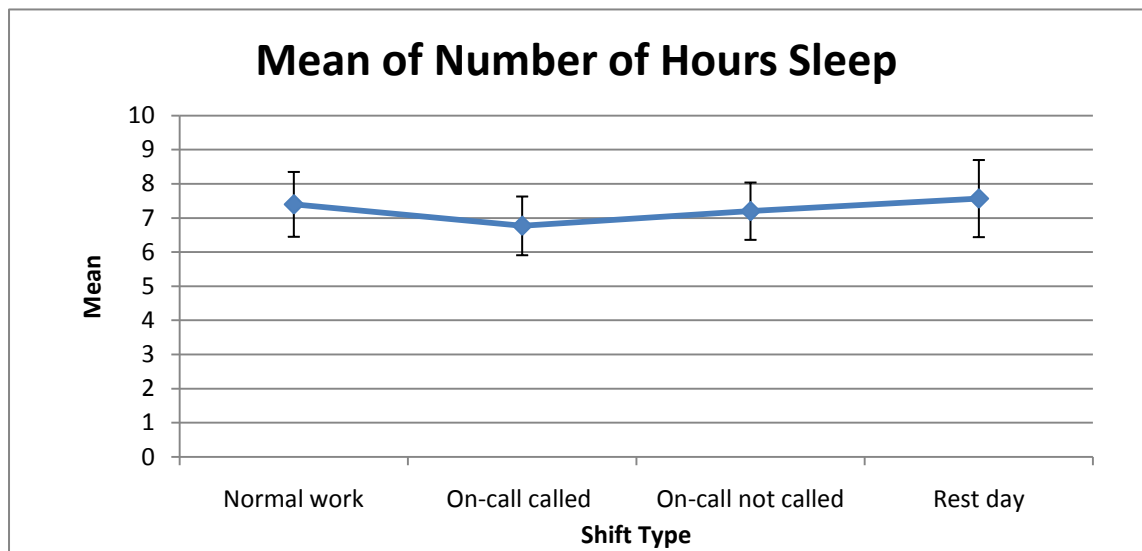


Figure 36. Mean rating of number of hours sleep across shift type.

Analysis of quality of sleep (1= very poor, 9= very good) revealed that there was no significant effect of shift type ( $F(3,12) = 0.77, p > 0.05$ ) on this fatigue measure (See figure 40). Although there was no significant effect of shift type clearly differences in shift can be observed. Interestingly in this measure on-call called ( $M 5.2$ ) and on-call not called ( $M 5.93$ ) are rated as lower in quality than normal work ( $M 6.27$ ) and rest ( $M 6$ ). Furthermore, rest ( $M 6$ ) is rated poorer than normal work ( $M 6.27$ ) in this participant sample.

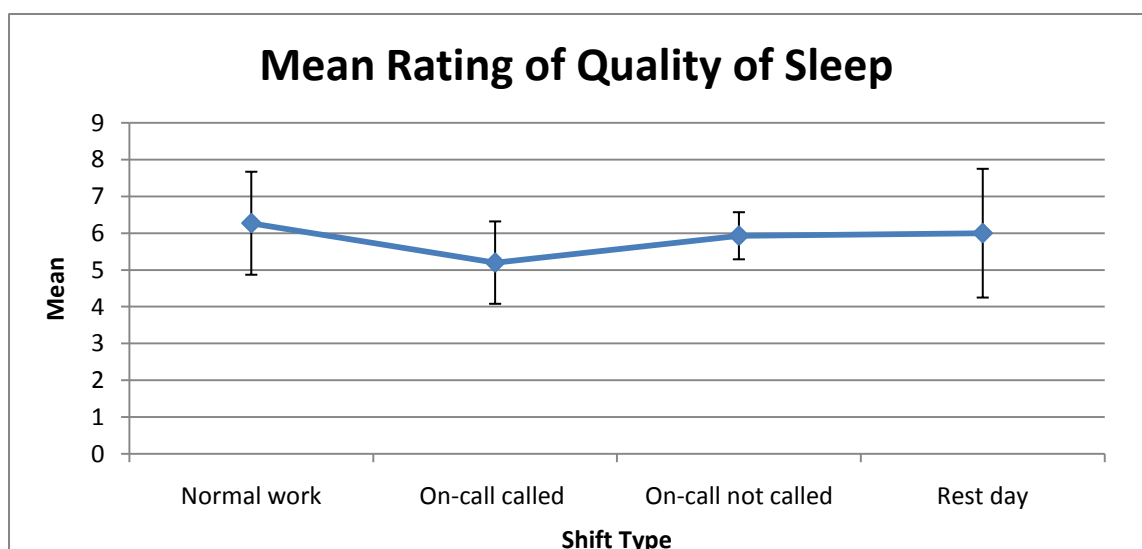


Figure 37. Mean rating of number of hours sleep across shift type.

## **6.5 Discussion**

### **6.5.1 Saliva Cortisol and Shift**

The results of the cortisol analysis revealed that the difference between the levels of cortisol within each shift failed to reach significance. However, this may be due to the relatively small sample size. Nevertheless, there was a moderate effect size indicating that there is a difference between the cortisol levels following the different shifts. However, differences in levels of cortisol between shift types indicate that the participant's do show a greater saliva cortisol 'spike' when on-call not called out than on any other shift type. This result would suggest that the anticipation for work is more stress inducing than actually being at work or on-call, as previous research indicates regarding waiting intention (Heise et al, 1997). These results contravene the European Working Time Directive, (EWTD), (2004) that states time spent on-call and not called out is counted as rest, clearly it is not the same as rest.

Therefore, as much of the research into working hours has concluded, psychological distress is common among employees with high strain jobs, which as this thesis attests on-call working must be included, (e.g. Stansfeld, Fuhrer, Head, Ferrie & Shipley, 1997; Stansfeld, Fuhrer, Shipley & Marmot, 1999; Paterniti, Niedhammer, Lang & Consoli, 2002; Ferrie et al., 2006). Furthermore, as work induced fatigue is primarily experienced after the working day has ended, it is only considered a problem if insufficient recovery time is offered between two periods of work (Brown, 1994). As such, on-call working is one particular instance of insufficient time off between work periods, as the on-call worker is expected to carry out further duties on a call out basis. Therefore, on-call workers are often not afforded sufficient recovery between working periods and subsequently report higher levels of stress when on-call compared to a night off (French, McKinley & Hastings, 2001).

Conversely, as we have observed in this study, the differences in cortisol levels across shift type indicate on-call not called out shift type is the most ‘stress inducing’ shift type, even though the levels of cortisol are within the normal range. This too therefore cannot be considered a period in which recovery from the working week can take place.

### **6.5.2 State Fatigue Scale**

With regards to the subjective measure of mental fatigue, the analysis indicated that there was no significant effect of shift. This could of course be attributable to the small sample size. Nevertheless, there was a moderate effect size indicating that there is an association between mental fatigue and shift type. Furthermore, the observed pattern is the same as that observed in the diary study, in that the shift type of on-call called out gives rise to a higher subjective mental fatigue response than any of the other shift types.

Indeed, where there is a continuous depletion of resources, as there frequently is during on-call periods, it is argued that this may lead to the negative load effects of fatigue, and in the absence of recovery, to exhaustion, loss of function, and physical and mental impairment (Sonnentag & Zijlstra, 2006). As on-call workers are predominantly not afforded sufficient recovery between working periods they subsequently, in turn, report higher levels of stress when on-call compared to when on a night off (French et al., 2001).

However, as reported in the diary study, the shift type of on-call not called out was reported as inducing the same mental fatigue as normal working. Although this result did not reach significance it is worth noting that both groups report on-call not called out is not the same as true rest. Clearly, as research suggests, waiting intention or anticipation of work is having an effect on their ability to feel truly at rest (Heise et al.,

1997). Again this must be considered a key issue for on-call workers especially in light of the results of the cortisol analysis.

The results of the subscale of emotional fatigue indicate a significant effect of shift type, with the highest reported emotional fatigue on on-call called shift type. Moreover, again both occupations report greater physical fatigue when on-call not called than when at rest, which suggests greater emotional fatigue is experienced when waiting to be called than when at rest. It is not surprising that such differences in on-call not called and rest are observed, as emotional fatigue or 'burnout' apply to the wearying effect of working under trying conditions; essentially, performing psychologically disagreeable tasks (Stokes & Kite, 2003). Hence, waiting to be called is disagreeable to what is supposed to be a rest day in which restitution is regarded as taking place, but where the actual psychological state is pre-engaged in readiness for work.

The rest of the subscales of physical fatigue, boredom, and negative affect within the state fatigue scale failed to reach significance. Therefore the discussion will now continue by examining the results of the mood scale.

### **6.5.3 Mood Scale**

While the results of the mood scale also failed to reach significance, the difference in mood between on-call not called out and rest clearly indicate that being on-call and waiting for the phone/pager to ring is not the same as true rest. Indeed, research has highlighted that sleep, mood and social satisfaction had a tendency to be worse on the first rest day following work shifts as compared with subsequent rest days (Totterdell et al., 1995). This research suggests that, for the measures of sleep, mood and social satisfaction, recovery from the previous shift was still absent by the end of the first rest day. As on-call periods often occur at the weekend, during rest periods it is not surprising that disturbances in mood have been reported in this study.



#### **6.5.4 Demands & Opportunities**

The results of demands and opportunities again failed to reach significance but the same effects of on-call not called and rest day were observed, with notable differences in work demands, personal control and personal support between the shift type of on-call called and all other shift types. As job characteristics impact on the individual's need for recovery it is not surprising that differences between on-call not called and rest are present, which are largely in relation to role ambiguity and situational constraints (Sonnentag & Zijlstra, 2006). The conflict between waiting to be called and supposed rest must be considered at odds with one another as home life may be interrupted, especially when the on-call worker has to switch roles and adopt their professional persona at anytime during an on-call period (Nicol & Boterill, 2004).

#### **6.5.5 Happiness Scale**

Although the results of the happiness scale again failed to reach significance a moderate effect size was observed, which can again be attributable to the small sample size. Nevertheless, the differences in happiness scores across the shift types indicate that the participants report lower levels of happiness when on-call called out than the other three shift types. As before, on-call not called out does not have the same happiness rating as rest day with lower levels of happiness being reported when on-call not called. However, there is very little variation between the happiness scores overall. The implications of which may be that the participants in this sample do not generally enjoy their job or aspects of their job, which spills over into their general job satisfaction. Research suggests that work satisfaction and perceptions of work demands and physical effort have also been linked to sleep quality, physical symptoms, fatigue and experience of stress in shift workers (Akerstedt et al., 2002), which bearing in mind the results of this study may indicate a degree of job dissatisfaction. As the survey study indicated

many of the fire officers would opt out of on-call working if it were an option, it may be that on-call working is an aspect of the fire officers job that they are dissatisfied with.

### **6.5.6 Number of Hours Sleep and Quality of Sleep**

The descriptive statistics regarding the number of hours sleep and quality of sleep revealed less sleep and sleep of poorer quality when on-call called and on-call not called than normal work and rest. It is intuitive that the participants would report less sleep when on-call called out as frequent calls would lead to less sleep. Although this results is not significant is however in line with the findings of previous research in which marine machine officers who were on-call but not called out showed a significant reduction in length and efficiency of sleep (Akerstedt et al., 2007).

Moreover, it should also be noted that when on-call workers are on-call and not called out the difference between number of hours sleep than when on rest day are clearly not the same, contrary to the EWTD. This result is in line with previous research which examined sleep in shift workers. Essentially, researchers found no improvements in sleep behaviour during the shift worker's rest days, which was attributed to the rostering of on-call working periods being included in their rest days (Rosa, Colligan & Lewis, 1989). As this thesis attests, most of the participants reported that they carry out on-call shifts during the weekends i.e. during their rest periods. Therefore the confounding effects that this has on such individuals were unlikely to be restorative and consequently could not be considered the same as true rest (Williamson, Gower & Clark 1994).

Furthermore, there is increasing evidence that neurobiological factors play a part in the regulation of sleep and wakefulness. Many recent research studies have confirmed this theory using both subjective and objective measures (e.g. Lammers-van der Holst, Van Dongen & Kerkhof, 2006; Van Dongen, 2006; Santhi, Horowitz, Duffy

& Czeisler, 2007; Smith, Cullnan & Eastman, 2008). With this in mind it is not surprising that increased sleepiness and high levels of fatigue are a regular occurrence in many shift-work settings (Jay, Dawson, Ferguson & Lamond, 2008) and as this research indicates for on-call workers too.

## **6.6. Study Strengths, Limitations and Conclusive Summary**

Firstly, prior to discussing the implications of this study it must be noted that the lack of significance in many of the measures is undoubtedly due to the small sample size and must therefore be considered a limitation of the study. Similarly, the fact that there is a moderate effect size in the cortisol levels, mental fatigue, emotional fatigue and happiness scores further substantiates that the lack of significance is probably due to insufficient sample size. Possibly, the results of this study may have been strengthened if the 6<sup>th</sup> participant had been able to take part in the study. However, the fact that this participant was taken ill with stress and anxiety may have some relevance in light of the theme of this thesis.

Moreover, having spent quite some time with all of the participants in this study, more than in any of the other studies in this thesis, it was interesting to find out just how many had had bouts of sickness absence due to anxiety and depression (four out of the initial six). However, this is a further limitation/bias in the study as a higher proportion have had health issues around anxiety/depression. Whether this is a result of on-call working or due to other factors can only be answered by further research. In future cortisol research studies a pre-screening questionnaire could be administered to establish existing/previous health issues of this nature. However, research suggests that the accumulative effects of the lack of recovery may result in long-term sickness absence (Sluiter et al., 1999) and this is certainly the case in on-call working. Nevertheless, other factors must also be considered as possible reasons for lack of

significance. The reasoning behind initially choosing 6 participants to take part in the research was also one of cost, as funding for research projects such as this bears considerable costs. These costs not only involve money but also time, as many organisations were not receptive to such measures being carried out in 'working time', however fortunately the fire service, in this instance, saw merit in this research. Similarly, as recorded in the diary study, finding an organisation willing to take part in research involving biological measures was difficult. Again the fire service recognised that the results of this study may be of benefit to their organisation.

However, the over-riding issue is that on-call working is a cause for concern in such workers. This has been highlighted by this study. The fact that both the levels of cortisol and the subjective reporting of levels of fatigue indicate that there is some degree of stress experienced by on-call workers is an important finding. Moreover, associations have been reported between work stresses, fatigue and sleep disturbances (Thorsteinsson & Brown, 2009) which in themselves may be a contributing factor towards the negative outcomes of the stress response. As this study highlights, all of these effects are present, to some degree or another, in the psychophysiological data collected by the participants who took part in the study. Furthermore, the levels of happiness experienced by the participants across shift type further substantiates the negative impact of working on-call irrespective of being called out or waiting to be called.

## **Chapter 7 General Discussion**

### **7.1 Summary**

This chapter aims to provide an overview of the findings from the studies carried out to investigate on-call work scheduling. It begins by providing an overview of on-call, highlighting the issues that surround this relatively new form of work scheduling. It then continues by summarising the key points and findings from each of the research studies, including the implications of this research. Finally, it will discuss the implications of this thesis for future research endeavours.

### **7.2 Introduction**

As chapter one of this thesis attests, on-call working is now a widely used practice (Nicol & Botterill, 2004). This is further supported by the results of studies one and two in which many of the participants, across all of the occupations have worked on-call for quite some time. This is arguably due to its status as a cheaper option to shift-work. Furthermore, its prevalence is an effect of the evolving nature of employment in the UK, from a factory based economy to that of one based on services and the need for 24 hour 7 day a week operations. Essentially, little is known, or indeed understood about this relatively new form of work scheduling, which takes many different forms. The common theme however is that workers who have to undertake such duties must be ready to respond when called upon.

However, the aim of this thesis was to address a number of issues relating to on-call work scheduling. It was designed to explore the complexity and diversity of on-call working, both within and across occupations and provide insights into the varying aspects of on-call work schedules and work patterns. It assessed the differences between occupations and on-call schedules and examined the outcomes across occupations using a multi-method approach. In addition, it examined the moderating factors of specific

aspects of personality on such outcomes. A summary of the findings of each research study will now be discussed.

### **7.3 Study 1 – The Interviews**

The findings of study one indicate that there are several key adverse outcomes of on-call work, each will be discussed, but in no specific order as they have all been deemed critical in determining stress outcomes. Firstly, on-call working has, by its sheer nature, elements of a lack of job control due to the unpredictability of the on-call shift, i.e. will they, won't they be called? The interviews highlighted that this is then further compounded by lack of consultation and input into the formation of on-call work rotas. In addition, within medical health professions, on-call working is a core component of their work schedule; in essence they are contractually obligated to work on-call shifts. Therefore, this suggests that there may be a degree of lack of job control on a number of levels, and as research attests (e.g. Karasek, 1979) having a degree of autonomy in deciding one's working strategy, and control over aspects of the job itself are critical in determining outcomes such as stress and or strain.

Secondly, within the existing previous research, (e.g. Torsvall & Akerstedt, 1988) it has been established that, in line with other forms of shift and night work, sleep and the quality of sleep were compromised. The findings of the interviews support this research and further indicate that, with on-call shifts, the deficits in sleep and issues of quality of sleep are further disrupted: Following a call out, when the on-call worker returns home, they find it difficult to get back to sleep due to ruminating or churning over the events that have just taken place. Therefore, as sleep loss and reduced sleep quality are considered stressors, and on-call workers sleep is further impeded by ruminating over the events that occurred during the call out, it is possible that such workers experience a significant amount of stress when on-call.

Finally, the most frequently reported negative effect of on-call working was the impact that it has on life outside of work. These effects are numerous but the key issues are its impact on familial and social interactions. The findings of the interview study indicate that home life is often interrupted and social lives are put aside as outside activities are limited during the on-call work period. Again not only the un-predictive nature of the on-call schedule but also the interruption of home life may also generate a great deal of stress. Essentially, research indicates that on-call workers must plan their lives around their on-call schedule (Nichol & Botterill, 2004). As one account highlighted, the extent to which on-call impedes on family life culminated in one participant taking two young children into work in the middle of the night.

Hence, the negative impact of lack of job control, sleep loss and the curtailment of familial and social interactions suggests that, as in other forms of shift working, on-call working may be considered a stress inducing form of work scheduling. The findings of study two will now be discussed.

### **7.3 Study 2 – The Survey**

The findings of study 2 indicate that on-call has been a feature within the studied occupations for over ten years. This highlights the extent to which on-call working exists within not only medical professionals as study 1 attests, but also across a range of occupations and is a key feature of their work patterns.

In addition, this study shows that many carry out work during call outs that is different to their normal daily work, which again indicates an additional stressor of working beyond their comfort zone. When this is combined with the unpredictability of the on-call shift, i.e. will they, won't they be called, and a lack of input into on-call work scheduling, this further compounds the lack of job control. Moreover, as noted earlier, control over aspects of the job are critical in determining stress outcomes. It

therefore follows that, in all probability, the individuals who took part in this study experience some degree of stress.

Furthermore, this study shows that, as with study 1, the requirement to perform on-call shifts following completion of their normal working day is a key feature within all of these occupations. It has been argued that working long hours acts both directly as a stressor, by increasing the demands on an individual when attempting to maintain performance levels, and indirectly, by increasing time spent in the workplace in which the worker is exposed to further sources of workplace stress (Spurgeon et al., 1997). Hence, again there are indications that on-call working may be a stress-inducing form of work scheduling.

Similarly, this study highlights that covering on-call periods during the weekend is a feature within these occupations on-call work schedule. As many individuals in this study reported that they are often called more than once in a given on-call period it follows that there will be some degree of work related fatigue experienced when working an on-call shift. Subsequently, as work induced fatigue is primarily experienced after the working day has ended, research indicates it is only considered a problem if insufficient recovery time is offered between two periods of work (Brown, 1994). As such, on-call working may frequently be considered one such instance of insufficient time off between work periods (although this is dependent on the exact nature of the individual working schedule). Hence, it follows that on-call workers are often not afforded sufficient recovery between working periods and, as research attests, will subsequently report higher levels of stress when on-call compared to a night off (French, McKinley & Hastings, 2001).

Hence, it is not surprising that many on-call workers report worrying about the decisions they make when working on-call. As study 1 highlighted, rumination or



churning over events that have just occurred following a call out is often experienced, which in turn impacts on sleep and thus increases experienced levels of fatigue, all of which further compound the stress response. Understandably, as many of the individuals in this study report, in an ideal world they would like to give up on-call.

In summary, the lack of job autonomy, long working hours, fatiguing aspects of on-call working, and insufficient time off between working periods are all implicated as stress inducing experiences when working on-call shifts. Hence, as this thesis has shown, there is arguably a cause for concern for the health and well-being of on-call workers.

#### **7.4 Study 3 – The Diary Study**

The findings of study 3 indicate there are significant differences between normal working, on-call called, on-call not called and rest in many of the diary study measures. It shows that on the measures of fatigue not only being on-call called out induces higher subjective fatigue, but interestingly on-call not called out, which is designated as rest in the European Working Time Directive (2004). On-call not called was found to elicit the same and sometimes higher subjective fatigue as normal work. This clearly indicates that there is a degree of stress/distress occurring, not only when on-call called out but also when on-call not called out, contrary to the European working time ruling. Hence, on-call working must be considered a factor in relation to job strain. Furthermore, as much of the research into working hours has concluded, psychological distress is common among employees with high strain jobs (e.g. Stansfeld, Fuhrer, Head, Ferrie & Shipley, 1997; Stansfeld, Fuhrer, Shipley & Marmot, 1999; Paterniti, Niedhammer, Lang & Consoli, 2002; Ferrie et al., 2006).

Moreover, aspects of the individual may also contribute to negative psychological outcomes as both this study and the survey study indicate. For example, individuals

high in trait anxiety have been shown to have a bigger difference in their subjective experiences of aspects of fatigue between on-call not called and rest. Similarly, coping styles have also been highlighted in this study and the survey study as indices of proactive and reactive coping styles. For example individuals high on the COPE subscale of seeking instrumental social support will experience less negative outcomes between the shifts of on-call not called out and rest than those who are low on this coping style. However, those high on the COPE subscale of seeking emotional social support and humour, will have the opposite effect, in that these coping styles will induce greater differences between the shifts of on-call not called and rest. Thereby increasing the likelihood of negative outcomes.

Therefore, the negative outcomes of on-call working are not only attributable to the on-call schedule, but also aspects of the individual may also contribute to the likelihood that such outcomes may occur.

### **7.5 Study 4 – The Psychophysiological Study**

Finally, the findings of study 4 cortisol levels across shift indicate that being on-call and not called out is the most stress provoking shift type. However, the subjective reports regarding fatigue, mood, demands and opportunities and happiness levels all point to being on-call and called out as having the greatest negative impact. Of further key importance was the finding that, on-call not called out was rated as being different to at rest in that it was reported as eliciting very similar effects the participants normal work.

The results of this study indicate that The European Working Time Directive (2004) ruling for being on-call and not called is incorrect as this is clearly not the same as being at rest. Although, taking into account the very small sample size, these findings should be considered as preliminary and tentative.

However, the fact that one participant in the final study had to withdraw due to ill health retirement is possibly a further indication of the negative impact on-call working has on health. Indeed, as research indicates, stress, mental health and well-being have been implicated as a source of absenteeism and work disability in shift working populations (De Raeve, Kant, Jansen, Vasse & van den Brandt, 2009). Therefore, it seems plausible that such indices of ill-health may be found in on-call workers as on-call working is, in essence, just another form of shift working.

## **7.6 Implications for Future Research**

The programme of research carried out in this thesis indicates that on-call working is detrimental to the health and well-being of individuals who have on-call work schedules as part of their working conditions. It has highlighted that the negative impact of lack of job autonomy, sleep loss and the curtailment of familial and social interactions indicate on-call working must be considered a stress inducing form of work scheduling. Add to this long working hours, the fatiguing aspects of on-call working, and insufficient time off between working periods all of which increase the likelihood of stress outcomes. Hence, there is arguably a cause for concern for the health and well-being of on-call workers. With this in mind, further research investigating these outcomes must continue in order to establish the extent to which individuals are affected by working on-call shifts. This is especially significant when we consider that one participant in the final study had to withdraw due to ill health retirement, and is possibly a further indication of the negative impact on-call working has on health.

However, the negative outcomes of on-call working are not only attributable to the on-call schedule, but also aspects of the individual may also contribute to the likelihood that such outcomes may occur. Therefore, continuing to explore the individual differences between on-call workers in relation to for example other coping

styles may offer further insights into those for whom on-call working may not be as damaging to health and well-being.

The results of this study indicate that The European Working Time Directive (2004) ruling for being on-call and not called may be incorrect as this thesis has shown that it is clearly not the same as being at rest. Therefore, continuing to examine psychophysiological responses in an on-call setting may be of some benefit in firmly establishing these initial findings.

Similarly, as this thesis has established, aspects of the individual may also contribute to the negative impact on well-being of on-call work schedules. Therefore further exploration of individual differences such as personality, gender and age in on-call workers may be beneficial in gaining a greater understanding of the extent to which personality may provide a buffer effect with regard to gender and age, or indeed, increases susceptibility to deficits in well-being.

Moreover, the recent increase in retirement age may have further implications for the on-call worker as this thesis has shown that opt out of on-call working is not an option for many on-call workers. Particularly in light of the findings of study one in which it emerged that the participants found it more difficult to get back to sleep following a call out as they got older. This may increase the likelihood that they will experience the negative effects of on-call working. Therefore, gaining an understanding of the implications of age in on-call workers in relation to sleep, fatigue, health and well-being may be of benefit.

The results of this thesis and through further research it may be possible to firmly establish the possible negative effects of on-call work schedules. This may be of benefit to organisations in relation to the organisation of on-call work schedules. Similarly, further research into the effects on-call working may be of assistance in

offering help and support via counselling/complimentary therapeutic interventions to those who have on-call aspects to their contract of employment. In addition continuing to examine personality moderators may offer insights into those for whom on-call working may not be as detrimental. This would be of huge benefit to organisation in the recruitment and selection of not only on-call workers but also shift/night workers.

Furthermore, the implications of this research for organisations, Government and EU legislation, with regard to being on-call and not called out, indicate that the current operations and rulings are incorrect in their assumption that such workers are effectively at rest, as on-call workers heightened psychological arousal and inability to detach from work during such work schedules is clearly observable in the studies within this thesis. Hence by providing some form of compensatory rest scheme, and by conducting a review of current legislation must be considered of great importance and benefit to on-call workers health and well-being both during on-call called, and especially when not called, we working periods.

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## Appendix 1 On-call interview questions

1. Can you tell me briefly about your job... what you do?
2. Tell me about the organisation of your on-call rotas.  
(prompts)
  - Frequency
  - Likelihood – ever more than once
  - Length of normal period of on-call
  - Typical length of call out
  - Organisation of pay (part of salary/extra payments)
3. Have you, at anytime being consulted regarding on-call organisation or structure?
4. When called out is the situation you are possibly facing the same as your normal daily work or different, and if it is different how is it different?
5. Do you feel you have the appropriate support to cope with the demands of this difference? (NB question may or may not be used depending on the previous answer).
6. In an on-call situation how is relevant information communicated to you, and is this the same as your normal working practices or is it different?
7. Is there anything that helps you cope with being on-call?
8. What for you is the most stressful aspect of on-call working?
9. What is the most positive aspect of on-call working?
10. Are there any aspects of on-call working that you thought you would find difficult but haven't?
11. Do you think having on-call aspects to your job has any impact on your broader life outside of work? (Offer prompts if needed – family, friends, health, outside interests).
12. If you think of the people you know who do on-call – if you can think of one person who copes very well and one person who does not – what are the main differences between them?
13. Now I want you to think about a fantasy person – imagine you could create a person who would cope really well with being on-call (the perfect on-call worker)
  - Describe them (including relevant aspects of their lifestyle/personality-use as prompts).
  - Are they a specific age/gender/personality or have a particular set of life circumstances? (Offered as prompts in needed)

14. Now the flip side of that – imagine a person who would not cope well, again a fantasy person.
  - Describe them: including relevant aspects of their lifestyle/personality that you think may be relevant.
  - Are they a specific age/gender/personality or have a particular set of life circumstances? (Offered as prompts if needed).
15. What is your general level of satisfaction with on-call working?
16. If you were organising on-call working in your department, what would you do differently?
17. Bearing in mind everything we have said, what do you think are the three most important aspects for successful on-call working?
18. If you were me conducting these interviews is there anything you would ask or include that I haven't?

## Appendix 2 Study 1 Part 1 Table of Themes

<b>How on-call works in this sample of participants</b>	
• Work 1 night per week and 1 weekend on-call	
• Work 1 full week of on-calls	Work intensity, hellish
• Go home after normal day's work and wait for call	
• Stay in the hospital waiting to be bleeped	
• Often called more than once during on-call session/work same as normal working	But more at worrying end of spectrum
• Payment is part of salary	Irrespective of how many hours – not worth the aggravation
• Paid time and a half when called out	From leaving to arriving back home
• Consulted regarding on-call	Peter does the paediatric rota Anita involved Evlyn no options Eliza and Jill part of contract
<b>Restrictiveness of on-call</b>	
• Totally available/Always available	Enormity
• Ruin dinner parties – therefore don't accept	Spoiling, pervasive
• Significant proportion of lives	Constraining
• Cant do anything/go out for drink/meal	Restrictive
• Everything revolves around on-call	Central in lives
• Affects family life	Pervasive
• Works night out	Restrictiveness
<b>Coping</b>	
• Buck ends with me	Acceptance
• Quality of doctor on scene	Trust
• Training done here	Belief systems, invincible
• Seniority of doctors	Trust
• Support from husband	Social support
• Support from friends	Social support
• Team work	Relying on others
• Psychological build up	Positive thinking
• Before on-call starts	Apprehension
• SHO/Registrar on hand	Can rely on others, support
• No mechanisms in place	Officially
• Self referral	Acceptance of limits, self understanding
• More experience	Understanding of what's expected
• Have on-call criteria	Tangible things

<b>Outcomes of on-call</b>	
• Worry about getting back to sleep	Fatigue
• Worry about junior doctors	Stresses
• Churning things through	Ruminating
• Relationship breakdowns	Stresses, problem solving, smoothing things over
• Light/noise disturbances	Stresses
• Age as a factor	Stresses
• Work the next day	Fatigue, stress
• Children to sort out/children & wife are woken	Tired, stressed, sleeplessness
• Going tired	Fatigue
• Hectic night on-call (bleep going off a lot)	Prioritising, observations, time management
• Difficult decisions/situations	Stressful/strain
• Most stressful when 1 <sup>st</sup> started	Bewildering, daunting, stressful
<b>Happy with on-call Schedule/what would you do differently</b>	
• Happy with it, aspects trying, within the constraints satisfied	Shared responsibility, satisfying, frustrating aspects,
• Teamwork, have to get on with it	Support, shared responsibility
• Offer an opt out or extra incentives	Fairness, monetary rewards
• New to on-call/cardiac arrest bleep scary prospect	Bewildering, worrying
• Management issues	Responsibility
• Offer more than nurses and doctors, ownership, reassurance, control	Satisfaction
<b>Most important aspects of on-call working</b>	
• Keeping things in perspective, having means of unloading, inter-team/patient relationships	
• Mutual team support, amicable and pleasant, maintain confidence (people skills)	
• Time management (prioritising), getting something to eat and drink, having a set routine	
• Reliable, managing problems, management skills	
• Prepared, well rested, confident	

### Appendix 3 Study 1 Part 2 Master Table of Themes for the group

	Anita	Evlyn	Eliza	Peter	Jill
<b>1. Personal conflict and concerns of on-call</b>	<b>Line number</b>				
Significant proportion of time	58, 59, 92, 96	24	181	14	-
Sacrifice	96	135	182	230	619
Restrictive	166, 251	97, 134	188	55, 193	297, 506
Physically taking a hit/psychological build up/likened to hell	35, 227	127, 131	151	102	-
Worry and difficulty switching off/detach	301, 261,	134, 173	241	308, 150, 17, 179	61
Fatigue	177, 183, 193, 230, 242	19, 154	150	233	-
<b>2. Shared Responsibility</b>					
Shared	7, 15	8, 11, 14	9, 67, 71	49, 53, 115	10, 100
Own	14, 69	16, 17	14, 92, 127	3, 7, 11, 27,	5, 28
<b>3. Support</b>					
Support/Teamwork	120	113	114, 120	75, 275	408
<b>4. Acceptance of the need for on-call</b>					
Fete a comply, commitment contractual	117, 121	53, 61	83	45, 47	269, 618
Medical need/urgency	147	88	159, 160	24, 67	215
<b>5. Achievements, pluses of on-call</b>					
Good outcomes	207	304	164	167, 170	576
Calming influence	217	301	198	264	562

## Appendix 4 Study 2 Survey Booklet

### The On-call Questionnaire

The following list of questions relates to you and your circumstances. These questions will provide us with an understanding of your on-call work, and how it impacts upon you.

Please read each question carefully and circle the response which is most suitable

<b>First please state your profession</b>	
<b>Gender</b> Male      Female	
<b>Age</b> Under 20      21-30      31-39      41-50      51-60      Over 60	
<b>Status</b> Single      Married/Cohabiting      Divorced      Other	
<b>I have</b>	No children Young children living at home Older children living at home Older children living away
<b>Do you have any other caring responsibilities (e.g. elderly relative)?</b>	Yes No
<b>How long have you worked on-call?</b>	0-1 year 1-2 years 3-5 years 5-10 years 10+ years
<b>In relation to your normal work, is the work you do 'on-call' ...</b>	The same Similar Slightly different Very different
<b>Do you cover an on-call shift after completing a normal day's work?</b>	Yes No
<b>If the answer above is yes, how frequently does this happen?</b>	Occasionally (once per month). Quite often (about once per fortnight). Regularly (about once per week). Very frequently (more than once per week).
<b>Do you work weekends on-call?</b>	Yes No
<b>Which of the following best describes your feelings towards your on-call work</b>	I really enjoy it I can live with it I really don't like it
<b>Overall how well do you feel you cope with the mental demands (e.g. Memory, problem solving, concentration) of your on-call?</b>	1 Not at all well 2 A little 3 Somewhat 4 Fairly well 5 Very well
<b>Overall how well do you feel you cope with the physical demands of your on-call?</b>	1 Not at all well 2 A little 3 Somewhat 4 Fairly well



	5 Very well
<b>In an “ideal world” would you <i>like</i> to give up on-call working?</b>	Yes No
<b>Within your department, is opting out of on-call an available option?</b>	Yes No
<b>If yes, is opting out of on-call a socially acceptable option in your department/organisation?</b>	Yes No N/A
<b>To what extent do you feel your on-call work affects your life outside of work....</b>	
<b>a) with regards to your family?</b>	Very negatively A little It has no impact It has a positive impact N/A
<b>b) with regards to your social life?</b>	Very negatively A little It has no impact It has a positive impact
<b>c) with regards to your sleep patterns?</b>	Very negatively A little It has no impact It has a positive impact
<b>d) with regard to your diet (not eating regular meals, snacking etc)</b>	Very negatively A little It has no impact It has a positive impact
<b>Have you at anytime been consulted regarding on-call organisation or structure?</b>	Yes No
<b>If ‘Yes’ did your input have any influence?</b>	Yes No
<b>Do you worry about the decisions you have to make when on call?</b>	Never Sometimes Always
<b>If you are unable to do your on-call (e.g. due to illness) are you responsible for finding your own replacement?</b>	Yes No

## Desirability of Control

Below you will find a series of statements. Please read each statement carefully and respond to it by expressing the extent to which you believe the statement applies to you. For all items a response from 1 to 7 is required. Use the number that best reflects your belief when the **scale** is defined as follows:

1. The statement doesn't apply to me at all.
2. The statement usually doesn't apply to me.
3. Most often, the statement does not apply.
4. I am unsure about whether or not the statement applies to me or applies to me about half the time.
5. The statement applies more often than not.
6. The statement usually applies to me.
7. The statement always applies to me.

Please circle the number alongside each statement that corresponds with the above scale. It is important that you respond to all items even ones that you feel may not apply to you; select the scale that best reflects your feelings about that statement.

1 = This statement doesn't apply to me at all >>>>>>>> 7 = This statement always applies to me							
I prefer a job where I have a lot of control over what I do and when I do it.	1	2	3	4	5	6	7
I enjoy political participation because I want to have as much of a say in running government as possible.	1	2	3	4	5	6	7
I try to avoid situations where someone else tells me what to do.	1	2	3	4	5	6	7
I would prefer to be a leader rather than a follower.	1	2	3	4	5	6	7
I enjoy being able to influence the actions of others.	1	2	3	4	5	6	7
I am careful to check everything on a car before I leave for a long trip.	1	2	3	4	5	6	7
Others usually know what is best for me.	1	2	3	4	5	6	7
I enjoy making my own decisions.	1	2	3	4	5	6	7
I enjoy having control over my own destiny.	1	2	3	4	5	6	7
I would rather someone else took over the leadership role when I am involved in a group project.	1	2	3	4	5	6	7
I consider myself to be generally more capable of handling situations than others are.	1	2	3	4	5	6	7
I'd rather run my own business and make my own mistakes than listen to someone else's orders.	1	2	3	4	5	6	7
I like to get a good idea of what a job is all about before I begin.	1	2	3	4	5	6	7
When I see a problem I prefer to do something about it rather than sit by and let it continue.	1	2	3	4	5	6	7

When it comes to orders, I would rather give them than receive them.	1	2	3	4	5	6	7
I wish I could push many of life's daily decisions off on someone else.	1	2	3	4	5	6	7
When driving, I try to avoid putting myself in a situation where I could be hurt by someone else's mistake.	1	2	3	4	5	6	7
I prefer to avoid situations where someone else has to tell me what it is I should be doing.	1	2	3	4	5	6	7
There are many situations in which I would prefer only one choice rather than having to make a decision.	1	2	3	4	5	6	7
I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered by it.	1	2	3	4	5	6	7

## The COPE

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by choosing one number for each, using the response choices listed in the table below:

<b>1 = I usually don't do this at all.</b>	<b>2 = I usually do this a little bit.</b>
<b>3 = I usually do this a medium amount.</b>	<b>4 = I usually do this a lot.</b>

Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true **FOR YOU** as you can. **Please answer every item** and indicate your answer by writing the appropriate number, as noted above, in the **RESPONSE** column. There are no 'right' or 'wrong' answers, so choose the most accurate answer for **YOU** – not what you think 'most people' would say or do. Indicate what **YOU** usually do when **YOU** experience a stressful event.

No.	STATEMENT	RESPONSE
1	I try to grow as a person as a result of the experience.	
2	I turn to work or other substitute activities to take my mind off things.	
3	I get upset and let my emotions out.	
4	I try to get advice from someone about what to do.	
5	I concentrate my efforts on doing something about it.	
6	I say to myself "this isn't real".	
7	I put my trust in God.	
8	I laugh about the situation.	
9	I admit to myself that I can't deal with it, and give up trying.	
10	I restrain myself from doing anything too quickly.	
11	I discuss my feelings with someone.	
12	I use alcohol or drugs to make myself feel better.	
13	I get used to the idea that it happened.	
14	I talk to someone to find out more about the situation.	
15	I keep myself from getting distracted by other thoughts or activities.	
16	I daydream about things other than this.	
17	I get upset, and am really aware of it.	

18	I seek God's help.	
19	I make a plan of action.	
20	I make jokes about it.	
21	I accept that this has happened and that it can't be changed.	
22	I hold off doing anything about it until the situation permits.	
23	I try to get emotional support from friends and relatives.	
24	I just give up trying to reach my goal.	
25	I take additional action to try to get rid of the problem.	
26	I try to lose myself for a while by drinking alcohol or taking drugs.	
27	I refuse to believe that it has happened.	
28	I let my feelings out.	
29	I try to see it in a different light, to make it seem more positive.	
30	I talk to someone who could do something concrete about the problem.	
31	I sleep more than usual.	
32	I try to come up with a strategy about what to do.	
33	I focus on dealing with this problem and, if necessary, let other things slide a little.	
34	I get sympathy and understanding from someone.	
35	I drink alcohol or take drugs, in order to think about it less.	
36	I kid around about it.	
37	I give up the attempt to get what I want.	
38	I look for something good in what is happening.	
39	I think about how I might best handle the problem.	
40	I pretend that it hasn't really happened.	
41	I make sure not to make matters worse by acting too soon.	
42	I try hard to prevent other things from interfering with my efforts at dealing with this.	
43	I go to the cinema or watch television, to think about it less.	
44	I accept the reality of the fact that it happened.	

45	I ask people who have had similar experiences what they did.	
46	I feel a lot of emotional distress and I find myself expressing those feelings a lot.	
47	I take direct action to get around the problem.	
48	I try to find comfort in my religion.	
49	I force myself to wait for the right time to do something.	
50	I make fun of the situation.	
51	I reduce the amount of effort I'm putting into solving the problem.	
52	I talk to someone about how I feel.	
53	I use alcohol or drugs to help me get through it.	
54	I learn to live with it.	
55	I put aside other activities in order to concentrate on this.	
56	I think hard about what steps to take.	
57	I act as though it hasn't even happened.	
58	I do what has to be done, one step at a time.	
59	I learn something from the experience.	
60	I pray more than usual.	

Reminder of the scale:

<b>1 = I usually don't do this at all.</b>	<b>2 = I usually do this a little bit.</b>
<b>3 = I usually do this a medium amount.</b>	<b>4 = I usually do this a lot.</b>

## The MBI

Please read each item below and circle the number that best describes how you feel at work/as a carer. Note: Recipient refers to the person you care for/the people who receive your services.

		Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Every day
1	I feel emotionally drained from my work.	0	1	2	3	4	5	6
2	I feel used up at the end of the workday.	0	1	2	3	4	5	6
3	I feel fatigued when I get up in the morning and have to face another day on the job.	0	1	2	3	4	5	6
4	I can easily understand how my recipients feel about things.	0	1	2	3	4	5	6
5	I feel I treat some recipients as if they were impersonal objects.	0	1	2	3	4	5	6
6	Working with people all day is really a strain for me.	0	1	2	3	4	5	6
7	I deal very effectively with the problems of my recipients.	0	1	2	3	4	5	6
8	I feel burned out from my work.	0	1	2	3	4	5	6
9	I feel I'm positively influencing other people's lives through my work.	0	1	2	3	4	5	6
10	I've become more callous towards people since I took this job.	0	1	2	3	4	5	6
11	I worry that this job is hardening me emotionally.	0	1	2	3	4	5	6
12	I feel very energetic.	0	1	2	3	4	5	6
13	I feel frustrated by my job.	0	1	2	3	4	5	6
14	I feel I'm working too hard on my job.	0	1	2	3	4	5	6
15	I don't really care what happens to some recipients.	0	1	2	3	4	5	6
16	Working with people directly puts too much stress on me.	0	1	2	3	4	5	6
17	I can easily create a relaxed atmosphere with my recipients.	0	1	2	3	4	5	6
18	I feel exhilarated after working closely with me recipients.	0	1	2	3	4	5	6
19	I have accomplished many worthwhile things in this job.	0	1	2	3	4	5	6
20	I feel like I'm at the end of my rope.	0	1	2	3	4	5	6
21	In my work I deal with emotional problems very calmly.	0	1	2	3	4	5	6
22	I feel recipients blame me for some of their problems.	0	1	2	3	4	5	6

## The Sensation Seeking Scale

This questionnaire is lengthy but is simple and quick to answer. A number of statements which people have used to describe themselves are given below. Read each statement and then circle/tick either **A** or **B** statement to indicate which best reflects your feelings regarding that statement. For example if “you would prefer a job in one location” then you would circle the letter **B** or put a tick by statement **B**. **There are no right or wrong answers**. Do not spend too much time on any one statement but **always** give one answer which seems closest to describing which you believe to be correct to each question.

<i>Please circle either the letter A or B statement that best reflects your thoughts/feelings.</i>	
1	A. I would like a job which would require a lot of travelling. B. I would prefer a job in one location.
2	A. I am invigorated by a brisk, cold day. B. I can't wait to get into the indoors on a cold day.
3	A. I find a certain pleasure in routine kinds of work. B. Although it is sometimes necessary I usually dislike routine kinds of work.
4	A. I often wish I could be a mountain climber. B. I can't understand people who risk their necks climbing mountains.
5	A. I dislike all body odours. B. I like some of the earthy body smells.
6	A. I get bored seeing the same old faces. B. I like the comfortable familiarity of everyday friends.
7	A. I like to explore a strange city or section of town by myself, even if it means getting lost. B. I prefer a guide when I am in a place I don't know well.
8	A. I find the quickest and easiest route to a place and stick to it. B. I sometimes take different routes to a place I often go, just for variety's sake.
9	A. I would not like to try any drug which might produce strange and dangerous effects on me. B. I would like to try some of the new drugs that produce hallucinations.
10	A. I would prefer living in an ideal society where everyone is safe, secure, and happy. B. I would have preferred living in the unsettled days of our history.
11	A. I sometimes like to do things that are a little frightening. B. A sensible person avoids activities that are dangerous.
12	A. I order the dishes with which I am familiar, so as to avoid disappointment and unpleasantness. B. I like to try new foods that I have never tasted before.
13	A. I can't stand riding with a person who likes to speed. B. I sometimes like to drive very fast because I find it exciting.
14	A. If I were a salesman I would prefer a straight salary, rather than the risk of making little or nothing on a commission basis. B. If I were a salesman I would prefer working on a commission if I had a chance to make more money than I could on a salary.
15	A. I would like to take up the sport of water skiing. B. I would not like to take up water skiing.
16	A. I don't like to argue with people whose beliefs are sharply divergent from mine, since such arguments are never resolved. B. I find people that disagree with my beliefs more stimulating than people who agree with me.



17	A. When I go on a trip I like to plan my route and timetable fairly carefully. B. I would like to take off on a trip with no pre-planned or definite routes, or timetables.
18	A. I enjoy the thrills of watching cars races. B. I find car races unpleasant.
19	A. Most people spend entirely too much money on life insurance. B. Life insurance is something that no man can afford to be without.
20	A. I would like to learn to fly an airplane. B. I would not like to learn to fly an airplane.
21	A. I would not like to be hypnotised. B. I would like to have the experience of being hypnotised.
22	A. The most important goal of life is to live it to the fullest and experience as much of it as you can. B. The most important goal of life is to find peace and happiness.
23	A. I would like to try parachute jumping. B. I would never want to try jumping out of a plane, with or without a parachute.
24	A. I enter cold water gradually giving myself time to get used to it. B. I like to dive or jump right into the ocean or a cold pool.
25	A. I do not like the irregularity and discord of most modern music. B. I like to listen to new and unusual kinds of music.
26	A. I prefer friends who are excitingly unpredictable. B. I prefer friends who are reliable and predictable.
27	A. When I go on a holiday I prefer the comfort of a good room and bed. B. When I go on holiday I would prefer to camp out.
28	A. The essence of good art is in its clarity, symmetry of form and harmony of colours. B. I often find beauty in the “clashing” of colours and irregular forms of modern paintings.
29	A. The worst social sin is to be rude. B. The worst social sin is to be a bore.
30	A. I look forward to a good nights rest after a long day. B. I wish I didn't have to waste so much of a day sleeping.
31	A. I prefer people who are emotionally expressive even if they are a bit unstable. B. I prefer people who are calm and even tempered.
32	A. A good painting should shock or jolt the senses. B. A good painting should give one a feeling of peace and security.
33	A. When I feel discouraged I recover by relaxing and having some soothing diversion. B. When I feel discouraged I recover by going out and doing something new and exciting.
34	A. People who ride motorcycles must have some kind of an unconscious need to hurt themselves. B. I would like to drive or ride on a motorcycle.

## The GHQ

I would like to know how your health has been in general over this past week. Please read the questions below and respond using the scale, by circling the statement that best fits your thoughts and feelings. It is important that you answer all the questions.

Using the following ratings, please answer the questions below:

Have you recently been able to concentrate on what you are doing?	Not at all No more than usual More than usual Much more than usual
Have you recently lost much sleep over worry?	Not at all No more than usual More than usual Much more than usual
Have you recently felt that you are playing a useful part in things?	More than usual No more than usual Less than usual Much less than usual
Have you recently felt capable of making decisions about things?	More than usual No more than usual Less than usual Much less than usual
Have you recently felt constantly under strain?	More than usual No more than usual Less than usual Much less than usual
Have you recently felt you could not overcome your difficulties?	More than usual No more than usual Less than usual Much less than usual
Have you recently been able to enjoy your normal day to day activities?	Not at all No more than usual More than usual Much more than usual
Have you recently been able to face up to your problems?	More than usual No more than usual Less than usual Much less than usual
Have you recently been feeling unhappy or depressed?	More than usual No more than usual Less than usual Much less than usual
Have you recently been losing confidence in yourself?	More than usual No more than usual Less than usual Much less than usual
Have you recently been thinking of yourself as a worthless person?	Not at all No more than usual More than usual Much more than usual
Have you recently been feeling reasonably happy, all things considered?	Not at all No more than usual More than usual Much more than usual

## The Recovery Scale

Finally, this questionnaire simple and quick to answer. A number of statements which people have used to describe themselves are given below. Read each statement and then circle your response by answering 'yes' or 'no' as to how you feel about that statement. **There are no right or wrong answers.** Do not spend too much time on any one statement but **always** give an answer which seems closest to describing which you believe to be correct.

<i>Please circle Yes or No to the following questions...</i>		
1	I find it hard to relax at the end of a working day.	YES NO
2	At the end of a working day I am really feeling worn-out.	YES NO
3	My job causes me to feel rather exhausted at the end of a working day.	YES NO
4	Generally speaking, I'm still feeling fresh after supper.	YES NO
5	Generally speaking, I am able to relax only on a second day off.	YES NO
6	I have trouble concentrating in the hours off after my working day.	YES NO
7	I find it hard to show interest in other people when I just come home from work.	YES NO
8	In general, it takes me over an hour to feel fully recovered after work.	YES NO
9	When I get home, people should leave me alone for some time.	YES NO
10	After a working day I am often too tired to start other activities.	YES NO
11	During the last part of the working day sometimes I cannot optimally perform my job because of fatigue.	YES NO

## Appendix 5 Study 3 Diary Page

### PART 1: Present State of Tiredness

Below are a set of statements which describe a range of feelings. Please indicate to what extent you agree with each statement.

Please consider how you feel **RIGHT NOW!**

	1= Strongly disagree			5 = Neutral			9 = Strongly agree		
1. I feel mentally tired	1	2	3	4	5	6	7	8	9
2. I feel bored	1	2	3	4	5	6	7	8	9
3. I feel somewhat sleepy	1	2	3	4	5	6	7	8	9
4. I feel detached / uninterested	1	2	3	4	5	6	7	8	9
5. I don't feel like making much of an effort	1	2	3	4	5	6	7	8	9
6. I feel like closing my eyes and having a nap	1	2	3	4	5	6	7	8	9
7. I feel worn out physically	1	2	3	4	5	6	7	8	9
8. I feel uneasy	1	2	3	4	5	6	7	8	9
9. I feel emotionally tired	1	2	3	4	5	6	7	8	9
10. I feel unable to concentrate	1	2	3	4	5	6	7	8	9
11. I feel tense / on edge	1	2	3	4	5	6	7	8	9
12. I feel irritated and annoyed	1	2	3	4	5	6	7	8	9
13. I feel wide awake	1	2	3	4	5	6	7	8	9
14. I feel emotionally drained	1	2	3	4	5	6	7	8	9
15. I feel mentally drained	1	2	3	4	5	6	7	8	9
16. I feel physically tired	1	2	3	4	5	6	7	8	9
17. I feel drowsy	1	2	3	4	5	6	7	8	9

How do you feel you have coped with the demands of your work today?

	Not at all well					Very Well			
Mentally (e.g. memory, problem solving and concentration)	1	2	3	4	5	6	7	8	9
Emotionally	1	2	3	4	5	6	7	8	9

Present Mood: Please indicate how you feel right now.

Enthusiastic	1 2 3 4 5 6 7 8 9	Miserable
Weary	1 2 3 4 5 6 7 8 9	Lively
Relaxed	1 2 3 4 5 6 7 8 9	Tense
Depressed	1 2 3 4 5 6 7 8 9	Optimistic
Energetic	1 2 3 4 5 6 7 8 9	Tired
On edge	1 2 3 4 5 6 7 8 9	At ease

Physical Health – have you experienced any of the following over the past 24 hours? (0 = not at all, 1 = a little, 2 = a lot).

Backache	0 1 3
Chest twinges	0 1 3
Cold/flu	0 1 3
Drowsiness	0 1 3
Eyestrain	0 1 3
Feeling weak	0 1 3
Lack of energy	0 1 3
Light headedness	0 1 3
Upset stomach	0 1 3
Headaches	0 1 3
Muscular pain	0 1 3
Poor appetite	0 1 3
Problems of attention/concentration	0 1 3
Difficulties making decisions	0 1 3
Forgetfulness/slips of the mind	0 1 3

Demands & Opportunities: Please indicate the type of demand/control that has been made on you today.

	Low	High
Mental demands	1 2 3 4 5 6 7 8 9	
Emotional demands	1 2 3 4 5 6 7 8 9	
Physical demands	1 2 3 4 5 6 7 8 9	
Personal control	1 2 3 4 5 6 7 8 9	
Personal support	1 2 3 4 5 6 7 8 9	

## Appendix 6 Study 3 Questionnaire Booklet

### Trait Anxiety:

A number of statements which people have used to describe themselves are given below. Read each statement and then mark the appropriate box to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

STATEMENT	Almost Never	Sometimes	Often	Almost Always
I feel pleasant	1	2	3	4
I feel nervous and restless	1	2	3	4
I satisfied with myself	1	2	3	4
I wish I could be as happy as others seem to be	1	2	3	4
I feel like a failure	1	2	3	4
I feel rested	1	2	3	4
I am "cool, calm and collected"	1	2	3	4
I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
I worry too much over something that really doesn't matter	1	2	3	4
I am happy	1	2	3	4
I have disturbing thoughts	1	2	3	4
I lack self confidence	1	2	3	4
I feel secure	1	2	3	4
I make decisions easily	1	2	3	4
I feel inadequate	1	2	3	4
I am content	1	2	3	4
Some unimportant thoughts run through my mind that bother me	1	2	3	4
I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
I am a steady person	1	2	3	4
I get in a state of tension or turmoil as I think over recent concerns	1	2	3	4

## Desirability of Control:

Below you will find a series of statements. Please read each statement carefully and respond to it by expressing the extent to which you believe the statement applies to you. For all items a response from 1 to 7 is required. Use the number that best reflects your belief when the **scale** is defined as follows:

1. The statement doesn't apply to me at all.
2. The statement usually doesn't apply to me.
3. Most often, the statement does not apply.
4. I am unsure about whether or not the statement applies to me or applies to me about half the time.
5. The statement applies more often than not.
6. The statement usually applies to me.
7. The statement always applies to me.

Please circle the number alongside each statement that corresponds with the above scale. It is important that you respond to all items even ones that you feel may not apply to you; select the scale that best reflects your feelings about that statement.

1 = This statement doesn't apply to me at all >>>>>>> 7 = This statement always applies to me							
I prefer a job where I have a lot of control over what I do and when I do it.	1	2	3	4	5	6	7
I enjoy political participation because I want to have as much of a say in running government as possible.	1	2	3	4	5	6	7
I try to avoid situations where someone else tells me what to do.	1	2	3	4	5	6	7
I would prefer to be a leader rather than a follower.	1	2	3	4	5	6	7
I enjoy being able to influence the actions of others.	1	2	3	4	5	6	7
I am careful to check everything on a car before I leave for a long trip.	1	2	3	4	5	6	7
Others usually know what is best for me.	1	2	3	4	5	6	7
I enjoy making my own decisions.	1	2	3	4	5	6	7
I enjoy having control over my own destiny.	1	2	3	4	5	6	7
I would rather someone else took over the leadership role when I am involved in a group project.	1	2	3	4	5	6	7
I consider myself to be generally more capable of handling situations than others are.	1	2	3	4	5	6	7
I'd rather run my own business and make my own mistakes than listen to someone else's orders.	1	2	3	4	5	6	7
I like to get a good idea of what a job is all about before I begin.	1	2	3	4	5	6	7
When I see a problem I prefer to do something about it rather than sit by and let it continue.	1	2	3	4	5	6	7
When it comes to orders, I would rather give them than receive them.	1	2	3	4	5	6	7
I wish I could push many of life's daily decisions off on someone else.	1	2	3	4	5	6	7
When driving, I try to avoid putting myself in a situation where I could be hurt by someone else's mistake.	1	2	3	4	5	6	7
I prefer to avoid situations where someone else has to tell me what it is I should be doing.	1	2	3	4	5	6	7
There are many situations in which I would prefer only one choice rather than having to make a decision.	1	2	3	4	5	6	7
I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered by it.	1	2	3	4	5	6	7
1 = This statement doesn't apply to me at all >>>>>>> 7 = This statement always applies to me							

## Mental Toughness Questionnaire:

Please indicate your response to the following items by circling one of the number, which have the following meaning:

**1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree.**

Please answer these items carefully, thinking about how you are generally. Do not spend too much time on any one item.

	Disagree		Agree		
1. I usually find something to motivate me.	1	2	3	4	5
2. I generally feel in control	1	2	3	4	5
3. I generally feel that I am a worthwhile person	1	2	3	4	5
4. Challenges usually bring out the best in me	1	2	3	4	5
5. When working with other people I am usually quite influential	1	2	3	4	5
6. Unexpected changes to my schedule generally throw me	1	2	3	4	5
7. I don't usually give up under pressure	1	2	3	4	5
8. I am generally confident in my own abilities	1	2	3	4	5
9. I usually find myself just going through the motions	1	2	3	4	5
10. at times I expect things to go wrong	1	2	3	4	5
11. "I just don't know where to begin" is a feeling I usually have when presented with several things to do at once	1	2	3	4	5
12. I generally feel that I am in control of what happens in my life	1	2	3	4	5
13. However bad things are, I usually feel they will work out positively in the end	1	2	3	4	5
14. I often wish my life was more predictable	1	2	3	4	5
15. whenever I try to plan something, unforeseen factors usually seem to wreck it	1	2	3	4	5
16. I generally look on the bright side of life	1	2	3	4	5
17. I usually speak my mind when I have something to say	1	2	3	4	5
18. At times I feel completely useless	1	2	3	4	5
19. I can generally be relied upon to complete the tasks I am given	1	2	3	4	5
20. I usually take charge of a situation when I feel it is appropriate	1	2	3	4	5
21. I can generally find it hard to relax	1	2	3	4	5
22. I am easily distracted from tasks that I am involved with	1	2	3	4	5
23. I generally cope well with any problems that occur	1	2	3	4	5
24. I do not usually criticise myself even when things go wrong	1	2	3	4	5
25. I generally try to give 100%	1	2	3	4	5
26. When I am upset or annoyed I usually let other know	1	2	3	4	5
27. I tend to worry about things well before they actually happen	1	2	3	4	5
28. I often feel intimidated in social gatherings	1	2	3	4	5
29. When faced with difficulties I usually give up	1	2	3	4	5
30. I am generally able to react quickly when something unexpected happens	1	2	3	4	5
31. Even under considerable pressure I usually remain calm	1	2	3	4	5
32. If something can go wrong, it usually will	1	2	3	4	5
33. Things just usually happen to me	1	2	3	4	5
34. I generally hide my emotion from others	1	2	3	4	5
35. I usually find it difficult to make a mental effort when I am tired	1	2	3	4	5
36. When I make mistakes I usually let it worry me for days after	1	2	3	4	5
37. When I am feeling tired I find it difficult to get going	1	2	3	4	5



38. I am comfortable telling people what to do	1	2	3	4	5
39. I can normally sustain high levels of mental effort for long periods	1	2	3	4	5
40. I usually look forward to changes in my routine	1	2	3	4	5
41. I feel that what I do tends to make no difference	1	2	3	4	5
42. I usually find it hard to summon enthusiasm for the tasks I have to do	1	2	3	4	5
43. If I feel somebody is wrong, I am not afraid to argue with them	1	2	3	4	5
44. I usually enjoy a challenge	1	2	3	4	5
45. I can usually control my nervousness	1	2	3	4	5
46. In discussions, I tend to back-down even when I feel strongly about something	1	2	3	4	5
47. When I face setbacks I am often unable to persist with my goal	1	2	3	4	5
48. I can usually adapt myself to challenges that come my way	1	2	3	4	5

## COPE:

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by choosing one number for each, using the response choices listed in the table below:

<b>1 = I usually don't do this at all.</b>	<b>2 = I usually do this a little bit.</b>
<b>3 = I usually do this a medium amount.</b>	<b>4 = I usually do this a lot.</b>

Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true **FOR YOU** as you can. **Please answer every item** and indicate your answer by writing the appropriate number, as noted above, in the **RESPONSE** column. There are no 'right' or 'wrong' answers, so choose the most accurate answer for **YOU** – not what you think 'most people' would say or do. Indicate what **YOU** usually do when **YOU** experience a stressful event.

No.	STATEMENT	RESPONSE
1	I try to grow as a person as a result of the experience.	
2	I turn to work or other substitute activities to take my mind off things.	
3	I get upset and let my emotions out.	
4	I try to get advice from someone about what to do.	
5	I concentrate my efforts on doing something about it.	
6	I say to myself "this isn't real".	
7	I put my trust in God.	
8	I laugh about the situation.	
9	I admit to myself that I can't deal with it, and give up trying.	
10	I restrain myself from doing anything too quickly.	
11	I discuss my feelings with someone.	
12	I use alcohol or drugs to make myself feel better.	
13	I get used to the idea that it happened.	
14	I talk to someone to find out more about the situation.	
15	I keep myself from getting distracted by other thoughts or activities.	
16	I daydream about things other than this.	
17	I get upset, and am really aware of it.	
18	I seek God's help.	
19	I make a plan of action.	
20	I make jokes about it.	

21	I accept that this has happened and that it can't be changed.	
22	I hold off doing anything about it until the situation permits.	
23	I try to get emotional support from friends and relatives.	
24	I just give up trying to reach my goal.	
25	I take additional action to try to get rid of the problem.	
26	I try to lose myself for a while by drinking alcohol or taking drugs.	
27	I refuse to believe that it has happened.	
28	I let my feelings out.	
29	I try to see it in a different light, to make it seem more positive.	
30	I talk to someone who could do something concrete about the problem.	
31	I sleep more than usual.	
32	I try to come up with a strategy about what to do.	
33	I focus on dealing with this problem and, if necessary, let other things slide a little.	
34	I get sympathy and understanding from someone.	
35	I drink alcohol or take drugs, in order to think about it less.	
36	I kid around about it.	
37	I give up the attempt to get what I want.	
38	I look for something good in what is happening.	
39	I think about how I might best handle the problem.	
40	I pretend that it hasn't really happened.	
41	I make sure not to make matters worse by acting too soon.	
42	I try hard to prevent other things from interfering with my efforts at dealing with this.	
43	I go to the cinema or watch television, to think about it less.	
44	I accept the reality of the fact that it happened.	
45	I ask people who have had similar experiences what they did.	
46	I feel a lot of emotional distress and I find myself expressing those feelings a lot.	
47	I take direct action to get around the problem.	
48	I try to find comfort in my religion.	
49	I force myself to wait for the right time to do something.	
50	I make fun of the situation.	
51	I reduce the amount of effort I'm putting into solving the problem.	

52	I talk to someone about how I feel.	
53	I use alcohol or drugs to help me get through it.	
54	I learn to live with it.	
55	I put aside other activities in order to concentrate on this.	
56	I think hard about what steps to take.	
57	I act as though it hasn't even happened.	
58	I do what has to be done, one step at a time.	
59	I learn something from the experience.	
60	I pray more than usual.	

## Appendix 7 Study 4 Diary Measures

State Fatigue Scale.

### PART 1: Present State of Tiredness

Below are a set of statements which describe a range of feelings. Please indicate to what extent you agree with each statement.

Please consider how you feel **RIGHT NOW!**

	1= Strongly disagree			5 = Neutral			9 = Strongly agree		
1. I feel mentally tired	1	2	3	4	5	6	7	8	9
2. I feel bored	1	2	3	4	5	6	7	8	9
3. I feel somewhat sleepy	1	2	3	4	5	6	7	8	9
4. I feel detached / uninterested	1	2	3	4	5	6	7	8	9
5. I don't feel like making much of an effort	1	2	3	4	5	6	7	8	9
6. I feel like closing my eyes and having a nap	1	2	3	4	5	6	7	8	9
7. I feel worn out physically	1	2	3	4	5	6	7	8	9
8. I feel uneasy	1	2	3	4	5	6	7	8	9
9. I feel emotionally tired	1	2	3	4	5	6	7	8	9
10. I feel unable to concentrate	1	2	3	4	5	6	7	8	9
11. I feel tense / on edge	1	2	3	4	5	6	7	8	9
12. I feel irritated and annoyed	1	2	3	4	5	6	7	8	9
13. I feel wide awake	1	2	3	4	5	6	7	8	9
14. I feel emotionally drained	1	2	3	4	5	6	7	8	9
15. I feel mentally drained	1	2	3	4	5	6	7	8	9
16. I feel physically tired	1	2	3	4	5	6	7	8	9
17. I feel drowsy	1	2	3	4	5	6	7	8	9

Present Mood: Please indicate how you feel right now.

Enthusiastic	1	2	3	4	5	6	7	8	9	Miserable
Weary	1	2	3	4	5	6	7	8	9	Lively
Relaxed	1	2	3	4	5	6	7	8	9	Tense
Depressed	1	2	3	4	5	6	7	8	9	Optimistic
Energetic	1	2	3	4	5	6	7	8	9	Tired
On edge	1	2	3	4	5	6	7	8	9	At ease

**Demands & Opportunities:** Please indicate the type of demand/control that has been made on you today.

	Low	High							
Mental demands	1	2	3	4	5	6	7	8	9
Emotional demands	1	2	3	4	5	6	7	8	9
Physical demands	1	2	3	4	5	6	7	8	9
Personal control	1	2	3	4	5	6	7	8	9
Personal support	1	2	3	4	5	6	7	8	9

**Total number of hours sleep in past 24 hours:** \_\_\_\_\_hrs

Happiness Questionnaire:

**For each of the following statements and/or questions, please circle the point on the scale that you feel is most appropriate in describing you.**

1. Right now, I consider myself:

Not very happy						Very happy
1	2	3	4	5	6	7

2. Compared to most of my peers, right now I would consider myself:

Less happy						More happy
1	2	3	4	5	6	7

3. Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you at this moment in time?

Not at all						A great deal
1	2	3	4	5	6	7

4. Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you at this moment in time?

Not at all						A great deal
1	2	3	4	5	6	7

## **Appendix 8 Study 4 Saliva Collection Instruction Sheet**

### **General instruction sheet for saliva collection**

1. Please do not eat or drink one hour before collecting your saliva sample, especially dairy products as this interferes with the saliva cortisol test.
2. Please rinse your mouth **thoroughly** with cold water only (not a mouth wash), 10 minutes before collecting your sample.
3. Please record the time and date when you collect your sample on the collection tube.
4. Please place your sample in the box provided immediately after collection and place the box in your freezer.
5. Please call the number at the bottom of the sheet so that I can arrange a convenient time to collect the sample.

### **Samples to be collected during the following shifts**

Please collect samples during the following shifts:

1. During normal working hours – collect saliva samples on three consecutive Wednesdays at 6pm.
2. Rest days – again three samples on three consecutive Saturday early evenings at 6pm.
3. On-call, called out – again three samples on your long weekend on-call at 6pm Saturday evening. Finally, on-call not called out – collect three samples on your long weekend on-call at 6pm Saturday evening.

### **How to collect your sample**

1. Rise mouth thoroughly with cold water 10 minutes before collecting sample.
2. Close your mouth for 10 seconds allowing a pool of saliva to collect in your mouth.
3. Remove the lid from the collection tube and spit the pool of saliva into the open tube.
4. Replace the lid and record the time and date on the collection tube in the spaces provided.
5. Place in chilled box and freeze.
6. Complete the questionnaire and place this in the freepost envelope, you can then post this at your convenience or hand it to me when I collect the sample (see instruction above).

**If you have any concerns or to arrange collection, please contact me on the numbers listed below**

**Contact Number :**        **01482 465598** Mobile: **07798652683**



**[T.Reid@2004.hull.ac.uk](mailto:T.Reid@2004.hull.ac.uk)**

**Regards,**

**Tracey Reid**

**PhD Psychology Research Student**



## Appendix 9 Study 4 Happiness Questionnaire

For each of the following statements and/or questions, please circle the point on the scale that you feel is most appropriate in describing you.

1. In general, I consider myself:

Not very happy						Very happy
1	2	3	4	5	6	7

2. Compared to most of my peers, I consider myself:

Less happy						More happy
1	2	3	4	5	6	7

3. Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?

Not at all						A great deal
1	2	3	4	5	6	7

4. Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you?

Not at all						A great deal
1	2	3	4	5	6	7

## Appendix 10 Study 4 Validation Study Questionnaires

### Oxford Happiness Questionnaire:

Below you will find a series of statements. Please read each statement carefully and respond to it by expressing the extent to which you agree or disagree with the statement. For all items a response from 1 to 6 is required. Use the number that best reflects your belief when the **scale** is defined as follows:

1. **Strongly disagree.**
2. **Moderately disagree.**
3. **Slightly disagree.**
4. **Slightly agree.**
5. **Moderately agree.**
6. **Strongly agree.**

Please read the statements carefully, because some are phrased positively and others negatively. Don't take too long over individual questions as there is no right or wrong answers. Please circle the number alongside each statement that corresponds with the above scale. It is important that you respond to all items even ones that you feel may not apply to you; select the scale that best reflects your feelings about that statement in general or most of the time.

1 = Strongly disagree >>>>>>> 6 = Strongly agree						
1. I don't feel particularly pleased with the way I am.	1	2	3	4	5	6
2. I am intensely interested in other people.	1	2	3	4	5	6
3. I feel that life is very rewarding.	1	2	3	4	5	6
4. I have very warm feelings towards almost everyone.	1	2	3	4	5	6
5. I rarely wake up feeling rested.	1	2	3	4	5	6
6. I am not particularly optimistic about the future.	1	2	3	4	5	6
7. I find most things amusing.	1	2	3	4	5	6
8. I am always committed and involved.	1	2	3	4	5	6
9. Life is good.	1	2	3	4	5	6
10. I do not think that the world is a good place.	1	2	3	4	5	6
11. I laugh a lot.	1	2	3	4	5	6
12. I am well satisfied about everything in my life.	1	2	3	4	5	6
13. I don't think I look attractive.	1	2	3	4	5	6
14. There is a gap between what I would like to do and what I have done.	1	2	3	4	5	6
15. I am very happy.	1	2	3	4	5	6
16. I find beauty in some things.	1	2	3	4	5	6
17. I always have a cheerful effect on others.	1	2	3	4	5	6
18. I can fit in (find time for) everything I want to.	1	2	3	4	5	6
19. I feel that I am not especially in control of my life.	1	2	3	4	5	6

20. I feel able to take anything on.	1	2	3	4	5	6
21. I feel fully mentally alert.	1	2	3	4	5	6
22. I often experience joy and elation.	1	2	3	4	5	6
23. I don't find it easy to make decisions.	1	2	3	4	5	6
24. I don't have a particular sense of meaning and purpose in my life.	1	2	3	4	5	6
25. I feel I have a great deal of energy.	1	2	3	4	5	6
26. I usually have a good influence on events.	1	2	3	4	5	6
27. I don't have fun with other people.	1	2	3	4	5	6
28. I don't feel particularly healthy.	1	2	3	4	5	6
29. I don't have particularly happy memories of the past.	1	2	3	4	5	6
<b>Reminder of the scale: 1 = Strongly disagree &gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt; 6 = Strongly agree</b>						

## **Revised Happiness Questionnaire:**

**For each of the following statements and/or questions, please circle the point on the scale that you feel is most appropriate in describing you.**

1. Right now, I consider myself:

Not very happy						Very happy
1	2	3	4	5	6	7

2. Compared to most of my peers, right now I would consider myself:

Less happy						More happy
1	2	3	4	5	6	7

3. Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you at this moment in time?

Not at all						A great deal
1	2	3	4	5	6	7

4. Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you at this moment in time?

Not at all						A great deal
1	2	3	4	5	6	7

## POMS:

Male/Female      Date of birth:

Below is a list of words that describe feelings people have. Please read each one carefully. Then circle the answer, which best describes HOW YOU FEEL RIGHT NOW. Please make sure you answer every statement.

	Not at all	A little	Moderately	Quite a bit	Extremely
1. Panicky	0	1	2	3	4
2. Sad	0	1	2	3	4
3. Lively	0	1	2	3	4
4. Confused	0	1	2	3	4
5. Furious	0	1	2	3	4
6. Worn out	0	1	2	3	4
7. Depressed	0	1	2	3	4
8.	0	1	2	3	4
9. Annoyed	0	1	2	3	4
10. Exhausted	0	1	2	3	4
11. Mixed- up	0	1	2	3	4
12. Sleepy	0	1	2	3	4
13. Bitter	0	1	2	3	4
14. Unhappy	0	1	2	3	4
15. Anxious	0	1	2	3	4
16. Worried	0	1	2	3	4
17. Energetic	0	1	2	3	4
18. Miserable	0	1	2	3	4
19. Muddled	0	1	2	3	4
20. Nervous	0	1	2	3	4
21. Angry	0	1	2	3	4
22. Active	0	1	2	3	4
23. Tired	0	1	2	3	4
24. Bad	0	1	2	3	4
25. Bushed	0	1	2	3	4
26. Alert	0	1	2	3	4
27. Uncertain	0	1	2	3	4