Factors that moderate the relationship between occupational stressors and health.

Button, Lori A

Factors that Moderate the Relationship between Occupational Stressors and Health

Lori A. Button

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

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SUMMARY

This study examined the factors that moderate the relationship between occupational stressors and health. Previous research has suggested that coping strategies and social support structures can alleviate the negative effect of occupational stress on health. Furthermore, despite the important advances made concerning social support, there is limited research examining the various aspects of support (i.e. source, nature, need and provision). This research examined the effect of proposed stress buffers, in particular the various aspects of social support, on the relationship between occupational stressors and health. Five hundred and thirty participants from three South Wales (UK) organisations were appraised in this study: 166 production-line workers, 290 health service employees and 74 governmental agency employees. A questionnaire was distributed within the organisations. It assessed the participants' coping strategies, social support, occupational stressors, job strain, psychological health and physical health measures.

In contrast to prior stress research, coping strategies did not moderate the relationship between occupational stressors and health. However, the various aspects of social support were found to be both detrimental and beneficial to the relationship between occupational stressors and health levels. Specifically, co-worker support outside of work was the most influential and advantageous source of support. Additional questions arose as to the effect of proposed stress buffers on life stress, compared to job stress, and health. Overall, it was concluded that social support does buffer the relationship between occupational stressors and health, although the relationship is complex.

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CHAPTER 1

1. Literature Review and Theoretical Orientation

1.1. The history of stress

If one looks back over the last two decades of research on stress and health, one cannot help but be impressed by the large volume of work and the substantial accumulation of findings. Research into the effects of stress on health has appeared in various fields of science such as medicine, psychiatry, psychology and physiology and still continues to be a major research topic. However, nearly all of the significant issues surrounding the concept of stress remain unsettled or controversial.

Stress has been referred to as non-specific arousal reaction (Selye, 1979). From this perspective stress is viewed as the adaptive physiological result of a confrontation with a stimulus. Stress is a response. An alternative view refers to stress as a stimulus (condition or external force) that when it acts on an organism will create a dynamic physiological and/or psychological strain (Lazarus, 1966; Cox, 1978; Spector, 1997). Suedfeld (1979) and Vahabzadeh (2002) expanded on this definition of stress to include internal behavioural components or stressors such as negative feelings (i.e. fear, sadness), expressions and adaptation costs (i.e. fatigue, infection). However, by integrating previous definitions, Kasl (1996) theorised that stress is not just the stimuli or the physiological result of a stressor. He defined stress as the entire process from the organism's exposure to the stressor to the resultant distress. Furthermore, Kasl surmised that once the steps from exposure to distress were identified then the way in which stress is defined would be of no great relevance. Nevertheless, Kasl continued, "Stress in the biological sense cannot be eliminated. Without it the process of life would cease, for the absence of stress means death" (p. 3).

In spite of the numerous volumes of research literature investigating how stress mobilises and motivates, there exists an equivalent number of volumes of research investigating how stress demobilizes and handicaps. Lazarus (1966) and Lazarus *et al.* (1985) contended that the individual and environmental interaction is inherent in the concept of stress. This theory is supported by research providing evidence associating stressors and various health–related outcomes such as: environmental stressors and cancer (Rosch, 1996), perceived control and blood pressure (Fisher, 1984; de Rijk *et al.*, 1998), occupational stressors and depression (Payne, 1980; Wall *et al.*, 1996) and job demand and control and cardiovascular disease (Karasek, 1979, 1981; Peters *et al.*, 2003).

Research has suggested that stressors do not affect individuals the same way. Any particular situation may on one occasion produce the pre-described pattern of change, but may not do so in others. Therefore, the research community has sought to explain the personal aspects that influence the effects of stress on health. The coping strategy of the individual when faced with a problem/threat and the social support structure (work and home) of that individual are amongst the extensively investigated moderating factors or stress buffers. Stress buffers have been found to conceptually block the perception of stress (Blanchard-Fields & Irion, 1988; Skinner, 1996), reduce depression (Landau, 1995), increase job satisfaction (Baker *et al*, 1995) and decrease psychological strain (Payne, 1980).

This chapter will focus on those variables that may alleviate the impact of occupational stress on individuals' physiological and/or psychological health (i.e. social support, coping strategies). In order to expand upon these, this chapter will commence by focusing on the physiological composition of stress then expand its investigation into

other intervening variables associated with the perception of stress, for example threat versus challenge appraisal, predictability and locus of control. The chapter will move on to discuss occupational stress and various factors comprising it such as workloads, job control, burnout and the job-demand-control model. The chapter with conclude with a discussion into the factors that may moderate the negative effects of occupational stress. In particular, the conception of stress buffers and their influence on occupational stress and health will be discussed in greater detail.

1.1.1. Theories of Stress

1.1.1.1. Hans Selye: General Adaptation Syndrome

A brief examination of any daily newspaper will reveal that stress has become a universal explanation for human behaviour, failure and disease. Stress today is a deeply held universal modern metaphor, an unquestioned explanation of the darker side of human experience, emotions and illness. Though stress is a universally recognised expression, the term *stress* is relatively new.

In the seventeenth century, a mechanical model evolved in which stress was described as the internal force generated within a solid body by the action of an external force that tended to distort the body, an explanation that would later be developed further within the physical sciences (Hingley & Cooper, 1986). However, it wasn't until after the 1930's that the term stress was found within layman or expert texts (Viner, 1999). In the 1940s, a Czech research physiologist known as Hans Selye (1907-82) created a new scientific term that via his publications and lectures brought the concept of stress into all areas and spheres of modern life. Before Selye, stress was broadly described within the field of psychological as a mere mental strain or an un-welcomed happening (Viner, 1999).

Fortunately, Selye established the contemporary concept of the widely acclaimed and debated definition of stress as, "the non-specific (common) result of any demand upon the body, be the effect mental or somatic" (Selye, 1993, p. 7). In reference to previous stress research theories, Selye explained the following:

> It was against this cumulative background that, as a medical student, I eventually was drawn to the problem of a stereotyped response to any exacting task. The initial focus of my interest was what I thought of as the 'syndrome of just being sick' (p. 9)

Selye believed these non-specific physiological adaptations or *reactions* to be the basis of life itself, and the foundation for his General Adaptation Syndrome (GAS) theory. In effect, this was the first scientific attempt to explain the dynamic process of the stress-related illness (Hingley & Cooper, 1986). Through his work as a physiologist, he discovered that while people may face quite different problems, in some respects their bodies respond in a stereotyped pattern. Hans Selye wrote that, "...identical biochemical changes enable us to cope with any type of increased demand on vital activity" (1993, p. 8). Selye believed he had discovered the natural and physiological connection between organisms and their environment (stressor) in that stress was a natural and healthy reaction in all situations that require increased energy for movement. One researcher wrote that this was: "A truth that he would sell to whoever would listen" (Viner, 1999, p. 394).

Selye's General Adaptation Syndrome (GAS) theory was based upon the concept that the function of the non-specific arousal reaction or stress is to facilitate the body's attempt to make a physical effort. This physiological stress definition implied first of all that stress is a reaction, and that what triggers the arousal is considered the stressor. In this definition, stress is viewed as neither negative nor positive. Selye later defined two

types of stress responses: *eustress* and *distress*. Selye described eustress as desirable and associated with positive effects of the stress response having positive constructive outcomes such as motivation (Nelson & Simmons, 2003; Theorell, 2003). Distress was distinguished as undesirable with negative outcome such as illnesses and disease (Nelson & Simmons, 2003; Theorell, 2003).

According to Selye, the initial stress response or *alarm reaction* was not the entire response. As illustrated in Figure 1.1, Selye theorised that one's physiological reaction to a noxious agent is comprised of phases. After the initial alarm reaction, a stage of adaptation or resistance occurs. He contended that a physical state of alarm could not be maintained continuously; therefore if the organism withstood the initial alarm response, the animal has gone into the *stage of resistance*. Selye believed that during this stage of resistance the animal is adapting to the stressor by using its physiological energy resources to fight or withstand the noxious agent. However, after continuous exposure to the noxious agent, the acquired adaptation is lost. The animal then enters into a third phase, the *stage of exhaustion*, which inexorably follows as long as the demand is severe enough and applied for a sufficient length of time. It is under this constant stress that there is the initial loss of adaptability and eventual exhaustion, ending with death. (Selye, 1993)

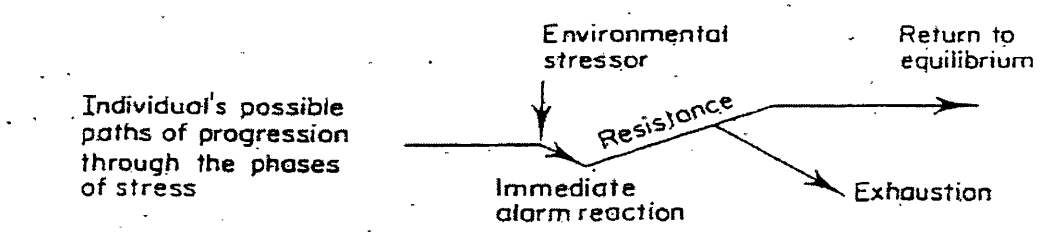


FIGURE 1.1. SELYE'S GENERAL ADAPTATION SYNDROME (Hingley & Cooper, 1986)

A simple analogy to explain the General Adaptation Syndrome is the workings of a battery. A new battery has a finite supply of energy, just as the human body has energy reserves that are used to provide power and/or energy. As the battery is used it looses energy, unless it is charged up again. For the human body, the charger is food and sleep. Just as a battery will die if placed under constant use, the body also slows down (fatigue) and eventual it will die. Selye theorised that once used up, the finite energy reserves can never be thoroughly replenished, therefore, "...just as any inanimate machine gradually wears out, so does the human machine sooner or later become the victim of constant wear and tear" (Selye, 1993, p.10).

Hans Selye (1993) suggested that most of the physical or mental exertions, infections and other stressors which individuals encounter day-to-day produce reactions corresponding to the first two stages of the General Adaptation Syndrome. He described that at first the stressors may be found upsetting or alarming, yet most individuals will adapt to them. Thus after repeated exposure to these day-to-day stressors, humans have become adapted to the activities and demands of everyday life. However, these adaptive responses can break down due to innate defects, under-stress, over-stress and/or psychological mismanagement, thereby creating the commonly known *diseases of adaptation* such as peptic ulcers in the stomach and upper intestine, high blood pressure, heart disease and nervous disturbances (Selye, 1993). Although Hans Selye could be attributed for the popularising of the term stress, Walter B. Cannon introduced the term to medicine.

Walter B. Cannon: Fight-or-Flight

Response-orientated theories of stress find their modern beginnings in the work of the American physiologist Walter B. Cannon. However, it was Hippocrates, the father of

medicine, who first recognised the existence of a *vis medicatrix naturae*, or the healing power of nature, made up of inherent bodily mechanisms for restoring health after exposure to pathogens (Selye, 1993). By 1939, Cannon fashioned the term *homeostasis*, which was devised from the Greek *homios* (similar) and *stasis* (position), literally translated as a steady state (Rosch, 1996). Cannon maintained that in order to sustain life it is necessary to maintain a relatively constant internal environment (Dubrovsky, 2000). He contended that good health was entirely dependent on maintaining the constancy or stability of the internal environment during stress. Furthermore, the term he used to describe the external factors that affected the bodily homeostasis was *stress* (Viner, 1999).

Early in his career, Cannon investigated the physiological responses of organisms to extreme variations in the physical environment. Utilizing an experimentally based approach, his work centred on the effects of environmental stresses upon animals and humans. Cannon's classic studies helped to establish the existence of many highly specific mechanisms for protection against hunger, thirst, haemorrhage, or agents tending to disturb normal body temperature (Selye, 1993). He investigated the natural tendency of humans to resist stress-induced distortion from the environment. Cannon's extensive research led him to describe an active pattern of responses to the acute stress of emergency situations, which is widely known as the Fight-or-Flight response. Implicit in Cannon's theory of Fight-or-Flight is the premise that human automatic and uncontrollable responses are adaptive changes that were once essential for survival.

In his book 'Wisdom of the Body' published in 1932, Cannon described his theory of homeostasis and the Fight-or-Flight syndrome that he viewed as an internal biological system that strives to maintain the internal equilibrium or homeostasis of the body. It describes the extraordinary complex internal mechanisms, which act to maintain the

body's essential physiological balances such as sugar, water, and the salt content of the blood -the tools the body requires in order to flee or confront when in imminent danger (Carpi, 1996).

Unlike Selye's General Adaptation Syndrome that was primarily based around the adreno-cortical response, Cannon's research focused on the activation of the sympathetic nervous system and increased secretions of catecholamines by the adrenal medulla (Spector, 1997). Cannon conceived that the preparation for and the facilitation of Fight-or-Flight response was foremost the function of the sympathetic nervous system and adrenal medulla, further emphasising that the stimulation of the sympathetic nervous system, with the resulting hormonal discharge that occurs during emergencies such as pain or rage (Mandler, 1993; Selye, 1993). In turn, this autonomic process induces the cardiovascular changes that prepare the body for fight or flight, such as heavier breathing and increased blood flow. Hans Selye subsequently categorized the aforementioned physiological responses as individual manifestations of a single coordinated stress syndrome (Hingley & Cooper, 1986).

Cannon described stress as a state of threatened homeostasis or disharmony which is counteracted by a complex repertoire of physiologic and behavioural responses that re-establish homeostasis. Similar to the theory behind the General Adaptation Syndrome, Cannon expressed the importance to individuals of maintaining a temperate environment and society; an environment void of chronic high levels of stress. Throughout his research, Cannon documented the physiological effects of stress. In his analyses Cannon found adrenal enlargements, gastrointestinal ulcers and thymicro-lymphatic involution as objective physiological manifestations of stress (Kasl, 1996). With his knowledge of

physiology and of the politics of his day, Cannon warned individuals to restrict the environment from taking over their life (Theorell, 1993).

1.1.1.3. Criticisms

Specific vs. non-specific arousal

Selye and Cannon pioneered research into the physiology of stress. Similar to Cannon's theory of individual response specificity, Selye's General Adaptation Syndrome postulated that the effects of stress on biological activity ought to be described in terms of a unitary state of increased arousal, implying that any stressful experience will result in the same physiological arousal.

There have been numerous criticisms of Selye and Cannon's non-specific response theories. Mason (1971) argued that if physiological arousal produced by stress is not affected by variations in stressors, then how could one explain the various physical reactions? Mason challenged the concept of non-specific stress responses and revealed that the responses of organisms to stressors were selective and specific. Within his research, blood samples were obtained from catheters implanted in one jugular vein at different times during exposure to different stressors. From these blood samples different hormonal measures were obtained. The results showed that a specific hormonal configuration appeared in the blood with each different stressor, provided that the other behavioural conditions remained stable (Mason, 1971). In other words, a distinct hormonal profile appeared to mediate the responses to different situations.

Concurrent with Mason's specific response pattern conception, Benton (1987), in his work with occupational stress, stated that individuals fluctuate in the ways in which they respond to a stimulus, which consequently produces hormonal level variations. He

explained that some individuals respond to psychological stressors by releasing large amounts of adrenaline whereas other individuals respond to stressors by producing moderate or even decreased amounts of adrenaline.

With supportive evidence, Armario *et al.* (1996) demonstrated that prolactin is not only responsive to stress but is also capable of reflecting the intensity of the human stress. Armario and colleagues (1996) examined the endocrine response to the intensity of psychological stressors in female medical students. The participants' plasma levels of glucose, cortisol and prolactin levels were measured before taking two examinations: one in physiology and the other in psychology. It was noted that just before taking each exam the stress levels increased in the experimental participants. It was also discovered that the prolactin levels increased in response to both examinations when compared to the non-stress condition. Cortisol levels also increased, but only marginally. Furthermore, a significant positive correlation was found between anxiety and glucose.

The data indicated that anxiety-provoking situations such as immediate anticipation of an examination increased plasma cortisol, prolactin, and glucose levels. More interestingly, prolactin responded to stress but its response differed significantly between the two stressful situations. Thus prolactin levels were only responsive to stress but were also capable of reflecting the intensity of the stress felt during the experimental situation. In addition, there is evidence that even emotional states such as fear and anger alter physiological hormonal patterns. This argument has been further verified by findings correlating fear reactions with adrenaline levels, and anger reactions with noradrenaline levels (Steptoe & Vögele, 1986; Tomaka *et al.*, 1993, 1994; Fisher, 1996).

However, in accord with Mason's theory, and concurrent with the research of Armario *et al.* (1996), Lazarus (1966) contended that physiological reactions to stressors are stimulus-specific. Yet specifically, underlying Lazarus' stimulus-specific theory is the principle that physiological responses vary according to individual cognitive appraisals of stressors. Lazarus suggested that if the individual has confidence in his coping abilities then the threat is likely to be minimal. However, if the person is unsure of these abilities he is likely to have feelings of helplessness and may become overwhelmed by the threatening situation. Lazarus and colleagues later clarified this conception by stating that, "No one environmental event can be identified as a stressor independently of its appraisal by the person" (1985, p. 776). Subsequently, much debate has risen regarding the impact of individual differences such as the individual's locus of control, perception of the stressor as a threat or challenge and its predictability, in the perception of stress.

1.1.2. Individual differences in perception of stress

Hingley & Cooper (1986) commended the work of Lazarus and Mason as, "an important advantage of the interaction approach to stress, in which stress is seen as an intervening variable, is that the nature of individual differences can be recognised and included as important 'moderating variables' "(p. 12, 1986). Lazarus (1966) described stress as an individual's appraisal of available resources, abilities and perceived demand. Cox (1978) also criticised Selye's theoretical approach to stress. In his research, Cox explained that for Selye to concentrate his attention on the body's physiological response to stressors, he ignored the role of psychological processes. Cox continued, "It is now suggested that much of the physiological responses are not determined by the actual presence of the stressor but by its psychological impact on the person (i.e. fear of

the unknown)" (p. 7). The cognitive appraisal influences the individuals' perception of stress.

Within the literature, numerous researchers have investigated the factors influencing individual evaluation of stress. The various facets of the perception of stress that have been explored have included locus of control (LOC) (Steptoe & Vögele, 1989; Skinner 1996; Peters *et al.* 2003), threat and challenge appraisal (Lazarus, 1966; Blanchard-Fields & Irion, 1988; Tomaka *et al,* 1993, 1994; Spector, 1997) and the predictability of a stressor (Fisher, 1984; Lazarus, 1999). These will be explored in greater depth in the following sections.

1.1.2.1. Threat and challenge appraisal

Various definitions of *threat* can be found within the stress literature. Tomaka *et al.* (1993) termed the word *threat* as an appraisal in which the perception of danger exceeds an individual's perception of personal abilities and resources to cope with the stressor. In comparison, Selye (1979) and Spector (1997) used the term *distress* to represent the perception of an event as demanding and/or harmful. Conversely, the terms *eustress* (Selye, 1979; Spector, 1997) and *challenge* (Lazarus, 1966; Tomaka *et al.,* 1993, 1994; Blanchard-Fields & Irion, 1988; Drach-Zahavy & Erez, 2002) have been used to describe the state when an organism's appraised ability and resources exceed the danger or stressor.

In considering the concept of threat, Lazarus (1966) asserted "...threat does not refer directly to observable factors but must be inferred from antecedent conditions and responses" (p.30). In simple terms, threat is the anticipation of harm. The way in which individuals evaluate events as a challenge or a threat is through the process of appraisal.

Lazarus (1966) classified the process of *cognitive appraisal* of stressors into three levels. The first level, *primary appraisal* contained the concept of arousal described as a motivated alert state characterised by the activation of physiological processes. He believed that if an organism's goals were perceived to be undisturbed or challenged then the outcome would be a positive emotion. Similarly, Lazarus' (1966) primary appraisal level has been compared to challenge appraisal (Blanchard-Fields & Irion, 1988; Tomaka *et al.*, 1993, 1994; Spector 1997).

According to Lazarus (1966) the second level of cognitive appraisal, or *secondary appraisal,* contained the organism's appraisal of anticipated harm, termed *appraisal of threat.* During secondary appraisal, an individual evaluates who is responsible for the situation, possible outcomes, future expectancy (likelihood of change), and personal options for influencing (problem-focused coping) or emotionally adapting to the situation (emotion-focused coping) (Drach-Zahavy & Erez, 2002; Lowe & Bennett, 2003). If the perception of threat remains evident the organism ascends to the third level. This third level of cognitive appraisal is defined by additional physiological arousal that is produced to assist in the diminishing or extinction of the perceived threat, such as accelerated heart rate and increased blood flow. These physiological indices of appraised threat are comparable to the General Adaptation Syndrome's stage of resistance and the Flight-or-Flight response. However, in contrast to the philosophy of Selye and Cannon, Lazarus *et al.* (1995) maintained that stress was not a product of the environment alone, but a result of the person's appraisal of the relationship between the environment and its demands and his/her goals or capabilities.

In a recent study, Drach-Zahavy & Erez (2002) tested the situational effects of goals and stress on the performance of complex tasks using 155 undergraduates attending a

major university in Northern Israel. Similar to previous studies, the researchers sought to explore the distinction between the perception of challenges and threats, and subsequently how these perceptions interact with task performance. The task required participants to predict the stock values of 120 different firms as best they could, based upon business data. The level of performance was measured by the value of stock as predicted by each participant compared to the actual stock value. In additional, some participants were required to perform memory tests, which consisted of the effective recall of business data that had been presented to them earlier in the study. Furthermore, the participants were also subjected to 'goal-setting manipulation'. The participants were orally instructed to either: do their best (no goal group) or to meet the goal of a prediction rate of 80% correct (goal group).

Drach-Zahavy & Erez (2002) reported that not only can threat and challenge be clearly differentiated by experimental manipulations, but the cognitive appraisal of a task as challenging or threatening could even affect performance. The researchers discovered that participants who appraised the task as a challenge performed better than those who appraised the task as a threat. Moreover, participants who appraised the tasks as challenging reached higher levels of performance than those who appraised the tasks as threatening, regardless of whether a goal was imposed. The challenge appraisals also outweighed the goal. This study demonstrated that the perception of a task as a challenge can produce greater performance levels than when tasks are goal oriented or perceived as threatening. Drach-Zahavy & Erez (2002) concluded, "...it may be possible to increase the level of performance of complex tasks by creating a more challenging work environment" (p. 680).

Tomaka and colleagues (1993) investigated the impact of cognitive appraisal on automatic physiological responses to stress. Students were asked to perform a mental arithmetic task whilst autonomic measures (skin conductance, heart rate, and pulse) were recorded. The participants' appraisal of the task (challenge or threat) and perception of stress were measured by subjective assessments before and during the task. Tomaka *et al.* discovered that those who perceived the task as a threat reported experiencing greater levels of stress than those individuals who appraised the task as a challenge.

In contrast to Cannon's Fight-or-Flight theory, the physiological responses of the participants in the challenge appraisal group resulted in a greater cardiac response and reduced vascular resistance than the participants in the threat appraisal group (Tomaka *et al.*, 1993). Tomaka *et al.* concluded that the cognitive appraisal of a threat resulted in participants recording greater subjective stress. Similar to Drach-Zahavy & Erez (2002), the researchers theorised that the higher physiological indices produced by the challenge appraisal group demonstrated greater individual motivation and effort. The studies suggest that when individuals perceive a task/stressor as challenging, they are not only more psychologically able to deal, but they are also more physically able to deal than if the stressor was perceived as a threat. However, some researchers believe that the appraisal of stressor as a threat or challenge is determined by individual perceptions of control.

1.1.2.2. Locus of control

Brewin *et al.* (1989) termed the degree to which an individual perceives events as being dependent upon his/her behaviour as locus of control (LOC). Similar, Steptoe & Vögele (1986) and Skinner (1996) described the degree to which an individual believes

he has the ability to produce desired outcomes, or prevent undesired outcomes, as self-efficacy.

Fisher (1984) theorised that the perception of control is dependent upon databases referred to as *knowledge*, wherein knowledge represented an individual's performance efficacy. The base of knowledge theory infers that if an individual is faced with a new situation (stressor) of which he lacks previous knowledge, he will perceive the stressor as a threat. Therefore, if an individual has had prior confrontations with a stressor, the individual could see the stressor as surmountable. Therefore, the individual will perceive an internal locus of control over the stressor. Conversely, if an individual has perceived the stressor as outside and beyond his control and knowledge, the individual will adopt an external locus of control. In support of Fisher's base of knowledge theory, the cognitive appraisal of an internal LOC coupled with perceived personal inadequacies, have been associated with social withdrawal (Skinner, 1996; Brewin *et al.*, 1989).

An individual's LOC has been found to influence physiological consequences in addition to psychological aspects such as threat appraisal and self-efficacy. To investigate this, Horner (1996) used a longitudinal study of 173 participants to study the effects of personality, stressors, coping and affective responses on health status. Through the use of various postal questionnaires the participants' LOC, neuroticism, daily stress, coping strategies, and health indices were assessed. The data revealed that participants who had an external LOC were more vulnerable to illness when compared to participants with an internal LOC. However, Horner discovered that when individuals with high neuroticism and high external LOC encountered a stressor they were further likely to become ill, compared to the remainder of the participants.

In a similar study, using 94 Dutch students ranging in age from 18-28, Peters *et al.* (2003) examined the effects of trait characteristics and task appraisal on physiological stress responses. Systolic blood pressure (SBP), diastolic blood pressure (DBP), cardiovascular signals and the concentration of adrenaline and noradrenaline within blood plasma were measured throughout the course of the experiment. The participants' level of perceived LOC was measured using a Dutch translation of Levenson's IPC scales (1974). In addition, participants were assessed for their perceived level of aggression using Buss-Durkey Hostility Inventory (BDHI-D; Lange *et al.*, 1995). The participants were then subjected to one of the four experimental tasks: (1) high effort-controllable, (2) high effort-uncontrollable, (3) low effort-controllable and (4) low effort-uncontrollable.

The initial results suggested that uncontrollable tasks and high effort tasks were related to high systolic and diastolic blood pressure. Yet, physiological measurements and LOC did not differ depending on experimental tasks. In comparison to Horner (1996), external LOC alone did not affect physiological responses to stress. However, the interaction of trait characteristics, aggression and external LOC was found to influence the effect of the stressor on physiological responses.

Peters *et al.* (2003) discovered that when the effort of the task was low, the physiological responses of the participants increased compared to their physiological base-rates. When the task effort was high, the physiological response of individuals with high LOC and high aggression was lower than the response of those with low external LOC and low aggression. The researchers suggested that the latter groups' physiological responses were better attuned to the actual effort required to complete the task. It was further suggested that the arousal system of stressed high aggressive and external LOC

individuals might loose their flexibility to respond to the demands of the situation, consequently posing a health threat. However, some researchers contend that there is an association between the predictability of a stressor and an individual's perception of control (Maisel, 1972; Fisher, 1984).

1.1.2.3. Predictability

Researchers have debated the relationship between perceived predictability and control. Lazarus (1966) stated that cues about possible future harmful events constituted the perception of a threat, rather than actual damage or harm. In one experiment carried out by Haggard in 1943, participants were given the options of signalled or non-signalled, consistent or non-consistent, and self-administered or experimenter-administered, shock treatments (Fisher, 1984). The results suggested that the participants preferred the self-administered consistent pre-signalled shocks to the experimenter-administered, non-signalled and inconsistent shock treatments. In criticism, Fisher (1984) argued that the self-administered shock treatments were subjectively predictable. Subsequently, any effects ascertained were correlated with prediction and not to control.

In a subsequent study, Maisel (1972) reported that when participants had control over the termination of the noxious stimuli (loud noise) the impact of the noxious stimulus decreased, as measured by the subjective stress assessment. However, the data revealed that predictability (warning signal) provided an insignificant relief from the stressor. Therefore, contrary to Haggard's earlier inference, Maisel (1972) concluded that the perception of control had a greater impact on the participants' experience of the stressor than the predictability of the stressor did.

In a preceding experiment, Steptoe & Vögele (1989) studied the association of self-efficacy appraisal in participants with panic disorders (PD) and participants who possessed a panic disorder with agoraphobia (PDA). The researchers discovered that the core difference in the greater panic expectation reported by PDAs were the result of an over-prediction of loss of control in social situations rather than the prediction of coping efficacy failure.

1.2. Occupational stress

Applied psychology, in its various manifestations, has established a common boundary with occupational safety and health. Numerous journals and professional and academic structures are dedicated to and reflect the development of occupational health psychology research. Globally, the nature of work is changing rapidly (Bartezzaghi, 1999; de Jonge *et al.*, 2000; Tummers *et al.*, 2002). The resultant work environment has been reported to be determined more by economic imperatives and cost/benefit market-based approaches than by a consideration of the human implications of these changes (Dollard *et al.*, 2000; de Jonge *et al.*, 2000; Laschinger & Spence *et al.*, 2001).

Occupational stress is emerging as a prevalent problem in the modern workplace, with many surveys demonstrating that a large proportion of workers reporting being stressed at work (Spector, 2002). Within the scope of occupational stress research, many researchers have equated work stress with negative environmental factors such as workload, role conflict/ambiguity and poor working conditions (Cooper & Marshall, 1976; Karasek *et al.*, 1988; Söderfeldt *et al.*, 1996; Michie & Williams, 2003).

Role ambiguity has been commonly referred to as the extent to which employees know what they are meant to do in regard to their job, while role conflict has been described as the extent to which the job's role conflicts with an individual's beliefs and values (Tummers *et al.* 2002). The amount of workload one reports gives an indication of how difficult the work is perceived in respect to pacing and amount (de Jonge *et al.* 2000; Tummers *et al.* 2002). Additional determinants of stress have included decision authority (Karasek, 1979; Tummers *et al.*, 2002) and job control (Spector, 2002; Troup & Dewe, 2002).

Furthermore, job decision latitude has been defined as the individual's potential control over his performance during the working day (Karasek, 1979; Söderfeldt *et al.*, 1996). Karasek (1979) stated that decision latitude represented the opportunity for a worker to exercise judgement over his job demands or tasks, thereby enhancing the individual's feelings of efficacy and ability to cope with the environment. It has been suggested that jobs differ tremendously in the amount and type of control that is allotted to the employees (Spector, 2002; Troup & Dewe, 2002). Bulat (1981) and Spector (2002) described that control is very limited in jobs such as production-line work where the pace is controlled entirely by the speed of the assembly line. While high-level management jobs where employees are given assignments, which can be completed at their own pace and place, lie at the other extreme.

Within the occupational stress literature, many studies have reported that individuals with high levels of job demands, workload and role ambiguity had significantly higher job strain compared to those with low levels of job demands, workload and role ambiguity (Karasek *et al.*, 1981, 1988; McGrath *et al.* 1989; Schechter *et al.*, 1997; Wheeler, 1998; Laschinger & Finegan *et al.*, 2001; Pelfrene *et al.*, 2001). Furthermore,

employees with greater job control have reported less strain and greater job satisfaction than employees who reported having less job control (Karasek *et al.*, 1981, 1988; Spector, 2002; Troup & Dewe, 2002).

It has been affirmed that occupational stress has been recognised as one of the most significant workplace hazards for employees in the United States and other developed countries (Spector, 2002). Several studies have demonstrated that occupational stress has led to negative emotional reactions such as anxiety, mental fatigue and burnout (Holding, 1983; de Rijk *et al.*, 1998; Dollard *et al.*, 2000; Bradley & Cartwright, 2002; Michie & Williams, 2003) in addition to physical ailments such as cardiovascular disease and digestive disorders (Cooper & Marshall, 1976; Karasek, 1979, 1981; Michie & Cockcroft, 1996; Schechter *et al.,* 1997; Heslop *et al.*, 2002).

There is a growing body of research suggesting that there are specific psychological, physical and emotional demands associated with different occupations. A number of investigations have focused on the particular distinctions between socially concentrated work such as nursing, police, social work and inanimate work such as construction and production-lines (Karasek, 1979; Fletcher & Jones, 1993; Söderfeldt *et al.*, 1996; de Jonge *et al.*, 1999). The forthcoming section will focus on the variations in stress determinants between two types of occupations: assembly work and health and social services. Furthermore, the advantages and disadvantages, in reference to their affect on its operators, between the lean and the original Ford systems of production will be investigated and debated.

1.2.1. Systems of mass production

1.2.1.1. Lean vs. Ford system of production

Within the mass production industry, companies have had to overcome constant customer pressures, increased safety and pollution restrictions, foreign competition and frequent technological changes. In response, companies have been forced to search for solutions to reduce costs, increase productivity and improve quality (De Toni & Tonchia, 2002). In order to combat these changes U.S. and European carmakers that historically have relied on Ford or Taylor models of production have shifted toward lean production (MacDuffie *et al.*, 1996; Soderquist & Motwani, 1999; Shah & Ward, 2003)

The term *lean production* (LP) was inspired by the distinction that the lean production model required less stock, minimal space, and a decreased workforce compared with Ford production-line systems. The lean production-line system is similar to the Taylor organizational model in regards to the seeking of maximized productivity. In association with the Ford system of production, the lean system of production also seeks a synchronicity of production-lines.

In comparison to the preceding systems, the lean production system has been defined as a new production philosophy based upon its distinctive production model that combines alternative strategies in production, supply and operations management (Bartezzaghi, 1999; Soderquist *et al.*, 1999). Central to LP is the organisations' strive to maintain customer satisfaction, compete in markets, and maximise the efficiency of the workforce through the utilisation of work-teams, flexible tooling, zero inventory and Just-in-time (JIT) methods (MacDuffie *et al.*, 1996; Nishiyama & Johnson, 1997; Bartezzaghi, 1999; Söderquist *et al.*, 1999; Parker, 2003; Seppälä & Klemola, 2004).

The Ford-Taylor production models were designed to create a clear distinction between the company and workers' objectives through precise attributions of responsibility and defined boundaries, enforced by an authoritative hierarchy (Bartezzaghi, 1999). Contrary to previous production systems, lean production emphasised self-regulation and team co-ordination. De Toni & Tonchia (2002) and Forza (1996) suggested that the lean production model surpassed the Ford system, from the human point of view, when worker involvement took the place of bureaucratic control. The LP model emphasised a widespread recognition of operational, improvement, and motivational objectives. Furthermore, LP plants encourage their workforce to act as teams rather than as individuals. This induced teamwork is illustrated by the fact that performance levels in lean production systems are evaluated on the output of the team, rather than the output of the individual (Groebner & Merz, 1994; Forza, 1996; Parker, 2003).

JIT manufacturing system

Intrinsic in the lean production model has been the Just-in-time (JIT) manufacturing system. JIT was introduced as a company-wide quality improvement programme with the objective to meet the demands of the customer immediately (Hiltrop, 1992; Seppälä & Klemola, 2004). Hiltrop (1992) categorised the JIT concept into three basic principles: small quantity manufacturing, the creation of a product only when needed by the customer, and the elimination of resource waste.

The JIT system included flexible tooling. Flexible tooling was designed to permit flexibility in production-lines in order to match frequently changing customer demands. The theory of flexible tooling is structured around work teams, job rotation, and multiple skills training (MacDuffie *et al.*, 1996; Shah & Ward, 2003). To prevent human

resource waste, workers are trained for various skills that are required for the production-line. This method of cross training was designed to create the flexibility required to modify production-lines (Klein, 1989; Groebner & Merz, 1994). Some researchers believed that JIT methods and procedures could provide benefits that are highly attractive to the contemporary manufacturing organisations, such as increased group efficiency (Groebner & Merz, 1994; Forza, 1996) and increased team decision latitude (Bartezzaghi, 1999; Seppälä & Klemola, 2004).

Klein (1989) discovered that job variety, derived from the rotation between workstations, served to balance the LP line's workload. Furthermore, he reported that the teams were responsible for their lines' work system and patterning, therefore job variations helped to create team decision latitude in determining task sequences and work methods.

Groebner & Merz (1994) investigated the effects that JIT implementation on employee job attitudes. The employees were assessed on four aspects of their job attitudes; group effectiveness, organisational climate, job description, and job satisfaction. Employees were separated into three groups. Participants in Group 1 were currently working within the JIT production system. Participants in the second group were introduced to the JIT system during the study. The participants in Group 3 (control) remained in the original Ford production-line system throughout the study.

The results indicated that only the cohesiveness of the teams differed significantly between the participant groups. Groebner & Merz discovered that participants in Group 1 reported greater team support and appreciation for fellow team members than other participants. In the follow-up study two years later, the groups still showed little

change in job attitudes from the first survey. However, it was discovered that overall job satisfaction levels decreased. The researchers suggested that the overall decreased job satisfaction levels were due to recent job transfers. Groebner & Merz (1994) concluded that the workers resisted the change to their social groups, rather than changes in the work environment. This finding contrasted with the organization's preliminary theory that the assembly workers would resist change in their work environment. Therefore, contrary to what the researchers expected, the implementation of JIT did not cause any negative reactions within the workforce.

More recent, using production managers and supervisors from four Finnish manufacturing companies, Seppälä & Klemola (2004) examined the effect of the implementation of lean production systems on the perceptions of production, job satisfaction and stress. The employees reported that due to the implementation of LP opportunities for personal growth and development at work had increased. Even though the time pressure and quantity of work also increased, employees stated that their jobs had become more interesting and challenging. In accordance with Groebner & Merz (1994), the implementation of the lean system of production did not result in any negative reactions within the workforce. Moreover, Seppälä & Klemola discovered that the participants viewed the implementation of lean production as a positive change. However, some researchers view the lean system of production with scepticism.

Scepticisms

Advocates of lean production have emphasised the increased reports of job autonomy and job variety (Groebner & Merz, 1994; Forza, 1996; Bartezzaghi, 1999). However, sceptics of the lean production-line system have provided evidence that the implementation of LP systems have increased levels of occupational stress due to

perceived loss of individual autonomy (Klein, 1989), increased job insecurity (Groebner & Merz, 1994), work overload and under-load (Klein, 1989; Hiltrop, 1992; Taira, 1996; Nishiyama & Johnson, 1997; Parker, 2003).

Within the lean production system, workers are trained for all the skills necessary on the production-line. Essential for LP's ability to change with customers' demands has been the creation of a multi-skilled workforce (Groebner & Merz, 1994; MacDuffie *et al.*, 1996; Bartezzaghi, 1999). However, underlying the LP system of JIT, has been the fact that workers are expected to be multi-skilled operators, who have the ability to run multiple machine, do their own quality control, solve quality problems, and perform a variety of jobs involving a variety of skills and talents (Klein, 1989; Forza, 1996). Therefore, according to critics such as Klein (1989) and Hiltrop (1992), the JIT system of flexible tooling has forced workers into an inflexible position with increased job demands and limited slack time.

In his research Klein (1989) examined an engine plant. Initially, the organisation was based upon self-monitoring multi-skilled work-teams and a non-hierarchical managerial structure. Employees were allowed, in fact expected, to create their own workspace and assembly task patterns. However, due to an oil recession the plant was economically forced to implement JIT techniques.

Klein (1989) discovered that employees became more self-managing and monitoring after the implementation of JIT. However, the workers reported that the elimination of production variety required strict adherence to methods and procedures. In addition, workers stated that the machine-cycle time in the previous system had allowed for a certain amount of free time for administrative duties or team meetings. The new non-

automotive system allowed no such free time or too much free time. In addition, the rigid work cycles to which employees had to adhere eliminated the worker's ability to control their own work pace, which resulted in work overload and under-load. One worker demonstrated, "...today I am slowed down and bored. The entire day is stressful" (p. 64).

Furthermore, Klein (1989) found that workers reported less freedom in the decision making process. Workers who were previously encouraged to be involved in the improvement process reported that their initiatives and suggestions were limited according to the new system's guidelines, thereby creating a feeling of loss of trust. Some employees expressed that the plant shifted from a human focus to a business focus.

Building upon the results of previous findings, Parker (2003) examined the longitudinal effects of newly implemented lean production practices on employees' psychological health and perceptions of their work in a UK-based manufacturing company. One of the lean process required workers to work within cohesive teams or 'lean teams'. Team members were expected to take the responsibility for support tasks such as quality management and improvements. Parker (2003) discovered that the implementation of lean teams lead to perceptions of lower autonomy and lower job commitment. Consistent with previous criticisms, together the lean production processes were attributed to declined job autonomy, skill utilisation and decision-making. When the longitudinal effects of new production system were considered, the employees reported substantially reduced commitment to their jobs, increased depression and lowered initiative. Parker concluded by cautioning companies that were considering the

implementation of lean production processes, "...especially if they aspire to have a mentally healthy, self-efficacious and committed work force" (p. 17).

Previously, Nishiyama & Johnson (1997) examined the elements of LP and their potential effects on reports of "death from overwork", or what is commonly termed in Japan as *karoshi* (p. 625). The researchers found that job demands (i.e. multi machines) increased while job control decreased with the induction of LP. Subsequently, increased reports of fatigue, stress, tension and muscular disorders were associated with lean production methods. Moreover, the investigators discovered that the LP system of eliminating waste (i.e. free time, skilled trades, and workspace) was significantly correlated with increased reports of karoshi precursors such as heart attacks, strokes and myocardial infarction (p. 625).

In accord with Parker (2003 and Klein (1989), Nishiyama & Johnson stated, "Most people who glorify JPM (LP) fail to consider that its focus is almost entirely on what benefits the company, not on what benefits the workers" (p. 635). Due to the elimination of waste, idle time generated by machine-paced cycles was eliminated. The elimination of idle time has been further found to elevate work intensity (Hiltrop, 1992; Groebner & Merz, 1994).

Advocates believe that LP alternative methods have taught workers to adapt to any situation, to co-operate as a team, and to be self-thinkers. However, Nishiyama & Johnson (1997) argued that through the implementation of teams, lean production systems have emphasized an overall importance of the company needs over the needs of the employees. Nishiyama & Johnson concluded, "...we would expect LP to tend toward eliminating workers oriented social support and collectively –considering it

either an obstacle to increase productivity or merely a form of unnecessary 'waste'" (p. 636).

1.2.2. The health and social services

The manufacturing industry and the field of healthcare alike have undergone tremendous global change. Nursing today has been characterised by increasing holistic patient care and sophisticated medical technologies, as well as staff shortages and budget cuts (de Jonge *et al.*, 2000; Tummers *et al.*, 2002). Furthermore, dramatic cuts to hospital budgets have led to poor staffing patterns, heavy workloads, mandatory overtime, replacement by unlicensed assistive personnel, and lack of professional development opportunities (Dollard *et al.*, 2000; Laschinger & Spence *et al.* 2001). Subsequently, the nursing profession is reportedly dealing with a crisis in the recruitment and retention of staff (Bradley & Cartwright, 2002; Tanner, 2002; Tyson *et al.*, 2002). Ironically, the nursing profession is experiencing staff shortages due to fewer individuals choosing to enter the stressful occupation, while the occupation is getting increasingly stressful due to the lack of nurses, thus a debilitating cycle results.

Assembly work has been characterised by its limited role conflict and few emotional demands (Karasek, 1979, 1981; Karasek *et al.*, 1981, 1988; Söderfeldt *et al.*, 1996). However, in contrast to assembly work and other manual occupations, jobs within the human services field have often been characterised by high role conflict, high emotional demands, low control and low autonomy (McGrath *et al.*, 1989; Wheeler, 1998; Lusa *et al.*, 2002; Tummers *et al.*, 2002; Michie & Williams, 2003). In consequence, it has been reported that nurses experience higher rates of mortality, suicide, stress-related disease, psychiatric admissions and general physical illness than does the general population (Hillhouse & Adler, 1997).

The stress determinants (i.e. workload, control, decision authority) within occupations ranging from blue-collar manual jobs to white collar jobs are predominantly analogous, although varying in degrees. However beyond these usual stressors, socially orientated occupations, particularly within nursing, must be physically, psychologically and socially able to withstand the requirements of the job (Lusa *et al.*, 2002).

A distinctive difference between manual and health and social service occupations has been that individuals in health service jobs face greater levels of performance stress than assembly line work. Söderfeldt *et al.* (1996) referred to the fact that the objects of work in the human services are people, inevitably resulting in lower outcome control than work centred on inanimate objects or information. Nurses and doctors can only recommend that their patients take particular medications and follow through with the appropriate out patient care. However, the actual control ultimately lies in the hands of the patients. In addition, lack of control within the health services has been found to correlate with lack of personal accomplishment (McGrath *et al.*, 1989). McGrath *et al.* (1989) contended that the feeling of lack of personal accomplishment may "...be more likely in a profession which attracts those with idealism which is not realised in practice" (p. 356).

Occupational mistakes made by nurses or doctors have a greater possibility of grave consequences compared to a mistake made on the assembly line. In particular, within the field of medicine when grave mistakes are made patients can die. In many studies the negative effects of death and dying on nursing staff have been well documented (Hingley, 1984; Granger *et al.*, 1995; Couden, 2002; Valente & Saunders, 2002). Hingley (1984) contended, "Nursing is, by its very nature, an occupation subject to a high degree

of stress. Every day the nurse confronts stark suffering, grief, and death as few other people do" (p. 20).

McGrath *et al.* (1989) investigated the determinants of occupational stress on 171 nurses in Northern Ireland. McGrath *et al.* suggested that the major factor in high levels of occupational stress in the nurses was the lack of autonomy. The data revealed that the majority of the nurses reported that they felt unable to make decisions, at least sometimes, and felt powerless to change unsatisfactory situations. Some of the nurses noted that they felt inadequately trained or equipped for their job, yet it was also felt that the job itself did not always utilize their training and experience. In relation to the stressors in nursing itself many of the nurses reported too little time in which to undertake their work and shortages and rationing of scarce services and resources. Moreover, it was reported that the nurses' contact with other professionals, and imposing controls which restricted the personal autonomy of patients, made the nursing experience additionally stressful.

There are numerous studies that support the contention that nursing is stressful. However, some researchers have suggested that the sources of stress may vary. Using questionnaires and semi-structured interviews, Tyler & Ellison (1994) investigated the sources of stress and psychological wellbeing among 60 high-dependency nursing staff working in four separate areas: theatre, liver/renal, haematology/oncology and elective surgery. The results indicated that while the level of reported stress was similar across the areas the sources of stress varied. The authors noted that theatre nurses experienced less stress from patients' death and dying and from dealing with patients and relatives compared to that experienced by the ward-based staff. However, theatre and haematology nurses reported managing workload as the most stressful element of

their job. Furthermore, inadequate preparation was a significant source of stress for nurses working in the liver and haematology units, while competence and confidence were most stressful for nurses working in elective surgery. Similarly, post-qualified nurses experienced more stress from heavy workloads, lack of social support, and from conflict with doctors and other nurses –occupational stress symptoms that some researchers indicate can lead to burn-out (McGrath *et al.*, 1989; Wheeler, 1998; Michie & Williams, 2003).

1.2.2.1. Burnout

Evidence indicates that work overload and job control remained pervasive stressors within nursing (McGrath *et al.*, 1989; de Rijk *et al.*, 1998; Wheeler, 1998; Tummers *et al.*, 2002; Michie & Williams, 2003). It has been suggested that the feeling of a lack of accomplishment may also be manifest symptoms of stress (McGrath *et al.*, 1989). Subsequently, due to increasing job demands (e.g. inadequate staffing, work overload, low salary, and high physical workload) nurses as an occupational group have reported burnout and levels of psychological complaints that are above average (Tummers *et al.* 2002; Michie & Williams, 2003).

Many studies have focused on burnout as a predetermined consequence of occupational stress. Burnout is generally described as a negative experience distinguished by a psychological deterioration resulting from prolonged exposure to stresses that is associated with acutely intense occupations such as nursing, medicine and social work (McGrath *et al.* 1989; Söderfeldt *et al.*, 1996; de Rijk *et al.*, 1998; Tummers *et al.*, 2002). The psychological consequences of burnout were classified as emotional exhaustion, depersonalisation, and diminished sense of personal accomplishment.

De Rijk *et al.* (1998) investigated the effects of job demand and job control on emotional burnout in the health services. In support of previous research, de Rijk *et al.* found a relationship between exhaustion levels and job control in nurses. The researchers recorded fewer reports of emotional exhaustion in nurses with high rather than low control. In comparison, nurses with low occupational control reported greater job frustration. Overall, the level of emotional exhaustion was lower in situations with high job control than in situations with low job control. Furthermore, job demand and control, as well as individual coping strategies, were found to influence incidences of burnout in nurses. In conclusion, the investigators suggested that the need for control was more related to measures of job satisfaction than measures of strain.

In a more recent study, Tummers *et al* (2002) attempted to examine the relationship between work characteristics and psychological reactions in 1,855 nurses working in general hospitals throughout the Netherlands. The main results suggested that the complexity of the job and decision authority had an affect on emotional exhaustion levels and psychosomatic health complaints. It was also discovered that poor psychosomatic health (cardiac, appetite and stomach complaints) and high burnout symptoms corresponded with high workload, low social support, and high role conflicts. These results support previous research that found that role conflict within and outside the profession were associated with burnout (Söderfeldt *et al.*, 1996; de Rijk *et al.*, 1998) and increased CHD risk (Karasek, 1981).

In a preceding study, Hillhouse & Adler (1997) suggested that even within a ward or unit, nurses demonstrated highly individualized responses to work stress. This conjecture is consistent with the previous research that found that the perception of stress was individual and therefore determinants of stressors cannot be generalized to

everyone (Lazarus, 1966; Cox, 1978; Tomaka *et al.*, 1993). However, Tyler & Ellison (1994) found that the sources of stress varied between nursing wards, while the stress levels remained relatively comparable, suggesting that nursing wards need to be assessed as areas of unique occupational stress.

In the past few years there has been an increasing recognition of the importance and impact of job-related stress. The safe conclusion from reviewing the literature is that various occupations share the same stressors, such as workload (Wheeler, 1998; Tummers *et al.*, 2002), job control (de Rijk *et al.*, 1998; Pelfrene *et al.*, 2001) job demand and decision latitude (Karasek, 1979, 1981; Karasek *et al.*, 1981, 1988; Söderfeldt *et al.*, 1996). However, within the health and social services, particularly in nursing, individuals confront additional stress determinants such as interpersonal relationships (McGrath *et al.*, 1989; Tyler & Ellison, 1994), emotional load (de Jonge *et al.*, 2000), death and dying (Hingley, 1984), and perceived lack of accomplishment (McGrath *et al.*, 1989). There is also evidence that those employees who work in the health-related profession are suffering more than other workers (Muncer *et al.*, 2001; Tummers *et al.*, 2002; Michie & Williams, 2003). More broadly, it has been recognised that work-related stress and depression are among the most important factors affecting the health of UK employees (Muncer *et al.*, 2001).

While research has identified a variety of factors causally implicated in stress, few studies have looked at how these causes interact (Muncer *et al.*, 2001). Wheeler (1997) argued that a model of stress that accounts for the complex nature of nursing has not been developed. Nevertheless, it has been indicated that different occupations have similar determinants of stress. However, due to the different number and intensities of the stressors, some occupations can be more stressful than others. Therefore, coupled with

individual differences in perceptions of workplace stressors, occupational stress is a prominent concern with obvious consequences, which are in need of creative and innovative solutions. One attempt to assess the determinants of a stressful job was Robert A. Karasek's (1979) job demand-control model.

1.2.3. Robert A. Karasek: The JD-C model

Many attempts have been made to gain greater insight into the relationship between occupational stress and the psychological and physical effects. These attempts vary from Cooper & Marshall's (1976) model of job strain (involves factors intrinsic to the job, relationships at work, and career development); 'balanced work system' theory (Carayon, 1994) and the Identity theory (Frone *et al.*, 1995). However, one of the most researched models has been the job demand-control (JD-C) model.

Karasek developed the Job Strain model (1979), later referred to as the JD-C model (Karasek *et al.*, 1981) that involved the implicit theory that workload demand and decision latitude interact to affect job satisfaction, physiological, and psychological health. The crucial issue was not whether jobs with high demands and low decision latitudes were stressful, but rather whether there was an interaction (Figure 1.2). In corroboration of Karasek's theory, researchers have reported that the interaction between job control and job demand influence job satisfaction levels (Fletcher & Jones, 1993; Wall *et al.*, 1996; Laschinger & Finegan *et al.*, 2001; Pelfrene *et al.*, 2001), burnout (Clarke & Goetz, 1996; Söderfeldt *et al.*, 1996; de Rijk *et al.*, 1998; de Jonge *et al.*, 2000), performance (Manenica, 1977; Sargent & Terry, 1998; Dollard *et al.* 2000), turnover rates (McKenna *et al.*, 1981), absenteeism, (Dwyer & Ganster, 1991) and physical health (Karasek, 1979 & 1981; Kristensen, 1996; Michie & Cockcroft, 1996; Schechter *et al.*, 1997).

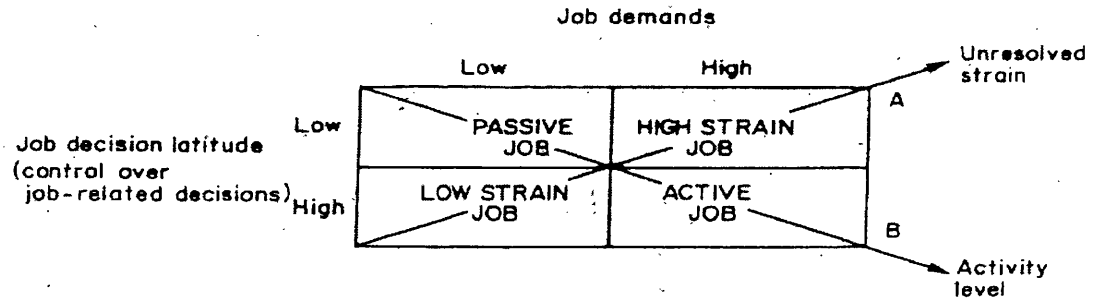


FIGURE 1.2. THE JOB DEMAND-CONTROL MODEL (Karasek, 1981)

1.2.3.1. Job demand and decision latitude

Karasek's (1979) original Job Strain model postulated that psychological strain resulted from the joint effects of job demand (work load) and decision latitude (discretion). Intrinsic in the Job Strain model were two principles: 1. When job demand is high and the level of control is low, psychological (i.e. depression, sleep disorders, or depression) and physiological strains (i.e. CHD and gastrointestinal disorders) could develop. 2. High job demand (i.e. volume and pacing) and job control would lead to personal growth, optimal learning, and job satisfaction (Karasek, 1979, 1981; Karasek *et al.*, 1981, 1988).

Job decision latitude (job control) has been defined as the individual's potential control over his performance during the working day (Karasek, 1979; Söderfeldt *et al.*, 1996). Karasek *et al.* (1979) stated that decision latitude represented the opportunity for a worker to exercise judgement over job demands or tasks, thereby enhancing the individual's feelings of efficacy and ability to cope with the environment. Karasek further described decision latitude as the constraint that transforms the release of stress into energy assessable for action. Karasek theorised, "If the individual must forgo other

desires because of low decision latitude, then the unreleased energy may manifest itself internally as mental strain" (1979, p. 287).

Initially, decision latitude was characterised by decision authority and intellectual discretion (i.e. pacing and skill utilization) (Karasek, 1979). However, in the succeeding literature decision authority was replaced by task orientation (Karasek *et al.*, 1981, 1988). Task orientation was different from decision authority in that individuals did not only make decisions about their immediate work tasks but could also influence organisational policies (Söderfeldt *et al.*, 1996).

1.2.3.2. Job strain categories

It could logically be assumed that decision latitude would increase with job demand. However, Karasek (1979) found a considerable amount of evidence suggesting that the correlation was in fact low. Subsequently, Karasek (1979, 1981) classified four areas of job types found in the workplace (Figure 1.2). Relaxed jobs were characterised by low demands and high decision latitude. High strain jobs had high psychological demand with low decision latitude. Active jobs contained high decision latitude and high control. Last, passive jobs were characterised by low job demand and low decision latitude. Consequently, passive jobs have been associated with job dissatisfaction (Karasek, 1979, 1981; de Jonge *et al.*, 2000) and high levels of absenteeism (Dwyer & Ganster, 1991; Schechter *et al.*, 1997). Conversely, the more demanding active jobs have been associated with high job satisfaction and reduced reports of psychosomatic illnesses (Karasek, 1979, 1981; de Jonge *et al.*, 2000) and low absenteeism rates (Dwyer & Ganster, 1991).

In one of his earliest studies, Karasek (1981) analysed various occupational and health data gathered by the US Examination Survey from 1960-62 and the US Health and Nutrition Examination Surveys from 1971-75. Karasek discovered increased reports of myocardial infarction and angina pectoris within high strain occupations compared to other job types. In similar studies, Karasek (1981) and Karasek *et al.* (1988) analysed Swedish secondary data on job characteristics and reports of myocardial infarction. In support of earlier research, low decision latitude and high psychological workload were associated with increased risk of myocardial infarction.

In both investigations, significant associations were found between the sample size in high-strain jobs and age. The data revealed that the population in high-strain jobs diminished significantly with age, suggesting that many of the potential victims of high strain work environments had switched to other job types, died, or retired, thus weakening the observable associations between job characteristics and coronary heart disease (CHD).

Schechter *et al.* (1997) analysed the relationship between the JD-C model's job types, subjective stress levels, and stress behaviours within a large company experiencing reorganisation and downsizing. Employees from various jobs completed the Job Content Questionnaire (Karasek, 1985), which assessed psychological demands and decision latitude. Based upon their responses, participants were classified into one of four job types (relaxed, active, passive, high strain). In support of Karasek's earlier findings, Schechter *et al.* (1997) reported that high stress levels were strongly associated with passive and high strain jobs. In addition, passive and high strain jobs contained significantly higher levels of worker absenteeism compared to relaxed and active jobs.

However, no associations were found between job type and self-reported variables such as blood pressure and heart disease.

Moreover, Schechter *et al.* (1997) found increased proportions of employees in high-strain jobs reporting poor to fair health. Similarly, employees in high strain jobs reported a greater level of absenteeism than other job types. However, employees in active and passive jobs had the largest consumption of alcohol. These findings were contrary to Karasek's (1981) premise that alcohol consumption levels would be greater in high strain jobs than in other job types. Schechter *et al.* (1997) explained that the association between active and passive job types and alcohol consumption could have been influenced by the confounding stress of impending lay-offs and job insecurity.

Dollard *et al.* (2000), de Jonge *et al.*, (2000) and Laschinger & Finegan *et al*, (2001) evaluated the JD-C scale within health services populations. Consistent with Karasek's research, the studies reported that high perceived stress levels were associated with high demands and less control (high strain). The results suggested that staff nurses who experienced high psychological stress at work, with little control over their jobs, were significantly less empowered, less committed to the organisation and less satisfied with their jobs than those with lower job strain. In addition, those nurses who reported greater control and decision latitude also reported greater confidence in their job-performance abilities and personal accomplishment. Furthermore, de Jonge *et al.* (2000) reported that high-strain jobs generated emotional exhaustion and psychosomatic health complaints. In addition, active jobs were concurrent with positive outcomes such as job challenge and job satisfaction.

In their study, Pelfrene *et al.* (2001) investigated the JD-C model within 25 large organisations across Belgium. Interestingly, his analyses suggested that the degree of psychological demands amongst the workers appeared to be the predominant factor in the levels of perceived stress, whereas decision latitude had a larger impact on job satisfaction. In a previous study, de Jonge *et al.* (2000) assessed the factors of the JD-C model with the addition of emotional demands, in a sample of health care providers. Although the results supported Karasek's JD-C theory, de Jonge *et al.* also reported that a majority of the variance was caused by emotional demands, which he attributed to the unique nature of the human services field. These variations in results support Wall *et al.*'s (1986) argument against the JD-C core contention that implies that the components of the JD-C model affect a range of different jobs and health related variables in the same way. Therefore, it was suggested that the components of and the theory behind the JD-C model might not be applicable to all occupations and indeed to all individuals.

1.2.3.3. Criticisms of the JD-C model

The effects of job variables on strain have been investigated, yet the predicted interactions between them have not been consistently demonstrated. Warr (1990) obtained no support for the prediction in an investigation of job-related anxiety, job-related depression, and job satisfaction within a heterogeneous sample of more than 1600 employees. More recently, Verhaeghe *et al.* (2003) examined the difference in the perceived job strain of Flemish health care workers and a control group of non-health care workers (i.e. secretaries, computer programmers, machine-operators). Verhaeghe *et al.* also examined the relationship between perceived job strain and illness-related absenteeism.

In accord with McGrath *et al* (1989), the health care workers reported higher workloads, more psychological demands and less decision latitude than those in the control group. In addition, 32% of the health care workers reported having high strain jobs, compared to only 16% of the participants in the control group. However, the investigators further found that the illness-related absenteeism rates did not differ between the two study groups. Other failures to confirm interactive effects have been reported by Manenica (1977), Fletcher & Jones (1993), Carayon (1994) and Verhaeghe (2003).

Within the JD-C model, decision latitude is comprised of skill discretion and decision authority (Karasek, 1981). The JD-C model theorised that job demand and job control would have interactive effects on psychological stress. Briefly discussed earlier, it has been found that the two components have individually affected outcome variables (Pelfrene *et al.*, 2001).

Karasek (1979, 1981) and Söderfeldt *et al.* (1996) equated control with decision latitude. However, Wall *et al.* (1996) argued that control provided the opportunity for individuals to adjust to demands according to their needs and circumstances. Wall *et al.* contended that subsequent research should analyse and define job control and decision latitude as individual factors that influence job strain.

Subsequently, Wall *et al.* (1996) analysed the effects of job decision latitude, control, and demand on job satisfaction, depression, and anxiety. The results supported Karasek's (1981) theory that job characteristics were associated with job strain. The analyses suggested that control was associated with job satisfaction and negatively associated with depression and anxiety. Strong correlations were found between decision latitude and job satisfaction, depression, and anxiety. However, in comparison to de Rijk *et al.*

(1998), Wall *et al.* reported that demand measures were not associated with job satisfaction or depression but were weakly associated with anxiety. De Rijk *et al.* (1998) and Wall *et al.* (1996) concluded that the need for control was a greater predictor of strain than the level of demand.

In a similar study, Fletcher & Jones (1993) reported that when assessed independently, job demand and job control predicted job and life satisfaction, anxiety, and depression. However, together, job demand and job control failed to predict any psychological or physiological strain. In addition, Dwyer & Ganster (1991) discovered that although high psychological demand and low job control were associated with increased reports of absenteeism. Psychological demand ratings alone were not associated with tardiness or sickness.

A number of researchers have proposed that the reported levels of job demand and job control were influenced by factors such as working conditions (Wall *et al.*, 1996), socio-economic variables (Fletcher & Jones, 1993), role ambiguity (Frone *et al.*, 1995), skill level and job complexity (Dwyer & Ganster, 1991). Furthermore, Schechter *et al.* (1997) reported that the high alcohol and stress levels found within some active and passive job types were due to the confounding stress of impending lay-offs and job insecurity. In exploring the criticisms of the JD-C model, the pacing of the work and task relevance will be examined in greater depth.

Paced vs. un-paced work

Manenica (1977) investigated job demand and job control using paced and un-paced work. Five men performed a simple repetitive assembly task for two hours. Participants were directed to assemble pieces in either a paced or un-paced manner. During both

conditions, pieces were delivered one by one from a feeding unit onto a conveyer belt that carried each piece to the participant. In the un-paced condition, the parts queued up in front of the participant and were indefinitely available for assembly. If the participant in the paced condition failed to assemble the part in the allotted time, the part was removed.

According to Karasek's (1981) job demand-control theory, the more stressful condition would have been reflected in increased levels of cardiac and respiratory variables. However, in contrast the JD-C theory, the cardiac indices suggested that the un-paced task were more physiologically demanding than the paced task (Manenica, 1977). Manenica (1977) suggested that the differences in the physiological indices were due to workload, even though the productivity levels between the paced and un-paced conditions were similar.

Manenica (1977) suggested that the participants in the un-paced task worked at their optimal pace while the participants in the paced condition may have experienced a work *under-load.* Manenica's concept of *under-load* could be equated to Karasek's (1981) theory of *under-utilization.* Karasek theorised that job-design strategies that advocated limited skill use and low decision latitude can resulted in negative consequences ranging from skill under-utilization to increased risk of CHD. Poulton (1978) suggested that the difficulty with work under-load was that there is not enough stimulation to keep a person alert. The work under-load could have made the worker bored and inefficient, thus explaining why fewer mistakes were made in the unpaced condition than the paced condition.

Manenica (1977) theorised that the lack of machine pacing allowed un-paced participants to optimise their level of productivity. Thus, the increased physiological indices could have been associated with the participant's effort and not to the task demand. Based upon Manenica's (1977) and Poulton's (1978) interpretations, the un-paced increased their productivity to combat work under-load and to remain active and alert. However, in terms of methodology, it could be argued that Manenica (1977) failed to demonstrate a true un-paced condition since the results revealed that the participants worked under a paced condition whether it was machine-paced or self-paced.

Task-relevance

Söderfeldt *et al.* (1996) referred to Karasek *et al's* (1981) decision latitude as task authority by reason of its ability to influence company policies. A recent point of attention has been the possible multifaceted nature of job demands and job decision latitude. Researchers have argued that Karasek's (1979) definition of decision latitude contained factors that are not consistent throughout all occupations.

Sargent & Terry (1998) contended that aspects of the job tasks that were central to daily activities (i.e. pace and work complexity) would have a greater impact on employee adjustment than dimensions that were less central to daily activities (i.e. scheduling and resources allocation). Sargent & Terry (1998) suggested that task-relevant sources of control such as work pacing were more relevant to the assessment of workload than peripheral sources of work control (i.e. resource allocation and organisational decision control). The researchers studied the effects of work control and job demand on employee adjustment and work performance using a multi-dimensional measure of workload. The dimensions of workload were task control, decision control and work

control. In addition, self-report measures and supervisor reports were used to assess the work performance of participants.

Sargent & Terry (1998) discovered that job control buffered the negative relationships between role ambiguity and job satisfaction, and work overload and depression. It is interesting to note that all the interactions involving task control were significant. There was no significant main or interactive effect when work performance was considered. Furthermore, high task control and high workload was associated with job satisfaction and low levels of stress.

These findings were comparable to those of Wall *et al.* (1996) and de Rijk *et al.* (1998). Wall *et al.* (1996) discovered that employees in high control and high demand jobs reported significantly less symptoms of depression than employees in high control and low demand jobs. Furthermore, de Rijk *et al.* (1998) and Laschinger & Spence *et al.* (2001) revealed that for nurses who displayed active coping, job control diminished the negative effects of job demands on emotional exhaustion, thus supporting Karasek's theory that high levels of work control and high job demand may enhance levels of well-being. De Rijk *et al.* (1998) and Sargent & Terry (1998) theorised that task-relevant aspects of work were more significant than peripheral aspects of work control on employee adjustment strains. Sargent & Terry (1998) added that future research into Karasek's JD-C model should investigate task-control and work-control as separate measures of job satisfaction and well-being.

1.3. Stress buffers

Any particular situation may induce a stress response on one occasion, but may not on other occasions. Understandably, this has led to the recognition that important psychological processes must intervene between the stimulus and the stress response- a psychological coping response that moderates the stress response. Johnson & Sarason (1979) reported, "Life stress is a product of changes that occur in one's life that require adaptation, coping and social readjustment" (p.151). Further attention has been paid to the role that social support can play in the adjustment to diverse stressful events such as work overload, role conflicts, bereavement and chronic illness. A major theme in the literature has been that social support and coping strategies can protect or buffer individuals against the negative consequences of stressful circumstances upon mental and physical health, including depression, psychosomatic symptoms and physical disease. The subsequent section will explore the debates and discussions surrounding the impact of social support and coping strategies on the relationship between occupational stress and health. Moreover, the effectiveness of support from co-workers, family and friends in relation to occupational stress will be considered.

1.3.1. Coping strategies

Coping refers to the process by which an individual attempts to manage internal or external demands. Within the literature, coping strategies have been divided into two basic categories; emotion-focused and problem-focused strategies (Lazarus, 1966, 1999; Healy & McKay, 2000; Lowe & Bennett, 2003; Patterson, 2003). Coping can include attempts at managing or altering the problem (problem-focused coping) or regulating the emotional response to the problem (emotion-focused coping). Problem-focused coping is notable for the elimination of a stressor through problem-solving (Skinner, 1996) and/or direct physical action (Tobin *et al.*, 1984; Suls & Fletcher, 1985; Shimazu &

Kosugi, 2003). Conversely, emotion-focused coping is characterised by the reinterpretation of the stressor/threat such as denial (Skinner, 1996), anger (Lowe & Bennett, 2003), avoidance (Tobin *et al.*, 1984; Suls & Fletcher, 1985; Blanchard-Fields & Irion, 1988; Murberg *et al.*, 2004) and/or regulating emotional responses in an attempt to consciously block the perception of the stressor (Patterson, 2003).

1.3.1.1. Problem-focused versus emotion-focused

Just as there is logical and supportive evidence for the efficiency of problem-focused strategies in reducing stress, the same is true of emotion-focused strategies. Yet both strategies, working in apparently different directions, have been found to be effective. The rational resolution is that problem-focused strategies work best under certain conditions, while emotion-focused strategies are optimum in others. How individuals perceive or appraise any specific problem could determine what coping strategy is used. A review of the literature has brought about a myriad of studies that explore this position. Within the literature, the individual's locus of control (Brewin *et al.*, 1989; Horner, 1996; Lowe & Bennett, 2003), age (Blanchard-Fields & Irion, 1988), education (Patterson, 2003), perception of consequences (Suls & Fletcher, 1985), home versus work stress (Patterson, 2003; Shimazu & Kosugi, 2003) and consequential job satisfaction (Healy & McKay, 2000; Tyson *et al.*, 2002) have all been explored in relation to the individual's adoption of coping strategies.

In their extensive review of the literature, Suls & Fletcher (1985) investigated the use of problem-focused and emotion-focused coping strategies. In addition, they explored how the perception of the long-term and short-term consequences of the stressor affects an individual's adoption of coping strategies. For the main meta-analyses, the studies were chosen based on four criteria: (a) explicit operationlisation of a stressor, (b)

problem-focused and emotion-focused coping strategies, (c) quantifiable outcome measure and (d) reported time between occurrence of stressor and outcome. Suls & Fletcher (1985) found within the data that participants did not report a preference for either emotion-focused or problem-focused strategies in the alleviation of subjective stress overall. Interestingly, when individuals were confronted with a short-term stressor, emotion-focused strategies were more beneficial. In comparison, problem-focused strategies were reported as superior to emotion-focused strategies when participants had to deliberate on the long-term consequences of the stressor.

Suls & Fletcher concluded that emotion-focused coping strategies were more beneficial than problem-focused coping strategies within the early stage of the stress experience. The researchers contended that in the early stage the individuals' resources were not sufficient to actively cope with the stressful circumstances. Therefore, when the individuals were faced with a chronic stressor the optimum coping strategy was to avoid the stressor until a later date (emotion-focused) when they could properly assess their resources and confront the stressor suitably (problem-focused strategy).

In support of these earlier findings, Horner (1996) and Landau (1995) discovered that participants with external locus of controls (LOC) were less likely to attempt to exert control over a stressful experience, which resulted in the participant perceiving life as stressful. These individuals were likely to use avoidance or emotion-focused coping strategies, which eventually led to further stress in the long run. Moreover, Landau (1995) reported that individuals with an internal LOC, who adopted active problem-focused coping strategies, experienced lower levels of depression than individuals with an external LOC.

Specifically, Murberg *et al.* (2004) examined the effects of avoidance coping upon mortality risks among 119 individuals with symptomatic congestive heart failure (CHF) attending an outpatient health clinic in Norway. The participants' use of coping styles (avoidance coping, active coping) (COPE: Carver *et al.*, 1989), level of neuroticism (Eysenck Personality Questionnaire: Eysenck & Eysenck, 1975) and physical status were assessed over a 6-year period. Similar to preceding research, avoidance (emotion-focused) coping was associated with increased risks of mortality. Murberg *et al.* suggested that in relation to CHF, counselling courses in active coping might help patients to manage their disease and thereby increase their longevity.

Within the literature there are several studies that focus on the effect of age on the employment of particular coping strategies. Blanchard-Fields & Irion (1988) examined the effect of age on the relationship between LOC and coping strategies. Participants were separated according to age into one of four groups: adolescent (14-17), young adult (18-25), middle age (30-50) and older adult (60+). Participants were then assessed for LOC using a revised version of the Internality Powerfulness of Others Scale (Levenson, 1981), and for coping strategies using the Ways of Coping questionnaire (Folkman & Lazarus 1985). In the preliminary analysis, the levels of stress were equivalent across the age groups. However, the middle aged and older adult groups reported a positive correlation between external (LOC) and the application of problem-focused strategies. Conversely, younger adults and adolescents reported a positive correlation between internal LOC and emotion-focused strategies.

Blanchard-Fields & Irion (1988) concluded that youthful individuals equated internal control in stressful situations with self-blame and therefore used emotion-focused coping strategies. These results support the previous premise by Lazarus (1966) who

stated that defence mechanisms such as anger, hostility, and self-blame arise from the need to maintain or restore self-esteem. However, in contrast, Blanchard-Fields & Irion (1988) reported that the mature participants' notion of internality involved the perception of LOC as internal and resulted in conscious and reflective appraisal. Blanchard-Fields & Irion found that individuals who perceived them as having control over the stressor assessed the situation as a challenge and consequently utilised problem-focused coping strategies. Overall, their study supported the contention that appraised controllability varies with age and therefore influences the adopted coping strategy.

More recently there has been substantial research into the buffering effects of coping strategies on occupational stress. Patterson (2003) examined the effects of coping strategies and education levels on work and life stress among police officers. Patterson theorised that work-related events were more likely to affect problem-focused strategies, whereas stressful family–related events were likely to affect emotion-focused coping.

Patterson found that emotion-focused coping moderated the effects of stressful life events. Therefore, emotion-focused coping had an effective role in buffering the negative effects of family and health-related stress. However, when assessed individually, problem-focused coping for stressful work-events actually resulted in a "reverse buffering effect" (p.223). In other words, the use of problem-focused coping strategies actually increased stress. Patterson reasoned that when problem-focused coping strategies were utilized in response to situations with no solution, stress would increase.

When assessing the effect of education levels on the adoption of coping strategies, Patterson (2003) found that police officers with a higher than the average level of

education for the occupation were more likely to use a variety of coping strategies in response to work events. Officers who had a higher level of education also reported a greater likelihood of using both emotion-focused and problem-focused strategies. These findings supported the previous findings of Suls & Fletcher (1985) in which they found that individuals used emotion-focused coping strategies until they perceive themselves as having the resources necessary to deal with the stressor (problem-focused coping). Interestingly, unlike Blanchard-Fields & Irion (1988) who found age influenced the adoption of coping strategies, Patterson (2003) concluded that it was the participant's education level that determined the use of all coping strategies.

In two cross-sectional studies, Healy & McKay (2000) and Tyson *et al.* (2002) examined the effects of coping strategies and job satisfaction on occupational stress in nurses. Both studies were created to investigate whether any coping strategy had beneficial buffering effects on occupational stress and job satisfaction. Consistent with prior research (Folkman & Lazarus, 1985; Patterson, 2003) Healy & McKay (2000) and Tyson *et al.* (2002) found problem-focus coping to be the most used coping strategy among nurses.

However, unlike Patterson (2003) who reported that problem-solving coping resulted in an increase in stress, Healy & McKay (2000) and Tyson *et al.* (2002) did not find an overall significant association between participants' reported use of problem-focused coping and mood disturbance or job satisfaction. When job satisfaction was assessed additionally, Tyson *et al.* (2002) found that problem–focused coping strategies buffered the effects of stress for nurses with low job satisfaction, whereas nurses with low job satisfaction, who infrequently used problem-focused coping strategies, experienced the greatest amount of stress. Tyson *et al.* theorised that problem solving among nurses

with low job satisfaction may buffer stress by focusing attention on controllable sources of stress. With reference to emotion-focused coping, both Tyson *et al.* and Patterson discovered that emotion-focused coping was positively correlated with perceived stress levels, however, emotion-focused coping strategies were not found to have any stress-buffering effects. Contrary to these findings, Healy & McKay (2000) discovered that although emotion-focused coping was reportedly the least used coping strategy amongst nurses, it resulted in higher levels of mental distress and mood disturbance when used.

The literature is lacking a fundamental resolution of the effects of coping strategies and the factors associated with an individual's adoption of coping strategies. Is it the age of the participant, educational level, locus of control, work vs. home stressor, or is it the actual perception of the consequences of the stressor that influence the employment of certain coping strategies? It is important to continue to unravel how humans approach and resolve the stresses of every day work and life. The next section will explore how the relationship that individuals have with others can affects the impact of occupational stress on health.

1.3.2. Social support

Many stress researchers have concentrated on the exploration of the buffering effect of social support (Miller et al., 1976; Lazarus, 1993; Green & Kocsis, 1996; Vedhara et al., 2000; Dirkzwager *et al.*, 2003; Keefe *et al.*, 2003). The buffering theory refers to the premise that a high level of social support will protect an individual against the negative consequences of stress. This theory implies that individuals who have strong social support systems are unlikely to be as affected by stressors and the consequential deterioration of psychological and physical health compared to those without a strong support system.

Cobb (1976) and Sarason *et al.* (1987) contended that an individual's social support network is central to an individuals' perception that they are cared for, loved, valued and belong to a network of communication and mutual obligation. Quick *et al.* (1996) expanded upon this theory of social support to include any psychological, emotional and material resources acquired through interpersonal relationships. In a prior study, Winnubst *et al.* (1988) suggested that social support was an interpersonal and emotional exchange process within social and personal relationships. Winnubst *et al.* contended that support structures provide different types of support: instructive support and emotional support. Instructive support has been described as the provision of advice, physical assistance and information, while emotional support is the expression that an individual is cared for, trusted, empathized with and loved (House, 1981; Sarason & Sarason, 1985; Winnubst et al. 1988). It was believed that instrumental and emotional support can either be provided by one group of individuals (i.e. family) or by different groups (i.e. family and co-workers). Yet, contrary to Quick *et al.* (1996), Winnubst *et al.* dismissed the inclusion of material resources (i.e. money, tools) acquired through interpersonal relationships as part of social support.

Research focused on social support has ranged from studies involving students (Sarason *et al.* 1985, 1987; Brewin *et al.*, 1989) to empirical occupational studies assessing industrial labourers (Handy, 1978; Baker *et al.*, 1996; Schmieder & Smith, 1996) and nurses (Mendelson *et al.*, 2000; Bradley & Cartwright, 2002; Tyson *et al.*, 2002). Furthermore, some of the literature has explored the differences and the effectiveness of occupational and home social support structures (Handy, 1978; Payne, 1980; Schmieder & Smith, 1996). Research involving the perception of social support has expanded to include cognitive appraisal (Winnubst *et al.*, 1988; Brewin *et al.*, 1989; Vedhara *et al.*, 2000),

chronic versus acute stressors (Miller *et al.*, 1976) and economic status (Séguin *et al.*, 1995).

Amid the social support literature it is maintained that an individual's belief that he/she has people available to care and help when needed may be the key factor in social support's mediation of health. Consequently, numerous investigations have examined the moderating effects of social support on physiological and psychological outcomes (Brewin *et al.*, 1989; Baker *et al.*, 1996; Bruhn, 1996; Green & Kocsis, 1996; Schmieder & Smith, 1996; Dirkzwager *et al.*, 2003; Keefe *et al.*, 2003).

The subsequent sections will delve further into the debates surrounding social support. It will commence by exploring the relationship between social support and health. Last, the effectiveness of the support depending on the source (i.e. family, co-workers) in relation to occupational stress will be discussed.

1.3.2.1. Social support and health

Although the importance of the relationship between social ties, well-being and health has long been recognised by social and behaviour scientists, particularly during the past decade researchers have examined the relationship between the characteristics of social relationships and a variety of physical and psychological symptoms. There is growing evidence that personal adjustment, social behaviour, health maintenance and recovery from illnesses can be significantly influenced by individuals' access to the support of others. Research into the moderating effect of social support has produced significant correlations between stress and psychological symptoms such as anxiety, depression and irritability (Miller *et al.*, 1976; Séguin *et al.*, 1995; Vedhara *et al.*, 2000; Dirkzwager *et al.*,

2003) and physiological symptoms such as pain, high blood pressure, and breathlessness (Winnubst *et al.*, 1988; Baker *et al.*, 1996; Bruhn, 1996; Keefe *et al.*, 2003).

In an early study, Miller *et al.* (1976) used an opportunity sample of 37 patients who attended a general practice in Edinburgh. Through home interviews, data were collected regarding the number of individuals that the participants could turn-to for support, and how near/close that support was to the participant. In addition, the number of threatening (e.g. car accidents, severe illness) and non-threatening (e.g. new baby, work relocation) life events that participants experienced three months prior to their interview was gathered. The levels of psychological symptoms (anxiety, depression) and physiological symptoms (headache, dizziness, breathlessness) were also measured.

The amount of threatening life events was associated more with the severity of the psychological rather than physical symptoms. With reference to the moderating affect of social support on health, Miller *et al.* concluded that lower levels of perceived available acquaintances and/or confidants were associated with higher psychological symptoms. In addition, participants who experienced a higher amount of life threatening events were more likely to develop symptoms and seek assistance from a doctor than those who experienced fewer life threatening events. In particular, it was noted that participants with fewer friends were more likely to seek assistance from doctors or other medically trained personnel for symptoms arising from threatening life events. Miller *et al.* theorised that those participants with fewer casual friends sought medical assistance to replace a casual social support network.

More recently, Vedhara *et al.* (2000) investigated the relationship between social support and emotional responses to emergency dental treatment. Participants were selected from

individuals attending an emergency outpatient dental clinic. Individual perception of social support was measured by the Significant Others Scale (Power & Champion, 1992), which assessed the amount of support provided by others and the extent to which that support matched the participants' ideal support. The emotional distress levels before and after treatment was measured using a shortened version of the Spielberger State Anxiety Inventory (Marteau & Bekker, 1992).

Contrary to Miller *et al.* (1976) Vedhara *et al.* found that anxiety levels did not differ between participants who reported different amounts of support. Vedhara *et al.* further noted that the perceived level of social support between accompanied and unaccompanied participants did not differ significantly. In fact, the only significant difference that emerged was between in situ support and pre-treatment anxiety levels. Participants who reported the highest levels of support before treatment also had the highest levels of anxiety prior to treatment. It was further discovered that those who attended the dental hospital chose close family members to accompany them. Vedhara *et al.* therefore theorised that the presence of a significant other resulted in increased anxiety for the participant. This theory is further supported by research identifying family members as a source of negative support (Green & Kocsis, 1996; Dirkzwager *et al.*, 2003).

Conceptual and methodological issues surround the debate concerning the measurement of social support. In order to measure social support effectively, it is necessary to know which aspects of social support are important. The majority of the literature has focused primarily on the perceived number of available social supports (e.g. Miller *et al.*, 1976; Séguin *et al.*, 1995). Overall, it has been proposed that the size of an individual's social network plays a significant role in moderating the negative effects

of stress. A notable objection to the quantity of social support approach has been that the mere number of social relationships does not indicate anything about the quality of support or the helping interactions that take place (Winnubst *et al.*, 1988).

Many authors, particularly sociologists, have conceptualised and measured social support in terms of its reliability and effectiveness. Such conceptualisations have been referred to as qualitative social support. Cobb (1976) defined social support as a 'social source which leads an individual to perceive that he is loved and cared for and that he is esteemed and valued as part of a network of communication and mutual obligation' (p. 301). This second approach measures social support by the subjective experienced quality of the social relationship. Subsequently, Hobfoll & Vaux (1993) suggested that intimate social networks provide high quality support for several reasons. The foremost of these is that quality friends and family are more likely to be responsive to one's distress, more motivated to expend energy to help, more accurate about the nature and degree of one's difficulties, provide help appropriate to one's needs, and to positively influence one's self-esteem.

Within the literature social support has been frequently identified as a valuable social commodity, thus suggesting that those who are endowed with social support are, in most cases, at an advantage. However, in some circumstances social support has been found to be detrimental by creating additional stress (Sarason *et al.*, 1985; Dirkzwager *et al.*, 2003). Hobfoll & Vaux (1993) affirmed that although the effect of social support moderately buffers the effects of stress in a majority of the individuals, in some cases social support contributed to more distress than relief for the recipient.

Former international peacekeepers that participated in operations between the years of 1979-1995 were used by Dirkzwager *et al.* (2003) to examine the relationship between positive and negative social support on the symptoms of post-traumatic stress disorder (PTSD). The researchers used both cross-sectional and longitudinal studies. Participants were asked to complete the Self-Rating Inventory for PTSD (SRIP: Hovens *et al.* 2000) and the Social Experience Checklist (SEC: Revenson *et al.*, 1983). The Social Experience Checklist consisted of two scales measuring the amount of positive and negative social interactions.

In the cross-sectional analysis, higher degrees of supportive social interactions were significantly associated with fewer PTSD symptoms (i.e. anxiety, intrusive memories). Conversely, more occurrences of negative social interactions were significantly associated with more PTSD symptoms. However, after controlling for the level of stressors, higher supportive social interactions were associated with decreased severity of PTSD symptoms. Principally, negative social interactions affected the relationship between additional stressful life events and PTSD symptoms among the veterans. When the longitudinal data were analysed, not only were both supportive and non-supportive interactions associated with PTSD severity, but more supportive social interactions and support seeking in 1996 were associated with less PTSD symptoms severity in 1998. Dirkzwager *et al.* concluded that the level of negative and positive social interactions affected the relationship between stressful life events and PTSD symptoms.

Distinct from the preceding studies, Dirkzwager *et al.* (2003) independently assessed the negative and positive social interactions when they explored the effects of social support on psychological health. The researchers discovered that negative social interactions in

stressful situations, such as international political conflicts, actually increased the symptoms of post-traumatic stress disorder in future years. Unlike Dirkzwager *et al.*, it could be argued that Miller *et al.* (1976) and Vedhara *et al.* (2000) measured the individual's perceived amount of social support, which is a combination of negative and positive social support. Thus, merely exploring the amount of social support that an individual perceives does not exhaust the possible relationships between stress, social support and distress.

Conversely, Coghlan (2003) suggested that immediate counselling after traumatic events might actually exacerbate the levels of stress and the subsequent psychological effects. In cases of traumatic circumstances, it has been customary to offer immediate single session debriefings to individuals in order to prepare them for any psychological problems that they may encounter later. However, according the research of Coghlan (2003), such debriefings can bolster stress in some individuals who may have otherwise recovered normally. He reported that the debriefing sessions might prime individuals to expect post-traumatic stress symptoms, which in some cases may be enough to trigger psychological problems after an incident. Therefore, in some cases, the social support from immediate professional counsellors may in fact be detrimental to the psychological well-being of the individual, contrasting with the beneficial social support provided by family and friends.

The importance of positively valued, intimate relationships has been particularly emphasised in the case of serious disease. In such a situation, there is a large group of potential support-givers, including spouses, family, friends, colleagues, social workers and physicians. However the proximity of a supportive person may be decisive for the relative well-being of the patient (Winnubst *et al.*, 1988; Shannon, 1996). Green &

Kocsis (1996) investigated the effect of social support and well-being in HIV disease. In their research, they suggested that the source and type of social support played an auxiliary role in the treatment of chronic illnesses. They discovered that the interactions between someone infected with HIV/AIDS with friends and/or family, or a professional caregiver, were disparate due to the fact that the patients often sought to guard and protect family members from the unpleasant aspects of HIV and AIDS. An example of this was that patients were more likely to disclose their HIV status to their lovers but not to colleagues or family members until symptoms started to develop. In addition, the patients would turn to their caregivers for advice, treatments and assistance. Therefore, Green & Kocsis' research indicated that based upon the nature of the problem (illness, intimate issues) different sources of support could fulfil different roles for individuals.

1.3.2.2. Occupation and family social support

The effectiveness of the support from families as a buffer against occupational stressors has been widely debated. The systems approach theory proposes that family interactions at home assist individuals in dealing with problems at work, therefore increasing work and home satisfaction (Bauer et al., 2003). Payne (1980) suggested that due to its structure the family is an extremely effective buffering system. He particularly emphasized that work-group structures frequently limit socialisation and restrict discussions primarily to work issues. Therefore, in comparison, the family has a more detailed understanding of the individual and can therefore provide greater support and knowledge than members of a work group.

More recently, Mendelson *et al.* (2000) explored the effect of occupational stress and social support on reports of Sick Building Syndrome (SBS). The Sick Building Syndrome was characterised by seemingly healthy individuals experiencing long-term psychological

and/or physical distress due to their work environment, which in 2000 consisted of 20-30% of all work settings in the USA (Mendelson *et al.*, 2000). In the study, five hospitals distinguished as *sick buildings* were investigated. The employees' perceived support from their union, employers and significant others were assessed using the Perceived Organisational Support Scale (Eisenberger *et al.* 1986) and the Perceived Attitudes of Significant Others scale (Mendleson *et al.*, 2000). The severities of physical and psychological symptoms were measured using the Neurobehavioural Symptom Checklist (Bauer *et al.*, 1992).

The analyses revealed that perceived support was positively associated with perceptions of adverse health effects such as nausea, dizziness and fatigue. In particular, low levels of support from supervisors and unions were associated with increased reports of adverse health. However, participants with high perceptions of ill health resulting from their work environment also reported high levels of support from significant others. Mendleson *et al.* concluded that the more participants perceived their work environment to adversely affect their health, the more they sought support from family and friends.

Alternatively, it has been suggested that the relationship between work and home is circular, indicating that stress at home can cause more stress at work. This view is supported by researchers such as Handy (1978) and Schmieder & Smith (1996) who argued that non-work social support is ineffective in reducing occupational stressors: any disturbance of family life could amplify the amount of stress in an already stressful situation. Handy argued that due to the nature of the family, such as its proximity, personal and emotional attachment, history and influence, that fluctuations in the family relationship must affect work and the whole person. Independently, family support can

prove to be helpful in some situations and detrimental in others. Consequently, Handy contended that "...the family is both a help and a hindrance" (p. 121).

1.3.2.3. Occupational stress and social support

The buffering effects of work-place social support on occupational stress and health have been widely investigated (Winnubst *et al.*, 1988; Baker *et al.* 1996; Schmieder & Smith, 1996; Mendelson *et al.* 2000; Bradley & Cartwright, 2002; Patterson, 2003). Underlying the theory of the buffering effect within the occupational setting is the assumption that high levels of social support can protect an individual against the negative consequences of occupational stressors.

Recently, Bradley & Cartwright (2002) examined the effects of perceived organizational support on the health, occupational stress and the job satisfaction of a sample of 1,162 English nurses. The results indicated that perceived organizational support was positively related to nurses' health and overall job satisfaction. Interestingly, Bradley & Cartwright concluded that current interventions by organizations to induce and increase social support might be limited in their effectiveness unless the employees' perceptions of organizational support are taken into account.

In a comparable study, Schmieder & Smith (1996) studied within nurses the effects of perceived social support on job stress and the intent to quit. Nurses from an urban hospital in the USA participated in the study. The 13-item social support scale developed by House & Wells (1978) assessed the nurses' perceived support from four sources: supervisors, co-workers, spouse, and friends and family. In addition, the nurses' level of role ambiguity, job satisfaction and intent to quit were measured. The results suggested that supervisor and co-worker support buffered the effect of role ambiguity in

predicting global job satisfaction and intent to quit in the shift-working nurses. Additionally, co-worker support was found to buffer the effects of role ambiguity in predicting global job satisfaction. Interestingly, non-work social supports were generally ineffective in reducing the negative effects of workplace stress.

Furthermore, it has been argued that the effectiveness of social support on occupational stresses may depend on the occupation of the individual. Patterson (2003) asserted that, due to the nature of police work, support sub-groups develop in which officers perceive that only other police officers can understand and relate to their occupational stresses. However, Patterson commented that the seeking of social support from these sub-groups was effective in reducing stress arising from work events, but not for life events. Similarly, several researchers have noted that the absence of support from administrators, supervisors, and co-workers, in addition to role conflict, role overload, and role ambiguity were positively correlated with reported perceptions of occupational stress (Baker *et al.*, 1996; Clarke & Goetz, 1996; Schmieder & Smith, 1996).

In two cross-sectioned studies, Baker *et al.* (1996) and Winnubst *et al.* (1988) explored the buffering effects of supervisor and co-worker support. The researchers reported that the manual labourers (blue-collar) consistently described greater effective co-worker support than supervisors. Yet, both occupational levels (blue and white collar) reported that instrumental social support provided by supervisors was of greater importance than co-workers support. This could be the result of the fact that work groups are primarily designed to accomplish cohesive corporate goals and therefore any interactions with supervisors will focus on production levels and instructive support. In a component-part manufacturing plant Baker *et al.* further reported a positive correlation between effective and instrumental support from supervisors, and decreased negative job feelings.

Furthermore, increased co-worker support was associated with decreased depressive symptoms.

In the work place social support may encompass a range of types of formal or informal processes. It has been suggested that managers provide support to their workers by allocating tasks and information to those individuals who are capable of handling the task and by providing the required skills and resources (instructive support) (Winnubst *et al.*, 1988; Bradley & Cartwright, 2002). Whereas, the second effect of social support concerns the positive influence that one's relationship with others has upon mental and physical health by meeting important needs such as regard, belonging and understanding (emotional support). In accord, Winnubst *et al.* (1988) concluded that non-supervisor/manual workers consistently work with each other, thus greater personal relationships are fostered that are unlike the organisationally created relationships with supervisors. It could be argued that there is a remarkable similarity in the type of support provided by family and co-workers (emotional support), compared to the rigid, goal orientated instruction support offered in the workplace by supervisors.

The conjecture that social support has significant effects on stress and health has been thoroughly debated and defended. However, within the literature, disputes remain regarding the affective strength of independent support variables on the relationship between occupational stress and health. For example, the findings indicate that differentiating between the types and sources of social support available to individuals may be important to advance the understanding of the role of social support in occupational stress. However, few occupational stress researchers have specifically addressed these issues.

Specifically, few researchers have investigated the relationship between the need for support and seeking of support, and occupational stressors and health (Green & Kocsis, 1996; Mendelson *et al.*, 2000; Schwarzer & Schulz, 2000). Although some researchers have explored the extent to which individuals need and seek support, there are few, if any, explorations into the provision of support that individuals' need and seek, and how the provision of support may affect the relationship between stress and health? Just as the need and seeking of support are influential, the provision of support can be arduous in that time must be taken to attend to those seeking the support. Moreover, it has been suggested that dealing with the concerns and problems of others can vicariously induce stress in the provider (Green & Kocsis, 1996).

The available evidence about the indirect effects of the source, need, provision, and quality of social support is very limited. Some measurements of support such as the Arizona Social Support Interview Schedule (Barrera, 1981) and the Duke Social Support Index (DSSI) (Keefe *et al.* 2003) focus solely on the type of available support. The Significant Others Scale (Power & Champion, 1992), Michigan Model (Winnubst *et al.* 1988) and the House & Wells (1978) revised version of Caplan's (1975) support scale provide a more inclusive assessment of support by measuring the type of support available from various support sources. Yet, even between themselves these scales differ as to what sources of support are considered. While the Michigan Model examined the roles of co-workers and supervisors as support, the Significant Others Scale considered the role of family members, spouses, relatives and friends. Moreover, the House & Wells scale examined the roles of co-workers, supervisors, spouses, friends and relatives.

In contrast to the mentioned scales, the Social Support Questionnaire (SSQ) (Sarason *et al.* 1985, 1987) examined the amount *and* the extent to which individuals are satisfied with the support, in addition to the number of people the individual can turn to in times of need in a variety of situations. The later of which correlates to the findings of Green & Kocsis (1996) in which it was concluded that based upon the nature of the problem (illness, intimate issues) different sources of support may fulfil different roles for individuals. These situations ranged from 'Whom can you really count on to help you feel more relaxed when you are under pressure or tense?' to 'Whom can you count on to console you when you are very upset?' The SSQ was comparatively comprehensive social support questionnaire. It assessed the type of support (intimate, general, relaxed), quality and quantity of support. However, it failed to consider the source of the support (i.e. family, co-workers). Do family members or co-workers provide the more effective support in relation to occupational stress? Do family members or friends provide the highest amount and quality of support in intimate situations? Some authors argue that due to the closeness and intimacy of the family structure, family members are the optimum source of support (Payne, 1980; Bauer *et al*, 2003). In opposition, it has been argued that in relation to occupational stress, co-workers can best relate and therefore provide the most effective social support (Handy, 1978; Winnubst *et al.*, 1988; Bradley & Cartwright, 2002).

More recently, Patterson (2003) suggested that the principal source of support is dependent on the type of support needed. He argued that in relation to occupational stress (i.e. work schedules, job demands) co-workers are the most effective, whereas family and friends support is suited to life stresses (i.e. deaths, moving house, accidents). Notably, one source of support has been overlooked in the literature. As it is not uncommon for individuals to meet with co-workers outside of work, would it be

uncommon for co-workers to provide support outside of the workplace? Payne (1980) noted that work-group structures frequently limit socialisation. Therefore, due to the limited time at work for socialisation, it stands to reason that some co-workers might meet outside of work to discuss work and/or personal problems and stresses. As it involves individuals who work together as well as socialise outside of work, the subsequent relationship might be closer/more intimate than standard co-worker relationships. Consequently, it could be argued that four sources of support exist in relation to occupational stress: family, friends, co-workers at work, and co-workers outside of work.

With the varying social support scales available, there are no measures that directly explore the relationships between all these aspects of support (i.e. need, quality, quantity, source, degrees of intimacy). This gap in the social support research could lead to theoretical problems considering that researchers could misinterpret the prevalent component responsible for moderating occupational stress by failing to explore all of the elements that construct the social support structure. There remains a theoretical need for further measurements and consequential research into the effect of social support structures (i.e. quality, quantity, nature, source and seeking of social support) on occupational stress and health.

1.4. Summary

First introduced by Walter B. Cannon's Fight-or-Flight theory, and then popularised by Hans Selye's contemporary General Adaptation Syndrome, the term stress has emerged as a universally recognised expression and idea. Within the literature, stress has been defined as the adaptive result of a confrontation with stimuli. Stress has also been

described as the stimulus, which when it acts upon an organism will create a physical or psychological strain within that organism. In spite of varying definitions of stress, volumes of research have provided evidence that associate stress with a number of negative responses such as cancer, physical fatigue, mental fatigue, depression, and cardiovascular disease. The conjecture that stress can produce negative responses within organisms is extensively supported. However, research has suggested that individual responses to stressful situations differ.

Understandably, it has been recognised that important psychological processes must be intervening between the stimulus and the stress response. Therefore, the research community has sought to explain the personal aspects that diminish or intensify the effects of occupational stress on health. Social support and coping strategies have been two foremost-investigated stress buffers. However, it has been argued that social support and coping strategies can either protect or expose individuals to the negative consequences of stressful work circumstances upon mental and physical health. The rational resolution of the contradiction is that one stress buffer may be most adequate under a certain circumstance, while another stress buffer may be optimum in another.

However, the literature is lacking a fundamental resolution of the effects of coping strategies and the factors associated with an individual's adoption of coping strategies, such as: age, educational level, locus of control, and work vs. home stressor. In addition, despite the important advances that have been made in the study of social support, the field required further exploration of the independent factors (i.e. source, situation, quality, provision) associated with the buffering effects of social support. Therefore, further research must delve into the utilisation of coping strategies and the various

aspects of social support, which assist in alleviating the negative effect of occupational stress on health.

CHAPTER 2

2. Methodology for Study 1

Stress theorists have contended that continual stressful events can negatively influence an individual's health and well-being. However, within the volumes of contemporary journals relating to stress, few areas have been as extensively explored as the workplace. Globally, the nature of work has been evolving, reflecting the demands of human resources and economics. Subsequently, occupational stress has emerged as a prevalent problem in the modern workplace with a large proportion of workers who report feeling stressed at work (Spector, 2002). Yet, within the evolving workplace and the subsequent increased levels of reported occupational stress, some investigators have suggested that individuals have resources that can defend/buffer against the negative influences of stress. Underlying this buffering theory has been the assumption that personal coping strategies and social support structures could moderate the relationship between occupational stress and health levels.

In gathering the data for Study 1, a South Wales automotive parts production plant was selected for two reasons: the first being that the environment (noisy, machine centred, manual labour) of production plants have been found particularly stressful. Second, the particular plant was chosen as a new production-line was being introduced. Therefore, this provided the opportunity to compare the Ford system of production and the lean system of production within the same plant. This was significant to the research because workers within the same organisation who had similar tasks, but different processes in which to accomplish their tasks (Ford vs. lean systems of production), could be compared. In addition, longitudinal variations in the levels of occupational stressors

health of the workers on the established traditional production-line and newly implemented lean production-line could be assessed and compared.

Aim

In the context of prior research, the aim of Study 1 was to investigate the factors (social support, coping strategies) that moderate the relationship between occupational stressors and health.

Objectives

There were four objectives of Study 1. The first objective of Study 2 was to examine the relationship between levels of reported occupational stressors and reported health. The second objective was to examine whether there would be differences in occupational stressor levels depending on the system of production (Ford, Lean), and how these differences affect health levels. The third objective of the study was longitudinal and examined if a negative relationship existed between occupational stressors and health levels over ten months. The fourth objective was to examine the relationship between proposed stress buffers (social support, coping strategies), occupational stressors and health.

Hypotheses

In line with the above discussion, the following hypotheses were formulated:

1. Participants with higher occupational stressor levels will also have poorer physical and psychological health.
2. The lean production-line will have higher occupational stressor levels and poorer health than the traditional production-line.

3. Participants with higher occupational stressor levels will also have poorer physical and psychological health over time.
4. The interaction between social support and occupational stressors will influence physical and psychological health levels.
5. The interaction between coping strategies and occupational stressors will influence physical and psychological health levels.

2.1. Methods

Participants

166 shift-working males from a South Wales automotive parts production plant volunteered to participate in the study. The participants' ages ranged from 22-60 years (mean age = 42, SD = 9.61). Each man was asked to complete a series of questionnaires at three time points: November 2000 (T1), March 2001 (T2) and August 2001 (T3).

Questionnaires

The study used a collection of standardized scales and demographic items to assess the levels of proposed stress buffers, occupational stressors and health. The questionnaires distributed at T1 and T2 were a combination of scales for two independent studies: the present study and another research project. The data collected from the following scales were assessed independently from the later study.

Time 1 (November 2000)

The complete questionnaire can be found in Appendix A1.

1) Job Satisfaction Questionnaire (Hackman & Oldman, 1975)

The Job Satisfaction Questionnaire that formed part of the Job Diagnostic Survey consisted of 5 items designed to assess an individual's satisfaction with his job. Respondents were asked to rate how strongly they agreed with questions relating to job satisfaction. The Likert scale ranged from 1-*Disagree strongly* to 7-*Agree strongly.* Individual scores were calculated as the sum of the items. Higher scores represented higher job satisfaction. According to Hackman & Oldman (1975) the Job Satisfaction Questionnaire had good internal consistency, with a Crobach alpha coefficient reported of .76.

2) Chronic Mental Fatigue Questionnaire (Bentall *et al.,* 1993)

Chronic mental fatigue was assessed through nine items measuring mental fatigue symptoms such as confusion, energy levels and the ability to make decisions. Individual scores were calculated by the extent to which the respondent had been affected by various symptoms of chronic mental fatigue during the last month. Since the questionnaire was used on a shift-working population, three questions relating to shift-working fatigue from the Survey of Shiftworkers (Barton *et al.,* 1995) were incorporated. The Likert scale ranged from 1-*Not at all* to 5-*Very much.* Individual scores were calculated as the sum of the nine items. A higher score represented a higher level of chronic mental fatigue. According to Bentall *et al.,* (1993) the Chronic Mental Fatigue Questionnaire had good internal consistency, with Crobach alpha coefficients reported as .85 and .86.

3) Coping Strategy Questionnaire (Barton *et al.,* 1995)

The Coping Strategy Questionnaire was a revised 8-item version of the Coping Strategies Inventory (CSQ: Tobin *et al.,* 1984). The coping strategy questionnaire measured the degree to which the respondent used two types of coping strategies:

engagement (problem-focused) and disengagement (emotion-focused), when faced with a problem inside and outside of work. A respondent who actively tried to overcome the situation or stressor was classified as using engagement coping. An inactive response or submission to the situation or stressor was classified as disengagement coping. The Likert scale ranged from 1-*Very unlike me* to 5-*Very like me.* The overall score for each subscale (engagement and disengagement) was calculated by summing the scores of the items for their respective scales. Higher scores were associated with a higher use of engagement and/or disengagement. According to Bentall *et al.,* (1993) the Coping Strategy Questionnaire had good internal consistencies, with Crobach alpha coefficients reported as .88 (engagement) and .90 (disengagement).

4) Social Support Questionnaire (SSQ: Sarason *et al.*, 1987)

Social Support was assessed through a 12-item questionnaire measuring the quantity and quality of perceived social support provided in various situations. The questionnaire contained two parts: number of available others and the degree of satisfaction with the perceived available support. The quantity of available social support in the various situations is calculated by summing the number of people given. The levels of support satisfaction were scored on a 6-point Likert scale from 1-*Very dissatisfied* to 6-*Very satisfied.* The score for support satisfaction was calculated by summing the 6-items relating to support satisfaction. Higher scores represent higher support quality and/or quantity. According to Sarason *et al.*. (1987) the Social Support Questionnaire had good internal consistency, with Crobach alpha coefficients reported as .97 for both support quality and support quantity.

5) Cognitive-Somatic Anxiety Questionnaire (Schwartz *et al.*, 1978)

The 14-item CSAQ was developed to separately assess somatic and cognitive components of trait anxiety. Subjects were asked to rate the degree to which they experienced each of the described symptoms when they had felt anxiety. Responses were scored on a Likert scale that ranged from 1-*Not at all* to 5-*Very much so.* Seven items related to cognitive anxiety and 7-tems related to somatic anxiety. Higher scores represented higher degrees of cognitive and/or somatic anxiety. Schwartz *et al.* (1978) did not report the internal reliabilities of the Cognitive-Somatic Anxiety Questionnaire. However, according to Bentall *et al.,* (1993) the cognitive anxiety and somatic anxiety questionnaires had good internal consistencies, with Crobach alpha coefficients reported as .86 and .80, respectively.

6) General Health Questionnaire (GHQ12: Goldberg, 1972)

The GHQ was a self-administered test for detecting minor psychiatric disorders in the general population. The respondent's general health (GHQ) was assessed using twelve questions encompassing the respondent's levels of self-confidence, sleep loss, depression and problem-solving. There were four response options, with a higher frequency of poor health represented by higher scores. A higher cumulative score represented poorer psychological health. Goldberg (1972) did not report the internal reliabilities of the General Health Questionnaire. However, according to Bentall *et al.,* (1993) the General Health Questionnaire had good internal consistencies, with a Crobach alpha coefficient of .89.

7) Physical Health Questionnaire (Barton *et al.*, 1995)

The Physical Health Questionnaire was specifically constructed as a concise health questionnaire. The 16-item questionnaire contained two sub-scales that measured

cardiovascular and gastrointestinal disorders. Respondents were asked to rate how frequently they experienced physical symptoms such as stomach upsets, chest pain and shortness of breath. Two additional questions relating to minor infections and joint pain were included. Minor infections, joint pain, gastrointestinal and cardiovascular health subscales were scored separately. Responses were scored on a Likert scale that ranged from 1-*Almost never* to 5-*Almost always.* Higher scores represented poorer physical health. According to Bentall *et al.,* (1993) the Physical Health Questionnaire had good internal consistencies, with Crobach alpha coefficients reported as .76 (cardiovascular health) and .86 (gastrointestinal health). However, the internal reliability of joint pain was not specified.

8) Job Pacing

The Job Pacing question was a subjective assessment of the respondent's perceived control over the pace of the job. Respondents were asked to rate how much they believed the pacing of their job was under their control. The Likert scale options ranged from 1-*Entirely outside my control* to 5-*Entirely under my control.* A higher score represented a higher degree of control over the pacing of the job.

9) Workload per Shift Questionnaire

The Workload questionnaire was a subjective assessment of the respondent's perceived workload per shift: morning, evening and night. The Likert scale options ranged from 1-*Extremely light* to 5-*Extremely heavy.* The workload scores per shift were summed together. A higher score represented a higher overall workload.

Time 2 (March 2001)

The scales used at time 1 were also used at time 2, with the inclusion of the Workload Questionnaire and excluded the Social Support Questionnaire (SSQ) (Appendix A3). Due to the constant nature of social support systems, the SSQ was utilised only at time 1 when the number of participants was at its maximum. At time 1 the Workload per Shift questionnaire was used to assess the respondents' perceived overall workload per shift (day, evening, night). However, in reconsideration, it was determined that a more in depth exploration into the perceived workload of the participants would be beneficial. Therefore, the Workload Questionnaire was added at time 2 to measure four different aspect of workload: emotional workload, physical workload, time pressure and emotional stress.

- Job Satisfaction Questionnaire (Hackman & Oldman, 1975)
- Chronic Mental Fatigue Questionnaire (Bentall *et al.*, 1993)
- Coping Strategy Questionnaire (Barton *et al.*, 1995)
- Cognitive-Somatic Anxiety Questionnaire (Schwartz *et al.*, 1978)
- General Health Questionnaire (Goldberg, 1972)
- Physical Health Questionnaire (Barton *et al.*, 1995)
- Job Pacing Question
- Workload per Shift

1) Workload Questionnaire (Barton *et al.*, 1995)

The four-item questionnaire was based upon the SSI (Barton *et al.*, 1995). The workload questionnaire was a subjective assessment of the respondent's perceived workload. Workload was divided into 4 categories: physical workload, mental workload, time pressure and emotional stress. Physical workload, time pressure, mental workload and

emotional workload scores were calculated separately. The Likert scale options ranged from 1-*Extremely light* to 5-*Extremely heavy*. A higher score represented a higher workload.

Time 3 (August 2001)

The majority of the scales used at time 2 were used again at time 3, with the addition of the Job Content Questionnaire (Appendix A4). As the Workload Questionnaire assessed workload in greater depth than the Workload per Shift Questionnaire, the Workload per Shift Questionnaire was omitted at T3. Based upon the findings of the previous studies (T1 & T2), it was questioned whether there was a relationship between the job control (decision latitude) and job demand (psychological demand) and health levels. Therefore, the Job Content questionnaire was added at T3. The Job Content Questionnaire also added the aspect of co-worker and supervisor support that was not explored at T1 with the Social Support Questionnaire (SSQ).

- Job Satisfaction Questionnaire (Hackman & Oldman, 1975)
- Chronic Mental Fatigue Questionnaire (Bentall *et al.*, 1993)
- Coping Strategy Questionnaire (Barton *et al.*, 1995)
- Cognitive-Somatic Anxiety Questionnaire (Schwartz *et al.*, 1978)
- General Health Questionnaire (Goldberg, 1972)
- Physical Health Questionnaire (Barton *et al.*, 1995)
- Job Pacing Question
- Workload Questionnaire

1) Job Content Questionnaire (JCQ: Karasek, 1985, *University of Massachusetts*)

The Job Content Questionnaire measured the content of the respondent's work tasks, focusing on work demands, decision-making opportunities, job insecurity and social

interactions. The limited scale version of the JCQ was used for this study. The limited scale version of the JCQ consisted of three scales: Job strain (decision latitude and psychological demands), Job insecurity and Social Support, with additional JCQ scales: social support (additional questions) and skill level.

1a) Job Strain (Job-Demand Control)

Job strain consisted of two sub-scales: Psychological Demands and Decision Latitude. The Job Strain scale measured the degree to which the individual had the ability to control his work situation in conjunction with the occupational demands that were placed upon him.

Decision Latitude

The Decision Latitude scale measured the respondent's potential control over tasks and other related activities in the work setting. Decision Latitude was a 9-item scale with two sub-scales: skill discretion and decision authority. The Decision Latitude scales were used three times to separately assess morning, evening, and night shifts. The Likert scale options ranged from 1-*Strongly disagree* to 4-*Strongly agree.* A higher score represented higher decision latitude. According to Karasek (JD-C manual) the skill discretion and decision authority scales had good internal consistencies with a Crobach alpha coefficients reported as .96 and .97, respectively.

Psychological Demands

The Psychological Demand scale measured the psychological demands necessary for an individual to carry out the tasks of his job. The 9-item scale was used three times to assess demand variations during the morning, evening, and night shifts. Respondents indicated the rate of psychological demands experienced on the job. The Likert scale

options ranged from 1-*Strongly disagree* to 4-*Strongly agree.* A higher score represented higher psychological demands. According to Karasek (JD-C manual) the psychological demand scale had good internal consistencies, with Crobach alpha coefficients reported as .96.

1b) Job Insecurity

The Job Insecurity scale was an additional Job Content questionnaire scale. The Job Insecurity scale measured the level of threat of job termination or layoff faced by the respondent. The respondent was asked to rate the frequency to which he/she were faced with job loss, steady work and job security based upon various response options. A higher score represented a higher degree of job insecurity. According to Karasek (JD-C manual) the Job Insecurity scale had good internal consistencies, with Crobach alpha coefficients reported as .91.

1c) Skill Level

The Skill Level scale was an additional Job Content question measuring the individual's perceived level of skill required for the job. Respondents ticked the appropriate level of education and the appropriate level of education or skill level required by their job. Response options ranged from 'Primary school' to 'Post-graduate'.

1d) Social Support

The Social Support scale was an additional Job Content questionnaire scale. The social support scale measured the level of positive social interaction available from supervisors and co-workers (i.e. buffering against psychological stressors, task interdependency, and social integration). The Social Support scale contained two sub-scales: supervisor and co-worker social support. This 9-item scale was replicated three times to individually

assess social support during the morning, evening, and night shifts. The respondent was asked to rate the extent to which he agreed with various statements about the co-workers' and supervisors' provision of social support. The Likert scale options ranged from 1-*Strongly disagree* to 4-*Strongly agree.* A higher score represented a higher degree of co-worker and/or supervisor support. According to Karasek (JD-C manual) the supervisor social support and co-worker social support scales had good internal consistencies with a Crobach alpha coefficients reported as .96 and 1.00, respectively.

2.2. Procedure

During the initial stage of the data collection, 109 employees in a South Wales automotive parts plant were asked to complete the first of three questionnaires during a work break created by their supervisors. During these times, which varied according to the shift pattern of the production-line, participants were administered the time 1 questionnaire in a quiet meeting room separate from the assembly areas. The participant groups varied from 1-20 male workers.

Participants were instructed to sit at tables that sat up to 6 people. Each person who agreed to take part in the study signed a consent form (Appendix A2). The participants were then asked to write their personal code in the space provided on the cover of the questionnaire. The personal code was explained as consisting of the day of the participant's birth followed by his mother or father's initials (e.g. 24BH). The participants were informed that the personal codes were used to maintain anonymity and to track participants through the follow-up T2 and T3 questionnaires. The participants were then instructed to begin completing the questionnaires. There was no

time restriction imposed upon the participants in which to complete the 13-paged questionnaire. The typical time taken to complete the questionnaire was 35 minutes.

To increase participant numbers, the time 1 questionnaire was then posted to the remaining workforce. The posted questionnaire packets contained an information letter outlining the study, the T1 questionnaire and a pre-paid envelope. It was stressed that participation in the study was completely voluntary. The participants were instructed to write their personal code in the space provided on the cover of the questionnaire. The participants were informed that the personal code was used to maintain anonymity and track participants through the study (T1, T2 and T3). A list containing the participants' names, addresses and respective personal codes was compiled and kept by the researcher. This list was not disclosed to anyone. Participants were instructed to complete the questionnaire at their earliest convenience and to send back the completed questionnaire and consent form in the pre-paid envelope provided. The average response duration was between 1-2 weeks. The second administration of the T1 questionnaire received an additional response from 56 participants. All participants were asked to complete a series of questionnaires at three points: November 2000 (time 1), March 2001 (time 2) and August 2001 (time 3).

At time 2 and time 3, the questionnaires were administered by mail using the same method as time 1. The time 2 questionnaires were sent to all of the respondents at time 1. At time 3, the questionnaires were sent to the all of the respondents at time 2. No further attempt was made to contact participants who did not subsequently respond.

2.2.1. Response rates

250 questionnaires were distributed at time 1, of which 166 were returned, a response rate of 66 per cent. The participants' ages ranged from 22-60 years (mean age = 42, SD = 9.61). At time 2, 49 questionnaires were returned, a response rate of 30 per cent (20% of initial sample). The participants' ages at time 2 ranged from 22-57 years (mean age = 42.4, SD = 8.91). At time 3, 32 questionnaires were returned, a response rate of 65 per cent (13% of initial sample). The participants' ages ranged from 22-60 years (mean age = 44.19, SD = 8.55). A total of 27 participants fully completed and returned the questionnaires at all three time periods.

2.2.2. Participant descriptive statistics at T1

Responses for each time point were divided into two groups: lean production-line (LPL) and traditional production-line (TPL). A sample of 41 men aged between 25 and 54 years (mean age = 37.44, SD = 7.77) and who were presently working on the lean production-line formed the time 1 LPL group. Participants from five non-lean production-line areas were combined to create the TPL group. At time 1, 119 male participants with ages ranging from 22-60 (mean age = 43.71, SD = 9.69) formed the TPL group. Six respondents did not indicate which production line they worked. Refer to Appendices B1-B6 for additional participant descriptives.

2.2.3. Participant descriptive statistics at T2

From the original sample of 41 men who were working on the lean production-line at time 1, seven men participated at time 2 with ages between 33 and 54 years (mean age = 39.71, SD = 7.76). Out of the 119 male participants who formed the traditional production-line group at time 1, 40 men participated at time 2 with ages between 22 and

57 years (mean age = 42.83, SD = 9.10). Two respondents did not indicate which production-line they worked. Further participant details are in Appendices B27-B32.

2.2.4. Participant descriptive statistics at T3

From the original sample of 41 men who were working on the LPL at time 1, four men participated at time 3 with ages between 33 and 54 years (mean age = 41.25, SD = 9.29). The mean age of the LPL group did not differ significantly between the time periods. Out of the 119 male participants who formed the TPL at time 1, 23 of the men participated at time 3 with ages between 22 and 60 years (mean age = 44.24, SD = 8.42). The mean age of the TPL group did not did differ significantly between the time periods. The data for 5 additional participants who incompletely returned the questionnaire were not examined. There were no significant differences in the baseline measures between the participants at time point 1, 2 or 3. In addition, the mean age of the men who participated throughout the entire study did not differ significantly from the other participants at any time period. Further participant details are in Appendices B27-B32.

2.3. Results

2.3.1. Descriptives

2.3.1.1. Internal reliability

The assessment of internal reliability of each composite of the T1, T2 and T3 questionnaires can be seen in Tables 2.1-2.3. The Cronbach alpha coefficients for the majority of health, proposed stress buffer and occupational stressor scales showed low to high internal reliability (Alpha value> .7).

SCALE	N	MEAN	SD	ALPHA
General job satisfaction	161	23.96	5.69	.79
Workload per shift	136	9.92	1.76	.93
Engagement coping	158	15.24	2.67	.67
Disengagement coping	158	10.04	3.91	.85
Social support: Quality	131	11.11	6.65	.96
Social support: Quantity	152	18.50	13.27	.95
Chronic mental fatigue	155	24.68	6.72	.82
Cognitive anxiety	164	1179	5.42	.90
Somatic anxiety	163	11.92	4.10	.78
General health (GHQ)	164	22.89	4.28	.84
Cardiovascular health	165	11.01	3.50	.83
Gastrointestinal health	161	14.36	4.40	.83
Joint pain	21	9.71	2.87	.72

TABLE 2.1. STUDY 1 TIME 1 DESCRIPTIVES STATISTICS AND RELIABILITIES FOR MAIN MEASURES

SCALE	N	MEAN	SD	ALPHA
General job satisfaction	22	20.22	6.32	.60
Workload per shift	11	9.91	2.17	.92
Engagement coping	19	15.42	2.61	.61
Disengagement coping	20	11.05	4.08	.97
Chronic mental fatigue	22	26.50	7.28	.83
Cognitive anxiety	22	11.77	3.69	.74
Somatic anxiety	22	12.00	3.60	.79
General health (GHQ)	22	23.77	3.96	.84
Cardiovascular health	22	11.09	2.41	.64
Gastrointestinal health	22	15.55	4.67	.86
Joint pain	22	9.55	2.77	.67

TABLE 2.2. STUDY 1 TIME 2 DESCRIPTIVES STATISTICS AND RELIABILITIES FOR MAIN MEASURES

SCALE	N	MEAN	SD	ALPHA
General job satisfaction	22	22.36	5.25	.46
Workload	22	12.59	1.89	.54
Job insecurity	22	8.50	1.44	.70
Decision latitude	22	22.82	3.49	.59
Psychological demands	21	25.43	3.09	.57
JCQ Social support	21	30.24	3.63	.76
Engagement coping	21	15.52	2.09	.67
Disengagement coping	21	9.57	2.52	.68
Chronic mental fatigue	22	25.23	7.20	.84
Cognitive anxiety	22	12.64	3.90	.74
Somatic anxiety	22	12.82	4.32	.80
General health (GHQ)	22	23.45	3.86	.85
Cardiovascular health	21	11.19	2.73	.71
Gastrointestinal health	22	16.77	5.05	.90
Joint pain	22	9.59	2.17	.66

TABLE 2.3. STUDY 1 TIME 3 DESCRIPTIVES STATISTICS AND RELIABILITIES FOR MAIN MEASURES

2.3.1.2. Factor Analyses and Varimax Rotations

In the initial analysis, the participant groups' data were analysed using the categories: occupational stressors, proposed stress buffers and health measures. The basic dimensions were analysed using Factor analyses.

Occupational stressors variables

First, the occupational stressor variables were subjected to principle components analysis. Using the T1 production-line data, an inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Oklin value was .637 with Bartlett's Test of Sphericity at a .0005 level of significance, supporting the factorability of the correlation matrix. Principle components revealed the presence of 2 components with eigenvalues exceeding 1, explaining 44.56 per cent and 18.77 per cent of the variance respectively (Figure 2.1). After a Varimax rotation was performed, the two-factor solution explained a total of 63.34 per cent of the variance.

Component 1 contributed 44.25 per cent and component 2 contributed 19.09 per cent of the variance (Table 2.4). Component 1 was composed of the coefficients: morning workload, evening workload and night workload. Component 1 was therefore retained as the variable: workload stressors. Component 2 was comprised of the coefficients: hours contracted to work, control of job pacing and hours worker per week, which suggested that individuals who work more hour report less job control. Component 2 was therefore retained as the variable: time stressors.

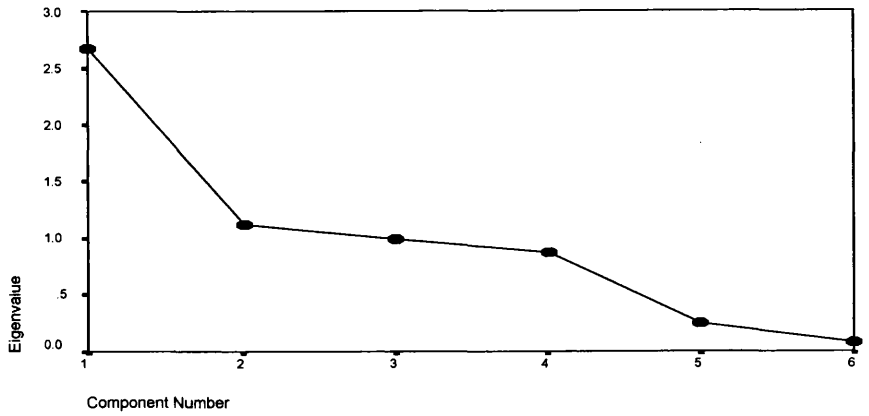


FIGURE 2.1. FACTOR ANALYSIS SCREE PLOT FOR OCCUPATIONAL STRESSOR COEFFICIENTS

Variables	Factor 1	Factor 2
Evening Workload	.967	-3.06E-02
Morning Workload	.932	-5.20E-02
Night Workload	.920	-.109
Hours worked per week	.110	.731
Control of job pacing	-.124	.634
Hours contracted per week	4.90E-02	.447
% of Variance	44.25 per cent	19.09 per cent
Total Variance	**63.34 per cent**	

TABLE 2.4. OCCUPATIONAL STRESSORS ROTATED COMPONENT MATRIX FOR PRODUCTION-LINES

Proposed stress buffers

The proposed stress buffer variables were subjected to principle components analysis. With the production-line data, the Kaiser-Meyer-Oklin value was .457. Bartlett's Test of

Sphericity level was not significant. Therefore the variables: support quality, quantity of support, coping engagement and coping disengagement were assessed individually.

Health measures

Next, the health measures were subjected to principle components analysis. The Kaiser-Meyer-Oklin value was .834 with Bartlett's Test of Sphericity at a significant level, supporting the factorability of the correlation matrix (Figure 2.2). Principle components revealed the presence of 2 components, explaining 46.06 per cent and 15.76 per cent of the variance respectively. A Varimax rotation was then performed. The two-factor solution explained a total of 61.83 per cent of the variance, with component 1 contributing 36.85 per cent and component 2 contributing 24.97 per cent of the variance (Table 2.5). The coefficients that composed Component 1 were cognitive anxiety, chronic mental fatigue, somatic anxiety and general health (GHQ). Furthermore, although not as powerful as the other coefficients, gastrointestinal (.354) and cardiovascular health (.471) also comprised Component 1. Due to the strength of the psychological health coefficients, Component 1 was retained as the variable: psychological health. The coefficients that composed Component 2 were gastrointestinal health, cardiovascular health, joint pain and minor infections. Therefore Component 2 was retained as the variable: physical health.

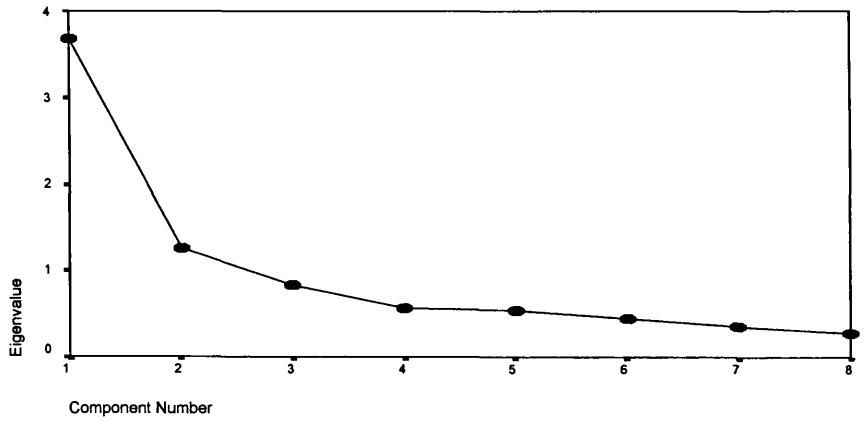


FIGURE 2.2. FACTOR ANALYSIS SCREE PLOT FOR HEALTH MEASURE COEFFICIENTS

VARIABLES	Factor 1	Factor 2
Cognitive Anxiety	.967	.108
Chronic mental fatigue	.932	-.273
Somatic Anxiety	.762	.315
General health (GHQ)	.755	-.298
PH: Gastrointestinal	.354	.709
PH: Cardiovascular	.471	.586
Joint pain	.109	.767
Minor infections	.265	.637
% of Variance	36.85 per cent	24.97 per cent
Total Variance	**61.83 per cent**	

TABLE 2.5. HEALTH MEASURES ROTATED COMPONENT MATRIX FOR PRODUCTION-LINES

2.3.1.3. Differences in health depending on occupational stressor levels

Differences in health depending on occupational stressor levels

Following the factor analyses and Varimax rotations, the resultant occupational stressors and proposed stress buffer factors were equally subdivided into three levels (low, medium, high). One-way between-groups ANOVAs were then conducted to explore if participants with higher occupational stressor levels had significantly poorer health compared to participants with lower stressor levels.

Based upon the results, psychological health did not differ depending on time stressor levels [F (2, 114)= .06, ns] or workload stressor levels [F (2, 114)= .91, ns]. In addition, physical health did not differ depending on workload stressor levels [F (2, 114)= 1.43, ns] (Appendices B21 & B22). However, production-line workers with medium time stressor had significantly poorer physical health than those with low or high time stressor levels [F (2,114)= 6.32, $p < .005$] (Table 2.6).

	Low	Medium	High
M=	-.25	.36* **	-.30
SD=	.96	1.00	.84
N=	33	43	41

TABLE 2.6. PHYSICAL HEALTH LEVELS DEPENDING ON TIME STRESSOR LEVELS
** Medium v low stressor p< .05*
*** Medium v high stressor p< .005*
¤*Physical health scores ranged from -1.90 (good health) to 3.25 (poor health)*

Differences in occupational stressor and health levels depending on production-line systems

Next, possible differences in stressor and health levels between production-lines were examined. There were no differences in workload stressor levels [F (1, 131)= .05, ns] or physical health [F (1, 138)= 3.14, ns]. However, the lean production-line had higher time stressor levels [F (1, 131)= 29.22, p< .0005] and better psychological health [F (1, 138)= 24.36, p< .0005], than the traditional production-line (Table 2.7) (Appendices B25 & B26).

	Time stressors		Psychological Health	
Production-line	Lean	Traditional	Lean	Traditional
M=	.66*	-.29	-.69**	.21
SD=	.80	.82	.53	1.02
N=	27	106	34	106

TABLE 2.7. DIFFERENCES IN HEALTH LEVELS BETWEEN PRODUCTION-LINE SYSTEMS
** Sig. difference in time stressor depending on production-line p< .005*
*** Sig. difference in psychological health depending on production-line p< .005*
¤*Time stressor scores ranged from -3.14 (low) to 2.28 (high)*
¤*Psychological health scores ranged from -1.70 (good health) to 3.80 (poor health)*

These findings support a possible relationship between time stressor levels and psychological health. To further investigate, a correlation between time stressor and psychological health was calculated for each of the production-line systems. Within the traditional production-line, there was no significant relationship between time stressor and psychological health levels (r = .17, n = 91, ns). However, participants on the lean

production–line worked more hours and had better psychological health, than those who worked fewer hours ($r = -.41$, $n = 24$, $p < .05$).

Differences in health depending on job demand-control (JD-C)

Differences in the levels of stressor and health depending on Karasek's Job Demand-Control model (1979) were to be investigated. However, due to the limited sample size at T3 ($n = 32$) the analyses could not be performed adequately.

2.3.1.4. Longitudinal changes in occupational stressor levels and health

Longitudinal changes in occupational stressor and health levels within the production-lines

The next section examined the longitudinal relationship between occupational stressors and health. The investigation asked if there were changes in individual occupational stressors levels over time would there also be changes in health measures.

One-way repeated measures ANOVAs were conducted to compare occupational stressor levels at three time periods. There was a significant increase in the amount of hours contracted to work per week between time 1 and time 2 [$F(2,63) = 4.02$, $p < .05$] (Table 2.8). However, there were no differences in the number of hours contracted to work per week from time 1 to time 3 or from time 2 to time 3. No other significant changes in stressor levels over time were found. Even though one of the occupational stressors increased from time 1 and time 2, there were no significant changes in health levels between the time periods (Appendices B27 & B28). Therefore, present results did not support a longitudinal relationship between individual occupational stressor levels and health.

	Time 1	Time 2	Time 3
M=	37.11*	39.82	39.68
SD=	2.13	4.06	4.13
N=	22	22	22

TABLE 2.8. DIFFERENCES IN THE NUMBER OF HOURS CONTRACTED TO WORK PER WEEK OVER TIME

** Sig. difference in the number of hours contracted to work per week between Time 1 and Time 2 p< .05*

¤*Number of hours contracted to work ranged from 28 to 48 hours per week*

Longitudinal changes in occupational stressor and health levels between production-lines

The next section examined changes in occupational stressors and health between three periods in time, in both lean production and traditional production-lines. There were no significant changes in occupational stressor levels over time for either of the production-line systems (Appendices B29-32). When changes in health levels were examined, the lean production-line had a significant diminishment in general health (GHQ) from time 1 to time 3 [F (2,9)= 5.07, p< .05] (Table 2.9). Conversely, in the traditional production-line, there were no significant changes in health levels between any of the time periods.

	Time 1	Time 2	Time 3
M=	20.00	22.50	24.00*
SD=	2.16	1.73	.87
N=	4	4	4

TABLE 2.9. DIFFERENCES IN GENERAL HEALTH (GHQ) LEVELS OVER TIME

** Sig. difference in general health (GHQ) levels between Time 1 and Time 3 p< .05*

¤*General health (GHQ) scores ranged from 12 (good health) to 48 (poor health)*

2.3.2. The relationship between proposed stress buffers, occupational stressors and health

The previous analyses explored possible differences in health depending on occupational stressor levels and systems of production. Time stressor levels were found to differ depending on the production-line system. However, a possible relationship

between time stressor levels and psychological health only emerged with the lean production-line, in which a higher level of time stressors was associated with better psychological health. It was then decided to investigate the relationship between occupational stressors, proposed stress buffers and health in greater depth. More specifically, the following section examined the moderating effect of proposed stress buffers on the relationship between occupational stressors and health while controlling for age and production-lines.

2.3.2.1. The moderating effect of proposed stress buffers on the relationship between occupational stressors and health

Whether the relationship between occupational stressors (time and workload) and health were moderated by coping strategies (engagement and disengagement) and/or social support (quantity and quality) was then examined, while controlling for age and production-line.

Multicollinearity

The data were examined to assess potential problems of multicollinearity. Multicollinearity can be a problem when variables in regression analyses are highly correlated, i.e. whether Pearson's r exceeds 0.80 (Bryman & Cramer, 1990). If multicollinearity occurs the regression coefficients may be unstable and may vary considerably between samples. The standard procedure for minimising potential problems of multicollinearity is to mean-center variables before computing interaction terms. This stand procedure was followed for all regression analyses reported in this thesis.

Regression analyses

A series of four hierarchical regression analyses were conducted for each of the dependent variables: physical health and psychological health. Separate analyses were performed to assess whether the relationship between the occupational stressors (time and workload) and the dependent variable (psychological health or physical health) were moderated by coping strategies (engagement and disengagement) and/or social support (quantity and quality) (Tables 2.10-2.14).

The variables age and production-line were placed in the first step of the regression to control for possible confounding effects. Next, workload stressors, time stressors and the moderator variable (social support quality, social support quantity, engagement coping or disengagement coping) were placed into the second step of the equation to test for main effects. In the third step, the variables workload stressors and time stressors were combined with the moderator variable to test for two-way interactions. In the fourth and last step, three-way interactions were explored using time stressors, workload stressors and each moderating variable.

Social support

The first set of regression analyses explored the role of social support (quality and quantity) as a moderator in the relationship between occupational stressors and 1) psychological heath and 2) physical health. In step 1, a significant amount of variance in psychological health was explained by age and production-line (R^2= .17) [F (2, 104)= 10.52, p< .001] and (R^2= .17) [F (2, 92)= 9.31, p< .001], respectively (Tables 2.10 & 2.11). In the subsequent steps, there were no significant main effects of workload stressors and time stressors in any of the analyses, nor any interactions involving social support quantity or social support quality. However, in both analyses, the production-

line system emerged as a significant independent predictor of psychological health ($p < .05$ and $p < .001$). Following the regression analyses, a one-way ANOVA was conducted to explore a possible difference in psychological health depending on the production-line system (lean, traditional). Based upon the analyses, the lean production-line had significantly better psychological health (M = -.69, SD = .53) than the traditional production-line (M = .21, SD = 1.02) [F (1, 139)= 24.36, p< 001].

The role of social support as a moderator in the relationship between occupational stressors and physical health was then examined. In step 1, a significant amount of variance in physical health was explained by age and production-line ($R^2 = .06$) [F (2, 104)= 3.38, $p < .05$] (Table 2.10). There were no significant main effects of workload stressors and time stressors in the analyses, nor any interactions involving social support quantity or social support quality.

	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.17**			.06*
Age	-.02	-.20		.02	.16	
Production-line system	.92*	.39*		.28	.12	
2. *Main effects*			.02			.02
Workload stressors	.02	.02		.07	.06	
Time stressors	.04	.03		-.11	-.10	
SSQN	-.01	-.09		.01	.12	
3. *Two-way interactions*			.02			.04
Time x workload	-.04	-.03		.09	.06	
Workload x SSQN	.004	.04		-.02	-.17	
Time x SSQN	-.01	-.08		.001	.01	
4. *Three-way interaction*			.004			.001
Time x workload x SSQN	-.01	-.09		-.005	-.04	

TABLE 2.10. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUANTITY AND THEIR INTERACTIONS

**p< .05 **p< .001*

Key - Time = Time stressors, Workload = Workload stressors, SSQN =Social support quantity

	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.17*			.06
Age	-.02	-.17		.02	.15	
Production-line system	.90*	.41*		.24	.10	
2. *Main effects*			.05			.03
Workload stressors	-.13	-.13		.10	.09	
Time stressors	-.03	-.02		-.11	-.09	
SSQL	.02	.13		.03	.18	
3. *Two-way interactions*			.004			.02
Time x workload	-.14	-.09		.22	.14	
Workload x SSQL	-.002	-.01		.02	.10	
Time x SSQL	.003	.01		.003	.01	
4. *Three-way interaction*			.004			.004
Time x workload x SSQL	-.02	-.08		.03	.08	

TABLE 2.11. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

$p < .001$

Key - Time = Time stressors, Workload = Workload stressors, SSQL =Social support quality

Coping strategies

The next set of regression analyses explored the role of coping strategies (engagement and disengagement) as moderators in the relationship between occupational stressors and 1) psychological heath and 2) physical health (Tables 2.12 & 2.13). In step 1, a significant amount of variance in psychological health was explained by age and production-line (*both* $R^2 = .17$) [$F(2, 106) = 10.49$, $p < .001$] and [$F(2, 106) = 3.09$, $p < .05$], respectively (Tables 2.12 & 2.13). There were no significant main effects of workload stressors and time stressors in any of the analyses, nor any interactions involving coping strategies. Similar to the first set of regression analyses, the production-line system emerged as a significant independent predictor of psychological health (*both* $p < .001$), with the lean production-line having better psychological health ($M = -.69$, $SD = .53$) than the traditional production-line ($M = .21$, $SD = 1.02$) [$F(1, 139) = 24.36$, $p < 001$]. In addition, disengagement coping was a significant predictor of psychological health ($p < .001$). Partial correlation was then used to explore the relationship between the use of disengagement coping and psychological health, while controlling for age and production-line systems. There was a strong positive

correlation, with higher levels of disengagement coping being associated with poorer psychological health (r= .27, N= 128, p< .005).

The role of coping strategies as moderators in the relationship between occupational stressors and physical health was then examined. When the role of coping disengagement on the relationship between occupational stressors and physical health was examined, a significant amount of variance in physical health was explained by age and production-line (R^2= .06) [F (2, 106)= 3.09, p< .05] (Table 2.13). There were no significant main effects of workload stressors and time stressors in the analyses. At step 4, the beta values from the final equation indicated that the interaction between engagement coping and workload stressors was a significant predictor of physical health scores (p< .05).

	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.17*			.06
Age	-.02	-.17		.01	.11	
Production-line system	1.01*	.42*		.26	.11	
2. *Main effects*			.05			.03
Workload stressors	.01	.01		.09	.09	
Time stressors	.05	.04		-.14	-.11	
DISC	.05*	.21*		.03	.13	
3. *Two-way interactions*			.02			.01
Time x workload	-.08	-.05		.11	.08	
Workload x DISC	-.03	-.11		-.001	-.03	
Time x DISC	.02	.07		-.03	-.12	
4. *Three-way interaction*			.001			.001
Time x workload x DISC	.01	.02		.002	.01	

TABLE 2.12. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, DISENGAGEMENT COPING AND THEIR INTERACTIONS

**p< .001*

Key - Time = Time stressors, Workload = Workload stressors, DISC =Disengagement coping

	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.17**			.06*
Age	-.01	-.11		.01	.14	
Production-line system	1.03**	.43**		.38	.16	
2. *Main effects*			.02			.02
Workload stressors	.04	.03		.09	.09	
Time stressors	.09	.08		-.08	-.07	
ENGC	-.04	-.12		-.004	-.01	
3. *Two-way interactions*			.02			.05
Time x workload	-.05	-.03		.10	.07	
Workload x ENGC	-.04	.13		.08*	.25*	
Time x ENGC	-.02	-.04		-.01	-.01	
4. *Three-way interaction*			.001			.002
Time x workload x ENGC	.002	.01		-.03	-.06	

TABLE 2.13. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, ENGAGEMENT COPING AND THEIR INTERACTIONS

**p< .05 **p< .001*

Key - Time = Time stressors, Workload = Workload stressors, ENGC =Engagement coping

Interactions were then explored by plotting the regression equations at one standard deviation below the mean of the moderator (engagement coping) and one standard deviation above the mean (Figure 2.3). In accordance with the procedures outlined by Aiken and West (1991), t-tests were calculated to determine whether the slopes of the simple regression lines were significantly different from zero. Post-hoc probing of the interactions indicated the presence of a significant relationship between workload stressors levels and physical health, among those reporting high levels of engagement coping, (t (125)= 2.48, p< .05). The findings suggested for those with a high engagement coping, physical health diminished as workload stressor levels increased. There was no significant relationship found between workload stressor levels and physical health among those with low engagement coping. The results indicated that for respondents who do not attempt to solve or overcome stressful situations, physical health was not affected by increased workload stressor levels increase.

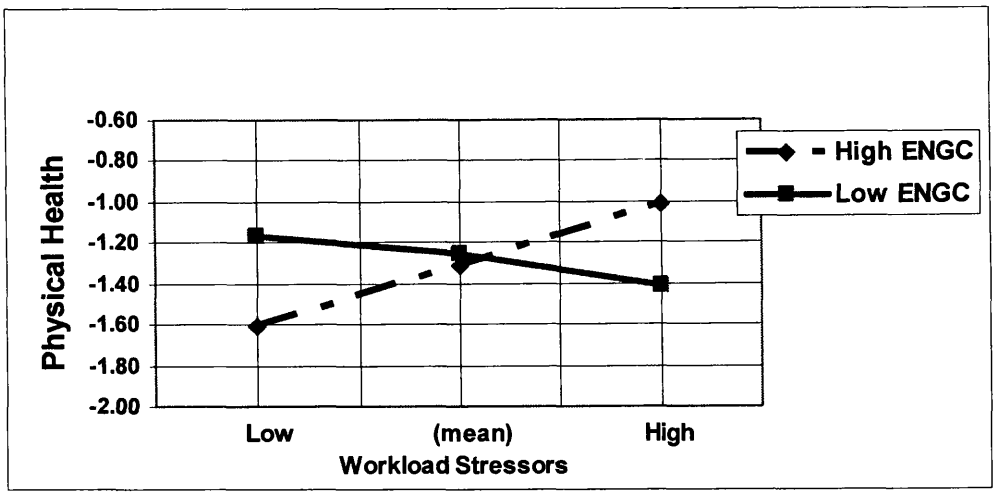


FIGURE 2.3. TWO-WAY INTERACTION EFFECT OF COPING ENGAGEMENT AND WORKLOAD STRESSORS ON PHYSICAL HEALTH

¤*Physical health scores ranged from -1.90 (good health) to 3.26 (poor health)*

Key- ENGC = Engagement coping

Regression analyses for each production-line system

As demonstrated in the previous results, the production-line was found to be a significant predictor in various previous regression analyses (Tables 2.10-2.13). Consequently, separate regressions analyses were conducted individually for the lean and traditional production-lines to assess whether the relationship between the occupational stressors (time and workload) and health were moderated by coping strategies (engagement and disengagement) and/or social support (quantity and quality) (Tables 2.1-2.4). In each analysis, the variable age was placed in the first step of the regression equation to control for possible confounding effects. The workload stressors and time stressors variables were placed into the second step of the equation to test for main effects. Next, the variables workload stressors and time stressors were combined with each moderator variable (social support quality, social support quantity, engagement coping, disengagement coping) to test for two-way interactions in the third step. In the fourth and last step, three-way interactions were explored using the time stressors, workload stressors and each moderating variable.

Social support

The first set of regression analyses explored the role of social support (quality and quantity) as a moderator in the relationship between occupational stressors and 1) psychological heath and 2) physical health for each production-line system (traditional, lean).

The role of social support as a moderator in the relationship between occupational stressors and psychological health was examined first. As seen in Tables 2.14-2.17, there were no significant main effects of workload stressors and time stressors in any of the analyses, nor any two-way interactions involving social support quantity or social support quality, regardless of the production-line. However, for the traditional production-line, there was a significant three-way interaction between time stressors, workload stressors and social support quantity regarding psychological health (R^2= .09) [F (7, 80)= 1.54, p< .05](Table 2.17).

The three-way interactions were then explored by plotting the regression equations at one standard deviation below the mean of the moderator (social support quantity) and one standard deviation above the mean (Figure 2.4). In accordance with the procedures outlined by Aiken and West (1991), t-tests were calculated to determine whether the slopes of the simple regression lines were significantly different from zero. Post-hoc probing of the interactions indicated the presence of three significant relationships between time stressors, workload stressors and the amount of available social support on psychological health levels. First, for respondents with a high amount of social support and a high level of time stressors, those who reported a low level of workload stressors had worse psychological health than those with a high level of workload stressors (*t* (72)= 2.26, p< .05). Second, for respondents with a high amount of social

support and a low level of time stressors, those who reported a low level of workload stressors had better psychological health than those with a high level of workload stressors (t (72)= 1.99, $p< .05$. Last, for respondents with a low amount of social support and a low level of time stressors, those who reported a higher level of workload stressors had better psychological health than those with a lower level of workload stressors (t (72)= 2.08, $p< .05$). There was no significant relationship found between social support quantity, workload stressors and psychological health among those with high time stressors.

The findings suggested for traditional production-line respondents with a high amount of social support, working fewer hours with less workload stressors was beneficial to their psychological health. Conversely, the findings implied that respondents with fewer supporters, those who fewer hours with less workload stressors had poorer psychological health than those who worked the same amount of hours but with a more workload stressors. Moreover, for respondents with a high amount of support and who worked a higher amount of hours, having a higher level of workload stressors was detrimental to their psychological health. These findings indicate that, although significant, the amount of hours spent at work may have less of an impact on overall psychological health than the level of workload stressors.

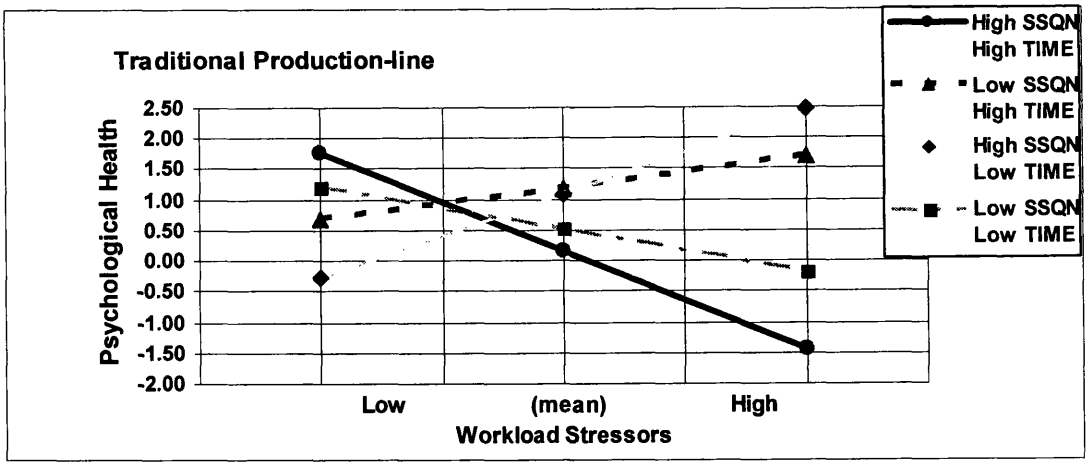


FIGURE 2.4. THREE-WAY INTERACTION EFFECT OF SOCIAL SUPPORT QUANTITY, TIME STRESSORS AND WORKLOAD STRESSORS ON PSYCHOLOGICAL HEALTH FOR THE TRADITIONAL PRODUCTION-LINE

¤*Psychological health scores ranged from -1.69 (good health) to 3.81 (poor health)*

Key- SSQN =Social support quantity, TIME = Time stressors

The role of social support as a moderator in the relationship between occupational stressors and physical health was then examined. There was a significant main effect between social support quantity (SSQN) and physical health ($p < .05$) (Table 2.16). Following the regression analyses, a partial correlation was used to explore the relationship between the amount of available social support and physical health within the lean production-line data. After controlling for age, there was no correlation found between the amount of available support and physical health ($r = .05$, $N = 30$, ns). There were no significant main effects of workload stressors and time stressors in the analyses, nor any interactions involving social support quantity or social support quality (Tables 2.14-2.17).

Lean production-line

	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.06			.002
Age	-.02	-.26		.001	.09	
2. *Main effects*			.22			.07
Workload stressors	2.10	3.25		-3.65	-4.69	
Time stressors	-.16	-.22		1.90	2.18	
SSQL	.25	2.77		-.30	-2.71	
3. *Two-way interactions*			.06			.18
Time x workload	-.27	-4.34		4.27	5.81	
Workload x SSQL	.53	3.95		-.68	-4.25	
Time x SSQL	-.27	-2.75		.37	3.14	
4. *Three-way interaction*			.08			.10
Time x workload x SSQL	-.60	-4.76		.83	5.50	

TABLE 2.14. HIERARCHICAL REGRESSION ANALYSES PREDICTING LEAN PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Workload = Workload stressors, SSQL= Social support quality

Traditional production-line

	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.03			.02
Age	-.02	-.18		.02	.16	
2. *Main effects*			.05			.03
Workload stressors	-.13	-.12		.15	.13	
Time stressors	.08	.06		-.14	-.09	
SSQL	.02	.16		.02	.11	
3. *Two-way interactions*			.02			.03
Time x workload	-.21	-.12		.32	.16	
Workload x SSQL	.0004	.002		.01	.03	
Time x SSQL	-.02	.08		-.02	-.06	
4. *Three-way interaction*			.001			.001
Time x workload x SSQL	-.02	-.05		-.02	-.04	

TABLE 2.15. HIERARCHICAL REGRESSION ANALYSES PREDICTING TRADITIONAL PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Workload = Workload stressors, SSQL=Social support quality

Lean production-line						
	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.05			.002
Age	-.02	-.20		-.01	-.01	
2. *Main effects*			.26			.09
Workload stressors	-.64	-.99		.12	.16	
Time stressors	-.12	-.17		-.07	-.08	
SSQN	.002	.06		.04*	.74*	
3. *Two-way interactions*			.21			.32
Time x workload	.30	.50		.10	.14	
Workload x SSQN	.01	.31		-.04	-.89	
Time x SSQN	-.02	-.52		-.03	-.54	
4. *Three-way interaction*			.01			.01
Time x workload x SSQN	.01	.21		.01	.28	

TABLE 2.16. HIERARCHICAL REGRESSION ANALYSES PREDICTING LEAN PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUANTITY AND THEIR INTERACTIONS

*p< .05

Key - Time = Time stressors, Workload = Workload stressors, SSQN=Social support quantity

Traditional production-line						
	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.02			.02
Age	-.01	-.13		.02	.17	
2. *Main effects*			.02			.03
Workload stressors	-.11	-.10		.05	.05	
Time stressors	-.07	-.05		-.18	-.13	
SSQN	-.01	-.09		.003	.03	
3. *Two-way interactions*			.003			.02
Time x workload	-.51	-.29		.01	.07	
Workload x SSQN	-.001	-.04		-.01	-.12	
Time x SSQN	-.04	-.23		-.01	-.07	
4. *Three-way interaction*			.09**			.003
Time x workload x SSQN	-.11*	-.46*		-.02	-.09	

TABLE 2.17. HIERARCHICAL REGRESSION ANALYSES PREDICTING TRADITIONAL PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUANTITY AND THEIR INTERACTIONS

p< .01 p< .005

Key - Time = Time stressors, Workload = Workload stressors, SSQN=Social support quantity

Coping strategies

The next set of regression analyses explored the role of coping strategies (engagement and disengagement coping) as moderators in the relationship between occupational stressors and 1) psychological heath and 2) physical health (Tables 2.18-2.21).

The role of coping strategies as moderators in the relationship between occupational stressors and psychological health was first examined. Within the lean production-line, there was a significant main effect between workload stressors and psychological health ($p < .05$) (Table 2.18). However, there were no significant interactions between the occupational stressors and any coping strategies. Following the regression analyses, a partial correlation was performed to explore the relationship between workload stressors and psychological health within the lean production-line data. After controlling for age, there was no correlation found between the magnitude of workload stressors and overall psychological health ($r = -.37$, $n = 21$, ns). It was determined that the conflicting results of the regression analysis and partial correlation may be attributed to the small sample used in the lean production-line analyses.

Last, the role of coping strategies as moderators in the relationship between occupational stressors and physical health was examined. There were no significant main effects of workload stressors and time stressors in the analyses, nor any interactions involving engagement coping or disengagement coping strategies (Tables 2.18-2.21).

Lean production-line						
	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.05			.002
Age	-.02	-.21		.001	.09	
2. *Main effects*			.22			.03
Workload stressors	-.61*	-.95*		.02	.03	
Time stressors	-.07	-.09		-.24	-.28	
ENGC	-.001	-.03		-.09	-.41	
3. *Two-way interactions*			.24			.22
Time x workload	.30	.50		-.15	-.20	
Workload x ENGC	-.03	-.16		.11	.47	
Time x ENGC	.06	.36		.11	.59	
4. *Three-way interaction*			.02			.002
Time x workload x ENGC	-.08	-.40		-.03	-.14	

TABLE 2.18. HIERARCHICAL REGRESSION ANALYSES PREDICTING LEAN PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, ENGAGEMENT COPING AND THEIR INTERACTIONS

*$p < .05$

Key - Time = Time stressors, Workload = Workload stressors, ENGC= Engagement coping

Traditional production-line	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.02			.02
Age	-.01	-.10		.01	.13	
2. *Main effects*			.05			.03
Workload stressors	.05	.05		.15	.14	
Time stressors	.26	.18		-.08	-.05	
ENGC	-.07	-.19		.02	.06	
3. *Two-way interactions*			.03			.06
Time x workload	-.12	-.07		.24	.14	
Workload x ENGC	-.03	-.09		.07	.21	
Time x ENGC	-.07	-.15		.01	.03	
4. *Three-way interaction*			.002			.001
Time x workload x ENGC	.03	.05		-.02	-.03	

TABLE 2.19. HIERARCHICAL REGRESSION ANALYSES PREDICTING TRADITIONAL PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, ENGAGEMENT COPING AND THEIR INTERACTIONS

Key - Time = Time stressors, Workload = Workload stressors, ENGC=Engagement coping

Lean production-line	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.05			.002
Age	-.02	-.21		.02	.22	
2. *Main effects*			.23			.03
Workload stressors	-.49	-.77		-.49	-.64	
Time stressors	-.20	-.27		-.53	-.61	
DISC	.01	.11		.16	1.14	
3. *Two-way interactions*			.05			.10
Time x workload	.29	.49		.46	.63	
Workload x DISC	.02	.16		-.17	-1.14	
Time x DISC	-.003	-.03		-.13	-1.18	
4. *Three-way interaction*			.001			.08
Time x workload x DISC	-.01	-.10		.12	1.03	

TABLE 2.20. HIERARCHICAL REGRESSION ANALYSES PREDICTING LEAN PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, DISENGAGEMENT COPING AND THEIR INTERACTIONS

Key - Time = Time stressors, Workload = Workload stressors, DISC= Disengagement coping

Traditional production-line						
	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.02			.02
Age	-.02	-.16		.01	.10	
2. *Main effects*			.10*			.05
Workload stressors	.05	.05		.16	.15	
Time stressors	.13	.10		-.13	-.09	
DISC	.08**	.32**		.04	.16	
3. *Two-way interactions*			.03			.02
Time x workload	-.03	-.02		.22	.12	
Workload x DISC	-.01	-.03		.01	.03	
Time x DISC	.06	.18		-.02	-.05	
4. *Three-way interaction*			.02			.001
Time x workload x DISC	.05	.14		.01	.03	

TABLE 2.21. HIERARCHICAL REGRESSION ANALYSES PREDICTING TRADITIONAL PRODUCTION-LINE'S HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, DISENGAGEMENT COPING AND THEIR INTERACTIONS

*p< .05 **p< .01

Key - Time = Time stressors, Workload = Workload stressors, DISC=Disengagement coping

2.3.3. Summary

2.3.3.1. Objectives and Hypotheses

Objective: Will participants with higher occupational stressor levels also have poorer health?

1. Participants with higher occupational stressor levels will also have poorer health.

Production-line workers with medium time stressor levels had significantly poorer physical health than those with low or high time stressor levels. However, there was no difference in health levels between individuals with low or high time stressor levels. Therefore, the hypothesis that participants with higher occupational stressor levels will also have poorer psychological and physical health was not supported.

Objective: Will there be a difference in occupational stressor levels depending on mass system of productions and how do these differences affect health levels?

1. The lean production-line will have higher occupational stressor levels and poorer health than the traditional production-line.

Lean production-line workers had higher a higher level of time stressors and had *better* psychological health than participants on the traditional production-lines. On the lean production-line, there was a significant relationship found between time stressors and psychological health, where a high level of time stressors was associated with better psychological health. This relationship did not exist in the traditional production-line group. The hypothesis was not supported. In contrast, the LPL had a higher level of time stressors and had *better* psychological health.

Objective: Does a negative relationship exist between occupational stressors and health levels over time?

1. *Participants with higher occupational stressor levels will also have poorer health over time.*

Within the production-lines, although the level of time stressors increased from time 1 to time 2, health levels did not change over time. For the lean production-line, general health (GHQ) diminished from time 1 to time 3, but stressor levels did not change. For the traditional production-line, there were no significant changes in overall health or stressor levels over time. The data did not support the hypothesis that participants with higher stressor levels will also have poorer health over time.

Objective: Is there a relationship between proposed stress buffers (social support, coping strategies), occupational stressors and health?

1. *The interaction between social support and occupational stressors will influence physical and psychological health levels.*

The analyses of psychological health revealed a three-way interaction between time stressors, workload stressors and the amount of available social support. When the traditional production-line data were assessed, the findings implied that for participants with a low amount of social support, those who worked more hours (high time

stressors) with high workload stressors had better psychological health than those who worked fewer hours and had less of a workload (low workload stressors). In addition, participants with a high amount of social support, those who worked fewer hours and had less of a workload had better psychological health than those who worked more hours with a higher workload. Conversely, participants with a high amount of social support and time stressors, those who had a higher level of workload stressors had significantly poorer psychological health than those with a lower level of workload stressors. Therefore, based upon these findings the hypothesis, relating to psychological health, was supported.

2. *The interaction between coping strategies and occupational stressors will influence physical and psychological health levels.*

The analyses of physical health revealed a two-way interaction between workload stressors and engagement coping. The findings indicated that for participants with high engagement coping, physical health diminished when workload stressor levels increased. Based upon these findings the hypothesis, relating to physical health, was supported.

2.3.3.2. Summary of Study 1 results

The aim of study 1 was to investigate the factors that moderate the relationship between occupational stressors and health. The first objective of was to examine the relationship between levels of reported occupational stressors and reported health. In all but one of the tests, there were no significant differences in health depending on occupational stressor levels (Table 2.6). The exception focused on difference in occupational stressor levels and health depending on the production-line system. In that case, the lean production-line had higher time stressor levels (high number of hours worked and contracted to work per week, low job control) and *better* psychological health than the

traditional production-line (Table 2.7). In concurrence with these results, based upon the later regression analyses that controlled for age, the lean production-line had better psychological health than the traditional production-line (Section 2.3.2.2.). Furthermore, higher levels of time stressors were associated with better psychological health for the lean production-line (Section 2.3.1.3.). These results suggest a possible relationship between hours worked on the lean system of production and psychological health -a relationship that did not exist for the traditional production-line. Therefore, based upon the results the hypotheses 1) Participants with higher occupational stressor levels will have poorer health was not supported and 2) The lean production-line will have higher occupational stressor levels and also poorer health than the traditional production-line, were not supported.

The subsequent section of this study explored the relationship between proposed stress buffers, occupational stressors and health. The regression analyses indicated that social support quantity (SSQN) moderated the relationship between workload stressors, time stressors and psychological health (Figure 2.4). When traditional production-line workers with a low workload and low time stressors had a higher amount of support it was beneficial to psychological health. While, having a fewer supportive others when time stressors and workload stressors levels were high, resulted in better psychological health.

Engagement coping was also a significant moderator of the relationship between workload and physical health. However, engagement coping did not act as an occupational stressor buffer as proposed. According to the results, for those with a high level of engagement coping, as the workload increased physical health diminished (Table 2.13). Therefore, for individuals who attempted to solve and/or overcome occupational

stressors, their physical health diminished as the workload increased. This relationship did not exist with low engagement coping. Subsequently, it could be reasoned that individuals who constantly strove to overcome occupational stressors exceed their physical resources.

According to these findings, the amount of available social support impacted on the relationship between occupational stressors and psychological health, while engagement coping moderated the relationship between workload stressors and physical health. However, the effect/impact of the proposed stress buffers was not always positive. Although the interaction between engagement coping and workload emerged in the regression analysis, it was only just above significance ($p < .05$). No other significant interactions involving coping strategies, occupational stressor levels and health emerged. This suggests that the significant interaction may be attributed to chance.

These results indicated that occupational components of a job alone do not govern health. However, these analyses have indicated that the relationship between the proposed stress buffers (social support, coping strategies), occupational stressors and health may be more complex that initially conceived. Moreover, even though the results of Study 1 are interesting, it must be noted that the limited sample size prevents these results from being generalised to the general population. Therefore further research is required.

CHAPTER 3

3. Methodology for Study 2

In Study 2 nurses from five South Wales NHS hospitals participated. Nurses were selected to participate in the second study for two reasons. The first reason was that a large number was available. Due to the large number of available participants, the data could be assessed depending upon nurse grades (auxiliary, staff nurse, midwife, senior nurse, ward sister). This was important because it provided the opportunity to compare the occupational stressor and health levels of individuals within the same organization but with different tasks and responsibilities. It has been suggested in the literature that workers in higher positions and/or grades within an organisation have more decision latitude and control over the pacing of their job than individuals in lower grades and/or positions (Karasek *et al.* 1981, 1988; Spector, 2002; Troup & Dewe, 2002). Based upon prior research, it could be argued that senior nurses will have a lower occupational stressor level than nurses in lower grades such as staff nurses and auxiliary nurses. Thereby assessing the levels of job demand, job control and other occupational stressors depending on nurse grades, possible differences between health levels can be explored.

The second reason was the occupational nature of the nursing profession. Numerous studies have reported that the nursing profession had high emotional stress, autonomy, demand, and poorer staffing (de Jonge *et al*, 2000; Laschinger & Spence *et al.*, 2001; Bradley & Cartwright, 2002). In addition, it has been suggested that the sources of occupational stress between health care and assembly work are dissimilar. Therefore, by utilising both nurses and assembly workers, differences in occupational stressors and subsequent health could be assessed.

Aim

In the context of prior research and due to the previous limited number of respondents, the aim of study 2 was to further investigate the relationship between perceived proposed stress buffers (social support, coping strategies), occupational stressors and health.

Objectives

Similar to the previous study, the first objective of Study 2 was to examine the relationship between levels of reported occupational stressors and reported health. The second objective, specific to Study 2, was to examine whether there would be differences in occupational stressor levels depending on nurse grades, and how these differences affect health levels. The third objective was to examine the relationship between proposed stress buffers (social support, coping strategies), occupational stressors and health.

Hypotheses

In line with the above discussion, the following hypotheses were formulated:

1. Participants with higher occupational stressors levels will also have poorer physical and psychological health.
2. Senior nurses will have lower occupational stressor levels and also have better health than lower grade nurses.
3. The interaction between social support and occupational stressors will influence physical and psychological health levels.
4. The interaction between coping strategies and occupational stressors will influence physical and psychological health levels.

3.1. Methods

Participants

290 individuals from five South Wales Hospitals participated in the cross-sectional study. The participants' age ranged from 21-63 years (mean age = 37.8, SD = 8.81). The participant ratio was 91.4% female and 5.5% male. Additional participant statistics are in Appendices B7 & B8.

Questionnaires

The study used a collection of standardized scales and demographic items to assess levels of proposed stress buffers, occupational stressors and health measures. The scales used in Study 1 listed below were used in Study 2. For additional questionnaire details refer to Section 2.1 and Appendix A5.

- Job Satisfaction Questionnaire (Hackman & Oldman, 1975)
- Chronic Mental Fatigue Questionnaire (Bentall *et al.*, 1993)
- Coping Strategy Questionnaire (Barton *et al.*, 1995)
- Cognitive-Somatic Anxiety Questionnaire (Schwartz *et al.*, 1978)
- General Health Questionnaire (Goldberg, 1972)
- Physical Health Questionnaire (Barton *et al.*, 1995)
- Workload Questionnaire (Barton *et al.*, 1995)
- Social Support Questionnaire (Sarason *et al.*, 1987)
- Job Content Questionnaire (Karasek, 1985)
- Job Pacing Question

3.2. Procedure

During the initial stage of data collection, 15 hospitals throughout Wales were asked to participate in the study. Of the 15 hospitals approached, 5 NHS hospitals agreed to participate. After the hospitals' Research Ethics Committee granted ethical approval, the questionnaires were sent to the wards of the hospitals to be distributed to the nurses. Participation in the study was impressed as completely voluntary. The nurses who volunteered to participate were given questionnaire packets. Each packet contained an information letter outlining the study, the 11-page questionnaire (Appendix A5), consent form (Appendix A6) and a pre-paid envelope. Participants were instructed to complete the questionnaire and consent form at their earliest convenience and to post the completed questionnaire in the pre-paid envelope provided. The average response duration was between 1-2 weeks.

3.2.1. Response rates

From the 2310 questionnaires that were sent out to five South Wales Hospitals, 290 questionnaires were completed and returned (12.5%).

3.2.2. Participant descriptive statistics

The total participant ratio was 91.4% female and 5.5% male. The participants' age ranged from 21-63 years (mean age = 37.83, SD = 8.81). The participants consisted of 9 auxiliary nurses, 221 staff nurses, 16 ward sisters, 8 midwifes and 23 senior nurses. The respondent ratio for auxiliary nurses was 11.1% male and 88.9% females. The age of the auxiliary nurses ranged from 22-54 (mean age = 36.67, SD = 11.67). The staff nurses were 6.7% male and 91.1% female. Their ages ranged from 21-63 years (mean age = 37.42, SD = 8.84). All of the ward sisters were female with ages ranging from 31-54 (mean age = 39.98, SD = 6.99). The age of midwifes and senior nurses ranged from

29-62 (mean age = 42.67, SD = 8.81) and 28-58 (mean age = 37.43, SD = 8.02), respectively. Participant data depending on nurse grade can be found in Appendices B9-B18.

3.3. Results

3.3.1. Descriptives

3.3.1.1. Internal reliability

The assessment of internal reliability of each composite of the Study 2 questionnaire can be seen in Tables 3.1. The Cronbach alpha coefficients for the majority of the health, proposed stress buffer and occupational stressor scales showed modest to reasonable internal reliability (Alpha value> .7). The alpha coefficients for job insecurity, decision latitude and psychological demands were on the low side.

SCALE	N	MEAN	SD	ALPHA
General job satisfaction	287	15.83	4.67	.71
Job insecurity	286	5.08	1.43	.68
Decision latitude	257	26.38	4.14	.45
Psychological demands	262	25.65	2.65	.45
JCQ Social support	249	33.40	8.15	.84
Social support: Quality	257	11.48	6.50	.95
Social support: Quantity	277	18.05	9.85	.88
Engagement coping	267	16.35	2.76	.72
Disengagement coping	269	10.61	3.49	.76
Chronic mental fatigue	279	24.56	6.50	.79
Cognitive anxiety	285	14.33	5.91	.87
Somatic anxiety	285	15.14	4.68	.76
General health (GHQ)	275	24.92	5.73	.90
Cardiovascular health	279	11.62	3.77	.82
Gastrointestinal health	283	14.71	5.18	.88
Joint pain	276	7.91	2.83	.74

TABLE 3.1 NURSE DESCRIPTIVES STATISTICS AND RELIABILITIES FOR MAIN MEASURES

3.3.1.2. Factor Analyses and Varimax Rotations

In the initial analysis, the participant groups' data were analysed using the categories: occupational stressors, proposed stress buffers and health measures. The basic dimensions were analysed using Factor analyses.

Occupational stress variables

The occupational stressor variables of the nurse data were also subjected to principle components analysis. The Kaiser-Meyer-Oklin value was .670 with a significant Bartlett's Test of Sphericity. Principle components revealed the presence of 3 components, explaining 25.01 per cent, 21.68 and 11.45 per cent of the variance respectfully (Figure 3.1). A Varimax rotation was then performed. The two-factor solution explained a total of 46.53 per cent of the variance, with component 1 contributing 23.69 per cent and component 2 contributing 22.84 per cent of the variance (Table 3.2). The coefficients that composed Component 1 were hours contracted to work per week and hours worked per week. Therefore Component 1 was retained as the variable: time stressors. Component 2 was comprised of mental workload, emotional workload, time pressure, job insecurity and control of job pacing. The relationship between the coefficients suggested that individuals who had a higher overall workload reported lower control over the pacing of the job and higher job insecurity. Component 2 was retained as the variable: job stressors.

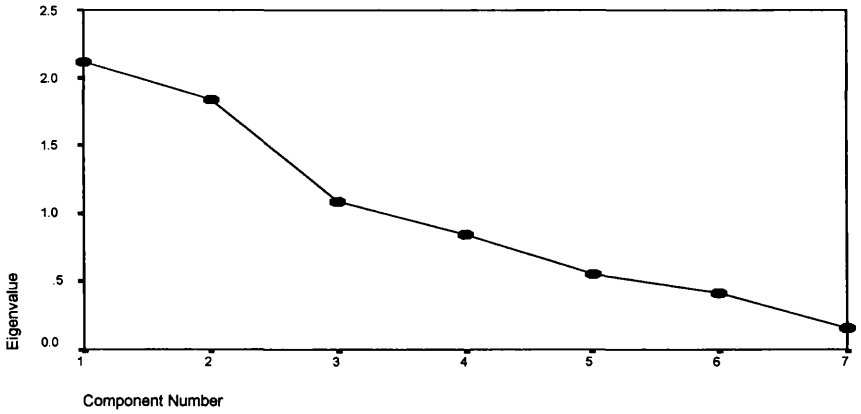


FIGURE 3.1. FACTOR ANALYSIS SCREE PLOT FOR OCCUPATIONAL STRESSOR COEFFICIENTS

Variables	Factor 1	Factor 2
Hours contracted per week	.927	3.24E-02
Hours worked per week	.917	.157
Mental workload	-4.78E-02	.800
Emotional workload	-5.97E-02	.800
Time pressure	-.124	.749
Job Insecurity	4.77E-02	.314
Control of job pacing	2.60E-02	.302
% of Variance	23.69 per cent	22.84 per cent
Total Variance	**46.53 per cent**	

TABLE 3.2 OCCUPATIONAL STRESSORS ROTATED COMPONENT MATRIX FOR NURSES

Proposed stress buffers

The proposed stress buffer variables were subjected to principle components analysis. The Kaiser-Meyer-Oklin value was .579 with a significant Bartlett's Test of Sphericity. Principle components revealed the presence of 2 components, explaining 29.94 per cent and 20.13 per cent of the variance (Figure 3.2). After a Varimax rotation as performed, the two-factor solution explained a total of 50.07 per cent of the variance, with component 1 contributing 29.60 per cent and component 2 contributing 20.47 per cent of the variance (Table 3.3).

Component 1 was composed of the coefficients: JCQ social support, social support quality and social support quantity. Therefore, Component 1 was retained as the proposed stress buffer variable: social support. The coefficients that composed Component 2 were coping engagement and coping disengagement. The relationship between the coefficients suggested that individuals with high coping engagement reported low coping disengagement. Component 2 was retained as the proposed stress buffer variable: coping strategies.

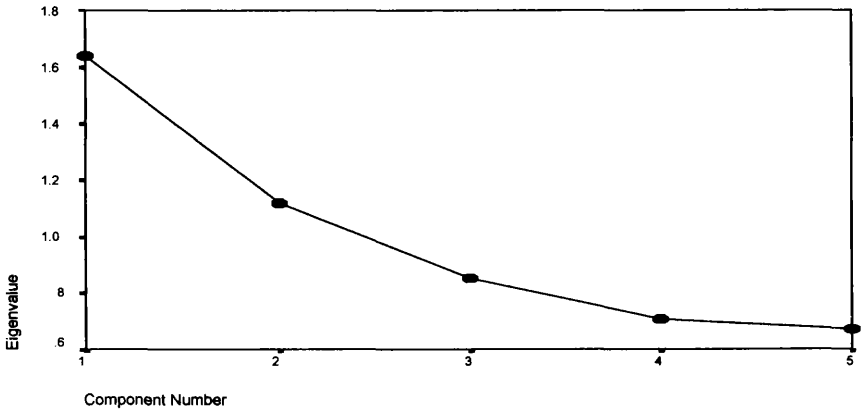


FIGURE 3.2. FACTOR ANALYSIS SCREE PLOT FOR PROPOSED STRESS BUFFER COEFFICIENTS

VARIABLES	Factor 1	Factor 2
JCQ Social Support	.818	.147
Social Support: quality	.586	.283
Social Support: quantity	.571	.312
Coping: engagement	.272	.716
Coping: disengagement	-5.81E-02	.627
% of Variance	29.60 per cent	22.84 per cent
Total Variance	**50.07 per cent**	

TABLE 3.3. PROPOSED STRESS BUFFERS ROTATED COMPONENT MATRIX FOR NURSES

Health measures

Next, the health measures were subjected to principle components analysis. The Kaiser-Meyer-Oklin value was .829 with Bartlett's Test of Sphericity at a significant level,

supporting the factorability of the correlation matrix (Figure 3.3). Principle components revealed the presence of 2 components, explaining 43.64 per cent and 14.58 per cent of the variance. After the Varimax rotation, the two-factor solution explained a total of 58.21 per cent of the variance, with component 1 contributing 32.88 per cent and component 2 contributing 25.34 per cent of the variance (Table 3.4).

The coefficients that composed Component 1 were cognitive anxiety, somatic anxiety and general health (GHQ). Furthermore, although not as powerful as the other coefficients, gastrointestinal (.395) and cardiovascular health (.514) also comprised Component 1. Due to the strength of the psychological health coefficients, Component 1 was retained as the variable: psychological health. The coefficients that composed Component 2 were gastrointestinal health, cardiovascular health, joint pain and minor infections and chronic mental fatigue. Therefore Component 2 was retained as the variable: physical health.

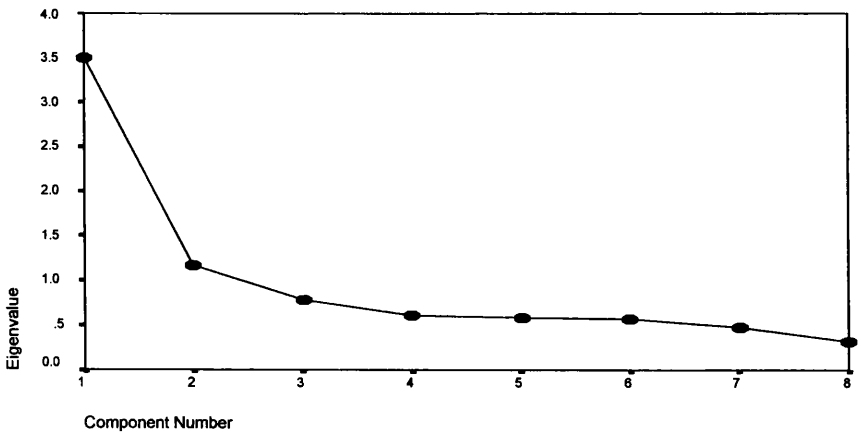


FIGURE 3.3. FACTOR ANALYSIS SCREE PLOT FOR HEALTH MEASURE COEFFICIENTS

VARIABLES	Factor 1	Factor 2
Cognitive Anxiety	.822	-.290
Somatic Anxiety	.777	-.273
General Health	.691	-.257
Chronic mental fatigue	-.223	.644
Minor infection	.266	.799
Joint pain	.265	.734
PH: Gastrointestinal	.395	.643
PH: Cardiovascular	.514	.576
% of Variance	32.88 per cent	25.34 per cent
Total Variance	**58.21 per cent**	

TABLE 3.4. HEALTH MEASURES ROTATED COMPONENT MATRIX FOR NURSES

3.3.1.3. Differences in health depending on occupational stressor levels

Differences in health depending on occupational stressor levels

Following the factor analyses and Varimax rotations, the resultant occupational stressors and proposed stress buffer factors were equally subdivided into three levels (low, medium, high). One-way between-groups ANOVAs were then conducted to explore if participants with higher levels occupational stressors had significantly poorer health compared to participants with lower occupational stressor levels.

Depending on the time stressor levels, there were no significant differences in psychological [F (2, 184)=1.87, ns] or physical health [F (2, 184)=1.05, ns]. There were also no differences in psychological [F (2, 183)=1.06, ns] or physical health levels [F (2, 183)=2.20, ns] depending on job stressor levels (Appendices B19 & B20).

Difference in occupational stressor and health levels depending on nurse grade

Next, possible differences in occupational stressor levels and health levels between nurse grades were examined. There was a significant difference in time stressor levels depending on the nurse grades [F (4, 207)= 6.72, $p < .005$]. Ward sisters reported a

higher level of time stressors (amount of hours contracted and worked per week) than auxiliary nurses, staff nurses and midwives (Table 3.5). In addition, auxiliary nurses reported a lower level of time stressors than senior nurses. However, depending on the nurse grades, there was no significant difference in levels of psychological health [F (4, 246)= .72, ns], physical health [F (4, 242) =1.16, ns] or job stressors [F (4, 207) = .78, ns] (Appendices B23 & B24).

	Aux. nurse	Staff nurse	Ward sister	Senior nurse	Midwife
M=	-.56*±	.01**	.99	.50	-.33***
SD=	.86	.91	.26	.54	1.05
N=	8	160	13	20	11

TABLE 3.5. DIFFERENCES IN TIME STRESS LEVELS DEPENDING ON NURSE GRADES
** Ward sister v aux. nurse p< .001*
*** Ward sister v staff nurse p< .001*
**** Ward sister v midwife p< .005*
± Aux. nurse v senior nurse p< .05
¤ Time stress scores ranged from -3.71 (low) to 1.60 (high)

The interactive effect of job-demand and job-control (JD-C model) on health

As demonstrated by de Rikj *et al.* (1998), hierarchical regressions were performed to test for main and interactive effects of Karasek's (1979) job demand and job control variables on psychological and physical health. First, the data were examined for potential problems of multicollinearity. Then the variables age, gender, auxiliary nurse, staff nurse, ward sister, midwife and senior nurse were placed in the first step of the regression to control for possible confounding effects. The job demand and job control variables were then placed into the second step of the equation to test for main effects. The variables job demands and job control were combined and entered into the last step of the equation to test for two-way interactions. There were no significant main effects of job demands or job control in any of the analyses, after controlling for age and gender. There was also no significant two-way interaction involving job demands and

job control in the analyses of physical health and psychological health. The results of the analyses were summarised in Table 3.6.

	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.01			.03
Age	-.003	.01		.003	.01	
Gender	.04	.31		.26	.31	
Auxiliary nurse	.10	.39		.31	.38	
Ward sister	.50	.46		-.53	.45	
Midwife	.38	.32		-.03	.31	
Senior nurse	.07	.36		-.25	.36	
2. *Main effects*			.08			.07
Demands	.17	.22		-.09	.22	
Control	.25	.24		-.01	.23	
3. *Two-way interactions*			.08			.07
Demand x control	-.004	.004		.001	.004	

TABLE 3.6. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT AND THEIR INTERACTIONS
Key - Demand = Job demand, Control = Job control

3.3.2. The relationship between proposed stress buffers, occupational stressors, and health

The previous analyses explored possible differences in health depending on occupational stressors levels and nurse grades. Even though time stressors levels were different depending nurse grade, health levels did not. Furthermore, when age, gender and nurse grade were controlled for, no significant main effects or two-way interactions involving job demand and job control emerged, in relation to psychological and physical health. Similar to Study 1, it was decided to investigate the moderating effect of proposed stress buffers on the relationship between occupational stressors and health while controlling for age, gender and nurses grade.

3.3.2.1. The moderating effect of proposed stress buffers on the relationship between occupational stressors and health

The next analyses concentrated on whether the relationship between occupational stressors (time and job) and health were moderated by coping strategies and/or social support while controlling for age, gender and nurse grade. As detailed in Section 2.3.2.1, the data were mean-centred to control for potential problem relating to multicollinearity before computing interaction terms.

Regression analyses

A series of four hierarchical regression analyses were conducted for each of the two dependent variables: physical health and psychological health. Separate analyses were conducted to assess whether the relationship between the occupational stressors (time and job) and the dependent variable were moderated by coping strategies and/or social support.

The variables age, gender, auxiliary nurse, staff nurse, ward sister, midwife and senior nurse were placed in the first step of the regression to control for possible confounding effects. The job stressors and time stressors variables were placed into the second step of the equation to test for main effects. Next, the variables job stressors and time stressors were combined with the moderator variable (social support, coping strategies) to test for two-way interactions in the third step. In the fourth and last step, three-way interactions were explored using the time stressors, job stressors and each moderating variable. It should be noted that the staff nurse coefficient was excluded from the regression analysis by the statistical programme (SPSS). Staff nurse was then placed into a separate regression analysis without any other control variables. Although the staff nurse coefficient was not excluded from the regression, it still did not emerge as a

significant individual predictor of physical or psychological health. It was concluded that due to the dummying of the other nurse grades, the staff nurse coefficient was redundant and therefore excluded from the following regression equations by the statistical programme.

Social support

The first set of regression analyses explored the role of social support as a moderator in he relationship between occupational stressors and 1) psychological heath and 2) physical health.

The first regression analysis examined the role of social support on the relationship between occupational stressors and psychological health (Table 3.7). In step 3, a significant amount of variance in psychological health was explained by the addition of the two-way interactions between time stressors, job stressors and social support (R^2= .13) [F (12, 93)= 1.98, $p < .05$]. Moreover, the interaction between social support and job stressors emerged as the significant predictor of psychological health ($p < .001$). There were no significant main effects of job stressors and time stressors in any of the analyses, nor any three-way interactions involving social support, time stressors and job stressors (Table 3.7).

The two-way interaction between social support and job stressors, regarding psychological health was then explored by plotting the regression equations at one standard deviation below the mean of the moderator (social support) and one standard deviation above the mean (Figure 3.4). In accordance with the procedures outlined by Aiken and West (1991), t-tests were calculated to determine whether the slopes of the simple regression lines were significantly different from zero. Post-hoc probing of the

interactions indicated the presence of a significant relationship between job stressors levels and psychological health, among those who reported high levels of social support, (t (89)= 3.08, p< .01) and those who reported low social support (t (89)= 2.62, p< .01) (Figure 3.4). The results indicated that for respondents with a high level of social support, as job stressor levels increased psychological health diminished. Alternatively, when participants reported a low level of social support, psychological health improved as job stressor levels increased.

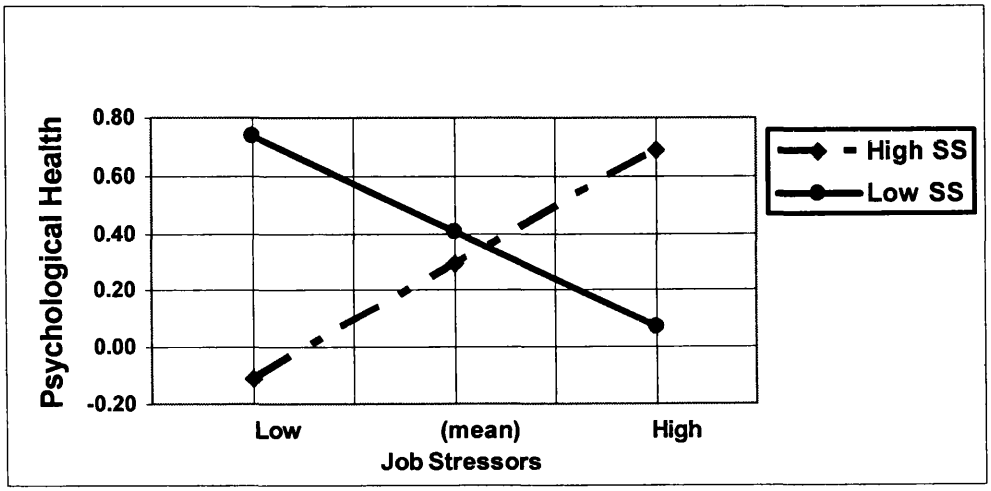


FIGURE 3.4. TWO-WAY INTERACTION EFFECT OF SOCIAL SUPPORT AND JOB STRESSORS ON PSYCHOLOGICAL HEALTH

¤*Psychological health scores ranged from -1.82 (good health) to 3.44 (poor health)*

Key- SS =Social support

The role of social support as a moderator in the relationship between occupational stressors and physical health was then examined (Table 3.8). In step 2, a significant amount of variance in physical health was explained by the addition of time stressors, job stressors and social support (R^2= .10) [F (9, 93)= 2.37, p< .05]. In the final equation, age and gender (*both* p< .05) along with job stressors (p< .05) and social support (p< .001) emerged as significant predictors of physical health. Furthermore, there was a significant interaction between social support and job stress (p< .001) (Table

3.7). There was no significant three-way interaction involving social support, time stressors and job stressors.

Social Support						
	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.05			.10
Age	-.001	-.08		-.02*	-.21*	
Gender	.10	.03		.78*	.22*	
Auxiliary nurse	.48	.11		-.07	-.02	
Ward sister	-.05	-.01		.02	.01	
Midwife	.76	-.01		-.10	-.30	
Senior nurse	-.24	-.05		-.77	-.19	
2. *Main effects*			.05			.10*
Time stressors	-.12	-.08		.006	.01	
Job stressors	.04	.04		.22*	.25*	
SS	-.06	-.06		-.33***	-.36***	
3. *Two-way interactions*			.13***			.07
Time x Job	.25	.18		-.14	-.12	
SS x Time	-.02	-.01		.05	.04	
SS x Job	.36***	.37***		-.26**	-.30**	
4. *Three-way interaction*			.004			.02
SS x Time x Job	-.11	-.07		.20	.16	

TABLE 3.7. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT AND THEIR INTERACTIONS
*$p < .05$ **$p < .01$ ***$p < .001$
Key - Time = Time stressors, Job = Job stressors, SS =Social support

Following the regression analyses, a one-way ANOVA was conducted to explore possible differences in physical health depending on gender. Based upon the analyses, there was no significant difference in physical health depending on gender [F (1, 239)= .60, ns.]. The conflicting results of the regression analysis and one-way ANOVA could be attributed to the relatively small amount of males within the sample size (males = 14, females = 226).

Next, the relationship between age and physical health was investigated using Pearson product-moment correlation coefficient. Converse to the association indicated by the regression analysis, no significant correlation was found between age and physical health ($r = .01$, $n = 244$, ns). Additional correlations were then performed to explore the

relationship between job stressor levels, social support and physical health, while controlling for age and gender. There were significant correlations between job stressors ($r = .15$, $n = 182$, $p < .05$) and social support ($r = -.30$, $n = 106$, $p < .005$), and physical health. Higher levels of job stressors were associated with poorer physical health ($r = .15$, $n = 182$, $p < .05$), while higher/better social support was associated with better physical health.

The interaction between job stressors, social support and physical health was then explored by plotting the regression equations at one standard deviation below the mean of the moderator (social support) and one standard deviation above the mean (Figure 3.5). Post-hoc probing of the interactions indicated the presence of a significant relationship between job stressor levels and physical health, among those reporting high levels of social support, (t (89)= 4.08, $p < .01$). The findings indicated for respondents with high social support, physical health diminished as job stressor levels increased (Figure 3.5). There was no significant relationship found between job stressor levels and physical health among those with low social support.

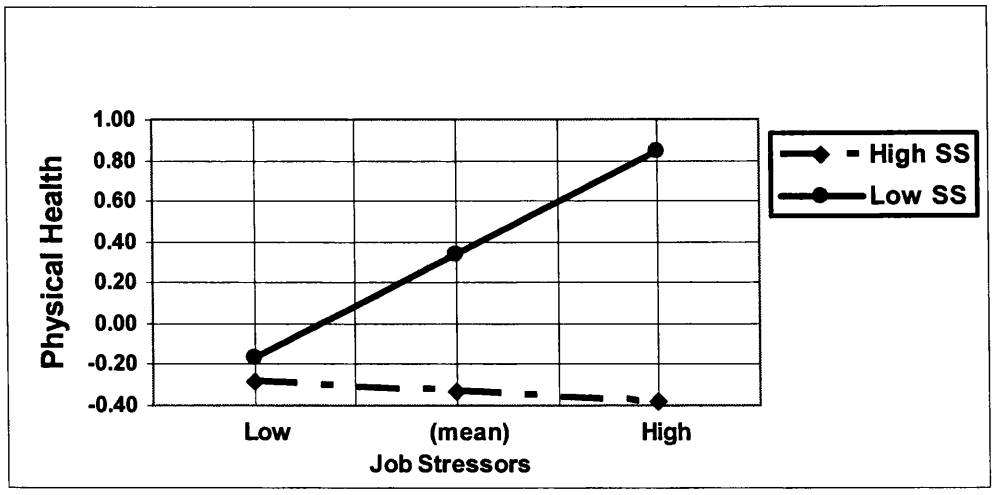


FIGURE 3.5. TWO-WAY INTERACTION EFFECT OF SOCIAL SUPPORT AND JOB STRESSORS ON PHYSICAL HEALTH

¤ *Physical health scores ranged from -2.32 (good health) to 3.77 (poor health)*

Key- SS = Social support

Coping strategies

The next set of regression analyses explored the role of coping strategies as moderators in the relationship between occupational stressors and 1) psychological heath and 2) physical health (Tables 3.8).

The first regression analysis examined the role of coping strategies on the relationship between occupational stressors and psychological health. In step 1 and step 2, the insertion of the control and main effect variables into the regression equation did not explain a significant amount of variance. In step 3, a significant amount of variance in psychological health was explained by the addition of interactions between time stressors, job stressors and social support (R^2= .09) [F (12, 93)= 1.27, p< .05]. In the final equation, the midwife variable emerged as a significant predictor of psychological health (p< .05). In addition, there was also a significant interaction between time stressors and job stressors (p< .05) (Table 3.8). No significant main effect of coping strategies or any interactions involving coping strategies emerged in the analysis of psychological health. In addition, there was no significant three-way interaction involving coping strategies, time stressors and job stressors. The results of the analysis are summarised in Table 3.8.

Following the regression analyses, a one-way ANOVA was conducted to explore possible differences in psychological health depending on nurse grades. Based upon the analyses, there were no significant differences in psychological health depending on nurse grade [F (4, 246)= .72, ns.]. The interaction between job stressors, time stressors and psychological health was then explored by plotting the regression equations at one standard deviation below the mean of the moderator (engagement coping) and one standard deviation above the mean (Figure 3.6). T-tests were calculated to determine

whether the slopes of the simple regression lines were significantly different from zero. Post-hoc probing of the interactions indicated the presence of a significant relationship between job stressor levels and psychological health, among those reporting high levels of time stressors, (t (89)= 2.50, p< .05) and those with low levels of time stressors (t (89)= 2.25, p< .05) (Figure 3.6). The findings indicated for respondents with a low level of time stressors, psychological health was better as job stressor levels increased. Furthermore, for respondents with a high level of time stressors, psychological health diminished as job stressor levels increased.

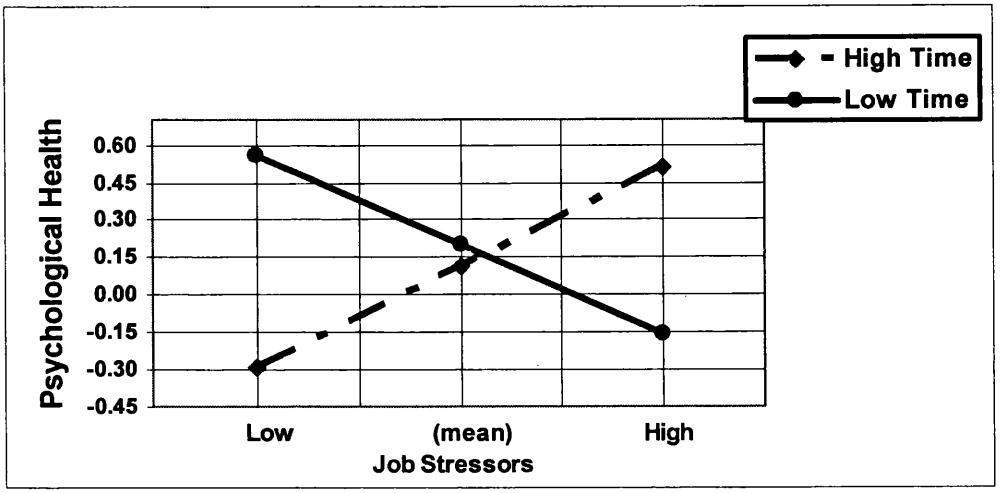


FIGURE 3.6. TWO-WAY INTERACTION EFFECT OF TIME STRESSORS AND JOB STRESSORS ON PSYCHOLOGICAL HEALTH

¤*Psychological health scores ranged from -1.82 (good health) to 3.44 (poor health)*

Key- Time = Time stressors

The next regression analysis examined the role of coping strategies on the relationship between occupational stressors and physical health. There were no significant main effects of job stressors, time stressors or coping strategies in the analysis, nor any interactions involving coping strategies. In the final equation, the gender emerged as a significant predictor of physical health (Table 3.8). Following the regression analyses, a one-way ANOVA was conducted to explore possible differences in physical health depending on gender. Identical to prior results, physical health did not differ depending

on gender [F (1, 239)= .60, ns.]. As discussed previously, these conflicting results of the regression analysis and one-way ANOVA could be attributed to the relatively small amount of males within the sample size (males = 14, females = 226).

Coping strategies	Psychological Health			Physical Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.05			.10
Age	-.01	-.08		-.02	-.14	
Gender	.23	.06		.76*	.22*	
Auxiliary nurse	.55	.13		.04	.01	
Ward sister	-.05	-.01		-.17	-.03	
Midwife	.95*	.23*		.24	.07	
Senior nurse	-.24	-.05		-.75	-.18	
2. *Main effects*			.02			.05
Time stressors	-.05	-.03		.20	.15	
Job stressors	.02	.02		.16	.19	
Coping	-.24	-.21		.09	.08	
3. *Two-way interactions*			.09*			.03
Time x Job	.42*	.30*		-.07	-.06	
Coping x Time	.43	.26		-.01	-.01	
Coping x Job	.16	.15		-.08	-.09	
4. *Three-way interaction*			.001			.04
Coping x Time x Job	.05	.04		.29	.27	

TABLE 3.8. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, COPING STRATEGIES AND THEIR INTERACTIONS
$p< .05$
Key - Time = Time stressors, Job = Job stressors, Coping =Coping strategies

3.3.3. Summary

3.3.3.1. Objectives and Hypotheses

Objective: Will participants who differed in levels of reported occupational stressors also differ in levels of reported health?

1. *Participants with higher occupational stressors will also have poorer physical and psychological health.*

According to the results, health levels did not differ depending on stress levels. Moreover, no significant interactions between job demand and job control in relation to any of the health measures emerged from the regression analysis. Therefore, the

hypothesis that participants with higher occupational stressor levels will have poorer health was not supported.

Objective: Will there be a difference in occupational stressor levels depending on nurse grade and how do these differences affect health levels?

1. *Senior nurses will have significantly lower occupational stressor levels and also have better health than lower grade nurses.*

Ward sisters worked the highest number of hours, while auxiliary nurses worked fewer hours than senior nurses. Although the number of hours worked differed, health levels did not differ depending on nurse grade. Therefore, the hypothesis was not supported.

Objective: Is there a relationship between proposed stress buffers (social support, coping strategies), occupational stressors and health?

1. *The interaction between social support and occupational stressors will influence physical and psychological health levels.*

The initial findings found a main effect between social support and physical health, with high social support being associated with better physical health. Moreover, social support and job stress was found to predict physical and psychological health. The results were similar in that for respondents with high social support, those with higher job stressor levels had poorer health than those with a lower job stress level. No significant relationship between social support and occupational stressors for respondent with low social support. Based upon these findings, the hypothesis was supported.

2. The interaction between coping strategies will influence physical and psychological health levels.

The data indicated that high engagement coping was associated with poorer psychological health. However, the interactions between coping strategies and occupational stressors did not predict any of the health measures in any other regression analyses. The hypothesis was not supported.

3.3.3.2. Summary of Study 2 results

The aim of study 2 was to investigate the factors that moderate the relationship between occupational stressor levels and health. The first objective examined whether participants who differed in levels of reported occupational stressors and/or nurse grade differed in levels of reported health. Although time stressor levels differed depending on nurse grades and job strain categories, health levels remained similar (Table 3.5). Furthermore, in regard to the JD-C model of job strain, health levels health measures were not influenced by the interaction between job control and job demand (Table 3.6). Subsequent analyses did indicate a significant correlation between job stressor levels and physical health, with higher levels of job stressors being associated with poorer physical health (Section 3.3.2.1.). This relationship was not found in any of the other analyses. However, in relation to the hypothesis, health levels did not differ depending on any of the participant groups. Therefore, the results did not support the hypotheses.

The second half of the study explored the relationship between proposed stress buffers (social support, coping strategies), occupational stressors and health. Contrary to the hypotheses, the relationships between coping strategies and occupational stressors did not effect or predict any of the health measures (Table 3.8). Yet, based upon the regression analyses, a significant relationship was found between social support, job stressors and psychological health (Figures 3.4). In support of the hypotheses, the

analyses indicated that for respondents with low levels of job stressors (low emotional workload, time pressure and physical workload) a higher amount of social support was beneficial to psychological health. Similarly, higher amounts of support and lower levels of job stressors were associated with better physical health (Figure 3.5).

With regard to the aim of the study, social support was found to moderate the relationship between occupational stressor levels and health. However, it was unclear as to why a good support system can be either beneficial or detrimental to health depending on occupational stressor levels. In particular, why is social support detrimental to health in times of high stress when it may be needed the most, while when stress is low, those with a good support structure had better psychological health than those with poor support? Although the theory that social support affects the relationships between occupational stressors and health has been supported by this study, certain questions emerged. It is suggested that further research is required to explore the various aspects of social support networks, such as the need for support, source of support, and the situational context in which support is provided (i.e. within work, outside of work).

CHAPTER 4

4. Methodology for Study 3

Building upon the findings of the previous two studies, Study 3 examined specific dimensions of social support and how they moderate occupational stressors levels and subsequent health. The first dimensions of social support examined were an individual's need for support, provision of support and the extent to which individuals seek support from others. Few researchers have investigated the relationship between the need for support and seeking of support, and occupational stressors and health (Green & Kocsis, 1996; Mendelson *et al.*, 2000; Schwarzer & Schulz, 2000). Moreover fewer, if any, have explored the relationship between the provision of support, occupational stressors and health. After an extensive search, the Berlin Social Support Scales (BSSS: Schwarzer & Schulz, 2000) was found that assessed the degree to which individuals need and seek support. However, there lacked a scale that measured the extent to which individuals provide support. Therefore, the BSSS was modified to incorporate the extent to which individuals provide social support (Section 4.1).

The remaining dimensions of support explored consisted of the source and nature of support. As previously discussed (Section 1.3.2.3.), the Social Support Questionnaire (SSQ) (Sarason *et al.*, 1985, 1987) was the most comprehensive social support questionnaire in that it examined the nature, quality and amount of available social support. However, it failed to consider the source from which support was provided. Is more support provided by family or co-workers? Do friends and co-workers provide the higher quality and quantity of support in relaxed situation, while family members provide the most support concerning intimate problems? Moreover, is there a difference in the quality and quantity of support from co-workers at work and co-

workers outside of work? The SSQ was therefore modified to incorporate the source of support: family, friends, co-workers at work, and co-workers outside of work (Section 4.1).

In this section of the research, it was necessary to have full-time employed participants in order to assess in greater depth co-worker, family and friend support, in relation to occupational stressors. Employees from a South Wales governmental agency were invited to participate.

Aim

In the context of prior research, the aim of Study 3 was to investigate the aspects of social support that moderate the relationship between occupational stressors and health.

Objectives

There were two objectives of Study 3. The first objective was to examine when, where and from who was most support provided. The second objective was to examine the relationships between the different aspects of social support, occupational stressors and health.

Hypotheses

In line with the above discussion, the following hypotheses were formulated:

1. Relaxed situations will have the highest amount of social support, while intimate situations will have the highest quality social support.
2. There will be differences in the quality and amount of support from various sources.
3. The support provided from various sources will differ with the situation.

4. The nature of support will influence the relationship between occupational stressors and health levels.
5. The source of support will influence the relationship between occupational stressors and health levels.
6. The interaction between the need, seek and provision of social support and occupational stressors will influence health levels.
7. The interaction between the social support quality and occupational stressors will influence health levels.
8. The interaction between the social support quantity and occupational stressors will influence health levels.

4.1. Methods

Participants

375 participants from a South West Wales governmental agency were recruited to participate in this cross-sectional study. The participants' age ranged from 20-57 years (mean = 37.97, SD = 10.37).

Questionnaires

Study 3 used a collection of standardized scales and demographic items to assess occupational stressors, health levels and individual components of social support.

The scales from Study 1 used in Study 3 are listed below (Section 2.1). Since the sample used were not shift-workers, the last three questions of the Chronic Mental Fatigue questionnaire relating to shift-work fatigue were not used. In addition, the Social Support Component Questionnaire and a modified version of the Social Support Questionnaire (SSQ) were used (Appendix A7).

- ❖ Chronic Mental Fatigue Questionnaire (Bentall *et al.*, 1993)
- ❖ Cognitive-Somatic Anxiety Questionnaire (Schwartz *et al.*, 1978)
- ❖ General Health Questionnaire (Goldberg, 1972)
- ❖ Physical Health Questionnaire (Barton *et al.*, 1995)
- ❖ Workload Questionnaire (Barton *et al.*, 1995)
- ❖ Job Insecurity (JCQ: Karasek, 1985)
- ❖ Job Pacing Question

1) Social Support Questionnaire (modified version of the SSQ: Sarason *et al.*, 1987)

Social support was assessed through a 24-item questionnaire measuring the quantity and quality of perceived social support provided by co-workers at work, co-workers outside of work, family and friends (not co-workers). The questionnaire contained two parts: number of available others in four situations and the degree of satisfaction with the support available in each situation by (1) co-workers at work, (2) co-workers outside of work, (3) family and (4) friends (not co-workers). The quantity of available social support was calculated by the sum of the number of people given per situation. The level of support satisfaction was scored on a 6-point Likert scale from 1-*Very dissatisfied* to 6-*Very satisfied.* The score for support satisfaction was calculated by summing the 6-items relating to support satisfaction. Higher scores represent higher support quality and/or quantity.

2) Social Support Component Questionnaire (SSCQ: unpublished)

Based on the Berlin Social Support Scale (BSSS: Schwarzer & Schulz, 2000), three components of social support were assessed through a 14-item questionnaire. Nine of the questions from the Berlin Social Support Scale, relating to an individual's need for

support and seeking of support from others, were used. Since the BSSS did not assess provision of support, five questions assessing the respondents' provision of support to others were added. Respondents were asked to rate the frequency that they need, seek, and provide social support in varying situations. The need, seeking and provision of support were calculated separately. The Likert response options ranged from 1-*Not at all true* to 4-*Exactly true.* A higher score represented a higher need, seeking and/or provision of support. Schwarzer & Schulz (2000) did not report the internal reliability of the BSSS, of which the SSCQ was based upon.

4.2. Procedure

A South Wales governmental agency was approached and agreed to participate in the study. Questionnaires were sent to the various departments were then distributed to the employees. Participation in the study was impressed as completely voluntary. The employees who volunteered to participate were given the questionnaire packet. Each packet contained an information letter outlining the study, the 4-page questionnaire (Appendix A7), consent form (Appendix A8) and a pre-paid envelope. Participants were instructed to complete the questionnaire at their earliest convenience and to send back the completed questionnaire and consent form in the pre-paid envelope provided. The average response duration was between 3 and 4 weeks.

4.2.1. Response rates

Three hundred and seventy-five participants from a South Wales governmental agency were recruited to participate in this cross-sectional study. All participants were asked to complete a postal questionnaire. Of the 375 questionnaires sent out, 74 questionnaires were completed and returned, a response rate of 19.73 per cent.

4.2.2. Participant descriptive statistics

The participants' age ranged from 20-57 years (mean age = 37.97, SD = 10.37). The participant ratio was 63.5% female and 35.1% male. The female participants' age ranged from 20-57 years (mean age = 38.51, SD = 10.23). The male participants' age ranged from 20-55 years (mean age = 36.96, SD = 10.95). Additional participant descriptive statistics are found in Appendices C1& C2.

4.3. Results

4.3.1 Descriptives

4.3.1.1. Descriptives of the data

First, the variables were checked for outliers and normal distribution. The only outliers that existed regarded the variable hours worked. To fully assess the effects of stressors arising from the work environment, it was important to have participants who worked *at least* full-time. The data were examined according to the reported hours worked each week. Only participants who worked at least 36 hours per week were utilized in this study.

4.3.1.2. Internal reliability

The assessment of internal reliability of each composite of the Study 3 questionnaire can be seen in Tables 4.1. The Cronbach alpha coefficients for the majority of the health, proposed stress buffer and occupational stressors scales showed modest to reasonable internal reliability (Alpha value> .7). The alpha coefficients for job insecurity, social support need, somatic anxiety and cardiovascular health were on the low side.

SCALE	N	MEAN	SD	ALPHA
Job insecurity	73	6.08	1.52	.53
Social support: Need	73	9.22	2.38	.61
Social support: Seek	74	13.23	2.91	.73
Social support: Provide	73	14.05	2.52	.86
Social support: Quality	46	27.33	14.71	.96
Social support: Quantity	73	26.01	18.08	.92
Quality of family support	66	5.60	3.48	.94
Quantity of family support	74	7.39	4.90	.86
Quality of friend support	61	5.59	3.62	.97
Quantity of friend support	74	8.11	6.68	.91
Quality of co-worker at work support	60	6.70	3.67	.92
Quantity of co-worker at work support	74	7.66	5.54	.80
Quality of co-worker outside work support	46	8.41	4.95	.95
Quantity of co-worker outside of work support	73	2.90	4.61	.90
Chronic mental fatigue	73	23.73	5.67	.77
Cognitive anxiety	74	12.53	4.38	.80
Somatic anxiety	73	11.62	3.39	.69
General health (GHQ)	70	24.70	5.25	.89
Cardiovascular health	73	10.67	2.51	.64
Gastrointestinal health	74	12.80	4.24	.84
Joint pain	73	7.51	2.77	.74

TABLE 4.1. STUDY 3 DESCRIPTIVES STATISTICS AND RELIABILITIES FOR MAIN MEASURES

4.3.1.3. Aspects of social support

Nature of Support

Paired-samples t-tests were used to evaluate differences in the quality and quantity of the participants' perceived support in various situations: relaxing situations, general discussions and intimate discussions. There was a significant difference in the amount of available supporters between the three situations (Table 4.2). Significantly more people were available during times of relaxation, than for general or intimate discussions. There were no significant differences in the satisfaction with the support provided depending on the different situations (Table 4.3). For further statistics refer to Appendix C3.

	Relax	General	Intimate
M=	12.34* **	9.17***	5.88
SD=	8.66	6.69	5.34
N=	59	59	59

TABLE 4.2. THE NUMBER OF SUPPORTERS IN DIFFERENT SITUATIONS

* *Relax v General quantity p< .0005*

** *Relax v Intimate quantity p< .0005*

*** *General v Intimate quantity p< .0005*

¤*Number of possible supporters ranged from 1-36*

	Relax	General	Intimate
M=	9.82* **	9.21***	9.36
SD=	5.10	4.79	5.35
N=	48	39	40

TABLE 4.3. THE QUALITY OF SUPPORT IN DIFFERENT SITUATIONS

* *Relax v general quality -n.s.*

** *Relax v intimate quality -n.s.*

*** *General v intimate quality -n.s.*

¤*Quality of support ranged from 1(very satisfied) to 24 (very dissatisfied)*

Source of Support

There was a significant difference between the number of co-workers who provide support outside work and the amount of support from co-workers at work, family and friends (Table 4.4). The number of co-workers who provide support outside of work was significantly less than the other sources, while there were no significant differences in the amount of support from the other groups.

The support provided by family and friends was significantly more satisfying than that from co-workers at work or co-workers outside of work (Table 4.5). Furthermore, the quality of support from co-workers outside of work was significantly lower than all other sources. However, there was no significant difference in the quality of support from friends or family. Additional information can be found in Appendix C4.

	Family	Friend	Co-worker at work	Co-worker outside work
M=	7.81*	8.29**	8.22***	3.92
SD=	5.17	7.06	5.73	4.46
N=	59	59	59	59

TABLE 4.4. THE NUMBER OF SUPPORTERS FROM DIFFERENT SOURCES

** Family v co-worker outside work quantity p< .0005*

*** Friend v co-worker outside work quantity p< .0005*

**** Co-worker at work v co-worker outside work quantity p< .0005*

¤*Number of possible supporters ranged from 1-27*

	Family	Friend	Co-worker at work	Co-worker outside work
M=	5.65*	6.02**	6.98***	8.89
SD=	3.60	3.59	4.21	4.95
N=	52	47	47	38

TABLE 4.5. THE QUALITY OF SUPPORT FROM DIFFERENT SOURCES

** Family v co-worker outside work quality p< .0005*

*** Friend v co-worker outside work quality p< .0005*

**** Co-worker at work v co-worker outside work quality p< .005*

¤*Quality of support ranged from 1 (very satisfied) to 18 (very dissatisfied)*

Sources of support in various situations

Relaxing situations

Participants reported that when they wanted to unwind and relax, the number and quality of support provided by co-workers outside work was significantly lower than the other sources (Tables 4.6 & 4.7). However, the number of supporters and the quality of support from co-workers at work, family or friends did not differ (Appendix C5).

	Family	Friend	Co-worker at work	Co-worker outside work
M=	3.39*	2.91**	3.93* **	1.39
SD=	2.21	3.63	2.87	2.25
N=	59	59	59	59

TABLE 4.6. THE AMOUNT OF SUPPORT IN TIMES OF RELAXING

** Family v co-worker outside work quantity p< .0005*

*** Friend v co-worker outside work quantity p< .0005*

**** Co-worker at work v co-worker outside work quantity p< .0005*

¤*Number of possible supporters ranged from 1-9*

	Family	Friend	Co-worker at work	Co-worker outside work
M=	2.00*	2.02**	2.33* **	1.71
SD=	1.35	1.31	1.39	3.06
N=	57	54	55	48

TABLE 4.7. THE QUALITY OF SUPPORT AVAILABLE IN TIMES OF RELAXING

** Family v co-worker outside work quality p< .0005*

*** Friend v co-worker outside work quality p< .0005*

**** Co-worker at work v co-worker outside work quality p< .001*

¤*Quality of support ranged from 1 (very satisfied) to 6 (very dissatisfied)*

General conversations

When participants wanted to discuss general issues and problems, the amount and quality of support available from co-workers outside of work was significantly less than the other sources (Tables 4.8 & 4.9). The quality and amount of support from co-workers at work, family and friends did not differ (Appendix C6).

	Family	Friend	Co-worker at work	Co-worker outside work
M=	2.63*	2.68**	2.81* **	1.05
SD=	1.89	2.59	2.30	1.69
N=	59	59	59	49

TABLE 4.8. THE NUMBER OF SUPPORTERS AVAILABLE FOR GENERAL DISCUSSIONS

** Family v co-worker outside work quantity p< .0005*

*** Friend v co-worker outside work quantity p< .0005*

**** Co-worker at work v co-worker outside work quantity p< .0005*

¤*Number of possible supporters ranged from 1-9*

	Family	Friend	Co-worker at work	Co-worker outside work
M=	1.85*	1.96**	2.24* **	2.98
SD=	1.17	1.29	1.44	1.73
N=	54	49	50	41

TABLE 4.9. THE QUALITY OF SUPPORT AVAILABLE FOR GENERAL DISCUSSIONS

** Family v co-worker outside work quality p< .0005*

*** Friend v co-worker outside work quality p< .0005*

**** Co-worker at work v co-worker outside work quality p< .001*

¤*Quality of support ranged from 1 (very satisfied) to 6 (very dissatisfied)*

Intimate discussions

Participants reported significantly fewer co-workers available outside of work with whom to discuss personal and intimate problems than from all other sources (Table 4.10). There were no significant differences in amount of support from family, friends and co-workers at work.

When discussing personal problems, participants reported most satisfaction with the support provided by friends and family, rather than co-workers at work or outside work (Table 4.11). There were no significant differences in the quality of support between family and friends or between co-workers at work and co-workers outside of work (Appendix C7).

	Family	Friend	Co-worker at work	Co-worker outside work
M=	1.80*	1.98**+	1.47* **	.63
SD=	1.69	2.15	1.46	1.47
N=	59	59	59	59

TABLE 4.10. THE NUMBER OF SUPPORTERS AVAILABLE FOR INTIMATE DISCUSSIONS

** Family v co-worker outside work quantity p< .0005*

*** Friend v co-worker outside work quantity p< .0005*

**** Co-worker at work v co-worker outside work quantity p< .0005*

+ Friend v Co-worker at work quantity p< .05

¤Number of possible supporters ranged from 1-9

	Family	Friend	Co-worker at work	Co-worker outside work
M=	1.79*	2.00** +	2.24***	2.78
SD=	1.18	1.35	1.44	1.75
N=	53	48	50	40

TABLE 4.11. THE QUALITY OF SUPPORT AVAILABLE FOR INTIMATE DISCUSSIONS

** Family v co-worker outside work quality p< .0005*

*** Family v co-worker at work quality p< .01*

**** Friend v co-worker outside work quality p< .0005*

+ Friend v co-worker at work quality p< .05

¤Quality of support ranged from 1 (very satisfied) to 6 (very dissatisfied)

4.3.2. The relationship between proposed stress buffers, occupational stressors and health

The previous analyses explored when, where and from what source is most support provided. Although the quality of support did not differ, participants reported there were more individuals with whom to relax with than for general and/or intimate discussions. In addition, although the quantity of support did not differ, friends and family provided the highest quality of support. Family and friends provided the highest quality and amount of support in all the situations (relax, general, intimate), while co-workers, when outside of work, provided the lowest amount and quality of support. Building upon these results, the following section explored the relationship between the aspects of support, occupational stressors and health. The impact and moderating effect of the various aspects of social support on the relationship between occupational stressors and health were analysed.

4.3.2.1. Occupational stressors Factor analysis and Varimax rotation

The occupational stressor variables were subjected to principle components analysis. An inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Oklin value was .630 with Bartlett's Test of Sphericity at a .0005 level of significance, supporting the factorability of the correlation matrix. Principle components revealed the presence of 3 components with eigenvalues exceeding 1, explaining 27.86 per cent, 21.53 per cent and 17.89 per cent of the variance respectively (Figure 4.1). A Varimax rotation was then performed. The two-factor solution explained a total of 54.41 per cent of the variance, with component 1 contributing 32.10 per cent and component 2 contributing 22.30 per cent of the variance (Table 4.12).

The coefficients that composed Component 1 were time pressure, emotional strain, mental workload, control of job pacing and job insecurity. The relationship between the coefficients suggested that participants with higher overall workload and good job security also reported lower control over job pacing. Component 1 was retained as the variable: job stressors. The coefficients that composed Component 2 were hours worked per week, hours contracted to work per week and physical workload. The relationship between the coefficients suggested that participants who worked more hours reported a lighter physical workload. Justifiably, this relationship implied that those who have less physically demanding jobs are able to work more hours. Moreover, the amount of hours worked per week increased as the amount of hours contracted to work increased, suggesting that respondent worked more hours per week if they were contracted. Therefore Component 2 was retained as the variable: time stressors.

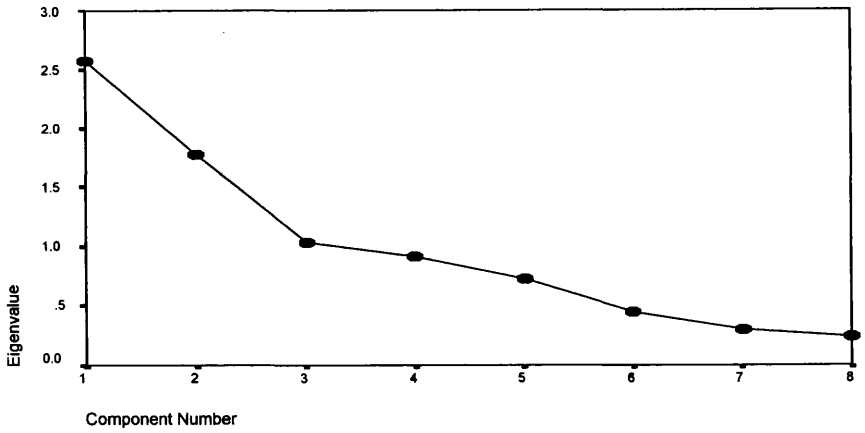


FIGURE 4.1. FACTOR ANALYSIS SCREE PLOT FOR OCCUPATIONAL STRESSORS COEFFICIENTS

Variables	Factor 1	Factor 2
Time pressure	.862	5.84E-02
Emotional strain	.785	-.140
Mental workload	.776	.154
Control of pacing	.566	.124
Job insecurity	.357	-7.47E-02
Hours worked per week	.242	.885
Hours contracted per week	-.126	.872
Physical workload	.290	.417
% of Variance	32.10 per cent	22.30 per cent
Total Variance	**54.41 per cent**	

TABLE 4.12 OCCUPATIONAL STRESSORS ROTATED COMPONENT MATRIX

4.3.2.2. Aspects of social support Factor analysis and Varimax rotation

The aspects of social support variables were subjected to principle components analysis. An inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Oklin value was .475 with Bartlett's Test of Sphericity at a .0005 level of significance, supporting the factorability of the correlation matrix (Figure 4.2). Principle components revealed the presence of 3 components with eigenvalues exceeding 1, explaining 45.58 per cent, 23.00 per cent and 9.96 per cent of the variance respectively. A Varimax rotation was then performed. The three-factor solution explained a total of 78.53 per cent of the variance, with component 1 contributing 35.88 per cent, component 2 contributing 32.37 percent and component 3 contributing 10.28 per cent of the variance (Table 4.13).

All of the coefficients that composed Component 1 related to the quality of available support. Component 1 was retained as the variable: social support quality. The coefficients that composed Component 2 all related to the amount of available support, therefore Component 2 was retained as the variable: social support quantity. The

coefficients that comprised Component 3 were need for support, seeking of support and provision of support. The relationship of the coefficients that comprised Component 3 indicated that the more respondents provided support, the more they sought and/or needed support. Therefore, Component 3 was retained as the variable: Need, Seek and Provide (NSP).

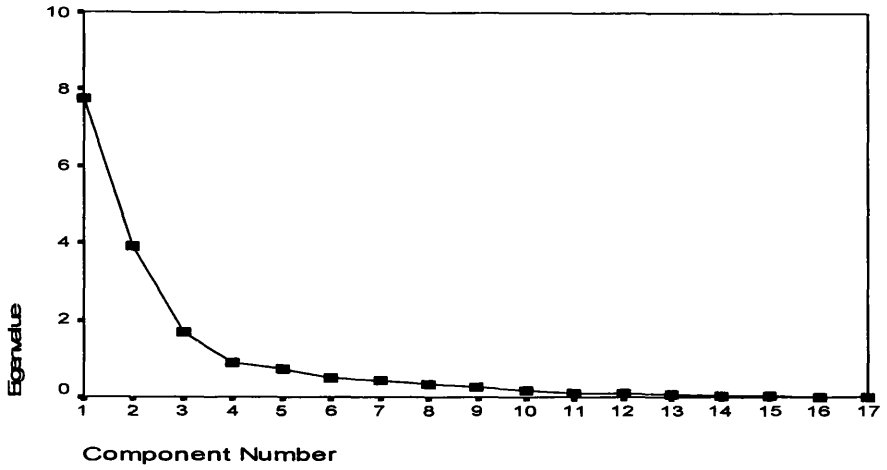


FIGURE 4.2. FACTOR ANALYSIS SCREE PLOT FOR ASPECTS OF SOCIAL SUPPORT COEFFICIENTS

Variables	Factor 1	Factor 2	Factor 3
NS Intimate: quality	.965	-.157	-6.69E-03
NS Unwind: quality	.963	-.143	2.25E-02
NS General: quality	.958	-.184	-1.75E-02
SS Friend: quality	.916	-.169	-9.23E-02
SS CWAW: quality	.912	-8.542E-02	3.12E-04
SS CWOW: quality	.865	-.125	.113
SS Family: quality	.820	-.210	-.109
NS General: quantity	-7.22E-02	.943	4.08E-03
NS Unwind: quantity	-.136	.915	4.51E-02
SS Friend: quantity	-4.70E-02	.875	.108
SS CWOW: quantity	-.249	.867	-3.30E-02
SS CWAW: quantity	-.175	.861	-2.84E-02
NS Intimate: quantity	-.261	.848	.112
SS Family: quantity	-.122	.772	.109
Seek	-.120	.136	.828
Need	.121	9.515E-02	.784
Provision	-3.14E-02	-3.617E-02	.610
% of Variance	35.88 %	32.37 %	10.28 %
Total Variance	**78.53 per cent**		

TABLE 4.13. ASPECTS OF SOCIAL SUPPORT ROTATED COMPONENT MATRIX
Key- CWOW = Co-worker support outside work, CWAW = Co-worker support at work, SS = Source of support, NS = Nature of support

4.3.2.3. The moderating effect of proposed stress buffers on the relationship between occupational stressors and health

Based upon the factor analysis depicted in Table 4.13, the resultant variables (NSP, social support quality, social support quantity) were then assessed for their moderating effect on the relationship between occupational stressors and health using regression analyses, controlling for age and gender.

Regression analyses

As detailed in Section 2.3.2.1, the data were first mean-centred to control for potential problem relating to multicollinearity before computing interaction terms. A series of three hierarchical regression analyses were then conducted for each of the eight dependent variables. Separate analyses were conducted to assess whether the relationship between the occupational stressors (time and job) and the dependent variable were moderated by the moderating variable (need, seek, provision of support (NSP), social support quality (SSQL) and social support quantity (SSQN)).

The variables age and gender were placed in the first step of the regression to control for possible confounding effects. The job stressors and time stressors variables were placed into the second step of the equation to test for main effects. Next, the variables job stressors and time stressors were combined with the moderator variable (NSP, social support quality, social support quantity) to test for two-way interactions in the third step. In the fourth and last step, three-way interactions were explored using the time stressors, job stressors and each moderating variable.

The need, seeking and the provision of support

The first set of analyses explored the role of need, seeking and the provision of support (NSP) as moderators in the relationship between occupational stressors and eight health measures. There were no significant main effects of the occupational stressors, nor any interactions involving the need for, seeking and provision of social support (NSP). The results of the analyses are summarised in Tables 4.14-4.17.

	Chronic Mental Fatigue			Cognitive Anxiety		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.02			.01
Age	-.7	-.15		.03	.07	
Gender	.61	.06		-.21	-.23	
2. *Main effects*			.07			.12
Time stressors	-.51	-.11		.36	.09	
Job stressors	1.20	.25		1.28	.30	
NSP	1.20	.24		.68	.16	
3. *Two-way interactions*			.09			.06
Time x Job	-1.23	-.20		-1.38	-.25	
Job x NSP	.99	.24		-.02	-.004	
Time x NSP	.17	.03		.24	.05	
4. *Three-way interaction*			.0001			.01
Time x Job x NSP	.20	.04		-.65	-.15	

TABLE 4.14. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Job = Job stressors, NSP = Need, seeking and provision of social support

	Somatic Anxiety			General Health		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.004			.04
Age	-.005	-.02		.05	.10	
Gender	.06	.01		.03	.003	
2. *Main effects*			.10			.11
Time stressors	.60	.18		-.90	-.18	
Job stressors	.88	.27		2.16	.43	
NSP	-.13	-.04		1.45	.28	
3. *Two-way interactions*			.03			.10
Time x Job	-.42	-.10		-2.03	-.31	
Job x NSP	.25	.09		.31	.07	
Time x NSP	.27	.07		-1.50	-.24	
4. *Three-way interaction*			.01			.001
Time x Job x NSP	-.56	-.16		-.41	-.08	

TABLE 4.15. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key – Time = Time stressors, Job = Job stressors, NSP = Need, seeking and provision of social support

Source	Cardiovascular Health B	Beta	R^2 change	Gastrointestinal Health B	Beta	R^2 change
1. *Control variables*			.03			.001
Age	.02	.09		-.005	-.01	
Gender	-.32	-.06		-.26	-.03	
2. *Main effects*			.06			.11
Time stressors	.27	.11		.98	.24	
Job stressors	.50	.21		.51	.12	
NSP	-.02	-.01		.83	.20	
3. *Two-way interactions*			.03			.06
Time x Job	-.27	-.08		-.16	-.03	
Job x NSP	.15	.07		.63	.17	
Time x NSP	.45	.15		.17	.03	
4. *Three-way interaction*			.001			.004
Time x Job x NSP	-.12	-.05		.55	.13	

TABLE 4.16. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Job = Job stressors, NSP = Need, seeking and provision of social support

Source	Joint Pain B	Beta	R^2 change	Minor Infections B	Beta	R^2 change
1. *Control variables*			.09			.04
Age	.07	.26		-.01	-.22	
Gender	.40	.07		.09	.07	
2. *Main effects*			.01			.01
Time stressors	-.24	-.09		-.13	-.22	
Job stressors	.31	.12		.14	.23	
NSP	-.10	-.04		-.03	-.05	
3. Two-way interactions			.04			.12
Time x Job	-.33	-.09		-.27	-.34	
Job x NSP	-.04	-.02		.03	.06	
Time x NSP	.81	.25		.11	.14	
4. Three-way interaction			.02			.02
Time x Job x NSP	.83	.29		.20	.31	

TABLE 4.17. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Job = Job stressors, NSP = Need, seeking and provision of social support

Social support quality

The next set of regression analyses explored the role of social support quality as a moderator in the relationship between occupational stressors and eight health measures. There were no significant main effects of job stressors and time stressors, nor any

interactions involving social support quality in the analyses of somatic anxiety, general health (GHQ), cardiovascular health, gastrointestinal health and minor infection (Tables 4.18-4.21).

There were main effects between job stressors and cognitive anxiety ($p < .05$) and social support quality and joint pain ($p < .05$) (Tables 4.18 & 4.21, respectively.) Partial correlations were then used to explore these relationships. After controlling for age and gender, there was no correlation found between the quality of support and cognitive anxiety ($r = .18$, $n = 61$). However, there was a significant positive relationship between the quality of social support and joint pain, with higher levels of satisfaction with support being associated with more joint pain ($r = .32$, $n = 41$, $p < .05$). There were no further main effects of job stressors and time stressors in the analyses, nor any interactions involving social support quality, in regard to cognitive anxiety or joint pain.

The next analysis explored the role of social support quality (SSQL) as a moderator in the relationship between occupational stressors and chronic mental fatigue (Table 4.18). In the final equation the beta values indicated that SSQL was a significant predictor of chronic mental fatigue ($p < .05$). Furthermore, there was a significant interaction between social support quality and time stressors ($p < .05$). There was no significant three-way interaction involving social support quality, time stressors and occupational stressors. Partial correlation was then used to explore the relationship between SSQL and chronic mental fatigue, while controlling for age and gender. There was a positive correlation, with higher social support satisfaction being associated with higher chronic mental fatigue ($r = .32$, $n = 128$, $p < .05$). Subsequently, interactions were explored by plotting the regression equations at one standard deviation below the mean of the moderator (social support quality) and one standard deviation above the mean

(Figure 4.3). T-tests were calculated to determine whether the slopes of the simple regression lines were significantly different from zero.

Post-Hoc probing of the interactions indicated the presence of a significant relationship between time stressor levels and chronic mental fatigue, among those reporting a low quality of support, ($t(39) = 2.58$, $p < .01$). The findings indicated for those with a low quality of support, chronic mental fatigue diminished as the amount of time stressors (i.e. hours at work) increased (Figure 4.3). There was no relationship found between time stressors and chronic mental fatigue among those with a high quality of support (low support satisfaction).

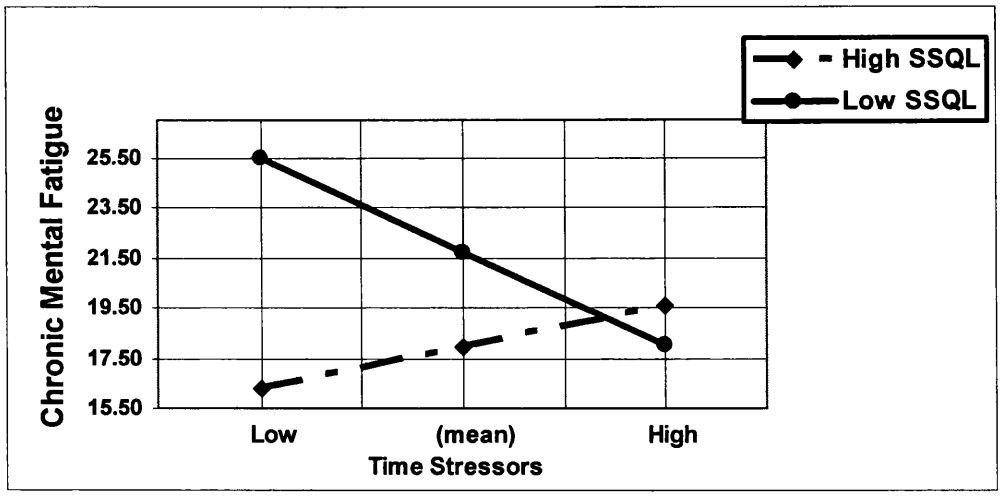


FIGURE 4.3. TWO-WAY INTERACTION EFFECT OF SOCIAL SUPPORT QUALITY AND TIME STRESSORS ON CHRONIC MENTAL FATIGUE

¤*Chronic mental fatigue scores ranged from 9.00 (good health) to 31.00 (poor health)*

Key- SSQL = Social support quality

Source	Chronic Mental Fatigue B	Beta	R^2 change	Cognitive Anxiety B	Beta	R^2 change
1. *Control variables*			.02			.01
Age	-.11	-.23		-.05	-.11	
Gender	.35	.03		-.50	-.06	
2. *Main effects*			.16			.10
Time stressors	-1.06	-.22		-.02	-.004	
Job stressors	1.24	.26		2.28*	.54*	
SSQL	1.92*	.39*		.56	.13	
3. *Two-way interactions*			.17			.07
Time x Job	-.85	-.14		-1.94	-.35	
Time x SSQL	-2.71*	-.61*		-.05	-.01	
Job x SSQL	.26	.07		-1.33	-.39	
4. *Three-way interaction*			.03			.02
Time x Job x SSQL	-1.55	-.35		1.30	.33	

TABLE 4.18. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

*$p < .05$

Key - Time = Time stressors, Job = Job stressors, SSQL =Social support quality

Source	Somatic Anxiety B	Beta	R^2 change	General Health (GHQ) B	Beta	R^2 change
1. *Control variables*			.004			.04
Age	.02	.05		.006	.01	
Gender	-.10	-.01		-.22	-.02	
2. *Main effects*			.12			.16
Time stressors	.55	.17		-1.54	-.30	
Job stressors	.40	.12		2.14	.42	
SSQL	.43	.13		1.50	.30	
3. *Two-way interactions*			.02			.11
Time x Job	.05	.01		-1.77	-.27	
Time x SSQL	-1.14	-.37		-1.88	-.40	
Job x SSQL	.91	.34		.18	.05	
4. *Three-way interaction*			.05			.01
Time x Job x SSQL	-1.52	-.51		-1.13	-.24	

TABLE 4.19. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Job = Job stressors, SSQL =Social support quality

Source	Cardiovascular Health B	Beta	R^2 change	Gastrointestinal Health B	Beta	R^2 change
1. *Control variables*			.03			.001
Age	.007	.03		.01	.03	
Gender	-.47	-.09		-.49	-.06	
2. *Main effects*			.10			.11
Time stressors	.19	.08		.91	.22	
Job stressors	.63	.26		-.03	-.01	
SSQL	.60	.24		.56	.13	
3. *Two-way interactions*			.04			.01
Time x Job	-.26	-.08		.73	.14	
Time x SSQL	-.40	-.18		-1.74	-.45	
Job x SSQL	-.22	-.11		1.22	.37	
4. *Three-way interaction*			.001			.10
Time x Job x SSQL	.10	.05		-2.27	-.71	

TABLE 4.20. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Job = Job stressors, SSQL =Social support quality

Source	Joint Pain B	Beta	R^2 change	Minor Infections B	Beta	R^2 change
1. *Control variables*			.09			.04
Age	.05	.19		-1.14	-.19	
Gender	.64	.11		.18	.14	
2. *Main effects*			.09			.004
Time stressors	-.48	-.18		-.15	-.23	
Job stressors	.35	.13		.14	.23	
SSQL	1.11*	.40*		-.01	-.01	
3. *Two-way interactions*			.19			.10
Time x Job	-.28	-.08		-.24	-.30	
Time x SSQL	-1.05	-.42		-.13	-.23	
Job x SSQL	-.26	-.12		-.03	-.06	
4. *Three-way interaction*			.002			.01
Time x Job x SSQL	.27	.11		-.13	-.24	

TABLE 4.21. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUALITY AND THEIR INTERACTIONS

*$p < .05$

Key - Time = Time stressors, Job = Job stressors, SSQL =Social support quality

Social support quantity

The last set of regression analyses explored the role of social support quantity as a moderator in the relationship between occupational stressors and eight health measures. The regression analyses indicated that there were no significant main effects of job stressors and time stressors, nor any interactions involving social support quantity in the

examination of chronic mental fatigue, cognitive anxiety, somatic anxiety, general health (GHQ), cardiovascular health, gastrointestinal health and joint pain. The results of the analyses are summarised in Tables 4.22-4.25.

The role of social support quantity as a moderator in the relationship between occupational stressors and minor infections was then examined. In Step 4, a significant amount of the variance in minor infections was explained the three-way interaction involving time stressors, job stressors and social support quantity (R^2 = .16) [F (9,30)= 6.92, p< .05] (Table 4.25). The beta values from the final equation also indicated that the two-way interaction between job stressors and social support quantity (p< .01) and three-way interaction between time stressors, job stressors and social support quantity were significant predictors of minor infections levels.

Following the regression analyses, partial correlation was used to explore the relationship between the amount of available support and minor infections. After controlling for age and gender, no correlation was found (r = -.03, n = 61). The discrepancy in results from the regression analysis and partial correlation may be attributed to the only just significance level attained in the regression analyses (p< .047). The interactions were then explored by plotting the regression equations at one standard deviation below the mean of the moderator (social support quantity) and one standard deviation above the mean (Figures 4.4 & 4.5). T-tests were calculated to determine whether the slopes of the simple regression lines were significantly different from zero. Post-Hoc probing of the two-way interaction indicated the presence of a significant relationship between time stressor and job stressor levels, among those reporting a low (t (35)= 2.57, p< .05) and high quality (t (35)= 1.78, p< .05) of available support (Figure 4.4). The findings indicated for respondents with a low amount of support the

frequency of minor infections decreased as job stressor levels increased. Furthermore, when respondents had a high amount of support, the frequency of minor infections increased as job stressor levels increased.

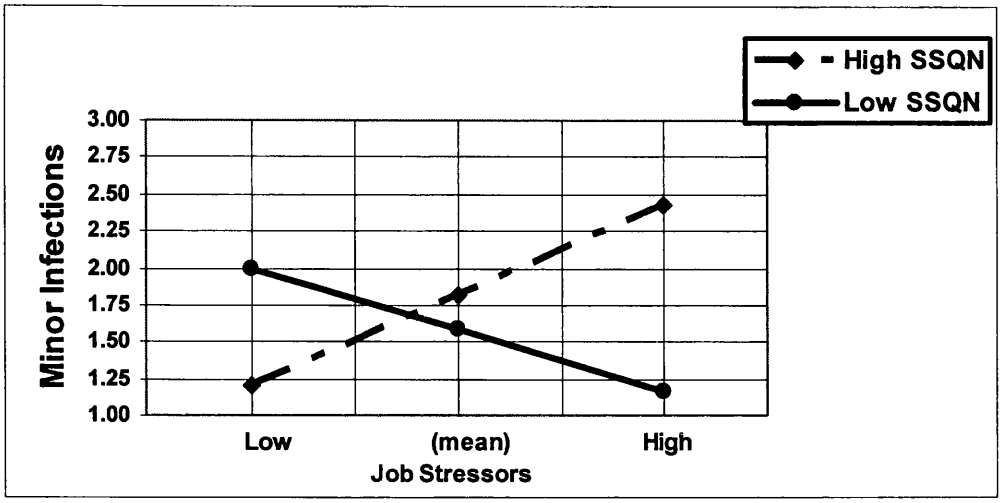


FIGURE 4.4. TWO-WAY INTERACTION EFFECT OF SOCIAL SUPPORT QUANTITY AND JOB STRESSORS ON MINOR INFECTIONS
¤*Frequency of Minor Infection scores ranged from 1.00 (almost never) to 3.00 (quite often)*
Key- SSQN = Social support quantity

Next, the three-way interaction was examined. Post-Hoc probing of the interaction indicated the presence of two significant relationships between time stressors, job stressors and amount of social support on minor infections (Figure 4.5). First, for respondents with a high amount of support and a low level of time stressors, those with lower levels of job stressors had fewer minor infections than those with higher levels of job stressors ($t(39) = 16.89$, $p < .01$). Second, for respondents with a low amount of social support and a high time stressor level, those who reported a lower level of job stressors had more minor infections than those with higher job stressor levels ($t(39) = 3.00$, $p < .05$). The findings suggested for respondents with a high amount of support, working fewer hours with a lower level of mental and emotional workload deceased the occurrence of minor infections. Conversely, the findings also implied that respondents with fewer supporters, those who worked more hours (high time stressors) with more

time pressure, emotional and mental workload had fewer minor infections than those who worked fewer hours with lower job stressor levels.

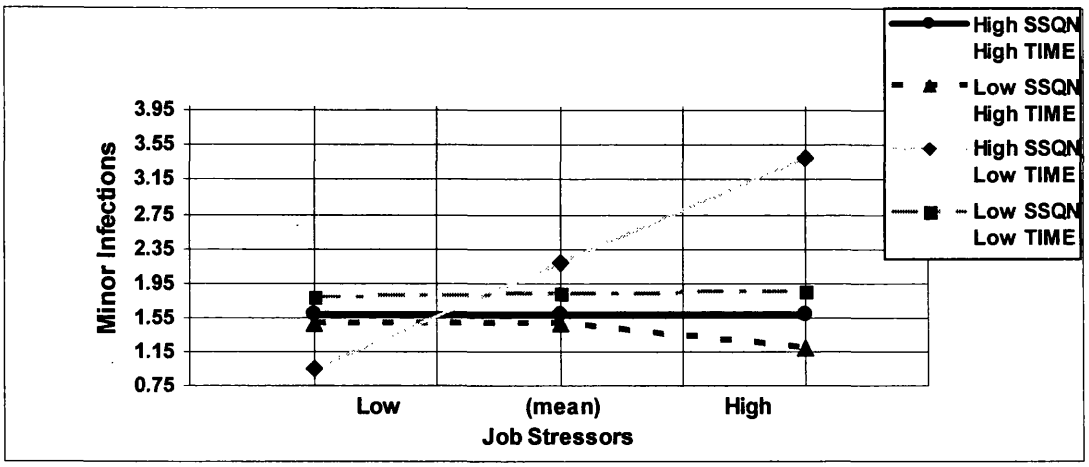


FIGURE 4.5. THREE-WAY INTERACTION EFFECT OF SOCIAL SUPPORT QUANTITY, TIME STRESSORS AND JOB STRESSORS ON MINOR INFECTIONS
¤*Frequency of Minor Infection scores ranged from 1.00 (almost never) to 3.00 (quite often)*
Key- SSQN = Social support quantity

	Chronic Mental Fatigue			Cognitive Anxiety		
Source	B	Beta	R^2 change	B	Beta	R^2 change
1. *Control variables*			.02			.01
Age	-.07	-.14		.009	.02	
Gender	-.11	-.01		-.45	-.05	
2. *Main effects*			.04			.08
Job stressors	-.74	-.16		-.02	-.004	
Time stressors	1.21	.25		1.30	.31	
SSQN	.20	.04		.34	.08	
3. *Two-way interactions*			.03			.05
Time x Job	-1.00	-.16		-.72	-.13	
Time x SSQN	-.02	-.01		-.59	-.14	
Job x SSQN	-.68	-.15	.01	-.41	-.10	.001
4. *Three-way interaction*						
Time x Job x SSQN	.90	.21		.29	.08	

TABLE 4.22. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUANTITY AND THEIR INTERACTIONS
**p< .05*
Key - Time = Time stressors, Job = Job stressors, SSQN =Social support quantity

Source	Somatic Anxiety B	Beta	R^2 change	General Health (GHQ) B	Beta	R^2 change
1. *Control variables*			.004			.04
Age	-.02	-.06		.05	.10	
Gender	.63	.09		.28	.03	
2. *Main effects*			.12			.08
Time stressors	.58	.18		-1.63	-.32	
Job stressors	1.06	.32		1.82	.36	
SSQN	-.06	-.02		.75	.14	
3. *Two-way interactions*			.07			.11
Time x Job	.14	.03		-1.13	-.17	
Time x SSQN	.03	.01		.34	.07	
Job x SSQN	-1.27	-.41		-2.66	-.56	
4. *Three-way interaction*			.003			.03
Time x Job x SSQN	.39	.13		1.77	.38	

TABLE 4.23. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUANTITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Job = Job stressors, SSQN =Social support quantity

Source	Cardiovascular Health B	Beta	R^2 change	Gastrointestinal Health B	Beta	R^2 change
1. *Control variables*			.03			.001
Age	.05	.19		.01	.03	
Gender	-.88	-.17		-1.03	-.12	
2. *Main effects*			.07			.09
Time stressors	-.04	-.02		.86	.21	
Job stressors	.08	.03		.47	.11	
SSQN	.17	.07		-.26	-.06	
3. *Two-way interactions*			.01			.05
Time x Job	.08	.03		-.38	-.07	
Time x SSQN	-.17	-.07		1.51	.37	
Job x SSQN	-.38	-.17		-2.01	-.52	
4. *Three-way interaction*			.04			.07
Time x Job x SSQN	.92	.42		2.17	.58	

TABLE 4.24. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUANTITY AND THEIR INTERACTIONS

Key - Time = Time stressors, Job = Job stressors, SSQN =Social support quantity

Source	Joint Pain B	Beta	R^2 change	Minor Infections B	Beta	R^2 change
1. *Control variables*			.09			.04
Age	.04	.14		-.002	-.03	
Gender	1.29	.22		.15	.11	
2. *Main effects*			.01			.003
Time stressors	.45	.17		-.29*	-.47*	
Job stressors	1.10	.41		-.09	-.14	
SSQN	-.15	-.06		.12	.18	
3. *Two-way interactions*			.10			.11
Time x Job	-.78	-.22		.07	.08	
Time x SSQN	.88	.33		-.06	-.10	
Job x SSQN	-.35	-.14		-.50**	-.87**	
4. *Three-way interaction*			.03			.16*
Time x Job x SSQN	-.90	-.37		.50*	.89*	

TABLE 4.25. HIERARCHICAL REGRESSION ANALYSES PREDICTING HEALTH OUTCOMES FROM OCCUPATIONAL STRESSORS, SOCIAL SUPPORT QUANTITY AND THEIR INTERACTIONS

*$p < .05$ **$p < .01$

Key - Time = Time stressors, Job = Job stressors, SSQN =Social support quantity

Quantity and quality of support correlations

The relationships between support from co-workers at work, co-workers outside of work, family and friends were investigated using a partial correlation controlling for age and gender. As seen in Table 4.26, when the number of supporters from one source was high, the number of supporters from all other sources was also high. The data imply that those who have a large number of supporters from one source will have a high number of supporters from all other sources. Also, if the participants were satisfied with the support provided from one source, they were satisfied with the support from all the sources. It was interesting that as the number of supporters from each source decreased, the participants' satisfaction with the available support from that source increased. The data suggested that the smaller the participant's support group, the closer and more supportive it is.

Measures		1	2	3	4	5	6	7	8
(1) Co-worker at work quality		1							
	N	0							
(2)Co-worker at work quantity		-.26*	1						
	N	56	0						
(3) Friend quality		.78****	-.27*	1					
	N	56	58	0					
(4) Friends quantity		-.10	.62****	-.18	1				
	N	56	70	58	0				
(5) Co-worker outside work quality		.77****	-.27	.73****	-.17	1			
	N	42	42	42	42	0			
(6) Co-worker outside work quantity		-.25*	.71****	-.25	.62****	-.44****	1		
	N	55	69	57	69	42	0		
(7) Family quality		.67****	-.15	.79****	-.04	.56****	-.22	1	
	N	56	62	57	62	42	61	0	
(8) Family quantity		-.02	.57****	-.19	.52****	-.09	.58****	-.34**	1
	N	56	70	58	70	42	69	62	0

TABLE 4.26. CORRELATIONS BETWEEN THE NUMBER OF SUPPORTERS AND SATISFACTION WITH THE AVAILABLE SUPPORT
*$p < .05$ **$p < .01$ ***$p < .005$ ****$p < .001$*

4.3.2.4. The impact of the nature and source of social support and occupational stressor levels on health levels

When the measures of social support were factored analysed (Section 4.3.2.2), three social support variables emerged (NSP, social support quality and quantity). However, it was observed that the *nature* and *source* of support did not emerge as separate variables. Therefore, in order to examine the effect of the nature of support (relax, general, intimate), as well as the source of support (friends, family, co-workers), and occupational stressor levels on health levels, the variables were assessed individually.

As previously detailed, the occupational stressor variables were subjected to principle components analyses followed by Varimax rotations (Section 4.3.2.1). Based upon the resulting figures, the retained time stressors and job stressors groups were then subdivided into two equal groups (low, high). Next, possible interactions between proposed stress buffers (nature, source) and occupational stressors and health measures were explored using two-way between subjects ANOVAs.

Nature of support

Relaxing situations

When cognitive anxiety was examined, there was a significant interaction between time stressors and the number of supporters available when relaxing [F (1,49) =4.89, p< .05]. There was also a significant interaction between the quality of available support and job stressors when cognitive anxiety [F (1,37) =5.28, p< .05] was examined (Appendix C8).

For participants who had few individuals to relax with, those who had a low amount of hours worked per week (low level of time stressors) had higher cognitive anxiety (M = 15.30, SD = 3.50) than those who worked more hours (M = 12.06, SD = 4.08) [F (1,26) =4.39, p< .05] (Figure 4.6). There was no difference in cognitive anxiety when participants who worked different numbers of hours, and who had a high number of individuals with whom they could relax, were examined [F (1,28) =.58, ns] (Appendices C9 & C10).

Participants who had a high level of satisfaction with the support available in relaxing situations, and who had a high level of job stressors, had higher cognitive anxiety (M = 14.67, SD = 4.46) than those with similar support satisfaction but who had less job stressors (M = 11.08, SD = 3.58) [F (1,23) =4.71, p< .05] (Figure 4.7). For participants with low support satisfaction, there was no difference in cognitive anxiety levels between the different levels of job stressors [F (1,19) =1.05, n.s.] (Appendices C11 & C12). Regardless of stressor levels, there were no significant differences in cognitive anxiety levels depending on the quality or amount of support in relaxing situations (Appendices C13 & C14).

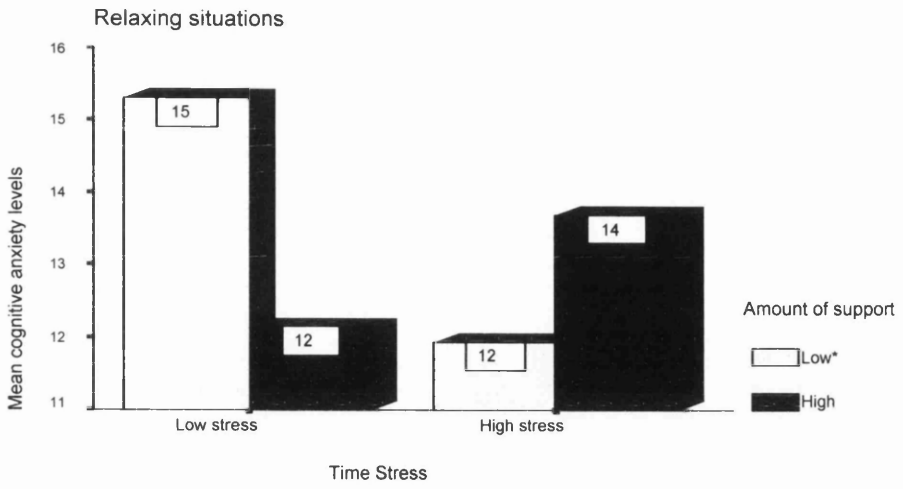


FIGURE 4.6. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTERS TO RELAX WITH AND TIME STRESSORS ON COGNITIVE ANXIETY

**Sig. difference in cognitive anxiety depending on time stressors levels*

¤Cognitive anxiety scores ranged from 7 (low anxiety) to 35 (high anxiety)

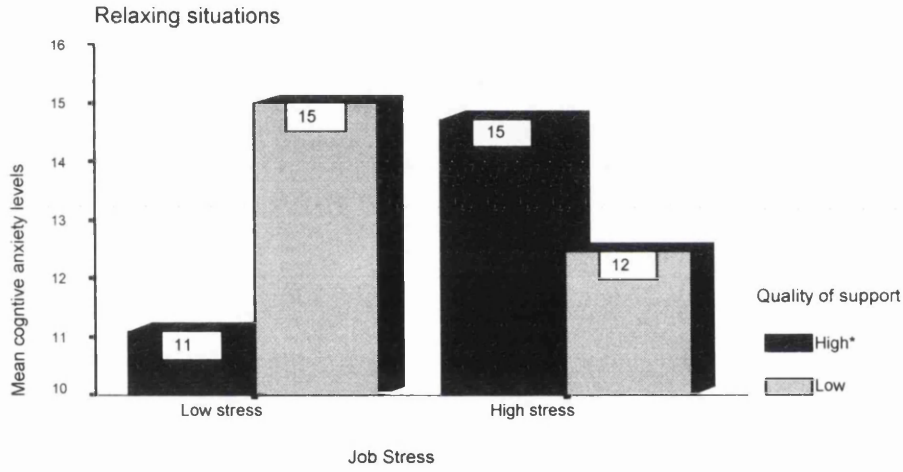


FIGURE 4.7. THE EFFECT OF THE INTERACTION BETWEEN THE QUALITY OF SUPPORT IN RELAXED SITUATIONS AND JOB STRESSORS ON COGNITIVE ANXIETY

**Sig. difference in cognitive anxiety depending on job stressors levels*

¤Cognitive anxiety scores ranged from 7 (low anxiety) to 35 (high anxiety)

General conversations

When minor infections were examined, there was a significant interaction between the amount of support with which to discuss general matters, and time stressors [F (1,49) =5.07, p< .05]. There were no significant interactions between the amount of support and job stressors with any of the health measures. In addition, there were no significant

interactions between the quality of available support and stressor levels regardless of the health measures considered (Appendix C15).

For participants with a low number of individuals with whom to discuss general matters, those who worked more hours had more minor infections (M = 1.47, SD = .52) than those who worked fewer hours (M = 2.00, SD = .58) [F (1,27) =6.66, p< .05] (Figure 4.8). Yet, when participants with a high amount of support were examined, there was no difference in the frequency of minor infections depending on the number of hours worked [F (1,27) =.90, ns]. In addition, there were no differences in health when participants with different amounts of available support for general discussions and low [F (1,23) =3.64, ns] or high time stressors [F (1,31) =1.48, ns] were analysed. Further statistical data can be found in Appendices C16-19.

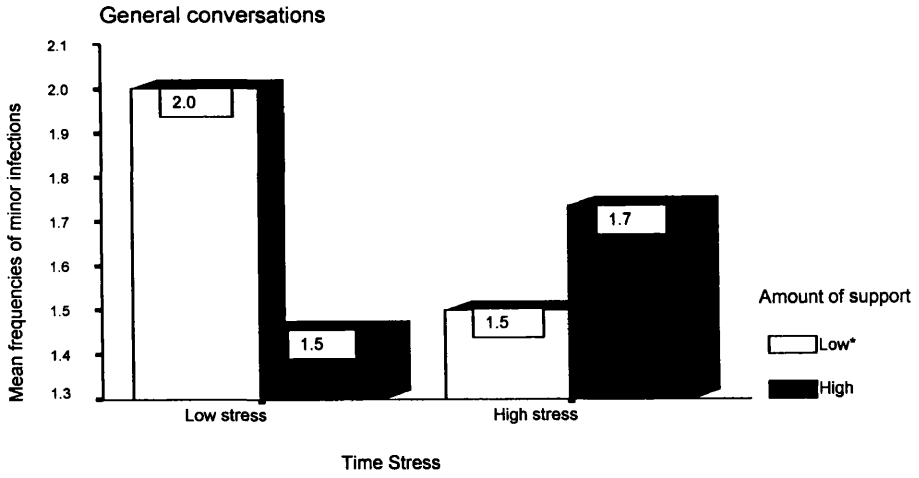


FIGURE 4.8. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTERS TO DISCUSS GENERAL IDEAS AND TIME STRESSORS ON MINOR INFECTION

**Sig. difference in frequency of minor infections depending on time stressors levels*

¤Frequency of minor infections ranged from 1 (almost never) to 4 (always)

Intimate discussions

When gastrointestinal health was examine, there was a significant interaction between the amount of support available for intimate discussions and time stressors F (1,49) =4.52, p< .05]. There were no significant interactions between the amount of intimate support and job stressors when any of the health measures were examined. When examining the effect of the quality of support, there was a significant interaction between the quality of support available for intimate discussions and job stressors when cognitive anxiety was the dependent variable [F (1,31) =9.09, p< .005]. In addition, there were significant interactions between the quality of available support and time stressors when chronic mental fatigue [F (1,32) =4.48, p< .05], cognitive anxiety [F (1,32) =5.61, p< .05] and minor infections [F (1,32) =5.16, p< .05] were examined (Appendix C20).

Participants who with a low level of time stressors (i.e. worked full-time) and who were dissatisfied with their intimate support had higher chronic mental fatigue (M = 21.33, SD = 5.92) than those who worked the same level of time stressors but who were satisfied (M = 15.30, SD = 5.14) [F (1,15) =4.62, p< .05] (Figure 4.9). When participants had high job stressors, those who were satisfied with the intimate support available had higher cognitive anxiety levels (M = 15.42, SD = 4.25) than those who were dissatisfied (M = 11.14, SD = 3.44) [F (1,18) =5.09, p< .05] (Figure 4.10). See Appendices C21, C22, C25, & C26 for further details.

Depending on stressor levels, when the possible differences in the health of participants were examined, those were dissatisfied with the intimate support available to them and worked full-time had higher cognitive anxiety [F (1,14) =5.93, p< .05] and chronic mental fatigue [F (1,14) =6.02, p< .05] than those dissatisfied with their available

support, but who worked more hours (more than full-time) (Table 4.27, Figures 4.9 & 4.11). For participants who were satisfied with the available support, there were no differences in health levels depending on the numbers of hours worked (Appendices C29 & C30).

For participants who were satisfied with the intimate support, those who had high job stressors levels had higher cognitive anxiety (M = 15.42, SD = 4.25) than those who had low job stressors (M = 11.10, SD = 3.21) [F (1,21) =6.97, p< .05] (Figure 4.10). Yet, for participants who were not satisfied with the intimate support available to them, health did not differ depending on the levels of job stressors. When participants with different support levels and stressor groups were examined, there were also no differences in gastrointestinal health or occurrence of minor infections. For further details see Appendices C23, C24, C27, & C28.

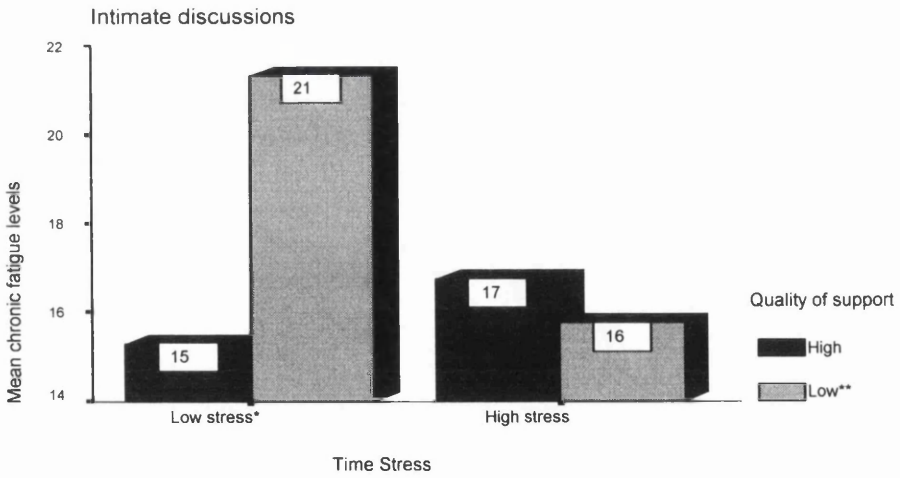


FIGURE 4.9. THE EFFECT OF THE INTERACTION BETWEEN THE QUALITY OF INTIMATE SUPPORT AND TIME STRESSORS ON CHRONIC MENTAL FATIGUE

**Sig. difference in chronic fatigue depending on quality of support levels*

***Sig. difference in chronic fatigue depending on time stressors levels*

¤Chronic mental fatigue scores ranged from 12 (low fatigue) to 60 (high fatigue)

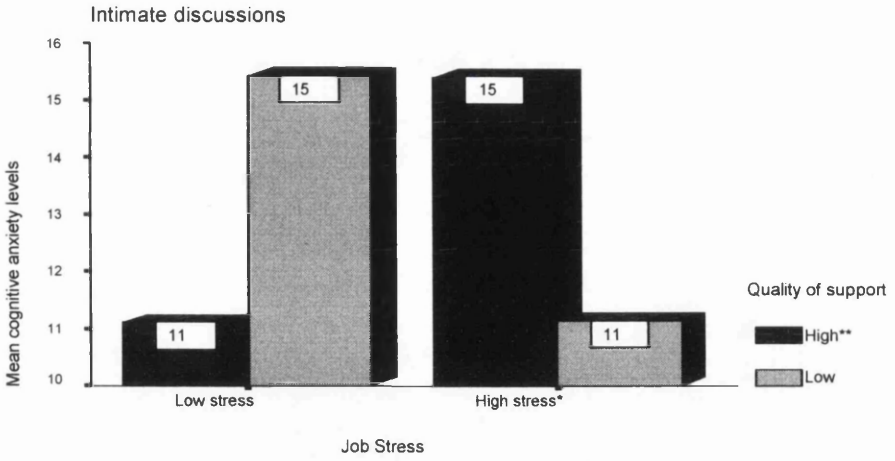


FIGURE 4.10. THE EFFECT OF THE INTERACTION BETWEEN THE QUALITY OF INTIMATE SUPPORT AND JOB STRESSORS ON COGNITIVE ANXIETY

**Sig. difference in cognitive anxiety depending on quality of support levels*

***Sig. difference in cognitive anxiety depending on job stressors levels*

¤*Cognitive anxiety scores ranged from 7 (low anxiety) to 35 (high anxiety)*

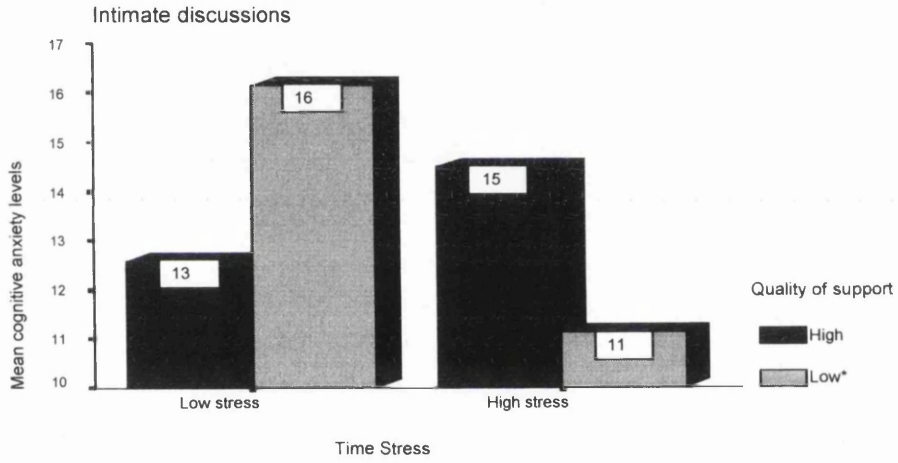


FIGURE 4.11. THE EFFECT OF THE INTERACTION BETWEEN THE QUALITY OF INTIMATE SUPPORT AND TIME STRESSORS ON COGNITIVE ANXIETY LEVELS

**Sig. difference in cognitive anxiety depending on time stressors levels*

¤*Cognitive anxiety scores ranged from 7 (low anxiety) to 35 (high anxiety)*

High Support Quality	Time stressors	N	Mean	Std. Deviation
Chronic mental fatigue	High	6	21.33	5.92
	Low	9	15.56	3.24
	Total	15	17.87	5.21
Cognitive Anxiety	High	6	16.17	3.43
	Low	9	11.00	4.36
	Total	15	13.07	4.68

TABLE 4.27. HEALTH DEPENDING ON THE LEVEL OF TIME STRESSORS AND A HIGH QUALITY OF INTIMATE SUPPORT

**All differences in health depending on need for support are significant*

¤*Higher health scores represents poorer health*

Source of support

Support from family members

There were no significant interactions between family support and levels of occupational stressors with any of the health measures as dependent variables (Appendix C31).

Support from friends

When the occurrences of minor infections were examined, there was a significant interaction between the number of friends and time stressors [F (1,49) =5.07, p< .05]. In addition there were significant interactions between the quality of support from friends and time stressors when cognitive [F (1,38) =4.27, p< .05] and somatic anxiety [F (1,38) =4.85, p< .05] were considered. However, there were no significant interactions between the quality of support of friends and job stressors when any of the health measures were examined (Appendix C32-34).

Participants who worked fewer hours and who were very satisfied with the support from their friends had less somatic anxiety (M = 11.58, SD = 2.23) than those working the same amount of hours but who were dissatisfied with the support (M = 16.20, SD = 3.11) [F (1,16) =12.04, p< .005] (Figure 4.12). However, for participants who worked more than full-time (high time stressors), there was no difference in the frequency of minor infections depending on the level of satisfaction with the support provided by friends [F (1,26) =10.64, ns] (Appendices C37 &C38).

Next, when possible differences in health depending on stressor levels were examined, participants who had a low number of friends and who worked full-time had more minor infections (M = 2.00, SD = .58) than those who worked more than full-time

(M = 1.47, SD = .52) [F (1,27) =6.66, p< .05] (Figure 4.13). Yet, for participants with a large amount of friends, there was no difference in health depending on the number of hours worked (Appendices C35 & C36).

In addition, participants who were dissatisfied with the support from their friends and who worked full-time had higher cognitive [F (1,18) =4.66, p< .05] and somatic anxiety [F (1,18) =10.79, p< .005] than those who were also dissatisfied with the support but who worked more hours (Table 4.28, Figures 4.12 & 4.14). However, for participants with a high quality of support from friends, there was no difference in health depending on the number of hours spent working (Appendices C39 & C40).

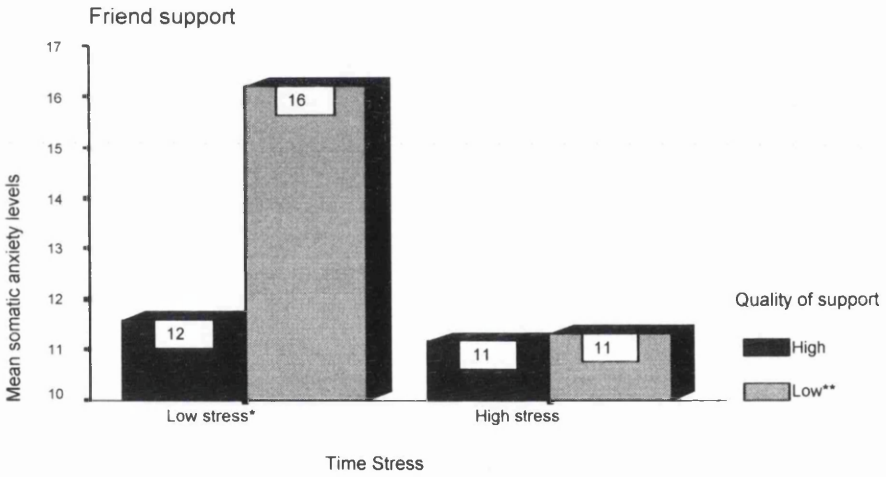


FIGURE 4.12. THE EFFECT OF THE INTERACTION BEWEEN THE QUALITY OF FRIENDSHIPS AND TIME STRESSORS ON SOMATIC ANXIETY

**Sig. difference in somatic anxiety depending on quality of support levels*

***Sig. difference in somatic anxiety depending on time stressors levels*

¤*Somatic anxiety scores ranged from 7 (low anxiety) to 35 (high anxiety)*

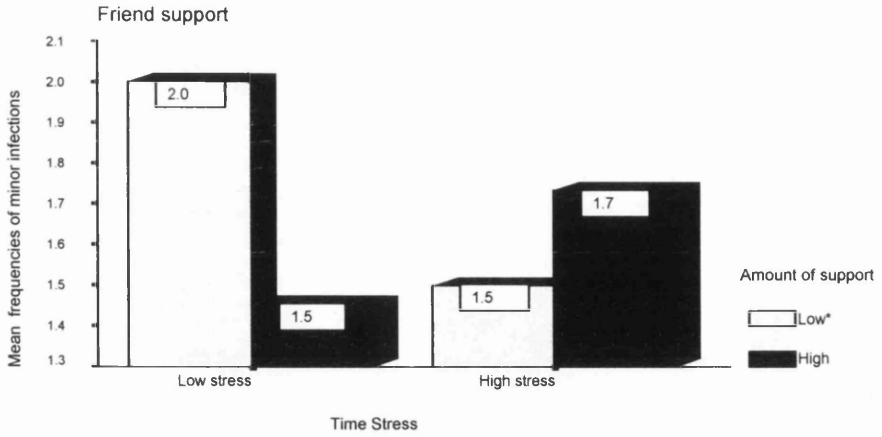


FIGURE 4.13. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF FRIENDS AND TIME STRESSORS ON THE FREQUENCY OF MINOR INFECTIONS

**Sig. difference in frequency of minor infections depending on time stressors levels*

¤*Frequency of minor infections ranged from 1 (almost never) to 4 (always)*

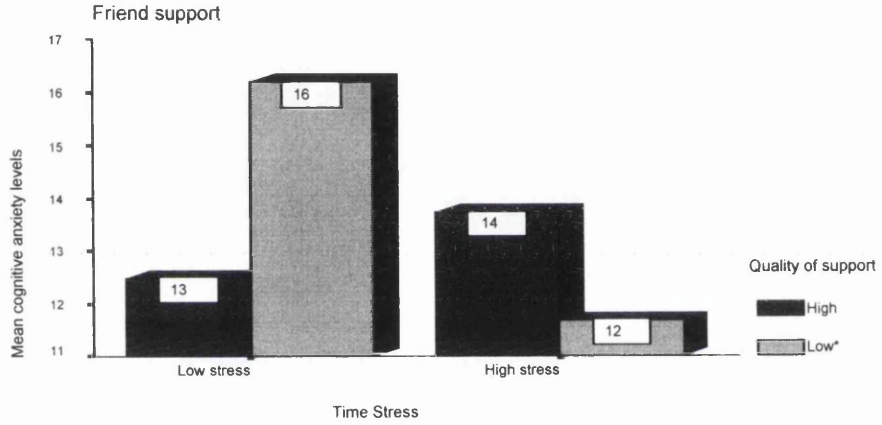


FIGURE 4.14. THE EFFECT OF THE INTERACTION BETWEEN QUALITY OF FRIENDSHIPS AND TIME STRESSORS ON COGNITIVE ANXIETY

**Sig. difference in cognitive anxiety depending on time stressors levels*

¤*Cognitive anxiety scores ranged from 7 (low anxiety) to 35 (high anxiety)*

Low Quality of Support from Friends	Time stressors	N	Mean	Std. Deviation
Somatic Anxiety	High	5	16.20	3.83
	Low	14	11.57	4.20
	Total	19	12.79	4.52
Cognitive Anxiety	High	5	16.20	3.11
	Low	14	11.14	2.91
	Total	19	12.47	3.67

TABLE 4.28. HEALTH DEPENDING ON THE LEVEL OF TIME STRESSORS AND LOW QUALITY OF SUPPORT FROM FRIENDS

**All differences in health depending on need for support are significant*

¤*Higher health scores represents poorer health*

Support from co-workers at work

When joint pain was examined, there was a significant interaction between the number of co-workers who provide support at work and job stressors [F (1,48) =6.09, p< .05]. In addition, there was a significant interaction between the number of co-workers who provided support at work and time stressors when minor infection was examined [F (1,49) =4.38, p< .05]. However, with any of the health measures, there were no significant interactions between the quality of co-worker support at work and stressor levels (Appendix C41).

Participants with a low number of co-workers who provided support at work, and who reported low job stressors, suffered from joint pains more often (M = 8.93, SD = 2.34) than those with similar amount of support and high job stressors (M = 6.43, SD = 1.91) [F (1,28) =9.86, p< .005] (Figure 4.15). For participants with a high amount of support from co-workers at work, there was no difference in the occurrences of joint pain depending on job stressors levels (Appendices C42 & C43).

Participants with a low number of co-workers who provided support at work, and who worked more than full-time, had fewer minor infections (M = 1.50, SD = .52) than those with few co-workers providing support at work but who worked fewer hours (M = 2.00, SD = .58) [F (1,28) =6.05, p< .05] (Figure 4.16). When participants had a high amount of support from co-workers at work, there were no differences in the frequency of joint pain [F (1,25) =.39, ns] or minor infections [F (1,26) =.73, ns] depending on time stressor or job stressor levels (Appendices C44-47).

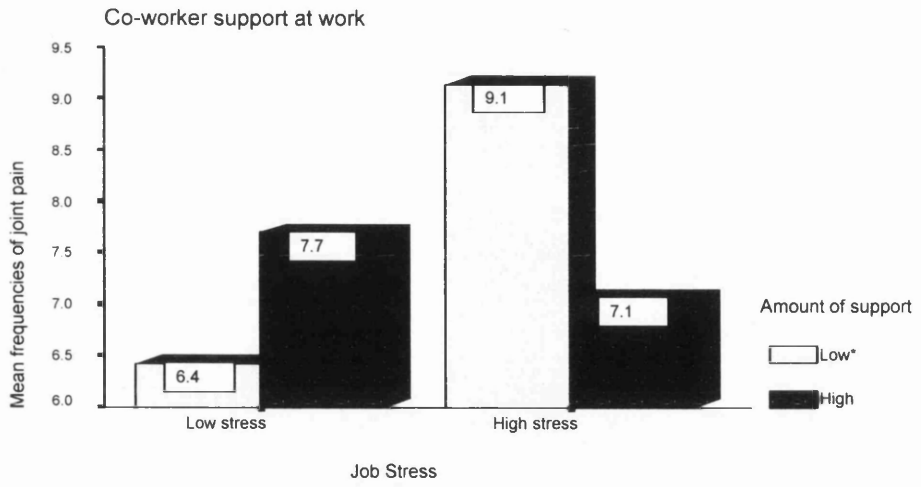


FIGURE 4.15. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS AT WORK AND JOB STRESSORS ON JOINT PAIN

**Sig. difference in frequency of joint pain depending on job stressors levels*

¤*Frequency of joint pain ranged from 4 (almost never) to 16 (always)*

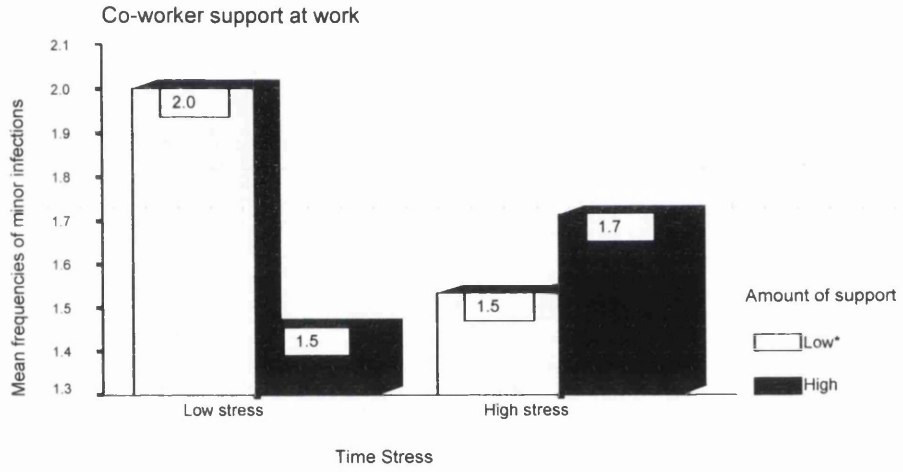


FIGURE 4.16. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS AT WORK AND TIME STRESSORS ON MINOR INFECTIONS

**Sig. difference in frequency of minor infections depending on time stressors levels*

¤*Frequency of minor infections ranged from 1 (almost never) to 4 (always)*

Support from co-workers outside of work

There were significant interactions between the number of co-workers providing support outside work and time stressors when chronic mental fatigue [F (1,49) =6.22, p< .05], cognitive anxiety [F (1,49) =5.70, p< .05], general health [F (1,49) =5.02, p< .05], cardiovascular health [F (1,49) =5.36, p< .05], joint pain [F (1,49) =5.40, p< .05] and minor infections [F (1,49) =4.91, p< .05] were examined. When chronic

mental fatigue was examined, there were significant interactions between the quality of support provided by co-workers outside of work and job stressors [F (1,29) =5.24, p< .05] and time stressors [F (1,30) =6.38, p< .05](Appendices C48).

Participants who worked a high level of hours (high time stressors) and had a high number of co-workers who provided support outside of work had fewer minor infections [F (1,23) =18.75, p< .0005], joint pains [F (1,23) =8.33, p< .01] and better cardiovascular health [F (1,23) =18.75, p< .0005], than those who worked the same number of hours but who had fewer co-workers to turn to outside of work (Table 4.29 & Figures 4.17-4.19). In addition, for participants with a high time stressor level and had a high number of co-workers who provide support outside of work had better general health (M = 26.23, SD = 4.97) than those with a low amount of support (M = 22.29, 4.40) [F (1,29) =5.28, p< .05] (Figure 4.20).

For participants with low job stressors, those who were satisfied with the support provided by co-workers outside of work had lower chronic mental fatigue (M = 13.00, SD = 3.90) than those who were dissatisfied with the support (M = 18.33, SD = 3.89) [F (1,17) =7.50, p< .05] (Figure 4.21). However, when participants had high job stressors, there were no differences in chronic mental fatigue depending on the level of satisfaction with the support [F (1,16) =.68, ns].

As seen in Table 4.30, participants with a low number of co-workers to turn to outside of work, and who had low time stress levels, had higher chronic mental fatigue [F (1,28) =5.55, p< .05], cognitive anxiety [F (1,28) =4.72, p< .05], occurrences of minor infections [F (1,28) =5.20, p< .05] and poorer general health [F (1,28) =5.86, p< .05], than those who worked more hours (see figures below). However, when

participants had a high number of co-workers available to discuss matters outside of work, those who worked a higher amount of hours had more joint pain (M = 6.00, SD = 1.91) than participants who worked fewer hours (M = 8.13, SD = 3.10) [F (1,23) =18.75, p< .0005](Figure 4.18).

In regard to quality of support, in participants who were satisfied with the support from co-workers outside of work, those with high job stressors had higher chronic mental fatigue (M = 18.00, SD = 4.66) than those with low job stressors (M = 13.00, SD = 3.90) [F (1,14) =4.68, p< .05] (Figure 4.24). Interestingly, when participants had a low quality of support from co-workers outside of work, those who worked a lower number of hours (low time stressors) had significantly higher chronic mental fatigue (M = 20.13, SD = 6.22) than those who worked more hours (M = 15.42, SD = 3.32) [F (1,19) =4.89, p< .05] (Figure 4.24). Supplemental statistical information can be found in Appendices C49-58.

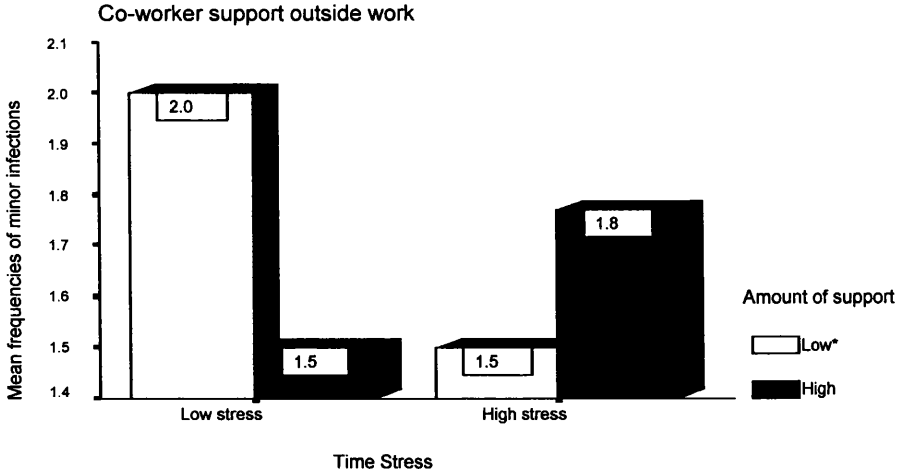


FIGURE 4.17. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS OUTSIDE WORK AND TIME STRESSORS ON MINOR INFECTIONS

**Sig. difference frequency of minor infections depending on time stressors levels*

¤Frequency of minor infections ranged from 1 (almost never) to 4 (always)

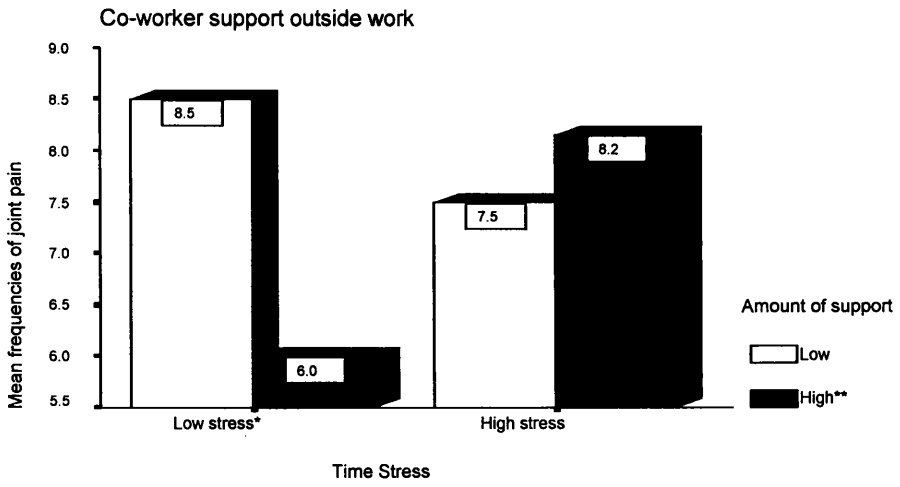


FIGURE 4.18. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS OUTSIDE WORK AND TIME STRESSORS ON FREQUENCY OF JOINT PAIN

**Sig. difference in frequency of joint pain depending on amount of support levels*

***Sig. difference in frequency of joint pain depending on time stressors levels*

¤*Frequency of joint pain ranged from 4 (almost never) to 16 (always)*

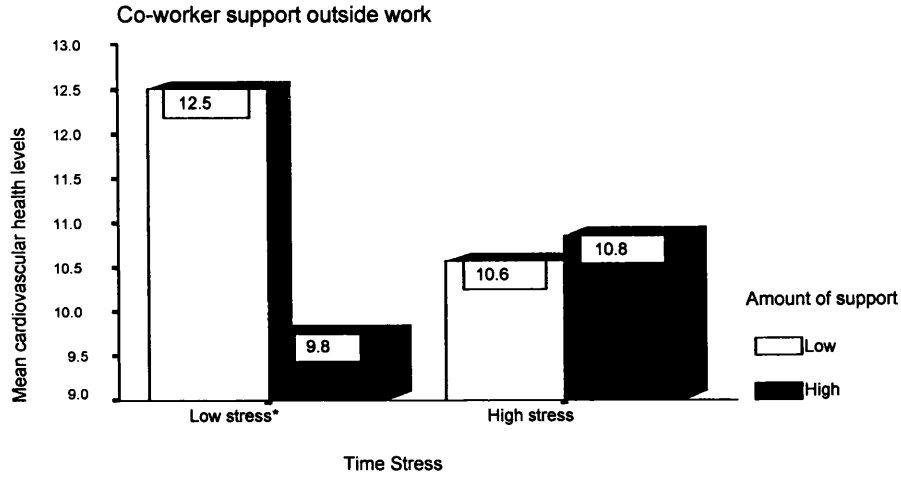


FIGURE 4.19. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS OUTSIDE WORK AND TIME STRESSORS ON CARDIOVASCULAR HEALTH

**Sig. difference in cardiovascular health depending on amount of support levels*

¤*Cardiovascular health scores ranged from 8 (good health) to 32 (poor health)*

Low Time stressors Level	Amount of co-worker support outside Work	N	Mean	Std. Deviation
Minor Infections	Low	12	12.50	1.68
	High	12	9.75	1.42
	Total	24	11.13	2.07
Joint Pain	Low	12	8.50	2.32
	High	12	6.00	1.91
	Total	24	7.25	2.44
Cardiovascular health	Low	12	12.50	1.68
	High	12	9.75	1.42
	Total	24	11.13	2.07

TABLE 4.29. HEALTH DEPENDING ON THE NUMBER OF CO-WORKERS PROVIDING SUPPORT OUTSIDE WORK AND TIME STRESSORS

**All differences in health depending on need for support are significant*

¤Higher health scores represents poorer health

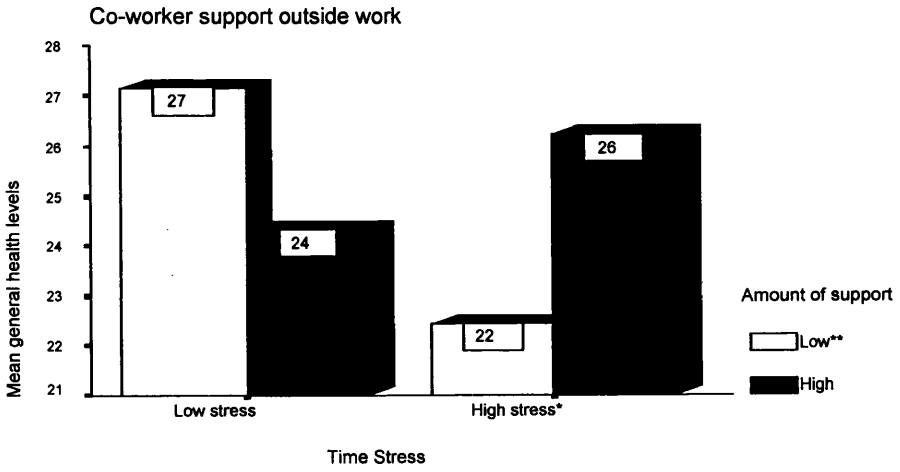


FIGURE 4.20. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS OUTSIDE WORK AND TIME STRESSORS ON GENERAL HEALTH

**Sig. difference in general health depending on amount of support levels*

***Sig. difference in general health depending on time stressors levels*

¤General health scores ranged from 12 (good health) to 48 (poor health)

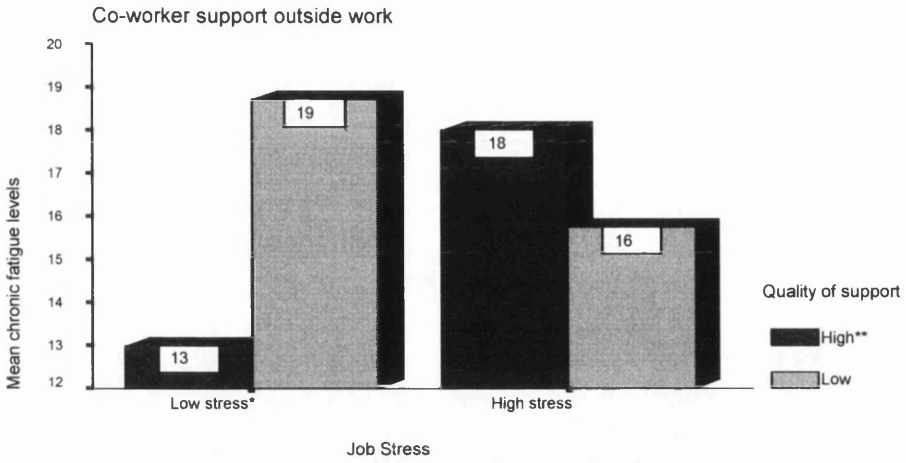


FIGURE 4.21. THE EFFECT OF THE INTERACTION BETWEEN THE QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE OF WORK AND JOB STRESSORS ON CHRONIC MENTAL FATIGUE

**Sig. difference in chronic fatigue depending on quality of support levels*

***Sig. difference in chronic fatigue depending on job stressors levels*

¤*Chronic mental fatigue scores ranged from 12 (low fatigue) to 60 (high fatigue)*

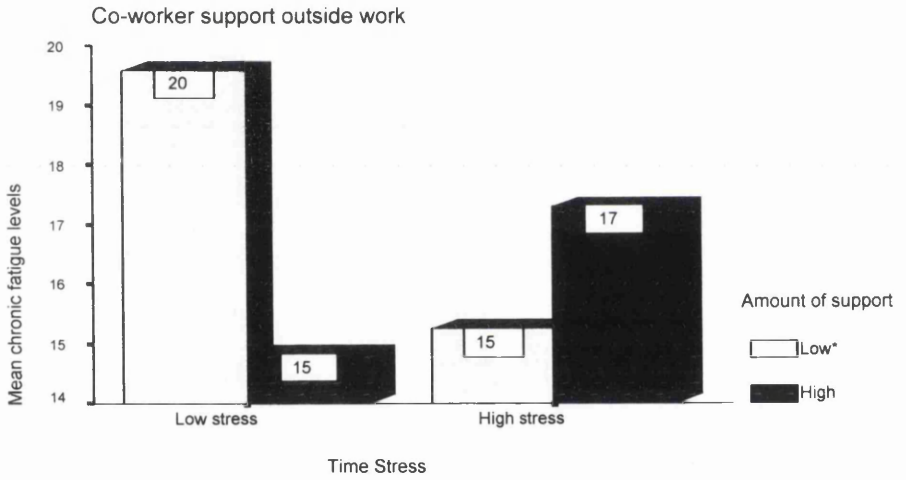


FIGURE 4.22. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS OUTSIDE WORK AND TIME STRESSORS ON CHRONIC MENTAL FATIGUE

**Sig. difference in chronic fatigue depending on time stressors levels*

¤*Chronic mental fatigue scores ranged from 12 (low fatigue) to 60 (high fatigue)*

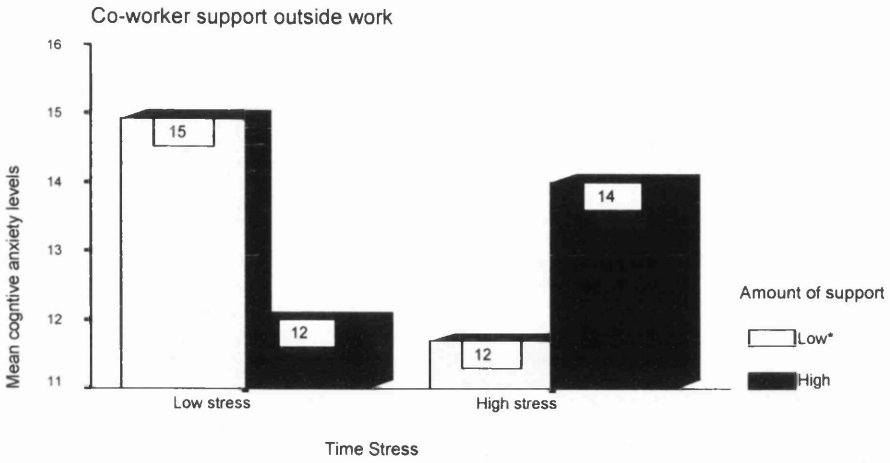


FIGURE 4.23. THE EFFECT OF THE INTERACTION BETWEEN THE NUMBER OF SUPPORTIVE CO-WORKERS OUTSIDE WORK AND TIME STRESSORS ON COGNITIVE ANXIETY

**Sig. difference in cognitive anxiety depending on time stressors levels*

¤*Cognitive anxiety scores ranged from 7 (low anxiety) to 35 (high anxiety)*

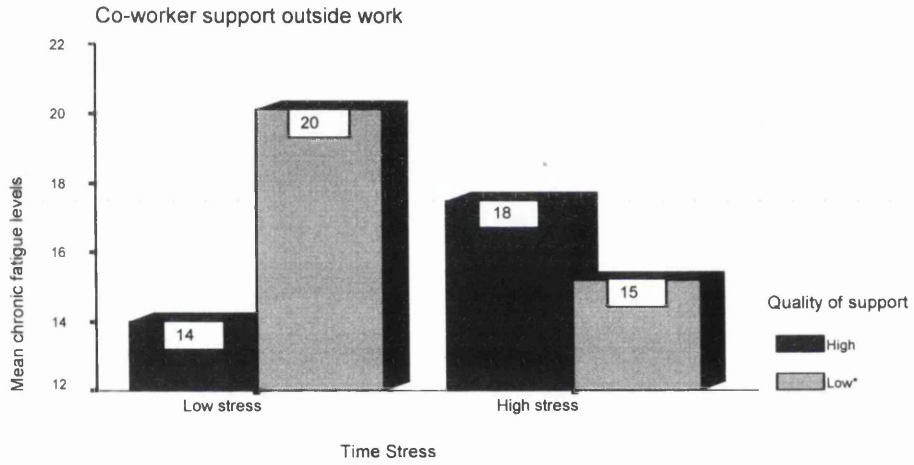


FIGURE 4.24. THE EFFECT OF THE INTERACTION BETWEEN THE QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE OF WORK AND TIME STRESSORS ON CHRONIC MENTAL FATIGUE

**Sig. difference in chronic fatigue depending on time stressors levels*

¤*Chronic mental fatigue scores ranged from 12 (low fatigue) to 60 (high fatigue)*

Low amount of co-worker support outside work	Time stressors	N	Mean	Std. Deviation
Chronic mental fatigue	Low	12	19.58	6.26
	High	17	14.94	4.38
	Total	29	16.86	5.64
Cognitive Anxiety	Low	12	14.92	3.82
	High	17	11.82	3.75
	Total	29	13.10	4.02
General Health	Low	12	27.17	6.46
	High	17	22.29	4.40
	Total	29	24.31	5.78
Minor Infection	Low	12	2.00	.74
	High	17	1.47	.51
	Total	29	1.69	.66

TABLE 4.30. HEALTH DEPENDING ON THE LEVEL OF TIME STRESSORS AND THE NUMBER OF CO-WORKERS PROVIDING SUPPORT OUTSIDE WORK

**All differences in health depending on need for support are significant*

¤Higher health scores represents poorer health

4.3.3. Summary

4.3.3.1. Objectives and Hypotheses

Objective: When, where and from whom is the most support provided?

1. *Relaxed situations will have the highest amount of social support, while intimate situations will have the highest quality social support.*

There were no significant differences in the quality of support offered in various situations. However, the data supported the hypothesis in that significantly more people were available during times of relaxation, than for intimate or general discussions.

2. *There will be differences in the quality and amount of support from various sources (family, friends and co-workers).*

In support of the hypothesis, the number of co-workers who provided support outside of work was significantly less than all other sources. Participants reported similar satisfaction with the support provided by family and friends, but these were significantly greater than that offered by co-workers inside and outside of work.

3. The support provided from various sources will differ with the situation.

When participants wanted to relax or discuss general concerns, the amount and quality of support provided from co-workers outside of work was significantly less than from other sources. When participants wanted to have personal and/or intimate discussions, friends and family support was significantly larger and more satisfactory than support from co-workers (at or outside work). Furthermore, the availability of intimate support from co-workers outside of work was significantly less than from other sources. Also, there was less satisfaction with the intimate support provided by co-workers in and outside of work than from friends and family. The data provided support for the hypothesis.

Objective: What is the relationship between the different aspects of social support, occupational stressors and health?

1. The nature of support will influence the relationship between occupational stressors and health measures.

In times of high stressor levels (time and job), participants with a high quality of relaxing and intimate support had high chronic mental fatigue. In addition, when participants had a low amount of support, regardless if the support was for relaxation or for discussing general or intimate concerns, those with a high level of time stressors had better overall health than those who had a lower level. In support of the hypothesis, the results suggest that the nature of support provided (relaxed, general, intimate) affected health in different ways.

2. *The source of support will influence the relationship between occupational stressors and health measures.*

The nature and amount of health measures influenced depended upon the source of support. There was no relationship between family support, occupational stressors and health. However, the relationship between occupational stressors and support from friends influenced somatic anxiety, cognitive anxiety and minor infection levels. Support from co-workers together with occupational stressor levels affected the occurrence of minor infections and joint pain. In conjunction with occupational stressors, support received from co-workers outside of work influenced minor infections, joint pain, cardiovascular health, general health (GHQ), chronic mental fatigue and cognitive anxiety levels. Due to the number of health measures influenced, it can be inferred that support from co-workers, combined with occupational stressors, was the most influence source of support. The hypothesis was supported.

3. *The interaction between the need, seeking and provision of social support and occupational stressors will influence health levels.*

The results of the regression analyses indicated that, after controlling for age and gender, the interaction between the need, seeking of, for provision of support and occupational stressors did not predict any of the health measures. The hypothesis was not supported.

4. *The interaction between social support quality and occupational stressors will influence health levels.*

The hypothesis was support as social support quality (SSQL) and time stressor levels were found to predict chronic mental fatigue. For respondents with a low support satisfaction level and time stressor level increased chronic mental fatigue decreased. No other significant interactions between SSQL and occupational stressors emerged.

5. The interaction between social support quantity and occupational stressors will influence health levels.

The hypothesis was supported as social support quantity (SSQN) and job stressor levels were found to predict minor infections. Moreover, there was a significant three-way interaction between SSQN, time stressors and job stressors, regarding minor infection levels. Congruent to the two-way interaction, higher stressor levels and low support resulted in fewer minor infections, while high stressor levels and high support resulted in more minor infections. No other significant interactions between SSQN and occupational stressors emerged.

4.3.3.2. Summary of Study 3 results

The aim of study 3 was to investigate the aspects of social support that moderate the relationship between occupational stressors and health. The first objective was to examine when, where and from what source is the most support provided. In support of the hypotheses, the amount and quality of support differed depending on the source and situation in which it was provided. Participants reported the highest amount of supporters on occasions when they wanted to relax, while the least support was available when participants needed to discuss personal problems in an open and intimate manner (Table 4.2). It is interesting that there were no significant differences in the overall quality of the support received in the three situations (Table 4.3). These findings suggest that the participants were satisfied with the support provided to them in each situation, although the amount of supporters varied. Yet, it appeared that the participants were more selective as to whom they turned when discussing personal and private matters.

Next, the amount of support available from co-workers outside of work, regardless of support situation, was less than that available from co-workers at work, family and friends (Table 4.4). It could be argued that individuals do not choose to meet with co-workers outside of work, compared to family and friends, because the co-worker relationship is more suitable for work-related discussion within the work environment. Furthermore, there were no significant differences in the quality of support from co-workers at work and co-workers outside of work (Table 4.5). On the other hand, it could be argued that there are more friends and family members than co-workers willing to meet with individuals outside of work. In reference to the objective, regardless of the situation (relax, general, intimate), family and friends provided the highest amount and quality of support (Tables 4.6-4.11).

The second objective of the study was to examine the relationship between the different aspects of support, occupational stressors and health. The initial findings indicated that the need for, seeking, and the provision of support (NSP) did not affect the relationship between occupational stressors and health (Figures 4.2-4.7). The findings of remaining ANOVAs and regressions analyses were broadly similar (Section 4.3.2.). Irrespective of the source or nature of support, the results implied that for participants with low occupational stressor levels, those with a high quality and/or quantity of support had better health than those with fewer and/or poorer quality support. On the other hand, it was discovered that when individuals had a high amount and/or quality of support, higher occupational stressor levels were associated with poorer health. These results suggested that for respondents with a good support structure, working more hours and/or with high job stressor levels may be detrimental to their health, while more hours and/or more job demands may be beneficial to health for respondents with poor support.

When the source of support was specifically examined, there was no significant interaction between family support, occupational stressors and health. However, there were significant interaction between the other sources of support, occupational stressors and health. Interestingly, support from co-workers emerged as the most influential source of support. In conjunction with time stressors and job stressor levels, the quality and amount of support from co-workers outside of work affected minor infection, joint pain, cardiovascular health, general health (GHQ), chronic mental fatigue and cognitive anxiety (Tables 4.17-4.24).

The findings of study 3 suggest that in addition to the nature, amount and quality of support, the source from which support is provided influences the relationship between occupational stress and health. Overall, co-worker support outside of work was one of the most influential sources of support. In regard to occupational stress, participants who had a high quality and number of co-workers available outside of work to discuss personal subjects had better overall health. Next, for participants with a good support structure, working overtime was detrimental to their health. It is theorised that for participants with a good support structure, more hours worked reflected more hours away from a supportive structure. Therefore, those who worked fewer hours could converse more and thus benefit further from their support than those who worked more hours. Last of all, among participants with a poor social support structure, those who worked more hours had better health than those who worked fewer hours. This suggests that for people with few and/or poor quality support, working more hours may have been more comforting and beneficial to health than being alone or being with non-supportive people.

CHAPTER 5

5. Discussion

Despite the advances that have been made in the study of proposed stress buffers, the field required further exploration into the factors associated with the buffering effect of coping strategies and social support. This concluding chapter will examine these debates in relation to the data presented in the foregoing sections, in the light of how workers' proposed stress buffers have affected the relationship between occupational stressor levels and health.

The aim of Study 1 and Study 2 was to investigate the factors that moderate the relationship between occupational stressors and health. The objectives were:

- To examine whether participants with higher occupational stressor levels will also have poorer health.
- To examine whether there would be differences in occupational stressor levels depending on the system of production (Ford, Lean) and how these differences affect health levels.
- To examine whether there would be difference in occupational stressor levels depending on nurse grades, and how these difference affect health levels.
- To examine if a negative relationship existed between occupational stressors and health levels over ten months.
- To examine the relationship between proposed stress buffers (social support, coping strategies), occupational stressor and health levels.

In the context of prior research, Study 3 investigated the aspects of social support that moderate the relationship between occupational stressors and health. The objectives of this study were:

- To examine when, where and from whom is most support provided.
- To examine the relationships between the different aspects of social support, occupational stressors and health.

The aim of studies 1 and 2 was to examine the factors that moderate the relationship between occupational stressor and health. To fully understand the relationship between proposed stress buffers, occupational stressors and health, it was necessary to examine the effect of occupational stressors on health levels. The preliminary objectives of this study were to explore this relationship. It was questioned whether occupational stressors alone will induce poor health. If not, are there factors that moderate the relationship between occupational stressors and health? This chapter will commence with a consideration of the present data and past research relating to the relationship between occupational stressor and health levels. Next, the factors that moderate the relationship between occupational stressors and health will be examined. This chapter will then conclude with a thorough examination and debate of the aspects of social support that moderate the relationship between occupational stressors and health.

5.1. The relationship between occupational stressors and health

5.1.1. The General Adaptation Syndrome and Fight-or-Flight response

The basic premise of Selye's General Adaptation Syndrome (1979) and Cannon's Fight-or-Flight response (Rosch, 1993) is that chronic stress will lead to diminished health. Based upon the preceding research, the initial objectives were to explore whether

participants who differed in occupational stressor levels, depending on production-line systems, nurse grades and/or job strain, also report differences in health levels.

Divergent to the aforementioned stressor theories, in the cross-sectional inspections, no associations were found between high occupational stressor levels and poor health. On the contrary, for some of the participant groups, those who had high time stressor (high number of hours worked and low control of job pacing) had better overall health than those with lower time stressors (Tables 2.6 & 2.7). Furthermore, the longitudinal effect of occupational stressors on health levels was examined. Again, there were no significant associations found between occupational stressors and health levels over the 10-month period (Section 2.3.1.4).

Yet, it was found that a high time stressor level was beneficial to health. In view of the fact that a higher amount of hours at work and hours contract to work per week resulted in better health, it could be inferred that another factor at work influenced the relationship between time stressors and health levels. This implication will be discussed in greater detail later in this chapter.

However, the divergence in results may be attributed to the limited sample sizes in the present study and/or perhaps 10-months were not long enough to assess chronic stress and health. Moreover, the variations in the present results from those of Cannon and Selye could be primarily attributed to the assessment of different types of stressors. While Cannon and Selye explored the effects of life stresses, the present study focused on occupational stressors such as job control, hours at work and workload. Based upon the results of the present study, in spite of the limitations, it was concluded that occupational stressors alone did not negatively influence health levels.

5.1.2. Lean vs. Ford system of production

Differences in systems of mass production have sparked substantial debates. Unlike the traditional Ford and Taylor production systems that focused on defined boundaries and authoritative hierarchy, lean systems of production emphasise self-regulation and team co-ordination. Advocates of the lean production system have identified increased reports of job autonomy, job variety and job satisfaction (Groebner & Merz, 1994; Bartezzaghi, 1999; Seppälä & Klemola, 2004). Meanwhile, some critics assert that with the instillation of lean production systems have come increased responsibilities and job demands, loss of control over job pacing and less slack/free time, resulting in diminished health (Klein, 1989; Hiltrop, 1992; Nishiyama & Johnson, 1997; Parker 2003).

The present study examined the possible differences in occupational stressors and health levels between workers on a newly installed lean production-line and those on the pre-existing Ford production-line. Similar to the findings of Klein (1989) and Hiltrop (1992), the lean production-line (LPL) worked more hours and had less control over the pacing of the work than the traditional production-lines (TPL). Previously, Nishiyama & Johnson (1997) discovered increased reports of poor physical health from LPL workers, while Parker (2004) found that the lean system of production was associated with increased reports of depression. When compared to preceding studies, although the LPL worked more hours than the TPL, increased time stressors was associated with *improved* psychological health (Table 2.7). Similar to Groebner and Merz (1994), the induction of the LPL did not produce any negative psychological or physical reactions within the workforce. Interestingly, for the traditional production-line, a significant interaction emerged between the amount of support, time stressor and workload stressors on psychological health (Figure 2.4.). TPL participants with more support and time at work (i.e. time stressors); having higher levels of workload was detrimental to psychological

health. Conversely, for those with few supporters and less time at work, having a higher workload was beneficial to psychological health. Therefore the results indicated that for those working the LPL, the amount of hours worked and contracted to work influenced their psychological health. Whereas, for TPL, the level of time stressors also influenced psychological health but only in conjunction with the amount of support available. The results suggested that for the TPL more hours at work was only beneficial when they had fewer supportive others. It could be reasoned that those on the new LPL may have a different support system than those on the traditional production-line (i.e. fewer co-workers, smaller families etc.)

However, as the TPL and LPL sample sizes were relatively small, these findings although interesting, would need further research with a large sample size to determine a true relationship. Moreover, the analyses were performed on the lean production-line data just three-months after it started. Therefore, it could be argued that those in the LPL have not begun to physically experience the effects of the LPL stressors and/or that the stressors they did report could be attributed to the production-line they were on prior to transferring to the LPL. Yet, contrary to prior research (Klein, 1989, de Toni & Tonchia, 2002; Seppälä & Klemola, 2004) this study compared the TLP and newly implemented LPL within the same manufacturing plant. Thereby, the present study was able to limit some of the external variables often found with research examining new manufacturing plants and/or participants entering new occupations/work environments.

In opposition to critics and advocates of lean production, the present findings suggest that the number of hours worked as well as social support amount, not the production-line systems, affected psychological health. Contrary to the hypothesis, it was concluded

that the differences in the systems of mass production were neither detrimental nor beneficial to the lives and health of production-line workers.

5.1.3. The Job Demand-Control model

Implicit in the Job Demand-Control model is the premise that job demand (workload) and decision latitude interact to affect physiological and psychological strain (Karasek, 1979, 1981). In accord with Karasek's theory, various researchers have reported interactions between job control, job demand and psychological (Clarke & Goetz, 1996; de Jonge *et al.* 2000) and physiological health (Karasek *et al.*, 1981, 1988).

The present study evaluated the JD-C model within the healthcare workforce. Contrary to premise of the JD-C model, there were no differences in health measures between the employees in high strain and active job groups (Section 3.3.1.3.). In addition, prior studies examining the JD-C model within health services populations have reported that high perceived stress levels were associated with high demands and less control (Dollard *et al.*, 2000; de Jonge *et al.*, 1999, 2000; Laschinger & Finegan *et al.*, 2001). However, the interaction between job demand and job control, did not predict any of the health measures (Table 3.6.).

The disparity in the results of current findings and those of previous research may be attributed to this studies limited sample size (n= 290) compared to those used by Karasek (1979, n= 950), Karasek *et al.* (1981, n= 1,928), Karasek *et al.* (1988, n= 2,424) and de Jonge *et al.* (2000, n=2,485). Furthermore, the JD-C may be most effective when assessing multiple occupations (Karasek, 1979; Karasek *et al.*, 1981, 1988), while the present study only assessed nurses. Thus, in accord with previous research, it may be

necessary to assess diverse occupations in order to compare the health of those in different job strain categories.

In conclusion, divergent of Karasek's theory, the findings of the current study support those of Fletcher & Jones (1993), Schechter *et al.* (1997) who concluded that the interactive effect of job demands and job control failed to predict any psychological health or physical strain.

5.2. The factors that moderate the relationship between occupational stressor and health

Subsequent to the previous results, the aim of study 1 and 2 was to investigate the factors (coping strategies, social support) that moderate the relationship between occupational stressor and health. Prior to this study, investigators (e.g. Healy & McKay, 2000; Tyson *et al.*, 2002; Murberg *et al.*, 2004) have suggested that problem-focused coping was physically and psychologically the most advantageous coping strategy. Specifically, Tyson *et al.* (2002) discovered that problem-solving coping among nurses with low job satisfaction acted as a stressor buffer to occupational stress. On the other hand, Patterson (2003) concluded that contrary to emotion-focused coping; problem-focused coping resulted in an increase in stress. Contrary to the findings of Tyson et al. (2002), high problem-focused coping coupled with an increased workload resulted in poorer physical health (Figure 2.3.). However, no interactions between occupational stressors and low engagement coping were found in relation to physical health. Moreover, no other interactions involving coping strategies and occupational stressors emerged from any of the studies. Unfortunately, the absence of any further supportive

evidence indicated that the significant interaction might be related more to chance than a veritable relationship.

Although the results suggested that individuals differed as to how they cope/deal with job stressors, this study was unable to determine which coping strategy was most beneficial. Moreover, the results do not support the hypothesis that coping strategies alone buffer the effects of occupational stressor.

As inferred from results of this research, social support had a significant effect on the relationship between occupational stressor and psychological health levels, even after controlling for age and gender (Figures 2.4, 3.4 & 3.5). However, a high amount and/quality of support emerged as potentially both detrimental and beneficial. In support of Vedhara *et al.* (2000) who theorised that the presence of significant others may result in increased stressor, it was discovered that in stressful work environments, good social support networks were detrimental to psychological health. However, in times of low occupational stressors levels, good social support networks were beneficial to psychological health. It could be argued that when individuals have more to do or contend with at work, having many supportive individuals may add further demands and/or psychological strain to the already stressful situation. Conversely, when the work environment is not demanding or stressful, individuals are more able to contribute and benefit from social support.

However, there is an issue of direction of causality. For example, does having a poor support cause poorer health, or do individuals with poorer health attract fewer supports? Unfortunately, due to limited previous research, there is no decisive answer to the question of causality. Yet, based upon the present study, it could be suggested

that it depends upon the individual. For some individuals having a small support system when support is desired may induce poor health. These individuals may psychologically and physically thrive on supportive attention. On the other hand, as detailed by Green & Kocsis' (1996) work with HIV patients, individuals who have poor health may intentionally limit their support system. This action may be a form of reclusion or as suggested by Green & Kocsis, a way to protect loved ones from the unpleasant aspects of their illness.

According to Hobfoll & Vaux (1993) family and friends are more likely to be responsive to one's distress, more accurate about the nature and degree of one's difficulties and provide help appropriate to one's needs. If this is true, in the present study, why was social support only beneficial in times of low stressor levels? Conversely, Schmieder & Smith (1996) and Patterson (2003) argued that, compared to family and friends, co-workers provide substantially more effective social support in dealing with job stressors. Then why did participants who were working more hours and high support have poorer psychological health than those with poor support? Who was providing support: family and friends vs. co-workers or both? Overall, in relation to the aims and objectives of study 1 and study 2, social support, unlike coping strategies, was found to moderate the relationship between occupational stressor and health. These results lead to the next part of the study that examined the individual aspects of social support that influence the relationship between occupational stressors and health.

5.3 The aspects of social support that moderate the relationship between occupational stressor and health

The succeeding research focused on the aspects of social support that moderate the relationship between occupational stressors and health. Within the literature, various researchers have debated the influence of social support variables such as quality (Miller *et al.*, 1976; Winnubst *et al.*, 1988) amount (Vedhara *et al.*, 2000) and type of support (Coghlan, 2003; Dirkzwager *et al.* 2003). Specifically, investigators have debated the benefits of support from various groups (i.e. co-workers, family) (Hobfoll & Vaux, 1993; Green & Kocsis, 1996; Schmieder & Smith, 1996; Mendelson *et al.*, 2000; Bradley & Cartwright, 2002).

Although the debates surrounding the various aspects of support are numerous, there was no comprehensive questionnaire to assess all the debated support variables. Accordingly, the 14-item Social Support Component Questionnaire (SSCQ) was developed to measure the extent to which an individual needs, seeks, and provides support. Also, as previously described in the methods of this research, the Social Support questionnaire (Sarason *et al.* 1987) was modified to measure the quality and quantity of support from family, friends, and co-workers at and outside of work, in three separate situations.

The next discussion sections will concentrate on the following aspects of support:

- Need for, seeking and the provision of support
- Nature of support (relax, general, intimate)
- Quality and quantity of support
- Source of support (family, friends and co-workers)

As well as, how these aspects of social support moderate the relationship between occupational stressors and health.

5.3.1. The need for, seeking and the provision of support

The effect of the need for, seeking, and the provision of support on the relationship between occupational stressor and health was examined. Unfortunately, in the literature there has been a lack of research investigating the individual aspects of support such as the seeking, need and the provision of support. Although not the focal point of their research, Dirkzwager *et al.* (2003) and Patterson (2003) noted that seeking supplemental support was associated with less post-traumatic stressor disorder symptoms and reduced stressor levels, respectively. Conversely, in the present study, there were no significant main effects or interactions involving the need, seek, and provision of support (NSP) regarding the prediction of health, after controlling for age and gender (Tables 4.14-4.17). In reference to the hypothesis, the degree to which individuals sought, provided and/or perceived a need for support did not influenced the relationship between occupational stressor and health.

Although the findings did not support the hypothesis, one could argue that perhaps there is an underlining factor that determines one's need, seeking and provision of support. The degree to which an individual perceived events as being dependent upon his/her behaviour has been termed *locus of control* (LOC) (Brewin *et al.*, 1989) and *self-efficacy* (Steptoe & Vögele, 1986; Skinner, 1996). Furthermore, Lazarus *et al.* (1995) and Horner (1996) maintained that stress was not the product of an environment, but the result of an individual's perception of the relationship between the environment and its demands and his/her capabilities. Building upon the preceding concepts, it can be reasoned that a low need for social support could reflect a perceived high internal LOC

and high ability to deal with occupational stressors. Conversely, a high need for support may indicate a perceived low internal ability to deal with stressors (external LOC), resulting in a high reliance and/or need for external assistance such as social support.

Horner (1996) and Peters *et al.* (2003) reported that when individuals with high external LOC encountered stressors they were more likely to become ill, than those with an internal LOC. Therefore, based upon preceding studies, this research evoked the question of a possible relationship between need, seek and provision of support and an individual's LOC. Do those with high internal LOC, need, seek or provide less support than those with a high external LOC? Similarly, it could be questioned whether respondents who return questionnaires have a higher level of internal LOC than those who do not?

5.3.2. Nature of support

Within the literature there appeared to be an additional deficiency of research exploring the context in which support is provided. Investigators have examined the benefits of various types of support such as psychological, emotional, instrumental and material resources (Baker *et al.*, 1996; Quick *et al.*, 1996; Winnubst *et al.*, 1998; Bradley & Cartwright, 2002). Numerous researchers have also debated the effectiveness of support provided by family members (Handy, 1978; Hobfoll & Vaux, 1993; Schmieder & Smith, 1996; Mendelson *et al.*, 2000) and co-workers (Payne, 1980; Bradley & Cartwright, 2002; Patterson, 2003) in affecting the perception of occupational stress and subsequent health. However few studies, if any, have evaluated the benefits of various sources of support in different situations (i.e. relaxing, general conversations and intimate discussions). The current study, therefore, examined the source of support and the situation in which it is provided.

In the present study, when individuals worked full-time, those who had more/better support with whom to relax or discuss intimate problems and concerns had less cognitive anxiety and less chronic mental fatigue than those with fewer/less satisfactory support (Figures 4.6 & 4.9). Concurrent with Miller *et al.* (1976) and Séguin *et al.* (1995), who found that low levels of perceived support were associated with poor psychological health, the present study established that having individuals available with which to relax and/or discuss personal issues was extremely beneficial to psychological health.

In times of high job stressor levels, workers with a high satisfaction level of the social support had higher cognitive anxiety than those with a poorer satisfaction with support (Figure 4.10). Similarly, Vedhara *et al.* (2000) found, that in times of high stress the presence of a significant other actually resulted in increased anxiety for the participant.

Apart from general support that affected minor infection levels, the amount and quality of relaxing and intimate support influenced psychological health. The results indicated that having individuals to discuss various matters with, or just with whom to relax and unwind, eased the psychological strains produced by work. However, this relationship proved detrimental when individuals had high occupational stressors levels. When placed into context, the results are logical. For example, if a manager with a high level of occupational stress had supportive friends who wanted to assist, but were unable to relate and effectively support the individual; this ineffectual support might create even more strain. Therefore, in accord with several studies that have found that some social support contributed to more distress than relief for the recipient (Schmieder & Smith, 1996; Vedhara *et al.* 2000; Patterson, 2003), these findings suggest that when individuals

have much on their mind, such as stress from work, having supportive people may be a psychological burden.

In reference to the type of support provided, the amount and quality of support available with which to relax and/or discuss intimate concerns had the most influence on the relationship between occupational stressor levels and health, specifically psychological health. This finding is particularly interesting because participants reported the most amount of support when they relaxed and the least when they discussed intimate concerns (Table 4.2). However, the quality of support provided did not differ depending on the type of support. Therefore, although the number of supporters differed according to the situation, the participants were equally pleased with the support provided. Subsequently, a small group of individuals with which to discuss personal concerns and ideas was equally effective as a large group of individuals in reducing psychological strains (i.e. cognitive anxiety) produced from work.

Based upon these findings, and in support of the hypothesis, it is concluded that the type of support provided can influence the relationship between occupational stressor and health. Furthermore, it was not the individuals with high occupational stressor levels who benefited from social support. Conversely, in times of high occupational stressor levels, having a less amount of and/or quality of support was associated with better psychological health. However, when dealing with low occupational stressor levels, having a high amount and/or quality of support with which to relax or discuss personal ideas, was associated with less cognitive anxiety and chronic mental fatigue.

5.3.3. Quality and quantity of support

When the previous aspects of support were discussed, similar outcomes have emerged pertaining to the effect of the quality and quantity of social support on the relationship between occupational stressor and health. This section focuses on the effect of the quality and amount of support on the relationship between occupational stressor and health levels. First, the association between amount of support and quality of support was examined. The data suggested that the smaller the participant's support group, the closer and more supportive it was (Table 4.26).

Next, the relationships between the quantity and quality of support, occupational stressors and health levels were examined. Initially, a significant relationship between quality of support, time stressors and chronic mental fatigue emerged. Concurrent with Miller *et al.* (1976) and Séguin *et al.* (1995), there was also a relationship between the amounts of available social support, job stressor and health levels (i.e. minor infections). A careful inspection of the data discovered a pattern similar to that in the preceding results. When individuals had a low quality of support, a higher amount of hours worked (i.e. high time stressors) was associated with lower levels of chronic mental fatigue (Figure 4.3). In addition, for individuals with a high amount of support, a higher job stressors level was associated with more minor infections (Figure 4.4). In comparison, for participants with few supportive others, higher job stressors level was associated with fewer minor infections (Figures 4.4 & 4.5). A simplified framework is illustrated in Figure 5.1.

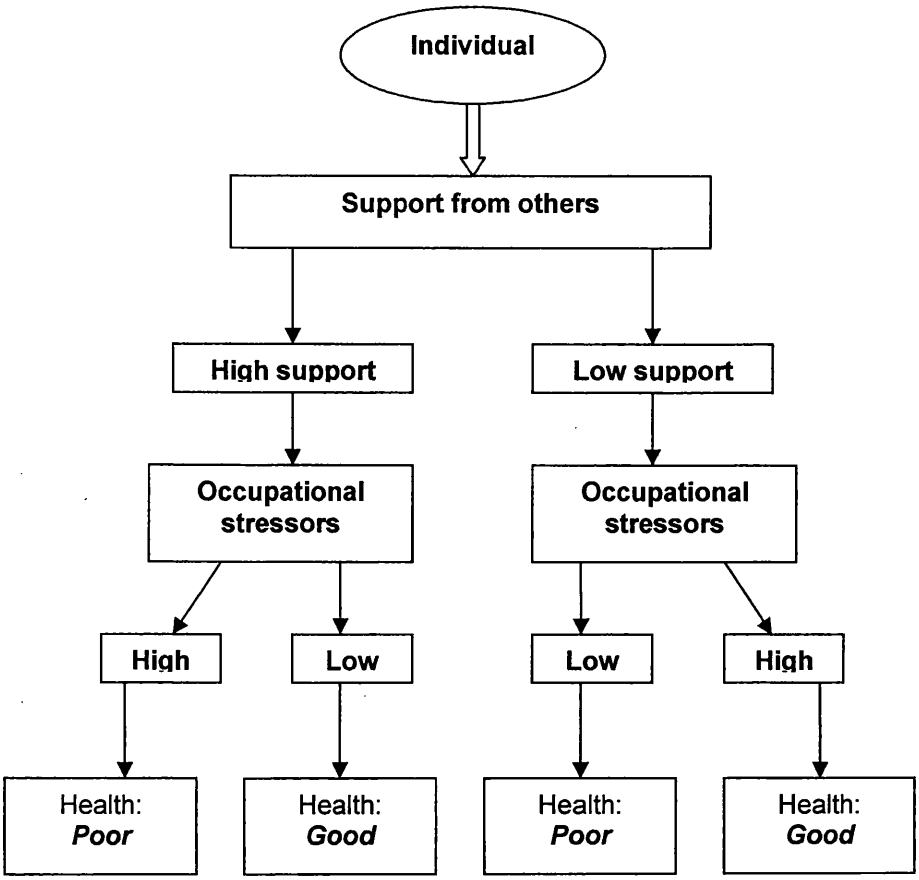


FIGURE 5.1. A MODEL OF THE INFLUENCE OF SOCIAL SUPPORT ON THE RELATIONSHIP BETWEEN OCCUPATIONAL STRESSORS AND HEALTH.

A rational explanation of these findings is that for people with few friends and/or a poor quality of support, work may act as a diversion from being alone or with non-supportive individuals. In comparison, when participants didn't work many hours or were strained by their job, they were able to meet and benefit from good social support.

In contrast, for individuals with high occupational stressor levels, having supportive others was detrimental to health. It is surmised that individuals who worked more hours had less social time and subsequently were less able to benefit from advantageous social support. Moreover, for those with a high job stressor level, having a high quality of support was associated with poorer health. The findings of the current study provides supportive evidence for Hobfoll & Vaux (1993) and Coghlan (2003) who reported that in some cases social support contributed to more distress than relief. It is

argued that that supportive others may provide inadequate and/or poor support, thereby adding more stressor to an already stressful situation.

These results indicated that a high amount of support and/or quality of support could have either a negative or positive influence on health, depending on the level of occupational stressors. In high occupational stressor environments, poorer support was associated with better health. Conversely, in low occupational stressor environments, higher amounts and quality of support were associated with better health. Moreover, participants reported a greater satisfaction level when they had few supporters than those with a large support group (Table 4.26). These results may reflect the fact that participants with high occupational stressor levels and high amount of support had poorer health than those with a low amount of support. Therefore, for those individuals with high stressor levels, a low amount of support was less stressful and more desired than a high amount of ineffective supporters.

To conclusion, the results of this study support the hypothesis that the amount of support and quality of support will influence the relationship between occupational stressor and health levels.

5.3.4. Source of support

Due to the findings of previous research and those of the present study, it was essential to examine the roles that various sources of support play in regard to occupational stressor and health. A preliminary examination of the results implied that support from co-workers outside of work had a greater influence on stressor and health levels than any other source (Section 4.3.2.4.). However, upon closer examination, the number of

hours worked in conjunction with support from co-workers affected both physiological and psychological health levels (Figures 4.17-4.24, except 4.21).

Within the literature, Payne (1980) emphasized that work-group structures are limited to discussions focused on work issues while, in comparison, the family has a more detailed understanding of the member and as a result can provide more effective support than members of a work group. Contrary to Payne (1980), when the results of the current study were examined, all the sources of support, except support from family members, affected the relationship between occupational stressor and various health measures (Section 4.3.2.4.). Moreover, support provided from co-workers outside of work was the foremost influential source of support that influenced various stressor levels and health measures (Figures 4.17-4.24). These findings support Handy (1978) and Schmieder & Smith (1996) who surmised that non-work social support was ineffective in reducing occupational stressor. Handy (1978) further contended that due to its nature and proximity, the family could cause unfavourable effects on occupational stressor and health levels.

As previously stated, in the current study, support from co-workers outside work was substantially more influential on the relationship between occupational stressor and health than support from co-workers at work, friends and family. In partial agreement with Miller *et al.* (1976), it could be inferred that within the work place, co-workers have little time to discuss ideas or that some problems may be inappropriate for the workplace and therefore support at work would be ineffective. However, participants who had more and/or better quality of support from co-workers *outside* of work had better overall health. In respect to occupational stressor the results suggest that individuals who are able to socialise with friends, and more importantly co-workers

outside of work, have better overall health, including less joint pain, than individuals who only have support from co-workers at work or family members. Unfortunately, many researchers examining family and co-workers support in relation to occupational stressor (Miller *et al.*, 1976; Schmieder & Smith, 1996; Mendelson *et al.*, 2000; Patterson, 2003) have failed to recognize the possibility of co-workers providing effective support outside of work.

In the literature, Baker *et al.* (1996) and Winnubst *et al.* (1988) suggested that co-workers were effective in providing instrumental support, whereas Hobfoll & Vaux (1993) found family members provided effective emotional support. This study did not explore the type of support provided/sought (instrumental, emotional), only the nature of the support (relax, general, intimate). Is intimate support the same as emotional support? What support do co-workers provide outside of work, instrumental, emotional or both? It would be in the best interest of subsequent to examine what type of support is sought/provided (instrumental or emotional) from the different sources, in order to assess what source of support is more effective based upon the support required.

In accord with the preceding research, the results of this study suggest that the purpose of the support (i.e. illness, work stress, life stress) may be the accurate indicator of which source of support will be most beneficial or detrimental in moderating stressful circumstances. Therefore, it is necessary to evaluate the type (instrumental, emotional) and environment in which support is given in conjunction with the support source. Furthermore, based upon the present data and previous studies, future research may benefit from examining the relationship between family vs. co-worker support and life vs. occupational stressor.

6. Conclusions

The findings support the hypothesis that the proposed stress buffers moderate the relationship between occupational stressors and health. Specifically, different aspects of social support affect the relationship between occupational stressors and health. In particular three main findings have emerged. The first is that co-worker support outside of work was the most influential source of support. In regards to occupational stressors, participants who had a high quality and number of co-workers available outside of work to discuss ideas and problems had better overall psychological and physiological health than those who did not have similar support.

Second, for participants with a good support structure, working overtime was detrimental to their health. It is theorised that for workers with a good support structure, those who work more hours do not have as much time or ability to meet or converse with supportive individuals and subsequently benefit from their support. Conversely, those who worked fewer hours can congregate and converse more and thus benefit from their support.

Another interesting finding was that for participants with a poor social support structure, those who worked more hours had better health than those who worked fewer hours. This suggests that for people with few and/or poor quality support, working more hours may have been more comforting and beneficial to health than being alone or being with non-supportive people. However, it can also be reasoned that individuals who work more hours are unable to form as good a supportive structure as those who work fewer hours.

There is a need for further research. As found in the present study, health levels did not differ in relation to changes in occupational stressor levels over the 10-month research period. It could be argued that the time period of assessment was too brief for changes in health levels to emerge. Therefore, extensive longitudinal studies may help to explain how long it may take chronic occupational stressors to affect physiological and psychological health.

Although the third study of this investigation utilized a mixed gender population, the sample amount was not optimum. Moreover, some of the analyses indicated that gender may play an underlying role in the relationship between proposed stress buffers, occupational stressors and health. Due to the limited sample size, analyses assessing gender differences were not preformed. It is implicit that further studies may benefit from larger sample sizes and gender comparisons. A great deal of research has delved into the association between stressors and perceived support, yet few studies have taken into account potentially effective variables such as age, gender and ethnic differences. Noticeably, the majority of industrial occupational studies have focused predominantly upon male white workers (Payne, 1980; Baker *et al.*, 1996). Furthermore, the majority of nursing and health-care studies have tended to utilize a predominantly white female nursing population (Bradley & Cartwright, 2002).

For example, one industrial study contained a near homogenous sample of 95% males and 80% white participants (Baker *et al.*, 1996). Furthermore, in two nursing studies, the final populations consisted of 92.2% and 100% females, respectively (Bradley & Cartwright, 2002; Tyson *et al.*, 2002). Those studies that do focus upon gender differences in social support and stress are outside of the industrial and nursing realm (Sarason *et al.*, 1995 & 1987; Séguin *et al.*, 1995; Schmieder & Smith, 1996). In general,

research must be expanded to incorporate various aspects such as ethnicity, age, and gender in order to generalise results to the ever expanding non-homogenous work force.

In relation to the findings of this study and previous work, a few additional questions have emerged. It would be valuable to compare the effectiveness of support sources in relation to work and life stresses. As previously discussed, support from co-workers outside of work influenced the relationship between occupational stressors and health. Therefore, would support from co-workers outside of work have as prominent and/or the same effect on life stresses?

Overall, the study substantiates the theory of the buffering effect of social support systems on the relationship between occupational stressors and health, although the relationship is complex.

APPENDICES

APPENDIX A

- South Wales Production Plant – Shiftworker Survey

  A1: Time 1 questionnaire

  A2: Consent form

  A3: Time 2 questionnaire

  A4: Time 3 questionnaire

- South and Mid-Wales Hospitals – Health and Occupational Study

  A5: HOS questionnaire

  A6: Consent form

- South Wales Government Agency – Social Support and Health study

  A7: SSH questionnaire

  A8: Consent form

APPENDIX B

- Study 1 and Study 2 data

APPENDIX C

- Study 3 data

APPENDIX A

APPENDIX A1

South Wales Production Plant – Shiftworker Survey

- Time 1 questionnaire

Section A: Your Personal Details

A1. Age_____

A2. Gender o Female o Male

A3. Are you: o Married/living with partner o Single o Separated/ divorced/widowed

A4. Number of dependents? (eg. children) _____

Section B: Your Work Schedule

B1. How long have you worked altogether? _____years _____months

B2. How long have you worked altogether? _____years _____months

B3. How many hours are you **contracted** to work each week? _____hours _____minutes

B4. How many hours do you **actually** work each week? (including overtime) _____hours _____minutes

Section C: Job Satisfaction

C1. Please rate your workload on each shift that you work:

	Extremely Light	**Quite Light**	**Average**	**Quite Heavy**	**Extremely Heavy**
Morning or Day (12h) Shift	1	2	3	4	5
Afternoon Shift	1	2	3	4	5
Night Shift	1	2	3	4	5

	Entirely outside my control	**Somewhat outside my control**	**In between**	**Somewhat under my control**	**Entirely under my control**
C2. The pacing of the job I do is:	1	2	3	4	5

C3. The following questions relate to **general job satisfaction** not your satisfaction with you shift system. Please circle the appropriate answer for each question.

	Disagree Strongly	**Disagree**	**Disagree slightly**	**Neutral**	**Agree slightly**	**Agree**	**Agree strongly**
Generally speaking, I am very satisfied with this job	1	2	3	4	5	6	7
I frequently think of quitting this job	1	2	3	4	5	6	7
I am generally satisfied with the kind of work I do	1	2	3	4	5	6	7
Most people on this job are very satisfied	1	2	3	4	5	6	7
People on this job often think of quitting	1	2	3	4	5	6	7

C4. To what extent do these statements represent your opinion?

	Not at all		Somewhat		Very much
I prefer the present production line to the production-line previously worked?	1	2	3	4	5

C5. In the past month, how much have you experienced:

	Not at all	A little	Some-what	Quite a lot	Very much
spells of confusion?	1	2	3	4	5
thought getting mixed up?	1	2	3	4	5
poor concentration?	1	2	3	4	5
can't easily make decisions?	1	2	3	4	5
poor memory for recent events?	1	2	3	4	5
can't take things in when speaking to people?	1	2	3	4	5
thoughts are slow?	1	2	3	4	5
muzzy head?	1	2	3	4	5
can't find the right words?	1	2	3	4	5
having plenty of energy?	1	2	3	4	5
feeling tired most of the time?	1	2	3	4	5
feeling lively?	1	2	3	4	5

Section D: Health & Well-Being

D1. Please indicate how frequently you experience the following, by circling the appropriate number:

	Almost never	Quite seldom	Quite often	Almost always
How often is your appetite disturbed?	1	2	3	4
How often do you have to watch what you eat to avoid stomach upsets?	1	2	3	4
How often do you feel nauseous?	1	2	3	4
How often do you suffer from heartburn or stomach-ache?	1	2	3	4
How often do you complain of digestion difficulties?	1	2	3	4
How often do you suffer from bloated stomach or flatulence	1	2	3	4
How often do you suffer from pain in your abdomen	1	2	3	4

	Almost never	Quite seldom	Quite often	Almost always
How often do you suffer from constipation or diarrhoea?	1	2	3	4
How often do you suffer from heart palpitations?	1	2	3	4
How often do you suffer from aches and pains in your chest?	1	2	3	4
How often do you suffer from dizziness?	1	2	3	4
How often do you suffer from sudden rushes of blood to your head?	1	2	3	4
Do you suffer from shortness of breath when climbing the stairs normally?	1	2	3	4
How often have you been told that you have high blood pressure?	1	2	3	4
Have you ever been aware of your heart beating irregularly?	1	2	3	4
How often do you feel "tight" in your chest?	1	2	3	4
How often do you suffer from minor infectious diseases, e.g. colds, flu, etc.?	1	2	3	4
How often do you suffer from pain in your:	1	2	3	4
shoulder and/or neck	1	2	3	4
back and/or lower back	1	2	3	4
arm and/or wrist	1	2	3	4
leg and/or knee	1	2	3	4

D2. The following questions deal with **how you have felt in general over the past few weeks.** Please circle the most appropriate answer for each question. Remember to concentrate on present and recent complaints, not those that you have had in the distant past.

Have you recently:

Been able to concentrate on what you are doing	Better than usual	Same as usual	Less than usual	Much less than usual
Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less than usual	Much less than usual
Felt capable of making decisions about things?	More so than usual	Same as usual	Less than usual	Much less than usual

Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt you could not overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been able to enjoy your normal day to day activities?	More so than usual	Same as usual	Less than usual	Much less than usual
Been able to face up to your problems?	More so than usual	Same as usual	Less than usual	Much less than usual
Been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling reasonably happy all things considered?	More so than usual	Same as usual	Less than usual	Much less than usual

D3. Below are listed some descriptions of **symptoms of anxiety.**

Please indicate the degree to which you **generally** or **typically** experience the symptom when **you are feeling anxious.**

	Not at all		**Some-what**		**Very much so**
I perspire	1	2	3	4	5
My heart beats faster	1	2	3	4	5
I worry too much over something that doesn't really matter	1	2	3	4	5
I feel jittery in my body	1	2	3	4	5
I imagine terrifying scenes	1	2	3	4	5
I get diarrhoea	1	2	3	4	5
I can't keep anxiety provoking picture out of my mind	1	2	3	4	5
I feel tense in my stomach	1	2	3	4	5
Some unimportant thought runs through my mind and bothers me	1	2	3	4	5
I nervously pace	1	2	3	4	5

	Not at all		Some-what		Very much so
I feel like I am losing out on things because I can't make up my mind soon enough	1	2	3	4	5
I feel physically immobilised	1	2	3	4	5
I can't keep anxiety provoking thoughts out of my mind	1	2	3	4	5
I find it difficult to concentrate because of uncontrollable thoughts	1	2	3	4	5

Section E: The Type of Person You Are

E1. When faced with a problem, some of us have preferred, or instinctive ways in which we immediately try to respond. How far do the following statements describe your ways of coping at work and outside work?

Typically, when faced with a problem I immediately try:

	Very unlike me	Fairly unlike me	In between	Fairly like me	Very like me
to solve it or overcome it					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to accept it or let it be					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to improve my feelings about it or reduce the upset					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to accept my feelings about it or accept being upset					
at work	1	2	3	4	5
outside work	1	2	3	4	5

E2. The following items relate to the people in your environment who provide you with help or support. **Each question has two parts.** For the first part list all people you know, excluding yourself, whom you can count on for help and support in the manner described. You may either give the person's initials, nickname or their relationship to you. For the second part, circle how satisfied you are with the overall support you have. If you have no support simply state 'no-one', but still rate your level of satisfaction. Do not list more than nine persons per question. ***All responses will be kept confidential.***

Whom can you really count on to distract you from your worries when you feel under stress?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support? *(circle one that best applies)* **Very satisfied** 1 2 3 4 5 6 **Very dissatisfied**

Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support? *(circle one that best applies)* **Very satisfied** 1 2 3 4 5 6 **Very dissatisfied**

Who accepts you totally, including both your worst and best points?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support? *(circle one that best applies)* **Very satisfied** 1 2 3 4 5 6 **Very dissatisfied**

Whom can you really count on to care about you, regardless of what is happening to you?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support? *(circle one that best applies)* **Very satisfied** 1 2 3 4 5 6 **Very dissatisfied**

Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support? *(circle one that best applies)* **Very satisfied** 1 2 3 4 5 6 **Very dissatisfied**

Whom can you count on to console you when you are very upset?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support? *(circle one that best applies)* **Very satisfied** 1 2 3 4 5 6 **Very dissatisfied**

E3. What are three main advantages of your present production line for you?

(a) _____

(b) _____

(c) _____

What are three main disadvantages of your present production line for you?

(a) _____

(b) _____

(c) _____

GENERAL INFORMATION

Some people experience severe health, sleep or emotional problems as a result of working shifts. It is possible that completing this questionnaire may have drawn your attention to problems you experience as a result of shiftwork and/or other factors. If you feel that talking to someone might help with these problems it is strongly advised that you contact your GP. If they cannot help they should be able to put you in contact with someone who can.

Before returning the questionnaire please check that you have:

1. **entered your personal code in the box provided**
2. **answered all of the questions**

BUT PLEASE DO NOT ALTER ANY OF YOUR ANSWERS.

If you have any comments or observations relating to your experiences as a shiftworker that have not been covered in this questionnaire we would be very grateful if you would describe them on the back cover.

Thank you for your co-operation.

APPENDIX A2

South Wales Production Plant – Shiftworker Survey

- Consent form

SHIFTWORKER SURVEY

CONSENT FORM

The details on this consent form will be used for the sole purpose of issuing questionnaires to participants throughout the project. Please enter your details below.

Name: .....

FIN Number: .....

Production line: .....

Date: .....

Signature: .....

- I consent to the use of my address for the issue of follow-up questionnaires.
- I have the right to withdraw from the study at any time.

The research project involves you filling out a questionnaire at 3 monthly intervals over the next 10 months. To preserve confidentiality you will not be asked to write your name on the questionnaire. Therefore, in order for the response for the same person to be matched up, you will be asked to produce a personal code. This will be made up of your *day of birth* followed by the initials of *either your mother or father*. So if you were born on the 15th of May and your mother's name is Jane Brooks you would enter the following in the box provided on the front of all questionnaires:

15JB

Although it is likely that some people will share the same day of birth it is less likely that they will also use the same initials, making it virtually impossible to identify individuals directly.

Enter your personal code here:

PLEASE RETURN THIS FORM WITH YOUR COMPLETED QUESTIONNAIRE

APPENDIX A3

South Wales Production Plant – Shiftworker Survey

- Time 2 questionnaire

1. How many hours are you **contracted** to work each week? _____hours _____minutes

2. How many hours do you **actually** work each week? (including overtime) _____hours _____minutes

3. Please rate your workload on each shift that you work:

	Extremely Light	Quite Light	Average	Quite Heavy	Extremely Heavy
Morning or Day (12h) Shift	1	2	3	4	5
Afternoon Shift	1	2	3	4	5
Night Shift	1	2	3	4	5

4. Please rate your **overall** workload for your job in comparison to the average workload of other people in a similar occupation. *(Regardless of shift.)*

	Extremely Light	Quite Light	Average	Quite Heavy	Extremely Heavy
Physical Workload	1	2	3	4	5
Mental Workload	1	2	3	4	5
Time Pressure	1	2	3	4	5

5. The pacing of the job I do is:	Entirely outside my control	Somewhat outside my control	In between	Somewhat under my control	Entirely under my control

6. The following questions relate to **general job satisfaction** not your satisfaction with your shift system. Please circle the appropriate answer for each question.

	Disagree Strongly	Disagree	Disagree slightly	Neutral	Agree slightly	Agree	Agree strongly
Generally speaking, I am very satisfied with this job	1	2	3	4	5	6	7
I frequently think of quitting this job	1	2	3	4	5	6	7
I am generally satisfied with the kind of work I do	1	2	3	4	5	6	7
Most people on this job are very satisfied	1	2	3	4	5	6	7
People on this job often think of quitting	1	2	3	4	5	6	7

7. To what extent do these statements represent your opinion?

	Not at all		Somewhat		Very much
I prefer the present production line to the production-line previously worked?	1	2	3	4	5

8. In the past month, how much have you experienced:

	Not at all	A little	Some-what	Quite a lot	Very much
spells of confusion?	1	2	3	4	5
thought getting mixed up?	1	2	3	4	5
poor concentration?	1	2	3	4	5
can't easily make decisions?	1	2	3	4	5
poor memory for recent events?	1	2	3	4	5
can't take things in when speaking to people?	1	2	3	4	5
thoughts are slow?	1	2	3	4	5
muzzy head?	1	2	3	4	5
can't find the right words?	1	2	3	4	5
having plenty of energy?	1	2	3	4	5
feeling tired most of the time?	1	2	3	4	5
feeling lively?	1	2	3	4	5

9. Please indicate how frequently you experience the following, by circling the appropriate number:

	Almost never	Quite seldom	Quite often	Almost always
How often is your appetite disturbed?	1	2	3	4
How often do you have to watch what you eat to avoid stomach upsets?	1	2	3	4
How often do you feel nauseous?	1	2	3	4
How often do you suffer from heartburn or stomach-ache?	1	2	3	4
How often do you complain of digestion difficulties?	1	2	3	4
How often do you suffer from bloated stomach or flatulence	1	2	3	4
How often do you suffer from pain in your abdomen	1	2	3	4
How often do you suffer from constipation or diarrhoea?	1	2	3	4
How often do you suffer from heart palpitations?	1	2	3	4
How often do you suffer from aches and pains in your chest?	1	2	3	4

	Almost never	Quite seldom	Quite often	Almost always
How often do you suffer from dizziness?	1	2	3	4
How often do you suffer from sudden rushes of blood to your head?	1	2	3	4
Do you suffer from shortness of breath when climbing the stairs normally?	1	2	3	4
How often have you been told that you have high blood pressure?	1	2	3	4
Have you ever been aware of your heart beating irregularly?	1	2	3	4
How often do you feel "tight" in your chest?	1	2	3	4
How often do you suffer from minor infectious diseases, e.g. colds, flu, etc.?	1	2	3	4
How often do you suffer from pain in your:	1	2	3	4
. shoulder and/or neck	1	2	3	4
back and/or lower back	1	2	3	4
arm and/or wrist	1	2	3	4
leg and/or knee	1	2	3	4

10. The following questions deal with **how you have felt in general over the past few weeks.** Please circle the most appropriate answer for each question. Remember to concentrate on present and recent complaints, not those that you have had in the distant past.

Have you recently:

Been able to concentrate on what you are doing	Better than usual	Same as usual	Less than usual	Much less than usual
Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less than usual	Much less than usual
Felt capable of making decisions about things?	More so than usual	Same as usual	Less than usual	Much less than usual
Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt you could not overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been able to enjoy your normal day to day activities?	More so than usual	Same as usual	Less than usual	Much less than usual

Been able to face up to your problems?	More so than usual	Same as usual	Less than usual	Much less than usual
Been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling reasonably happy all things considered?	More so than usual	Same as usual	Less than usual	Much less than usual

11. Below are listed some descriptions of **symptoms of anxiety.** Please indicate the degree to which you **generally** or **typically** experience the symptom when **you are feeling anxious**

	Not at all		**Some-what**		**Very much so**
I perspire	1	2	3	4	5
My heart beats faster	1	2	3	4	5
I worry too much over something that doesn't really matter	1	2	3	4	5
I feel jittery in my body	1	2	3	4	5
I imagine terrifying scenes	1	2	3	4	5
I get diarrhoea	1	2	3	4	5
I can't keep anxiety provoking picture out of my mind	1	2	3	4	5
I feel tense in my stomach	1	2	3	4	5
Some unimportant thought runs through my mind and bothers me	1	2	3	4	5
I nervously pace	1	2	3	4	5
I feel like I am losing out on things because I can't make up my mind soon enough	1	2	3	4	5
I feel physically immobilised	1	2	3	4	5
I can't keep anxiety provoking thoughts out of my mind	1	2	3	4	5
I find it difficult to concentrate because of uncontrollable thoughts	1	2	3	4	5

12. When faced with a problem, some of us have preferred, or instinctive ways in which we immediately try to respond. How far do the following statements describe your ways of coping at work and outside work?

Typically, when faced with a problem I immediately try:

	Very unlike me	**Faily unlike me**	**In between**	**Fairly like me**	**Very like me**
to solve it or overcome it					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to accept it or let it be					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to improve my feelings about it or reduce the upset					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to accept my feelings about it or accept being upset					
at work	1	2	3	4	5
outside work	1	2	3	4	5

13. What are three main advantages of your present production line for you?

(a) _____

(b) _____

(c) _____

What are three main disadvantages of your present production line for you?

(a) _____

(b) _____

(c) _____

If you have any comments or observations relating to your experiences as a shiftworker that have not been covered in this questionnaire we would be very grateful if you would describe them on the back cover.

GENERAL INFORMATION

Some people experience severe health, sleep or emotional problems as a result of working shifts. It is possible that completing this questionnaire may have drawn your attention to problems you experience as a result of shiftwork and/or other factors. If you feel that talking to someone might help with these problems it is strongly advised that you contact your GP. If they cannot help they should be able to put you in contact with someone who can.

Before returning the questionnaire please check that you have answered all of the questions

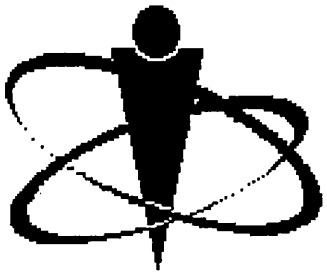
But please do not alter any of your answers.

Thank you for your co-operation

APPENDIX A4

South Wales Production Plant – Shiftworker Survey

- Time 3 questionnaire



Visteon SHIFTWORKER SURVEY

Part 3-Final

The following survey is a follow up to a similar questionnaire you have completed and returned, looking at the problems people may experience as a result of working shifts. Some of the questions are very similar to those you answered in the first questionnaire; they are repeated here to see whether your opinions or perceptions of events have changed over time.

Please note that any information you provide in the questionnaire will be treated in the strictest confidence and will not be divulged to anyone (including yourself). No individual will be identified in connection with any of the research findings. This questionnaire is primarily concerned with the information obtained from groups of shiftworkers.

Throughout this questionnaire the terms "Morning", "Afternoon", and "Night" shifts are used. Please ignore the fact that these terms may differ from the ones used in your organisation. For example, you may call your "Morning" shift an "Early" one, while your "Afternoon" shift may be referred to as a "Late", "Evening" or "Swing" shift. If you are on a 12-hour shift system please complete the "Morning or Day" and "Night" shift sections and leave the "Afternoon" shift sections blank.

YOUR PERSONAL CODE	Day of birth	Mother's/Father's initials

When you have completed this questionnaire please return it in the pre-paid envelope provided.

Thank you for your time and co-operation.

Lori A. Button

Department of Psychology, University of Wales Swansea, Singleton Park, Swansea. SA2 8PP

Logo designed by Lori A. Button

Section A

A1. Ethnic origin: _____

A2. Highest level of education completed?

o Primary school
o Secondary school
o A-level/College
o Undergraduate
o Post-graduate

Section B

B1. How many hours are you **contracted** to work each week? _____hours _____minutes

B2. How many hours do you **actually** work each week? (including overtime) _____hours _____minutes

B3. Estimated income earned from this job per year? £_____.00

Section C

C1. Please rate your **overall** workload for your job in comparison to the average workload of other people in a similar occupation. *(Regardless of shift.)*

	Extremely light	**Quite Light**	**Average**	**Quite Heavy**	**Extremely heavy**
Physical Workload	1	2	3	4	5
Mental Workload	1	2	3	4	5
Time Pressure	1	2	3	4	5
Emotional Strain	1	2	3	4	5

	Entirely outside my control	**Somewhat outside my control**	**In between**	**Somewhat under my control**	**Entirely under my control**
C2. The pacing of the job I do is:	1	2	3	4	5

C3. During the past year, how often were you in a situation where you faced job loss or layoff?

o **Never**	o **Faced with possibility once**	o **Faced with the possibility more than once**	o **Constantly**	o **Actually layed off**

C4. How likely is it that during the next couple years will you lose your present job with your employer?

o **Not at all likely**	o **Not too likely**	o **Somewhat likely**	o **Very likely**

C5. The following questions relate to **general job satisfaction and job security**. Please circle the appropriate answer for each question.

	Disagree Strongly	**Disagree**	**Disagree slightly**	**Neutral**	**Agree slightly**	**Agree**	**Agree strongly**
Generally speaking, I am very satisfied with this job	1	2	3	4	5	6	7
I frequently think of quitting this job	1	2	3	4	5	6	7
I am generally satisfied with the kind of work I do	1	2	3	4	5	6	7
Most people on this job are very satisfied	1	2	3	4	5	6	7
People on this job often think of quitting	1	2	3	4	5	6	7

C6. How steady is your work? o **Regular** o **Seasonal** o **Frequent layoffs** o **Seasonal and frequent layoffs** o **Other**

C7. My job security is good. o **Strongly disagree** o **Disagree** o **Agree** o **Strongly agree**

C8. To what extent do these statements represent your opinion?

	Not at all		**Somewhat**		**Very much**
I prefer the present production line to the production-line previously worked?	1	2	3	4	5

Section D

D1. In the past month, how much have you experienced:

	Not at all	A little	Some-what	Quite a lot	Very much
spells of confusion?	1	2	3	4	5
thought getting mixed up?	1	2	3	4	5
poor concentration?	1	2	3	4	5
can't easily make decisions?	1	2	3	4	5
poor memory for recent events?	1	2	3	4	5
can't take things in when speaking to people?	1	2	3	4	5
thoughts are slow?	1	2	3	4	5
muzzy head?	1	2	3	4	5
can't find the right words?	1	2	3	4	5
having plenty of energy?	1	2	3	4	5
feeling tired most of the time?	1	2	3	4	5
feeling lively?	1	2	3	4	5

Section E

E1. The following questions relate to job characteristics of the **MORNING SHIFTS.**
To what extend do the following statements reflect your **MORNING Shifts?**
Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My job requires that I learn new things.	1	2	3	4
My job involves a lot of repetitive work	1	2	3	4
My job requires me to be creative.	1	2	3	4
My job allows me to make a lot of decisions on my own.	1	2	3	4
My job requires a high level of skill.	1	2	3	4
On my job, I have very little freedom to decide how I do my work.	1	2	3	4
I get to do a variety of different things on my job.	1	2	3	4

	Strongly disagree	Disagree	Agree	Strongly agree
I have a lot of say about what happens on my job.	1	2	3	4
I have the opportunity to develop my own special abilities.	1	2	3	4
My job requires working very fast.	1	2	3	4
My job requires very hard work.	1	2	3	4
My job requires lots of physical work.	1	2	3	4
I am not asked to do an excessive amount of work.	1	2	3	4
I have enough time to get the job done.	1	2	3	4
I am often required to move or lift very heavy loads on my job.	1	2	3	4
My job requires rapid and continuous physical activity.	1	2	3	4
I am free from conflicting demands that others make.	1	2	3	4
My job requires long periods of intense concentration on the task.	1	2	3	4
My tasks are often interrupted before they can be completed, requiring attention at a later time.	1	2	3	4
My job is very hectic.	1	2	3	4
I am often required to work for long periods with my body in physically awkward positions.	1	2	3	4
I am required to work for long periods with my head or arms in physically awkward positions.	1	2	3	4
Waiting in work from other people or departments often slows me down on my job.	1	2	3	4

E2. To what extent do you agree with the following statements when working the **MORNING Shifts**?

Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My supervisor is concerned about the welfare of those under him/her	1	2	3	4
My supervisor pays attention to what I am saying.	1	2	3	4
I am exposed to hostility or conflict from my supervisor.	1	2	3	4
My supervisor is helpful in getting the job done.	1	2	3	4
My supervisor is successful in getting people to work together	1	2	3	4

E3. To what extent do you agree with the following statements when working the **MORNING Shifts?**
Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
People I work with are competent in doing their jobs.	1	2	3	4
People I work with take a personal interest in me.	1	2	3	4
I am exposed to hostility or conflict from the people I work with	1	2	3	4
People I work with are friendly.	1	2	3	4
The people I work with encourage each other to work together	1	2	3	4
People I work with are helpful in getting the job done.	1	2	3	4

Section F

F1. When faced with a problem, some of us have preferred, or instinctive ways in which we immediately try to respond.
How far do the following statements describe your ways of coping at work and outside work?

Typically, when faced with a problem I immediately try:

	Very unlike me	Faily unlike me	In between	Fairly like me	Very like me
to solve it or overcome it					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to accept it or let it be					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to improve my feelings about it or reduce the upset					
at work	1	2	3	4	5
outside work	1	2	3	4	5
to accept my feelings about it or accept being upset					
at work	1	2	3	4	5
outside work	1	2	3	4	5

Section G

G1. Please indicate how frequently you experience the following, by circling the appropriate number:

	Almost never	Quite seldom	Quite often	Almost always
How often is your appetite disturbed?	1	2	3	4
How often do you have to watch what you eat to avoid stomach upsets?	1	2	3	4
How often do you feel nauseous?	1	2	3	4
How often do you suffer from heartburn or stomach-ache?	1	2	3	4
How often do you complain of digestion difficulties?	1	2	3	4
How often do you suffer from bloated stomach or flatulence	1	2	3	4
How often do you suffer from pain in your abdomen	1	2	3	4
How often do you suffer from constipation or diarrhoea?	1	2	3	4
How often do you suffer from heart palpitations?	1	2	3	4
How often do you suffer from aches and pains in your chest?	1	2	3	4
How often do you suffer from dizziness?	1	2	3	4
How often do you suffer from sudden rushes of blood to your head?	1	2	3	4
Do you suffer from shortness of breath when climbing the stairs normally?	1	2	3	4
How often have you been told that you have high blood pressure?	1	2	3	4
Have you ever been aware of your heart beating irregularly?	1	2	3	4
How often do you feel "tight" in your chest?	1	2	3	4
How often do you suffer from minor infectious diseases, e.g. colds, flu, etc.?	1	2	3	4
How often do you suffer from pain in your:	1	2	3	4
shoulder and/or neck	1	2	3	4
back and/or lower back	1	2	3	4
arm and/or wrist	1	2	3	4
leg and/or knee	1	2	3	4

G2. What are three main advantages of your present production line for you?

(a) _____

(b) _____

(c) _____

What are three main disadvantages of your present production line for you?

(a) _____

(b) _____

(c) _____

Section H

H1. The following questions relate to job characteristics of the **EVENING SHIFT.**
To what extend do the following statements reflex your **EVENING Shift?**
Complete only if applicable.

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
My job requires that I learn new things.	1	2	3	4
My job involves a lot of repetitive work	1	2	3	4
My job requires me to be creative.	1	2	3	4
My job allows me to make a lot of decisions on my own.	1	2	3	4
My job requires a high level of skill.	1	2	3	4
On my job, I have very little freedom to decide how I do my work.	1	2	3	4
I get to do a variety of different things on my job.	1	2	3	4
I have a lot of say about what happens on my job.	1	2	3	4
I have the opportunity to develop my own special abilities.	1	2	3	4
My job requires working very fast.	1	2	3	4
My job requires very hard work.	1	2	3	4
My job requires lots of physical work.	1	2	3	4
I am not asked to do an excessive amount of work.	1	2	3	4
I have enough time to get the job done.	1	2	3	4
I am often required to move or lift very heavy loads on my job.	1	2	3	4
My job requires rapid and continuous physical activity.	1	2	3	4
I am free from conflicting demands that others make.	1	2	3	4
My job requires long periods of intense concentration on the task.	1	2	3	4

	Strongly disagree	Disagree	Agree	Strongly agree
My tasks are often interrupted before they can be completed, requiring attention at a later time.	1	2	3	4
My job is very hectic.	1	2	3	4
I am often required to work for long periods with my body in physically awkward positions.	1	2	3	4
I am required to work for long periods with my head or arms in physically awkward positions.	1	2	3	4
Waiting in work from other people or departments often slows me down on my job.	1	2	3	4

H2. To what extent do you agree with the following statements when working the **EVENING Shifts**?

Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My supervisor is concerned about the welfare of those under him/her	1	2	3	4
My supervisor pays attention to what I am saying.	1	2	3	4
I am exposed to hostility or conflict from my supervisor.	1	2	3	4
My supervisor is helpful in getting the job done.	1	2	3	4
My supervisor is successful in getting people to work together	1	2	3	4

H3. To what extent do you agree with the following statements when working the **EVENING Shifts**?

Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
People I work with are competent in doing their jobs.	1	2	3	4
People I work with take a personal interest in me.	1	2	3	4
I am exposed to hostility or conflict from the people I work with	1	2	3	4
People I work with are friendly.	1	2	3	4
The people I work with encourage each other to work together	1	2	3	4
People I work with are helpful in getting the job done.	1	2	3	4

Section I

I1. The following questions deal with **how you have felt in general over the past few weeks.** Please circle the most appropriate answer for each question.

Remember to concentrate on present and recent complaints, not those that you have had in the distant past.

Have you recently:

Been able to concentrate on what you are doing	Better than usual	Same as usual	Less than usual	Much less than usual
Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less than usual	Much less than usual
Felt capable of making decisions about things?	More so than usual	Same as usual	Less than usual	Much less than usual
Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt you could not overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been able to enjoy your normal day to day activities?	More so than usual	Same as usual	Less than usual	Much less than usual
Been able to face up to your problems?	More so than usual	Same as usual	Less than usual	Much less than usual
Been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling reasonably happy all things considered?	More so than usual	Same as usual	Less than usual	Much less than usual

Section J

J1. Below are listed some descriptions of **symptoms of anxiety.**
Please indicate the degree to which you **generally** or **typically** experience the symptom when **you are feeling anxious.**

	Not at all		**Some-what**		**Very much so**
I perspire	1	2	3	4	5
My heart beats faster	1	2	3	4	5
I worry too much over something that doesn't really matter	1	2	3	4	5
I feel jittery in my body	1	2	3	4	5
I imagine terrifying scenes	1	2	3	4	5
I get diarrhoea	1	2	3	4	5
I can't keep anxiety provoking picture out of my mind	1	2	3	4	5
I feel tense in my stomach	1	2	3	4	5
Some unimportant thought runs through my mind and bothers me	1	2	3	4	5
I nervously pace	1	2	3	4	5
I feel like I am losing out on things because I can't make up my mind soon enough	1	2	3	4	5
I feel physically immobilised	1	2	3	4	5
I can't keep anxiety provoking thoughts out of my mind	1	2	3	4	5
I find it difficult to concentrate because of uncontrollable thoughts	1	2	3	4	5

Section K

K1. The following questions relate to job characteristics of the **NIGHT SHIFT.**
To what extent do the following statements reflect your **NIGHT Shift?**
Complete only if applicable.

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
My job requires that I learn new things.	1	2	3	4
My job involves a lot of repetitive work	1	2	3	4
My job requires me to be creative.	1	2	3	4

	Strongly disagree	Disagree	Agree	Strongly agree
My job allows me to make a lot of decisions on my own.	1	2	3	4
My job requires a high level of skill.	1	2	3	4
On my job, I have very little freedom to decide how I do my work.	1	2	3	4
I get to do a variety of different things on my job.	1	2	3	4
I have a lot of say about what happens on my job.	1	2	3	4
I have the opportunity to develop my own special abilities.	1	2	3	4
My job requires working very fast.	1	2	3	4
My job requires very hard work.	1	2	3	4
My job requires lots of physical work.	1	2	3	4
I am not asked to do an excessive amount of work.	1	2	3	4
I have enough time to get the job done.	1	2	3	4
I am often required to move or lift very heavy loads on my job.	1	2	3	4
My job requires rapid and continuous physical activity.	1	2	3	4
I am free from conflicting demands that others make.	1	2	3	4
My job requires long periods of intense concentration on the task.	1	2	3	4
My tasks are often interrupted before they can be completed, requiring attention at a later time.	1	2	3	4
My job is very hectic.	1	2	3	4
I am often required to work for long periods with my body in physically awkward positions.	1	2	3	4
I am required to work for long periods with my head or arms in physically awkward positions.	1	2	3	4
Waiting in work from other people or departments often slows me down on my job.	1	2	3	4

K2. To what extent do you agree with the following statements when working the **NIGHT Shifts**?
Complete only if applicable.

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
My supervisor is concerned about the welfare of those under him/her	1	2	3	4
My supervisor pays attention to what I am saying.	1	2	3	4
I am exposed to hostility or conflict from my supervisor.	1	2	3	4
My supervisor is helpful in getting the job done.	1	2	3	4
My supervisor is successful in getting people to work together	1	2	3	4

K3. To what extent do you agree with the following statements when working the **NIGHT Shifts**?
Complete only if applicable.

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
People I work with are competent in doing their jobs.	1	2	3	4
People I work with take a personal interest in me.	1	2	3	4
I am exposed to hostility or conflict from the people I work with	1	2	3	4
People I work with are friendly.	1	2	3	4
The people I work with encourage each other to work together	1	2	3	4
People I work with are helpful in getting the job done.	1	2	3	4

K4. What level of skill is *required* for your job in terms of formal training?
(Not necessarily the same as your education.)

o **Primary school** o **Secondary school**

o **A-level/College** o **Undergraduate**

o **Post-graduate**

Additional Comments
Do you have any comments or observations relating to your control and/or demands at work that you would like to bring to my attention?

If so, please describe them here: *(if you need further space, please use other side)*

.....

.....

.....

GENERAL INFORMATION

Some people experience severe health, sleep or emotional problems as a result of working shifts. It is possible that completing this questionnaire may have drawn your attention to problems you experience as a result of shiftwork and/or other factors. If you feel that talking to someone might help with these problems it is strongly advised that you contact your GP. If they cannot help they should be able to put you in contact with someone who can.

Before returning the questionnaire
please check that you have answered all of the questions

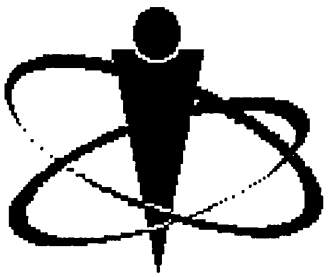
PLEASE DO NOT ALTER ANY OF YOUR ANSWERS.

Thank you for your time and co-operation.

APPENDIX A5

South and Mid-Wales Hospitals – Health and Occupational Study

- HOS questionnaire



Health and Occupation Study

-For Nurses

The following questionnaire is part of a study investigating various occupational factors associated with the nursing profession. There is no particular "axe to grind" within an organisation. The primary aim is to help identify the effects of shiftwork for nurses.

Please note that any information you provide in the questionnaire will be treated in the strictest confidence and will not be divulged to anyone (including yourself). No individual will be identified in connection with any of the research findings. This questionnaire is primarily concerned with the information obtained from groups of nurses.

Throughout this questionnaire the terms "Morning", "Afternoon", and "Night" shifts are used. Please ignore the fact that these terms may differ from the ones used in your organisation. For example, you may call your "Morning" shift an "Early" one, while your "Afternoon" shift may be referred to as a "Late", "Evening" or "Swing" shift. If you are on a 12-hour shift system please complete the "Morning or Day" and "Night" shift sections and leave the "Afternoon" shift sections blank.

It is possible that completing this questionnaire may draw your attention to problems you are experiencing. If you are worried that these are serious it is advised that you contact your GP.

IMPORTANT

When you have completed this questionnaire please return it with your consent form in the pre-paid envelope provided.

Thank you for your time and co-operation.

Ms. Lori A. Button
University of Wales Swansea

HOS logo developed by: Lori A. Button

PLEASE *DO NOT* WRITE YOUR NAME ON THIS QUESTIONNAIRE

Section A

A1. Age_____

A2. o Female o Male

A3. Ethnical background o White o Non-white

A4. Marital status o Married/living with partner o Single o Separated/ divorced/widowed

A5. Number of dependents? (eg. children) _____

A6. Highest level of education completed? o Primary school o Secondary school o A-level/College o Undergraduate o Post-graduate

Section B

B1. Place of Employment:

Hospital _____

Title _____

B2. How many hours are you **contracted** to work each week? _____hours _____minutes

B3. How many hours do you **actually** work each week? (including overtime) _____hours _____minutes

B4. How long have you worked altogether? _____years _____months

B5. How long altogether have you been working shifts? _____years _____months

B6. Estimated income earned from this job per year? £_____.00

Section C

C1. The following questions relate to **general job satisfaction and job security**. Please circle the appropriate answer for each question.

	Disagree Strongly	**Disagree**	**Disagree slightly**	**Neutral**	**Agree slightly**	**Agree**	**Agree strongly**
Generally speaking, I am very satisfied with this job	1	2	3	4	5	6	7
I frequently think of quitting this job	1	2	3	4	5	6	7
I am generally satisfied with the kind of work I do	1	2	3	4	5	6	7
Most people on this job are very satisfied	1	2	3	4	5	6	7
People on this job often think of quitting	1	2	3	4	5	6	7

C2.How steady is your work? o **Regular** o **Seasonal** o **Frequent layoffs** o **Seasonal and frequent layoffs** o **Other**

C3. My job security is good. o **Strongly disagree** o **Disagree** o **Agree** o **Strongly agree**

C4. During the past year, how often were you in a situation where you faced job loss or layoff?

o **Never** o **Faced with possibility once** o **Faced with the possibility more than once** o **Constantly** o **Actually layed off**

C5. How likely is it that during the next couple years will you lose your present job with your employer?

o **Not at all likely** o **Not too likely** o **Somewhat likely** o **Very likely**

C6. What level of skill is *required* for your job in terms of formal training?
(Not necessarily the same as your education.)

o **Primary school** o **Secondary school**

o **A-level/College** o **Undergraduate**

o **Post-graduate**

Section D

D1. In the past month, how much have you experienced:

	Not at all	A little	Some-what	Quite a lot	Very much
spells of confusion?	1	2	3	4	5
thought getting mixed up?	1	2	3	4	5
poor concentration?	1	2	3	4	5
can't easily make decisions?	1	2	3	4	5
poor memory for recent events?	1	2	3	4	5
can't take things in when speaking to people?	1	2	3	4	5
thoughts are slow?	1	2	3	4	5
muzzy head?	1	2	3	4	5
can't find the right words?	1	2	3	4	5
having plenty of energy?	1	2	3	4	5
feeling tired most of the time?	1	2	3	4	5
feeling lively?	1	2	3	4	5

Section E

E1. The following questions relate to job characteristics of the **MORNING SHIFTS.**
To what extend do the following statements reflect your **Morning Shifts?**
Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My job requires that I learn new things.	1	2	3	4
My job involves a lot of repetitive work	1	2	3	4
My job requires me to be creative.	1	2	3	4
My job allows me to make a lot of decisions on my own.	1	2	3	4
My job requires a high level of skill.	1	2	3	4
On my job, I have very little freedom to decide how I do my work.	1	2	3	4
I get to do a variety of different things on my job.	1	2	3	4
I have a lot of say about what happens on my job.	1	2	3	4
I have the opportunity to develop my own special abilities.	1	2	3	4

	Strongly disagree	Disagree	Agree	Strongly agree
My job requires working very fast.	1	2	3	4
My job requires very hard work.	1	2	3	4
My job requires lots of physical work.	1	2	3	4
I am not asked to do an excessive amount of work.	1	2	3	4
I have enough time to get the job done.	1	2	3	4
I am often required to move or lift very heavy loads on my job.	1	2	3	4
My job requires rapid and continuous physical activity.	1	2	3	4
I am free from conflicting demands that others make.	1	2	3	4
My job requires long periods of intense concentration on the task.	1	2	3	4
My tasks are often interrupted before they can be completed, requiring attention at a later time.	1	2	3	4
My job is very hectic.	1	2	3	4
I am often required to work for long periods with my body in physically awkward positions.	1	2	3	4
I am required to work for long periods with my head or arms in physically awkward positions.	1	2	3	4
Waiting in work from other people or departments often slows me down on my job.	1	2	3	4

E2. To what extent do you agree with the following statements when working the **Morning Shifts**?

Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My supervisor is concerned about the welfare of those under him/her	1	2	3	4
My supervisor pays attention to what I am saying.	1	2	3	4
I am exposed to hostility or conflict from my supervisor.	1	2	3	4
My supervisor is helpful in getting the job done.	1	2	3	4
My supervisor is successful in getting people to work together	1	2	3	4

E3. To what extent do you agree with the following statements when working the **Morning Shifts**? **Complete only if applicable.**

	Strongly disagree	Disagree	Agree	Strongly agree
People I work with are competent in doing their jobs.	1	2	3	4
People I work with take a personal interest in me.	1	2	3	4
I am exposed to hostility or conflict from the people I work with	1	2	3	4
People I work with are friendly.	1	2	3	4
The people I work with encourage each other to work together	1	2	3	4
People I work with are helpful in getting the job done.	1	2	3	4

Section F

F1. When faced with a problem, some of us have preferred, or instinctive ways in which we immediately try to respond.

How far do the following statements describe your ways of coping at work and outside work?

Typically, when faced with a problem I immediately try:

	Very unlike me	Faily unlike me	In between	Fairly like me	Very like me
to solve it or overcome it **at work**	1	2	3	4	5
outside work	1	2	3	4	5
to accept it or let it be **at work**	1	2	3	4	5
outside work	1	2	3	4	5
to improve my feelings about it or reduce the upset **at work**	1	2	3	4	5
outside work	1	2	3	4	5
to accept my feelings about it or accept being upset **at work**	1	2	3	4	5
outside work	1	2	3	4	5

Section G

G1. The following items relate to the people in your environment who provide you with help or support. **Each question has two parts.** For the first part list all people you know, excluding yourself, whom you can count on for help and support in the manner described. You may either give the person's initials, nickname or their relationship to you. For the second part, circle how satisfied you are with the overall support you have. If you have no support simply state 'no-one', but still rate your level of satisfaction. Do not list more than nine persons per question. ***All responses will be kept confidential.***

Whom can you really count on to distract you from your worries when you feel under stress?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support?
(circle one that best applies)

Very satisfied 1 2 3 4 5 6 **Very dissatisfied**

Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support?
(circle one that best applies)

Very satisfied 1 2 3 4 5 6 **Very dissatisfied**

Who accepts you totally, including both your worst and best points?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support?
(circle one that best applies)

Very satisfied 1 2 3 4 5 6 **Very dissatisfied**

Whom can you really count on to care about you, regardless of what is happening to you?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support?
(circle one that best applies)

Very satisfied 1 2 3 4 5 6 **Very dissatisfied**

Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support?
(circle one that best applies)

Very satisfied 1 2 3 4 5 6 **Very dissatisfied**

Whom can you count on to console you when you are very upset?

a)	b)	c)
d)	e)	f)
g)	h)	i)

How satisfied are you with this support?
(circle one that best applies)

Very satisfied 1 2 3 4 5 6 **Very dissatisfied**

Section H

H1. Below are listed some descriptions of **symptoms of anxiety.**

Please indicate the degree to which you **generally** or **typically** experience the symptom when **you are feeling anxious.**

	Not at all		**Some-what**		**Very much so**
I perspire	1	2	3	4	5
My heart beats faster	1	2	3	4	5
I worry too much over something that doesn't really matter	1	2	3	4	5
I feel jittery in my body	1	2	3	4	5
I imagine terrifying scenes	1	2	3	4	5
I get diarrhoea	1	2	3	4	5
I can't keep anxiety provoking picture out of my mind	1	2	3	4	5
I feel tense in my stomach	1	2	3	4	5
Some unimportant thought runs through my mind and bothers me	1	2	3	4	5
I nervously pace	1	2	3	4	5
I feel like I am losing out on things because I can't make up my mind soon enough	1	2	3	4	5
I feel physically immobilised	1	2	3	4	5
I can't keep anxiety provoking thoughts out of my mind	1	2	3	4	5
I find it difficult to concentrate because of uncontrollable thoughts	1	2	3	4	5

Section I

I1. The following questions relate to job characteristics of the **EVENING SHIFT**.
To what extend do the following statements reflex your **Evening Shift**?
Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My job requires that I learn new things.	1	2	3	4
My job involves a lot of repetitive work	1	2	3	4
My job requires me to be creative.	1	2	3	4
My job allows me to make a lot of decisions on my own.	1	2	3	4
My job requires a high level of skill.	1	2	3	4
On my job, I have very little freedom to decide how I do my work.	1	2	3	4
I get to do a variety of different things on my job.	1	2	3	4
I have a lot of say about what happens on my job.	1	2	3	4
I have the opportunity to develop my own special abilities.	1	2	3	4
My job requires working very fast.	1	2	3	4
My job requires very hard work.	1	2	3	4
My job requires lots of physical work.	1	2	3	4
I am not asked to do an excessive amount of work.	1	2	3	4
I have enough time to get the job done.	1	2	3	4
I am often required to move or lift very heavy loads on my job.	1	2	3	4
My job requires rapid and continuous physical activity.	1	2	3	4
I am free from conflicting demands that others make.	1	2	3	4
My job requires long periods of intense concentration on the task.	1	2	3	4
My tasks are often interrupted before they can be completed, requiring attention at a later time.	1	2	3	4
My job is very hectic.	1	2	3	4
I am often required to work for long periods with my body in physically awkward positions.	1	2	3	4

	Strongly disagree	Disagree	Agree	Strongly agree
I am required to work for long periods with my head or arms in physically awkward positions.	1	2	3	4
Waiting in work from other people or departments often slows me down on my job.	1	2	3	4

I2. To what extent do you agree with the following statements when working the **Evening Shifts**?

Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My supervisor is concerned about the welfare of those under him/her	1	2	3	4
My supervisor pays attention to what I am saying.	1	2	3	4
I am exposed to hostility or conflict from my supervisor.	1	2	3	4
My supervisor is helpful in getting the job done.	1	2	3	4
My supervisor is successful in getting people to work together	1	2	3	4

I3. To what extent do you agree with the following statements when working the **Evening Shifts**?

Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
People I work with are competent in doing their jobs.	1	2	3	4
People I work with take a personal interest in me.	1	2	3	4
I am exposed to hostility or conflict from the people I work with	1	2	3	4
People I work with are friendly.	1	2	3	4
The people I work with encourage each other to work together	1	2	3	4
People I work with are helpful in getting the job done.	1	2	3	4

Section J

J1. The following questions deal with **how you have felt in general over the past few weeks.** Please circle the most appropriate answer for each question. Remember to concentrate on present and recent complaints, not those that you have had in the distant past.

Have you recently:

Been able to concentrate on what you are doing	Better than usual	Same as usual	Less than usual	Much less than usual
Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less than usual	Much less than usual
Felt capable of making decisions about things?	More so than usual	Same as usual	Less than usual	Much less than usual
Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt you could not overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been able to enjoy your normal day to day activities?	More so than usual	Same as usual	Less than usual	Much less than usual
Been able to face up to your problems?	More so than usual	Same as usual	Less than usual	Much less than usual
Been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling reasonably happy all things considered?	More so than usual	Same as usual	Less than usual	Much less than usual

Section K

K1. Please indicate how frequently you experience the following, by circling the appropriate number:

	Almost never	Quite seldom	Quite often	Almost always
How often is your appetite disturbed?	1	2	3	4
How often do you have to watch what you eat to avoid stomach upsets?	1	2	3	4
How often do you feel nauseous?	1	2	3	4
How often do you suffer from heartburn or stomach-ache?	1	2	3	4
How often do you complain of digestion difficulties?	1	2	3	4
How often do you suffer from bloated stomach or flatulence	1	2	3	4
How often do you suffer from pain in your abdomen	1	2	3	4
How often do you suffer from constipation or diarrhoea?	1	2	3	4
How often do you suffer from heart palpitations?	1	2	3	4
How often do you suffer from aches and pains in your chest?	1	2	3	4
How often do you suffer from dizziness?	1	2	3	4
How often do you suffer from sudden rushes of blood to your head?	1	2	3	4
Do you suffer from shortness of breath when climbing the stairs normally?	1	2	3	4
How often have you been told that you have high blood pressure?	1	2	3	4
Have you ever been aware of your heart beating irregularly?	1	2	3	4
How often do you feel "tight" in your chest?	1	2	3	4
How often do you suffer from minor infectious diseases, e.g. colds, flu, etc.?	1	2	3	4
How often do you suffer from pain in your:				
shoulder and/or neck	1	2	3	4
back and/or lower back	1	2	3	4
arm and/or wrist	1	2	3	4
leg and/or knee	1	2	3	4

	Entirely outside my control	Somewhat outside my control	In between	Somewhat under my control	Entirely under my control
K2. The pacing of the job I do is:	1	2	3	4	5

Section L

L1. The following questions relate to job characteristics of the **NIGHT SHIFT**.
To what extent do the following statements reflect your **Night Shift**?
Complete only if applicable.

	Strongly disagree	Disagree	Agree	Strongly agree
My job requires that I learn new things.	1	2	3	4
My job involves a lot of repetitive work	1	2	3	4
My job requires me to be creative.	1	2	3	4
My job allows me to make a lot of decisions on my own.	1	2	3	4
My job requires a high level of skill.	1	2	3	4
On my job, I have very little freedom to decide how I do my work.	1	2	3	4
I get to do a variety of different things on my job.	1	2	3	4
I have a lot of say about what happens on my job.	1	2	3	4
I have the opportunity to develop my own special abilities.	1	2	3	4
My job requires working very fast.	1	2	3	4
My job requires very hard work.	1	2	3	4
My job requires lots of physical work.	1	2	3	4
I am not asked to do an excessive amount of work.	1	2	3	4
I have enough time to get the job done.	1	2	3	4
I am often required to move or lift very heavy loads on my job.	1	2	3	4
My job requires rapid and continuous physical activity.	1	2	3	4
I am free from conflicting demands that others make.	1	2	3	4
My job requires long periods of intense concentration on the task.	1	2	3	4
My tasks are often interrupted before they can be completed, requiring attention at a later time.	1	2	3	4
My job is very hectic.	1	2	3	4

	Strongly disagree	Disagree	Agree	Strongly agree
I am often required to work for long periods with my body in physically awkward positions.	1	2	3	4
I am required to work for long periods with my head or arms in physically awkward positions.	1	2	3	4
Waiting in work from other people or departments often slows me down on my job.	1	2	3	4

L2. To what extent do you agree with the following statements when working the **Night Shifts**? **Complete only if applicable.**

	Strongly disagree	Disagree	Agree	Strongly agree
My supervisor is concerned about the welfare of those under him/her	1	2	3	4
My supervisor pays attention to what I am saying.	1	2	3	4
I am exposed to hostility or conflict from my supervisor.	1	2	3	4
My supervisor is helpful in getting the job done.	1	2	3	4
My supervisor is successful in getting people to work together	1	2	3	4

L3. To what extent do you agree with the following statements when working the **Night Shifts**? **Complete only if applicable.**

	Strongly disagree	Disagree	Agree	Strongly agree
People I work with are competent in doing their jobs.	1	2	3	4
People I work with take a personal interest in me.	1	2	3	4
I am exposed to hostility or conflict from the people I work with	1	2	3	4
People I work with are friendly.	1	2	3	4
The people I work with encourage each other to work together	1	2	3	4
People I work with are helpful in getting the job done.	1	2	3	4

L4. Please rate your **overall** workload for your job in comparison to the average workload of other people in a similar occupation. *(Regardless of shift.)*

	Extremely light	**Quite Light**	**Average**	**Quite Heavy**	**Extremely heavy**
Physical Workload	1	2	3	4	5
Mental Workload	1	2	3	4	5
Time Pressure	1	2	3	4	5
Emotional Strain	1	2	3	4	5

Additional Comments

Do you have any comments or observations relating to your control and/or demands at work that you would like to bring to my attention?

If so, please describe them here: *(if you need further space, please use other side)*

.....

.....

.....

.....

GENERAL INFORMATION

Some people experience severe health, sleep or emotional problems as a result of working shifts. It is possible that completing this questionnaire may have drawn your attention to problems you experience as a result of shiftwork and/or other factors. If you feel that talking to someone might help with these problems it is strongly advised that you contact your GP. If they cannot help they should be able to put you in contact with someone who can.

Before returning the questionnaire please check that you have:

3. **answered all of the questions**

4. **enclosed your consent form**

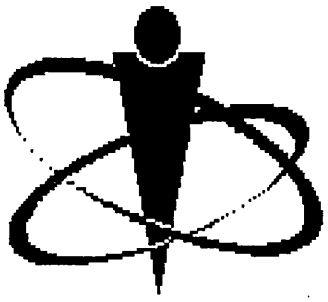
PLEASE DO NOT ALTER ANY OF YOUR ANSWERS.

Thank you for your time and co-operation.

APPENDIX A6

South and Mid-Wales Hospitals – Health and Occupational Study

- Consent form



Health and Occupation

-For Nurses

CONSENT FORM

This form, once signed, will render consent to participate in this study. Information provided will be for the sole purpose of this study. All information provided will be treated in the strictest confidence and will not be disclosed to anyone.

Please enter your details below:

Name: _____

Hospital: _____

Job title: (*i.e. Nurse or Nurse aid*) _____

Date: _____

Signature: _____

To preserve confidentiality you will not be asked to write your name on the questionnaire.

PLEASE RETURN THIS FORM WITH THE QUESTIONNAIRE, WHEN FINISHED, IN THE PRE-PAID ENVELOPE PROVIDED

Lori A. Button - University of Wales, Swansea

APPENDIX A7

South Wales Government Agency – Social Support and Health study

- SSH questionnaire

SOCIAL SUPPORT AND HEALTH STUDY (SSH)

***Please note that any information you provide in the questionnaire will be treated in the strictest confidence and will not be divulged to anyone (including yourself). We do not ask for your name. No business or individuals will be identified in connection with any of the research findings.**

DEMOGRAPHICS

Age_____

Gender o Female o Male

Marital status o Married/living with partner o Single o Separated/ divorced/widowed

Number of dependents? (eg. children) _____

Place of Employment: _____

Position _____

How many hours are you **contracted** to work each week? _____hours _____minutes

How many hours do you **actually** work each week? (including overtime) _____hours _____minutes

SECTION A

A1. In the past month how much have you experienced:

	Not at all	A little	Somewhat	Quite a lot	Very much
Spells of confusion?	1	2	3	4	5
thoughts getting mixed up?	1	2	3	4	5
poor concentration?	1	2	3	4	5
can't easily make decisions?	1	2	3	4	5
poor memory for recent events?	1	2	3	4	5
can't take things in when speaking to people?	1	2	3	4	5
thoughts are slow?	1	2	3	4	5
muzzy head?	1	2	3	4	5

	Not at all	A little	Somewhat	Quite a lot	Very much
can't find the right words?	1	2	3	4	5
having plenty of energy?	1	2	3	4	5
feeling tired most of the time?	1	2	3	4	5
feeling lively?	1	2	3	4	5

A2. Please indicate how frequently you experience the following, by circling the appropriate number:

	Almost never	Quite seldom	Quite often	Almost always
How often is your appetite disturbed?	1	2	3	4
How often do you have to watch what you eat to avoid stomach-aches?	1	2	3	4
How often do you feel nauseous?	1	2	3	4
How often do you suffer from heartburn or stomach-ache?	1	2	3	4
How often do you complain of digestion difficulties?	1	2	3	4
How often do you suffer from bloated stomach or flatulence?	1	2	3	4
How often do you suffer from pain in your abdomen?	1	2	3	4
How often do you suffer from constipation or diarrhoea?	1	2	3	4
How often do you suffer from heart palpitations?	1	2	3	4
How often do you suffer from aches and pains in your chest?	1	2	3	4
How often do you suffer from dizziness?	1	2	3	4
How often do you suffer from sudden rushes of blood to your head?	1	2	3	4
Do you suffer from shortness of breath when climbing the stairs normally?	1	2	3	4
How often have you been told that you have high blood pressure?	1	2	3	4
Have you ever been aware of your heart beating irregularly?	1	2	3	4
How often do you feel "tight" in your chest?	1	2	3	4
How often do you suffer from minor infectious diseases (colds, flu, etc.)?	1	2	3	4
How often do you suffer from pain in your:				
shoulder and/or neck	1	2	3	4
back and/or lower back	1	2	3	4
arm and/or wrist	1	2	3	4
leg and/or knee	1	2	3	4

A3. Please rate your overall workload for your job in comparison to the average workload of other people in a similar occupation.

	Extremely light	Quite Light	Average	Quite Heavy	Extremely heavy
Physical Workload	1	2	3	4	5
Mental Workload	1	2	3	4	5
Time Pressure	1	2	3	4	5
Emotional Strain	1	2	3	4	5

SECTION B

B1. Please indicate the degree to which you **generally** or **typically** experience the following:

	Not at all		Some what		Very much so
I perspire	1	2	3	4	5
My heart beats faster	1	2	3	4	5
I worry too much over something that doesn't really matter	1	2	3	4	5
I feel jittery in my body	1	2	3	4	5
I imagine terrifying scenes	1	2	3	4	5
I get diarrhoea	1	2	3	4	5
I can't keep anxiety provoking images out of my mind	1	2	3	4	5
I feel tense in my stomach	1	2	3	4	5
Some unimportant thought runs through my mind and bothers me	1	2	3	4	5
I nervously pace	1	2	3	4	5
I feel like I am losing out on things because I can't make my mind up soon enough	1	2	3	4	5
I feel physically immobilised	1	2	3	4	5
I can't keep anxiety provoking thoughts out of my mind	1	2	3	4	5
I find it difficult to concentrate because of uncontrollable thoughts	1	2	3	4	5

B2. How steady is your work? o **Regular** o **Seasonal** o **Frequent layoffs** o **Seasonal and frequent layoffs** o **Other**

B3. My job security is good. o **Strongly disagree** o **Disagree** o **Agree** o **Strongly agree**

B4. During the past year, how often were you in a situation where you faced job loss or layoff?

o Never	o Faced with possibility once	o Faced with the possibility more than once	o Constantly	o Actually layed off

B5. How likely is it that during the next couple years will you lose your present job?

o Not at all likely	o Not too likely	o Somewhat likely	o Very likely	o Not at all likely

B6. The pacing of the job I do is...

o Entirely outside my control	o Somewhat outside my control	o In between	o Somewhat under my control	o Entirely under my control

SECTION C

C1. Please circle the most appropriate answer for each question.

	Not at all true	Rarely true	Moderately true	Exactly true
When I am down, I need someone who will boost my spirits.	1	2	3	4
It is important for me always to have someone who listens to me.	1	2	3	4
Before making any important decisions, I absolutely need a second opinion.	1	2	3	4
I get along best without any outside help.	1	2	3	4
In critical situations, I prefer to ask others for their advice.	1	2	3	4
Whenever I am down, I look for someone to cheer me up.	1	2	3	4
When I am down, I reach out to someone to talk to.	1	2	3	4
If I do not know how to handle a situation I ask others what they would do.	1	2	3	4
Whenever I need help, I ask for it.	1	2	3	4
In critical situations, others prefer to ask me for my advice.	1	2	3	4
Whenever others are down, they look to me to cheer them up.	1	2	3	4

	Not at all true	Rarely true	Moderately true	Exactly true
When others are down, they reach out to me to talk to.	1	2	3	4
If others do not know how to handle a situation they ask me what I would do	1	2	3	4
When others need help, they ask me.	1	2	3	4

C2. The following questions deal with how you have **felt in general over the past few weeks.** Please circle the most appropriate answer for each question. Remember to concentrate on present and recent complaints, not those that you have had in the distant past.

Have you recently:				
been able to concentrate on what you are doing?	o Better than usual	o Same as usual	o Less than usual	o Much less than usual
lost much sleep over worry?	o Not at all	o No more than usual	o Rather more than usual	o Much more than usual
felt that you are playing a useful part in things?	o More so than usual	o Same as usual	o Less than usual	o Much less than usual
felt capable of making decisions about things?	o More so than	o Same as usual	o Less than usual	o Much less than usual
felt constantly under strain?	o Not at all	o No more than usual	o Rather more than usual	o Much more than usual
felt you could not overcome your difficulties?	o Not at all	o No more than usual	o Rather more than usual	o Much more than usual
been able to enjoy your normal day to day activities?	o Not at all	o Same as usual	o Less than usual	o Much less than usual
been able to face up to your problems?	o More so than usual	o Same as usual	o Less than usual	o Much less than usual
been feeling unhappy and depressed?	o Not at all	o No more than usual	o Rather more than usual	o Much more than usual
been losing confidence in yourself?	o Not at all	o No more than usual	o Rather more than usual	o Much more than usual
been thinking of yourself as a worthless person?	o Not at all	o No more than usual	o Rather more than usual	o Much more than usual
been feeling reasonably happy all things considered?	o More so than usual	o Same as usual	o Less than usual	o Much less than usual

SECTION D (Final section)

D1. The following items relate to the people who provide you with help or support. **Each question has two parts.** For the first part list all people you know, excluding yourself, whom you can count on for help and support in the manner described. Please give the person's initials or nickname. **If is a family member, please state their relationship to you.**

For the second part, circle how satisfied you are with the overall support. If you have no support simply state 'no-one', but still rate your level of satisfaction. Do not list more than nine persons per question. ***All responses will be kept confidential.***

1.Whom can you count on when you want to 'unwind'?

Co-workers (at work)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Family (State relationship)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Friends (not co-workers)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Co-workers (outside of work)	a)	b)	c)	d)
e)	f)	g)	h)	i)

How satisfied are you with this co-worker support at work? **Very satisfied 1 2 3 4 5 6 Very dissatisfied**

How satisfied are you with this support outside of work from your family? **Very satisfied 1 2 3 4 5 6 Very dissatisfied**

How satisfied are you with this support outside of work from your friends (excluding co-workers)? **Very satisfied 1 2 3 4 5 6 Very dissatisfied**

How satisfied are you with this support outside of work from co-workers? **Very satisfied 1 2 3 4 5 6 Very dissatisfied**

2.Whom can you count on when you want to discuss your general problems or ideas?

Co-workers (in work)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Family (State relationship)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Friends (not co-workers)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Co-workers (outside of work)	a)	b)	c)	d)
e)	f)	g)	h)	i)

How satisfied are you with this co-worker support at work?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**
How satisfied are you with this support outside of work from your family?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**
How satisfied are you with this support outside of work from your friends (excluding co-workers)?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**
How satisfied are you with this support outside of work from co-workers?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**

3.Whom can you count on when you need someone to discuss more personal problems and an open and intimate manner?

Co-workers (in work)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Family (State relationship)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Friends (not co-workers)	a)	b)	c)	d)
e)	f)	g)	h)	i)

Co-workers (outside of work)	a)	b)	c)	d)
e)	f)	g)	h)	i)

How satisfied are you with this co-worker support at work?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**
How satisfied are you with this support outside of work from your family?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**
How satisfied are you with this support outside of work from your friends (excluding co-workers)?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**
How satisfied are you with this support outside of work from co-workers?	**Very satisfied**	**1**	**2**	**3**	**4**	**5**	**6**	**Very dissatisfied**

- E N D O F Q U E S T I O N N A I R E -

THANK YOU FOR YOUR TIME AND CO-OPERATION

Ms. Lori A. Button

Department of Psychology

PRIFYSGOL CYMRU ABERTAWE
UNIVERSITY OF WALES SWANSEA

APPENDIX A8

South Wales Government Agency – Social Support and Health study

- Consent form

Social Support and Health Study

CONSENT FORM

This form, once signed, will render consent to participate in this study. Information provided will be for the sole purpose of this study. All information provided will be treated in the strictest confidence and will not be disclosed to anyone.

Please enter your details below:

Name (print): _____

Employer: _____

Position: _____

Date: _____

Signature: _____

To preserve confidentiality you will not be asked to write your name on the questionnaire.

PLEASE RETURN THIS FORM WITH THE QUESTIONNAIRE, WHEN FINISHED, IN THE PRE-PAID ENVELOPE PROVIDED

Lori A. Button - University of Wales, Swansea
Department of Psychology

APPENDIX B

	N	Mean	Std. Deviation
Age	162	42.01	9.61
Number of dependents	164	1.15	1.13
Hours worked per week	163	48.86	7.50
Hours contracted per week	166	37.71	3.86
Control of job pacing	166	2.81	1.20
Physical health	142	-1.93E-02	1.00
Preference of production line	154	3.19	1.37
Psychological health	142	-1.57E-02	.998
Workload stress	135	1.48E-02	.96
Time stress	135	-9.84E-02	.89
Chronic mental fatigue	155	24.68	6.72
Cognitive anxiety	164	11.79	5.42
Disengagement coping	158	10.04	3.91
Engagement coping	158	15.27	2.69
General health	164	22.89	4.28
General job satisfaction	161	3.71	.75
Cardiovascular health	165	11.01	3.50
Gastrointestinal health	161	14.36	4.40
Minor infections	166	1.98	.66
Joint pain	161	8.86	2.83
Somatic anxiety	163	11.92	4.10
Social support quantity	153	14.52	11.01
Social support quality	131	11.11	6.65
Evening workload	144	3.29	.60
Morning workload	164	3.34	.71
Night workload	151	3.27	.65

TABLE B1. ALL PRODUCTION LINE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender	Male	165	99.4	100.0
	Total	166	100.0	
Marital Status	Married/living with partner	140	84.3	90.4
	Single	8	4.8	95.2
	Separated/Divorce/Widow	8	4.8	100.0
	Total	166	100	100

TABLE B2. ALL PRODUCTION LINE FREQUENCIES

Lean production line	N	Mean	Std. Deviation
Age	41	37.44	7.74
Number of dependents	41	1.29	1.10
Hours worked per week	40	54.50	7.54
Hours contracted per week	41	37.83	5.38
Control of job pacing	41	2.61	1.09
Physical health	34	-.27	.74
Preference of production line	40	3.75	1.15
Psychological health	34	-.69	.54
Workload stress	27	-3.13E-02	.85
Time stress	27	.67	.79
Chronic mental fatigue	38	20.89	4.34
Cognitive anxiety	41	9.59	3.77
Disengagement coping	40	9.25	4.29
Engagement coping	40	15.33	2.78
General health	40	20.53	3.15
General job satisfaction	41	3.92	.62
Cardiovascular health	41	10.02	3.03
Gastrointestinal health	41	12.61	4.01
Minor infections	41	2.00	.59
Joint pain	39	7.59	2.42
Somatic anxiety	40	9.78	2.78
Social support quantity	38	21.76	14.19
Social support quality	35	9.74	6.42
Evening workload	32	3.25	.51
Morning workload	41	3.29	.64
Night workload	34	3.29	.52

TABLE B3. LEAN PRODUCTION LINE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender				
	Male	41	100.0	100.0
	Total	41	100.0	
Marital Status				
	Married/living with partner	36	87.8	90.2
	Single	2	4.9	95.1
	Separated/Divorce/Widow	2	4.9	100.0
	Total	41		

TABLE B4. LEAN PRODUCTION LINE FREQUENCIES

Traditional production line	N	Mean	Std. Deviation
Age	121	43.55	9.72
Number of dependents	123	1.10	1.14
Hours worked per week	123	47.02	6.55
Hours contracted per week	125	37.67	3.23
Control of job pacing	125	2.88	1.23
Physical health	108	5.88E-02	1.06
Preference of production line	114	3.00	1.39
Psychological health	108	.20	1.02
Workload stress	108	2.63E-02	.98
Time stress	108	-.29	.82
Chronic mental fatigue	117	25.91	6.91
Cognitive anxiety	123	12.53	5.69
Disengagement coping	118	10.31	3.75
Engagement coping	118	15.25	2.68
General health	124	23.65	4.32
General job satisfaction	120	3.64	.78
Cardiovascular health	124	11.34	3.59
Gastrointestinal health	120	14.96	4.39
Minor infections	125	1.98	.68
Joint pain	122	9.26	2.85
Somatic anxiety	123	12.62	4.22
Social support quantity	115	12.13	8.55
Social support quality	96	11.61	6.70
Evening workload	112	3.30	.63
Morning workload	123	3.35	.74
Night workload	117	3.26	.69

TABLE B5. TRADITIONAL PRODUCTION LINE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender				
	Male	124	99.2	100.0
	Total	125		
Marital Status				
	Married/living with partner	104	83.2	90.4
	Single	6	4.8	95.2
	Separated/Divorce/Widow	6	4.8	100.0
	Total	125		

TABLE B6. TRADITIONAL PRODUCTION LINE FREQUENCIES

	N	Mean	Std. Deviation
Age	287	37.83	8.81
Number of dependents	283	1.07	1.17
Hours worked per week	276	35.82	7.25
Hours contracted per week	289	33.10	6.75
Annual income	255	17775.30	4739.01
JCQ social support	151	34.43	6.27
Cognitive anxiety	285	14.33	5.91
Disengagement coping	269	10.61	3.49
Engagement coping	267	16.35	2.76
Chronic mental fatigue	279	24.56	6.50
General job satisfaction	287	4.25	1.07
General health	275	24.92	5.73
Joint Pain	276	7.91	2.83
Minor infections	285	1.83	.74
Cardiovascular health	279	11.62	3.77
Gastrointestinal health	283	14.71	5.18
Somatic anxiety	285	15.14	4.68
Social support quality	257	11.48	6.50
Social support quantity	277	21.01	11.44
Control of job pace	284	2.55	1.05
Physical health	247	1.47E-02	1.01
Psychological health	247	3.94E-02	1.015
Stress buffer: coping strategy	125	-2.22E-02	.92
Stress buffer: social support	125	1.97E-02	1.03
Job insecurity	285	-.72	1.37
Time stress	212	7.99E-02	.91
Job stress	212	1.19E-02	.99
Emotional workload	263	4.09	.79
Mental workload	264	4.10	.68
Physical workload	265	3.60	.85
Time pressure	264	4.04	.82

TABLE B7. NURSE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender	Female	267	92.1	94.5
	Male	16	5.5	100.0
	Total	290	100.0	
Ethic background	White	285	98.3	99.0
	Non-white	3	1.0	100.0
	Total	290		
Marital Status	Married/living with partner	208	71.7	71.7
	Single	44	15.2	86.9
	Separated/Divorce/Widow	38	13.1	100.0
	Total	290		

TABLE B8. ALL NURSE FREQUENCIES

	N	Mean	Std. Deviation
Age	9	36.67	11.67
Number of dependents	9	1.11	1.27
Hours worked per week	9	35.42	7.95
Hours contracted per week	9	32.94	6.49
Annual income	9	10068.56	1340.02
JCQ social support	7	32.29	1.92
Cognitive anxiety	9	15.56	6.89
Disengagement coping	8	13.25	3.06
Engagement coping	8	16.87	1.64
Chronic mental fatigue	9	27.67	6.76
General job satisfaction	9	5.02	.78
General health	9	25.33	5.87
Joint pain	8	8.38	2.56
Minor infections	9	2.22	.44
Cardiovascular health	9	11.56	2.13
Gastrointestinal health	9	16.56	4.42
Somatic anxiety	9	16.78	4.02
Social support quality	9	12.22	9.82
Social support quantity	9	19.22	10.84
Control of job pacing	9	2.33	.87
Physical health	8	.40	.75
Psychological health	8	.35	.85
Stress buffer: coping strategy	6	.46	.57
Stress buffer: social support	6	5.28E-03	1.10
Job insecurity	9	-.33	.87
Time stress	8	-.56	.86
Job stress	8	-.43	1.01
Emotional workload	9	3.78	1.09
Mental workload	9	3.67	.71
Physical workload	9	3.78	.83
Time pressure	9	3.78	.67

TABLE B9. AUXILIARY NURSE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender	Female	8	88.9	88.9
	Male	1	11.1	100.0
	Total	9	100.0	
Ethnic Origin	White	8	88.9	88.9
	Non-white	1	11.1	100.0
	Total	9	100.0	
Marital Status	Married/living with partner	6	66.7	66.7
	Separated/Divorce/Widow	3	33.3	100.0
	Total	9	100.0	

TABLE B10. AUXILIARY NURSE FREQUENCIES

	N	Mean	Std. Deviation
Age	221	37.42	8.84
Number of dependents	218	1.06	1.18
Hours worked per week	211	35.65	7.30
Hours contracted per week	223	32.90	6.94
Annual income	196	17226.56	4405.79
JCQ Social Support	118	34.77	6.44
Cognitive Anxiety	219	14.17	5.77
Disengagement coping	209	10.44	3.50
Engagement coping	207	16.29	2.89
Chronic mental fatigue	216	24.50	6.54
General Job Satisfaction	222	4.20	1.06
General Health	212	24.72	5.87
Joint Pain	213	7.84	2.79
Minor Infections	219	1.84	.77
Cardiovascular health	213	11.75	3.96
Gastrointestinal health	217	14.71	5.24
Somatic Anxiety	220	15.11	4.58
Social Support Quality	197	11.26	6.25
Social Support Quantity	212	21.31	11.65
Pacing of the Job- Control	218	2.55	1.02
Physical health	190	2.51E-02	1.03
Psychological health	190	2.25E-02	1.04
Stress buffer: coping strategy	97	-.11	.93
Stress buffer: social support	97	7.01E-02	1.03
Job Insecurity	220	-.68	1.47
Stress: Time	160	1.40E-02	.91
Stress: Job characteristics	160	-1.47E-02	1.01
Emotional Workload	204	4.06	.79
Mental Workload	204	4.10	.68
Physical Workload	205	3.62	.85
Time Pressure	204	4.04	.82

TABLE B11. STAFF NURSE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender	Female	204	91.1	93.3
	Male	15	6.7	100.0
	Total	224	100.0	
Ethnic Origin	White	221	98.7	99.6
	Non-white	1	.4	100.0
	Total	224	100.0	
Marital Status	Married/living with partner	162	72.3	72.3
	Single	35	15.6	87.9
	Separated/Divorce/Widow	27	12.1	100.0
	Total	224	100.0	

TABLE B12. STAFF NURSE FREQUENCIES

	N	Mean	Std. Deviation
Age	16	39.38	6.99
Number of dependents	16	1.31	1.08
Hours worked per week	16	41.78	4.08
Hours contracted per week	16	37.50	.0000
Annual income	15	23626.80	1193.53
JCQ social support	5	33.87	4.05
Cognitive anxiety	16	13.38	6.15
Disengagement coping	14	10.29	3.36
Engagement coping	14	16.71	2.64
Chronic mental fatigue	15	23.73	5.42
General job satisfaction	16	4.70	.94
General health	16	26.06	5.28
Joint pain	16	7.25	3.11
Minor infections	16	1.56	.63
Cardiovascular health	16	9.81	2.37
Gastrointestinal health	16	13.81	5.13
Somatic anxiety	15	13.27	3.94
Social support quality	15	11.40	5.26
Social support quantity	16	19.19	9.67
Control over job pacing	16	2.75	1.00
Physical health	14	-.41	1.10
Psychological health	14	-4.65E-02	.86
Stress buffer: coping strategy	4	.80	1.09
Stress buffer: social support	4	.11	.78
Job insecurity	16	-.81	.98
Time stress	13	.99	.26
Job stress	13	.17	.76
Emotional workload	14	4.29	.47
Mental workload	14	4.14	.53
Physical workload	14	3.36	.93
Time pressure	14	4.29	.73

TABLE B13. WARD SISTER DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender	Female	16	100.0	100.0
Ethnic Origin	White	16	100.0	100.0
Marital Status	Married/living with partner	8	50.0	50.0
	Single	3	18.8	68.8
	Separated/Divorce/Widow	5	31.3	100.0
	Total	16	100.0	

TABLE B14. WARD SISTER FREQUENCIES

	N	Mean	Std. Deviation
Age	18	42.67	8.61
Number of dependents	18	1.44	1.29
Hours worked per week	17	28.65	6.40
Hours contracted per week	18	27.90	6.67
Annual income	13	18948.08	5144.26
JCQ social support	13	30.05	3.25
Cognitive anxiety	18	15.94	6.95
Disengagement coping	18	10.67	3.18
Engagement coping	18	15.61	2.33
Chronic mental fatigue	17	24.18	5.60
General job satisfaction	18	3.91	1.20
General health	18	26.78	4.67
Joint pain	17	9.18	3.00
Minor infections	18	1.94	.64
Cardiovascular health	18	12.67	3.65
Gastrointestinal health	18	14.72	5.54
Somatic anxiety	18	17.39	5.66
Social support quality	17	15.00	7.24
Social support quantity	18	17.61	12.15
Control over job pacing	18	2.33	1.03
Physical health	16	.22	.87
Psychological health	16	.35	.99
Stress buffer: coping strategy	12	.22	.73
Stress buffer: social support	12	-.73	.95
Job insecurity	17	-.65	.93
Time stress	11	-.33	1.05
Job stress	11	.21	1.11
Emotional workload	16	4.19	.66
Mental workload	17	4.24	.75
Physical workload	17	3.35	.70
Time pressure	17	3.88	.93

TABLE B15. MIDWIFE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender	Female	17	94.4	100.0
	Total	18	100.0	
Ethnic Origin	White	17	94.4	94.4
	Non-white	1	5.6	100.0
	Total	18	100.0	
Marital Status	Married/living with partner	16	88.9	88.9
	Single	1	5.6	94.4
	Separated/Divorce/Widow	1	5.6	100.0
	Total	18	100.0	

TABLE B16. MIDWIFE FREQUENCIES

	N	Mean	Std. Deviation
Age	23	37.43	8.02
Number of dependents	22	.64	.95
Hours worked per week	23	38.72	3.20
Hours contracted per week	23	36.19	3.68
Annual income	22	21134.18	3040.37
JCQ social support	8	38.75	7.44
Cognitive anxiety	23	14.74	6.03
Disengagement coping	20	11.60	3.66
Engagement coping	20	17.20	1.88
Chronic mental fatigue	22	24.73	7.50
General job satisfaction	22	4.43	1.09
General health	20	24.25	5.43
Joint pain	22	8.00	2.93
Minor infections	23	1.65	.65
Cardiovascular health	23	10.91	2.92
Gastrointestinal health	23	14.57	4.77
Somatic anxiety	23	14.22	4.94
Social support quality	19	10.26	7.09
Social support quantity	22	22.95	10.41
Control over job pacing	23	2.65	1.40
Physical health	19	-.11	.91
Psychological health	19	-.12	.91
Stress buffer: coping strategy	6	-.22	1.10
Stress buffer: social support	6	.67	.83
Job insecurity	23	-1.30	.82
Time stress	20	.50	.54
Job stress	20	.19	.94
Emotional workload	20	4.25	.91
Mental workload	20	4.10	.64
Physical workload	20	3.75	.85
Time pressure	20	4.10	.79

TABLE B17. SENIOR NURSE DESCRIPTIVE STATISTICS

		Frequency	Percent	Cum. Percent
Gender	Female	22	95.7	100.0
	Total	23	100.0	
Ethnic Origin	White	23	100.0	100.0
Marital Status	Married/living with partner	16	69.6	69.6
	Single	5	21.7	91.3
	Separated/Divorce/Widow	2	8.7	100.0
	Total	23	100.0	

TABLE B18. SENIOR NURSE FREQUENCIES

		N	Mean	Std. Deviation
Psychological health				
Time Stress	Low	61	.25	1.06
	Medium	67	-9.06E-02	1.02
	High	59	2.83E-02	.93
	Total	187	5.80E-02	1.01
Physical health				
Time Stress	Low	61	.15	1.11
	Medium	67	2.54E-02	.93
	High	59	-.11	.94
	Total	187	2.191E-02	.99
Psychological health				
Job stress	Low	59	-6.27E-02	1.08
	Medium	63	8.70E-03	.89
	High	64	.19	1.05
	Total	186	4.92E-02	1.01
Physical health				
Job stress	Low	59	-.142	.81
	Medium	63	-9.72E-03	.941
	High	64	.23	1.12
	Total	186	3.02E-02	.99

TABLE B19. DIFFERENCES IN HEALTH DEPENDING ON STRESS LEVELS FOR NURSES

		df	F	Sig.
Psychological health				
Time Stress	Between Groups	2	1.87	.157
	Within Groups	184		
	Total	186		
Physical health				
Time Stress	Between Groups	2	1.05	.353
	Within Groups	184		
	Total	186		
Psychological health				
Job stress	Between Groups	2	1.06	.347
	Within Groups	183		
	Total	185		
Physical health				
Job stress	Between Groups	2	2.20	.113
	Within Groups	183		
	Total	185		

TABLE B20. DIFFERENCE IN HEALTH DEPENDING ON STRESS LEVELS FOR NURSES

		N	Mean	Std. Deviation
Psychological health				
Workload stress	Low	40	.15	1.16
	Medium	37	-8.62E-03	.73
	High	40	-.14	1.00
	Total	117	-1.17E-04	.99
Physical health				
Workload stress	Low	40	-.25	.86
	Medium	37	-6.28E-04	.97
	High	40	.12	1.08
	Total	117	-4.50E-02	.98
Psychological health				
Time Stress	Low	33	-4.09E-02	.80
	Medium	43	3.81E-02	1.01
	High	41	-7.35E-03	1.11
	Total	117	-1.17E-04	.99
Physical health				
Time Stress	Low	33	-.25	.96
	Medium	43	.36	1.00
	High	41	-.30	.84
	Total	117	-4.50E-02	.98

TABLE B21. DIFFERENCES IN HEALTH DEPENDING ON STRESS LEVELS FOR PRODUCTION LINES

		df	F	Sig.
Workload stress				
Psychological health	Between Groups	2	.91	.41
	Within Groups	114		
	Total	116		
Physical health	Between Groups	2	1.43	.24
	Within Groups	114		
	Total	116		
Time Stress				
Psychological health	Between Groups	2	.06	.94
	Within Groups	114		
	Total	116		
Physical health	Between Groups	2	6.32	.002
	Within Groups	114		
	Total	116		

TABLE B22. DIFFERENCE IN HEALTH DEPENDING ON STRESS LEVELS FOR PRODUCTION LINES

		N	Mean	Std. Deviation
Psychological health	Aux. Nurse	8	.35	.85
	Staff Nurse	190	2.25E-02	1.04
	Ward Sister	14	-4.65E-02	.86
	Midwife	16	.35	.99
	Senior Nurse	19	-.12	.91
	Total	247	3.94E-02	1.01
Physical health	Aux. Nurse	8	.40	.75
	Staff Nurse	190	2.51E-02	1.03
	Ward Sister	14	-.41	1.10
	Midwife	16	.22	.87
	Senior Nurse	19	-.11	.91
	Total	247	1.47E-02	1.01
Time Stress	Aux. Nurse	8	-.56	.86
	Staff Nurse	160	1.40E-02	.91
	Ward Sister	13	.99	.27
	Midwife	11	-.33	1.05
	Senior Nurse	20	.50	.54
	Total	212	8.00E-02	.91
Job Stress	Aux. Nurse	8	-.43	1.01
	Staff Nurse	160	-1.47E-02	1.01
	Ward Sister	13	.17	.76
	Midwife	11	.21	1.11
	Senior Nurse	20	.19	.94
	Total	212	1.19E-02	.99

TABLE B23. DIFFERENCES IN HEALTH AND STRESS DEPENDING ON NURSING GRADES

		df	F	Sig.
Psychological health	Between Groups	4	.721	.579
	Within Groups	242		
	Total	246		
Physical health	Between Groups	4	1.156	.331
	Within Groups	242		
	Total	246		
Time stress	Between Groups	4	6.720	.000
	Within Groups	207		
	Total	211		
Job stress	Between Groups	4	.783	.538
	Within Groups	207		
	Total	211		

TABLE B24. DIFFERENCES IN HEALTH AND STRESS DEPENDING ON NURSING GRADES

		N	Mean	Std. Deviation
Workload stress	Lean	27	-3.13E-02	.85
	Traditional	106	1.56E-02	.98
	Total	133	6.09E-03	.95
Time stress	Lean	27	.67	.80
	Traditional	106	-.29	.82
	Total	133	-9.23E-02	.90
Psychological health	Lean	34	-.69	.54
	Traditional	106	.21	1.02
	Total	140	-7.04E-03	1.00
Physical health	Lean	34	-.27	.74
	Traditional	106	8.09E-02	1.06
	Total	140	-3.64E-03	1.00

TABLE.B25. DIFFERENCES IN HEALTH AND STRESS DEPENDING ON PRODUCTION SYSTEMS

		df	F	Sig.
Workload stress	Between Groups	1	.052	.820
	Within Groups	131		
	Total	132		
Time stress	Between Groups	1	29.22	.000
	Within Groups	131		
	Total	132		
Psychological health	Between Groups	1	24.36	.000
	Within Groups	138		
	Total	139		
Physical health	Between Groups	1	3.14	.078
	Within Groups	138		
	Total	139		

TABLE B26. DIFFERENCES IN HEALTH AND STRESS DEPENDING ON PRODUCTION SYSTEMS

	Time Period	N	Mean	Std. Deviation
Physical workload	1	0	.	.
	2	22	3.05	.79
	3	22	3.09	.61
	Total	44	3.07	.70
Mental workload	1	0	.	.
	2	22	3.18	1.01
	3	22	3.23	.81
	Total	44	3.20	.90
Time pressure	1	0	.	.
	2	22	3.45	.86
	3	22	3.50	.51
	Total	44	3.48	.70
Preference of production line	1	18	2.72	1.23
	2	19	2.63	1.34
	3	19	2.79	1.23
	Total	56	2.71	1.25
Control of job pacing	1	22	2.82	1.40
	2	22	3.00	1.07
	3	22	2.95	1.05
	Total	66	2.92	1.17
Chronic mental fatigue	1	20	27.70	7.97
	2	22	26.50	7.28
	3	22	25.23	7.20
	Total	64	26.44	7.42
Cognitive anxiety	1	22	12.41	5.48
	2	22	11.77	3.69
	3	22	12.64	3.90
	Total	66	12.27	4.38
Somatic anxiety	1	22	12.59	4.75
	2	22	12.00	3.60
	3	22	12.82	4.32
	Total	66	12.47	4.20
General health	1	22	23.86	5.10
	2	22	23.77	3.96
	3	22	23.45	3.86
	Total	66	23.70	4.28
Gastrointestinal health	1	22	15.41	3.76
	2	22	15.55	4.67
	3	22	16.77	5.05
	Total	66	15.91	4.50
Cardiovascular health	1	21	10.62	3.04
	2	22	11.09	2.41
	3	21	11.19	2.73
	Total	64	10.97	2.70
Minor infections	1	22	2.09	.81
	2	22	2.05	.84
	3	22	2.05	.58
	Total	66	2.06	.74
Joint pain	1	21	9.71	2.87
	2	22	9.55	2.77
	3	22	9.59	2.17
	Total	65	9.62	2.58
Hours contracted per week	1	22	37.11	2.13
	2	22	39.82	4.06
	3	22	39.68	4.13
	Total	66	38.87	3.73
Hours worked per week	1	20	49.43	6.70
	2	22	50.77	7.45
	3	22	50.98	7.35
	Total	64	50.42	7.11

TABLE B27. LONGITUDINAL CHANGES IN HEALTH AND STRESS FOR PRODUCTION LINES

		df	F	Sig.
Physical Workload	Between Groups	2	.02	.978
	Within Groups	41		
	Total	43		
Mental Workload	Between Groups	2	.01	.987
	Within Groups	41		
	Total	43		
Time Pressure	Between Groups	2	.02	.978
	Within Groups	41		
	Total	43		
Preference of production line	Between Groups	2	.07	.929
	Within Groups	53		
	Total	55		
Control of job pacing	Between Groups	2	.14	.869
	Within Groups	63		
	Total	65		
Chronic mental fatigue	Between Groups	2	.58	.566
	Within Groups	61		
	Total	63		
Cognitive anxiety	Between Groups	2	.23	.799
	Within Groups	63		
	Total	65		
Somatic Anxiety	Between Groups	2	.22	.805
	Within Groups	63		
	Total	65		
General Health	Between Groups	2	.05	.948
	Within Groups	63		
	Total	65		
Gastrointestinal health	Between Groups	2	.62	.549
	Within Groups	63		
	Total	65		
Cardiovascular health	Between Groups	2	.26	.770
	Within Groups	61		
	Total	63		
Minor infections	Between Groups	2	.03	.974
	Within Groups	63		
	Total	65		
Joint pain	Between Groups	2	.024	.977
	Within Groups	62		
	Total	64		
Hours contracted per week	Between Groups	2	4.022	.023
	Within Groups	63		
	Total	65		
Hours worked per week	Between Groups	2	.284	.754
	Within Groups	61		
	Total	63		

TABLE B28. LONGITUDINAL CHANGES IN HEALTH AND STRESS FOR PRODUCTION LINES

	Time Period	N	Mean	Std. Deviation
Physical workload	2	4	3.00	.82
	3	4	3.25	.50
	Total	8	3.13	.64
Mental workload	2	4	3.00	1.63
	3	4	3.00	.82
	Total	8	3.00	1.20
Time pressure	2	4	3.25	.50
	3	4	3.75	.50
	Total	8	3.50	.53
Preference of production line	1	4	2.75	1.26
	2	4	2.00	.82
	3	4	2.00	.82
	Total	12	2.25	.97
Control of job pacing	1	4	2.75	.50
	2	4	3.50	.58
	3	4	3.75	.50
	Total	12	3.33	.65
Chronic mental fatigue	1	3	18.00	4.00
	2	4	23.00	8.83
	3	4	20.75	5.85
	Total	11	20.82	6.42
Cognitive anxiety	1	4	9.50	2.52
	2	4	10.00	.82
	3	4	11.25	.96
	Total	12	10.25	1.66
Somatic anxiety	1	4	9.00	2.45
	2	4	10.00	2.45
	3	4	10.75	3.86
	Total	12	9.92	2.81
General health	1	4	20.00	2.16
	2	4	22.50	1.73
	3	4	24.00	1.41
	Total	12	22.17	2.37
Gastrointestinal health	1	4	14.75	2.99
	2	4	17.00	4.24
	3	4	14.75	5.12
	Total	12	15.50	3.97
Cardiovascular health	1	4	8.50	1.00
	2	4	9.25	1.50
	3	4	9.25	1.50
	Total	12	9.00	1.28
Minor infections	1	4	2.00	.82
	2	4	2.50	1.00
	3	4	2.00	.82
	Total	12	2.17	.83
Joint pain	1	3	8.33	.58
	2	4	9.00	2.94
	3	4	9.25	3.20
	Total	11	8.91	2.43
Hours contracted per week	1	4	35.00	4.88
	2	4	41.38	4.64
	3	4	41.63	4.64
	Total	12	39.33	5.34
Hours worked per week	1	3	56.67	5.77
	2	4	56.75	4.27
	3	4	53.00	9.56
	Total	11	55.36	6.56

TABLE B29. LONGITUDINAL CHANGES IN HEALTH AND STRESS FOR LEAN PRODUCTION SYSTEM

		df	F	Sig.
Physical workload	Between Groups	2	.11	.90
	Within Groups	5		
	Total	7		
Mental workload	Between Groups	2	.00	1.00
	Within Groups	5		
	Total	7		
Time pressure	Between Groups	2	.83	.49
	Within Groups	5		
	Total	7		
Preference of production line	Between Groups	2	.77	.49
	Within Groups	9		
	Total	11		
Control of job pacing	Between Groups	2	3.91	.06
	Within Groups	9		
	Total	11		
Chronic mental fatigue	Between Groups	2	.47	.64
	Within Groups	8		
	Total	10		
Cognitive anxiety	Between Groups	2	1.23	.34
	Within Groups	9		
	Total	11		
Somatic anxiety	Between Groups	2	.34	.72
	Within Groups	9		
	Total	11		
General health	Between Groups	2	5.07	.034
	Within Groups	9		
	Total	11		
Gastrointestinal health	Between Groups	2	.38	.69
	Within Groups	9		
	Total	11		
Cardiovascular health	Between Groups	2	.41	.68
	Within Groups	9		
	Total	11		
Minor infections	Between Groups	2	.43	.66
	Within Groups	9		
	Total	11		
Joint pain	Between Groups	2	.10	.90
	Within Groups	8		
	Total	10		
Hours contracted per week	Between Groups	2	2.53	.14
	Within Groups	9		
	Total	11		
Hours worked per week	Between Groups	2	.36	.71
	Within Groups	8		
	Total	10		

TABLE B30. LONGITUDINAL CHANGES IN HEALTH AND STRESS FOR LEAN PRODUCTION SYSTEM

	Time Period	N	Mean	Std. Deviation
Physical workload	2	18	3.06	.80
	3	17	3.00	.61
	Total	35	3.03	.71
Mental workload	2	18	3.22	.88
	3	17	3.29	.85
	Total	35	3.26	.85
Time pressure	2	18	3.50	.92
	3	17	3.47	.51
	Total	35	3.49	.74
Preference of production line	1	14	2.71	1.27
	2	15	2.80	1.42
	3	14	2.93	1.27
	Total	43	2.81	1.30
Control of job pacing	1	18	2.83	1.54
	2	18	2.89	1.13
	3	17	2.71	1.05
	Total	53	2.81	1.24
Chronic mental fatigue	1	17	29.41	7.26
	2	18	27.28	6.94
	3	17	26.35	7.42
	Total	52	27.67	7.18
Cognitive anxiety	1	18	13.06	5.80
	2	18	12.17	3.97
	3	17	12.94	4.38
	Total	53	12.72	4.71
Somatic anxiety	1	18	13.39	4.80
	2	18	12.44	3.71
	3	17	13.00	4.34
	Total	53	12.94	4.24
General health	1	18	24.72	5.20
	2	18	24.06	4.29
	3	17	23.18	4.32
	Total	53	24.00	4.58
Gastrointestinal health	1	18	15.56	3.97
	2	18	15.22	4.81
	3	17	16.82	4.93
	Total	53	15.85	4.55
Cardiovascular health	1	17	11.12	3.16
	2	18	11.50	2.41
	3	16	11.38	2.63
	Total	51	11.33	2.70
Minor infections	1	18	2.11	.83
	2	18	1.94	.80
	3	17	2.00	.50
	Total	53	2.02	.72
Joint pain	1	18	9.94	3.04
	2	18	9.67	2.81
	3	17	9.53	1.97
	Total	53	9.72	2.61
Hours contracted per week	1	18	37.58	.35
	2	18	39.47	3.98
	3	17	39.35	4.13
	Total	53	38.79	3.35
Hours worked per week	1	17	48.15	6.13
	2	18	49.44	7.42
	3	17	50.94	7.02
	Total	52	49.51	6.85

TABLE B31. LONGITUDINAL CHANGES IN HEALTH AND STRESS FOR TRADITIONAL PRODUCTION SYSTEM

		df	F	Sig.
Physical workload	Between Groups	2	.03	.975
	Within Groups	32		
	Total	34		
Mental workload	Between Groups	2	.03	.971
	Within Groups	32		
	Total	34		
Time pressure	Between Groups	2	.01	.994
	Within Groups	32		
	Total	34		
Preference of production line	Between Groups	2	.09	.912
	Within Groups	40		
	Total	42		
Control of job pacing	Between Groups	2	.10	.909
	Within Groups	50		
	Total	52		
Chronic mental fatigue	Between Groups	2	.81	.452
	Within Groups	49		
	Total	51		
Cognitive anxiety	Between Groups	2	.18	.834
	Within Groups	50		
	Total	52		
Somatic anxiety	Between Groups	2	.22	.805
	Within Groups	50		
	Total	52		
General health	Between Groups	2	.49	.616
	Within Groups	50		
	Total	52		
Gastrointestinal health	Between Groups	2	.59	.558
	Within Groups	50		
	Total	52		
Cardiovascular health	Between Groups	2	.09	.916
	Within Groups	48		
	Total	50		
Minor infections	Between Groups	2	.24	.786
	Within Groups	50		
	Total	52		
Joint pain	Between Groups	2	.11	.895
	Within Groups	50		
	Total	52		
Hours contracted per week	Between Groups	2	1.84	.170
	Within Groups	50		
	Total	52		
Hours worked per week	Between Groups	2	.70	.501
	Within Groups	49		
	Total	51		

TABLE B32. LONGITUDINAL CHANGES IN HEALTH AND STRESS DESRIPTIVES FOR TRADITIONAL PRODUCTION SYSTEM

APPENDIX C

Variable	N	Mean	Std. Deviation
Age	59	37.44	10.52
Number of dependents	55	.82	1.06
Job - grade	16	15.34	18.11
Hours contracted per week	58	38.22	2.17
Hours worked per week	59	40.95	3.29
Relax amount of support from co-work at work	59	3.93	2.87
Relax amount of support from	59	3.39	2.21
Relax amount of support from friends	59	3.63	2.91
Relax amount of support from co-work outside work	59	1.39	2.25
Relax quality of support from co-work at work	55	2.33	1.39
Relax quality of support from family	57	2.00	1.35
Relax quality of support from friends	54	2.02	1.31
Relax quality of support from co-work outside work	48	3.06	1.71
General amount of support from co-work at work	59	2.81	2.30
General amount of support from family	59	2.63	1.89
General amount of support from friends	59	2.68	2.59
General amount of support from co-work outside work	59	1.05	1.67
General quality of support from co-work at work	50	2.24	1.44
General quality of support from family	54	1.85	1.17
General quality of support from friends	49	1.96	1.29
General quality of support from co-work outside work	41	2.98	1.73
Intimate amount of support from co-work at work	59	1.47	1.46
Intimate amount of support from family	59	1.80	1.69
Intimate amount of support from friends	59	1.98	2.15
Intimate amount of support from co-work outside work	59	.63	1.47
Intimate quality of support from co-work at work	48	2.37	1.59
Intimate quality of support from family	53	1.79	1.18
Intimate quality of support from friends	48	2.00	1.35
Intimate quality of support from co-work outside work	40	2.78	1.75
Social support need	59	9.19	2.36
Social support seek	59	13.00	2.97
Social support provision	58	13.81	2.59
Social support quantity -all	59	27.39	18.99
Social support quality- all	38	28.48	15.05
Relax support: quantity	59	12.34	8.66
Relax support: quality	48	9.52	4.82
General support: quantity	59	9.17	6.69
General support: quality	39	9.21	4.79
Intimate support: quantity	59	5.88	5.34
Intimate support: quality	40	9.23	5.35
Job stress	56	.049	1.09
Time stress	56	.34	.37
Co-worker support at work quality	47	6.98	4.20
Co-worker support at work quantity	59	8.23	5.73
Friend support quality	47	6.02	3.59
Friends support quantity	59	8.29	7.06
Co-worker support outside work -quality	38	8.89	4.95
Co-worker support outside work -quantity	59	3.92	4.46
Family support quality	52	5.65	3.60
Family support quantity	59	7.81	5.17
Chronic mental fatigue	58	16.38	5.06
Cognitive anxiety	57	12.67	3.67
Somatic anxiety	58	12.17	3.53
General health	55	24.73	5.47
Cardiovascular health	59	10.72	2.44
Gastrointestinal	59	13.42	4.484
Joint pain	59	7.39	2.58
Minor infection	59	1.66	.63

TABLE C1. DESCRIPTIVE STATISTICS OF PARTICIPANTS

		Frequency	Percent	Cum. Percent
Gender	Female	34	57.6	57.6
	Male	25	42.4	100.0
	Total	59	100.0	
Marital status	Single	20	33.9	33.9
	Married/living with partner	32	54.2	88.1
	Separated/divorced/widow	7	11.9	100.0
	Total	59	100.0	
Job position	Unknown	35	59.3	59.3
	Personnel assistant	10	16.9	76.3
	Personnel training officer	3	5.1	81.4
	Health and safety assistant	1	1.7	83.1
	Principal officer	2	3.4	86.4
	Manager	1	1.7	88.1
	Receptionist/clerical assistant	1	1.7	89.8
	Administration assistant	2	3.4	93.2
	Researcher	4	6.8	100.0
	Total	59	100.0	

TABLE C2. PARTICIPANTS' FREQUENCIES

		Differences		t	df	Sig. (2-tailed)
		Mean	Std. Deviation			
Pair 1	Relax quantity General quantity	3.17	5.33	4.57	58	.000
Pair 2	Relax quantity Intimate quantity	6.46	6.37	7.79	58	.000
Pair 3	General quantity Intimate quantity	3.29	3.94	6.42	58	.000
Pair 4	Relax quality General quality	.615	1.97	1.95	38	.058
Pair 5	Relax quality Intimate quality	.410	2.20	1.17	38	.251
Pair 6	General quality Intimate quality	-.11	1.72	-.38	37	.708

TABLE C3. DIFFERENCES THE AMOUNT OF QUALITY OF SUPPORT DEPENDING ON DIFFERENT SITUATIONS

		Paired Differences		t	df	Sig. (2-tailed)
		Mean	Std. Deviation			
Pair 1	Co-worker at work quantity Friends quantity	-.07	5.30	-.10	58	.92
Pair 2	Co-worker at work quantity Co-worker outside work quantity	4.31	3.99	8.29	58	.000
Pair 3	Co-worker at work quantity Family quantity	.41	5.11	.61	58	.54
Pair 4	Friends quantity Co-worker outside work quantity	4.38	5.41	6.21	58	.000
Pair 5	Friends quantity Family quantity	.47	6.04	.60	58	.55
Pair 6	Co-worker outside work quantity Family quantity	-3.90	4.47	-6.70	58	.000
Pair 7	Co-worker at work quality Friend quality	.96	2.56	2.56	46	.014
Pair 8	Co-worker at work quality Co-worker outside work quality	-1.55	3.21	-2.98	37	.005
Pair 9	Co-worker at work quality Family quality	1.11	3.20	2.37	46	.022
Pair 10	Friend quality Co-worker outside work quality	-2.66	3.55	-4.61	37	.000
Pair 11	Friend quality Family quality	.15	2.22	.461	46	.647
Pair 12	Co-worker outside work quality Family quality	2.95	4.43	4.10	37	.000

TABLE C4. DIFFERENCES IN THE AMOUNT AND QUALITY OF SUPPORT DEPENDING ON SOURCE OF SUPPORT

		Paired Differences		t	df	Sig. (2-tailed)
		Mean	Std. Deviation			
Pair 1	Co-worker at work quantity Family quantity	.54	2.24	1.86	58	.07
Pair 2	Co-work at work quantity Friend quantity	.31	2.10	1.11	58	.27
Pair 3	Co-worker at work quantity Co-worker outside work quantity	2.54	2.16	9.04	58	.000
Pair 4	Family quantity Friend quantity	-.24	2.48	-.74	58	.465
Pair 5	Family quantity Co-worker outside work quantity	2.00	2.32	6.62	58	.000
Pair 6	Friend quantity Co-worker outside work quantity	2.24	2.45	7.01	58	.000
Pair 7	Co-worker at work quality Family quality	.29	1.15	1.88	54	.066
Pair 8	Co-worker at work quality Friend quality	.26	1.12	1.70	53	.095
Pair 9	Co-worker at work quality Co-worker outside work quality	-.73	1.46	-3.47	47	.001
Pair 10	Family quality Friend quality	-.02	1.39	-.09	53	.923
Pair 11	Family quality Co-worker outside work quality	-1.02	1.59	-4.45	47	.000
Pair 12	Friend quality Co-worker outside work quality	-.98	1.41	-4.82	47	.000

TABLE C5. DIFFERENCES IN THE AMOUNT AND QUALITY OF SUPPORT DEPENDING ON THE SOURCE OF SUPPORT IN TIMES OF RELAXATION

		Paired Differences		t	df	Sig. (2-tailed)
		Mean	Std. Deviation			
Pair 1	Co-worker at work quantity Family quantity	.19	2.34	.61	58	.54
Pair 2	Co-worker at work quantity Friend quantity	.14	2.15	.49	58	.63
Pair 3	Co-worker at work quantity Co-work outside work quantity	1.76	2.30	5.89	58	.000
Pair 4	Family quantity Friend quantity	-.05	2.36	-.17	58	.87
Pair 5	Family quantity Co-worker outside work quantity	1.58	1.77	6.83	58	.000
Pair 6	Friend quantity Co-worker outside work quantity	1.63	2.20	5.67	58	.000
Pair 7	Co-worker at work quality Family quality	.34	1.24	1.94	49	.06
Pair 8	Co-worker at work quality Friend quality	.29	1.21	1.66	48	.10
Pair 9	Co-worker at work quality Co-worker outside work quality	-.57	1.32	-2.76	39	.009
Pair 10	Family quality Friend quality	-.04	1.15	-.25	48	.81
Pair 11	Family quality Co-worker outside work quality	-1.05	1.63	-4.13	40	.000
Pair 12	Friend quality Co-worker outside work quality	-.92	1.42	-4.06	38	.000

TABLE C6. DIFFERENCES IN THE AMOUNT AND QUALITY OF SUPPORT DEPENDING ON THE SOURCE OF SUPPORT FOR GENERAL CONVERSATIONS

		Paired Differences		t	df	Sig. (2-tailed)
		Mean	Std. Deviation			
Pair 1	Co-worker at work quantity Family quantity	-.32	1.58	-1.56	58	.123
Pair 2	Co-worker at work quantity Friend quantity	-.51	1.84	-2.12	58	.038
Pair 3	Co-worker at work quantity Co-worker outside work quantity	.85	1.52	4.29	58	.000
Pair 4	Family quantity Friend quantity	-.19	2.06	-.694	58	.490
Pair 5	Family quantity Co-worker outside work quantity	1.17	1.59	5.66	58	.000
Pair 6	Friend quantity Co-worker outside work quantity	1.36	1.89	5.51	58	.000
Pair 7	Co-worker at work quality Family quality	.52	1.30	2.77	47	.008
Pair 8	Co-worker at work quality Friend quality	.38	1.00	2.59	47	.013
Pair 9	Co-worker at work quality Co-worker outside work quality	-.32	1.02	-2.01	39	.051
Pair 10	Family quality Friend quality	-.15	1.15	-.88	47	.383
Pair 11	Family quality Co-worker outside work quality	-.88	1.60	-3.45	39	.001
Pair 12	Friend quality Co-worker outside work quality	-.67	1.30	-3.31	39	.002

TABLE C7. DIFFERENCES IN THE AMOUNT AND QUALITY OF SUPPORT DEPENDING ON THE SOURCE OF SUPPORT FOR INTIMATE DISCUSSIONS

Source	Dependent variable	df	F	Sig.
Relax Support	Chronic mental fatigue	1	2.03	.16
Quantity	Cognitive Anxiety	1	2.01	.16
Job Stress	Somatic Anxiety	1	.04	.84
	General Health	1	.05	.82
	Cardiovascular health	1	.002	.97
	Gastrointestinal health	1	.15	.70
	Joint Pain	1	2.85	.10
	Minor Infection	1	2.21	.14
	Chronic mental fatigue	1	2.74	.10
Time Stress	Cognitive Anxiety	1	4.89	**.032**
	Somatic Anxiety	1	.005	.94
	General Health	1	2.64	.11
	Cardiovascular health	1	2.47	.12
	Gastrointestinal health	1	1.35	.25
	Joint Pain	1	.89	.35
	Minor Infection	1	2.44	.13
Relax Support	Chronic mental fatigue	1	2.37	.13
Quality	Cognitive Anxiety	1	5.28	**.03**
Job Stress	Somatic Anxiety	1	1.37	.25
	General Health	1	.37	.55
	Cardiovascular health	1	1.32	.26
	Gastrointestinal health	1	1.55	.22
	Joint Pain	1	.87	.36
	Minor Infection	1	2.10	.16
	Chronic mental fatigue	1	.57	.46
Time Stress	Cognitive Anxiety	1	3.71	.06
	Somatic Anxiety	1	.18	.68
	General Health	1	1.15	.29
	Cardiovascular health	1	.009	.93
	Gastrointestinal health	1	.50	.48
	Joint Pain	1	.003	.95
	Minor Infection	1	1.44	.24

TABLE C8. TWO-WAY ANOVAS FOR INTERACTIVE EFFECT OF RELAX SUPPORT AND STRESS ON HEALTH

Cognitive Anxiety

Relax support quantity		N	Mean	Std. Deviation
Low amount	Low	10	15.3000	3.49762
	High	17	12.0588	4.08458
	Total	27	13.2593	4.12863
High amount	Low	14	12.1429	3.82013
	High	15	13.2667	4.07898
	Total	29	12.7241	3.92698

TABLE C9. DIFFERENCES IN COGNITIVE ANXIETY DEPENDING ON TIME STRESS LEVELS AND QUALITY OF SUPPORT IN RELAXED SITUATIONS

Cognitive Anxiety

Relax support quantity		df	F	Sig.
Low amount	Between Groups	1	4.386	.047
	Within Groups	25		
	Total	26		
High amount	Between Groups	1	.584	.451
	Within Groups	27		
	Total	28		

TABLE C10. DIFFERENCES IN COGNITIVE ANXIETY DEPENDING ON TIME STRESS LEVELS AND QUALITY OF SUPPORT IN RELAXED SITUATIONS

Cognitive Anxiety

Relax support		N	Mean	Std. Deviation
High quality	Low	12	11.0833	3.57919
	High	12	14.6667	4.45856
	Total	24	12.8750	4.35703
Low quality	Low	9	14.4444	4.92725
	High	11	12.4545	3.77793
	Total	20	13.3500	4.33195

TABLE C11. DIFFERENCES IN COGNITIVE ANXIETY DEPENDING ON JOB STRESS LEVELS AND AMOUNT OF SUPPORT IN RELAXED SITUATIONS

Cognitive Anxiety

Relax support quality		df	F	Sig.
High quality	Between Groups	1	4.714	.041
	Within Groups	22		
	Total	23		
Low quality	Between Groups	1	1.047	.320
	Within Groups	18		
	Total	19		

TABLE C12. DIFFERENCES IN COGNITIVE ANXIETY DEPENDING ON JOB STRESS LEVELS AND AMOUNT OF SUPPORT IN RELAXED SITUATIONS

Stress Levels	Relax Support	N	Mean	Std. Deviation
Time Stress				
Low stress	Low quantity	10	15.30	3.50
	High quantity	14	12.14	3.82
	Total	24	13.46	3.95
High stress	Low quantity	17	12.06	4.08
	High quantity	15	13.27	4.08
	Total	32	12.63	4.06
Job Stress				
Low stress	High quality	12	13.50	5.02
	Low quality	14	11.21	3.07
	Total	26	12.27	4.16
High stress	High quality	15	13.07	3.43
	Low quality	14	14.07	4.36
	Total	29	13.56	3.87

TABLE C13. DESCRIPTIVE FOR COGNITIVE ANXIETY LEVELS DEPENDING ON AMOUNT AND QUALITY OF SUPPORT AND TIME STRESS IN RELAXED SITUATIONS

Stress Levels		df	Mean Square	F	Sig.
Time Stress					
Low stress	Between Groups	1	58.14	.75	.55
	Within Groups	22	13.63		
	Total	23			
High stress	Between Groups	1	11.63	.70	.41
	Within Groups	30	16.66		
	Total	31			
Job Stress					
Low stress	Between Groups	1	33.76	2.03	.17
	Within Groups	24	16.64		
	Total	25			
High stress	Between Groups	1	7.31	.47	.50
	Within Groups	27	15.25		
	Total	28			

TABLE C14. DIFFERENCES IN COGNITIVE ANXIETY LEVELS DEPENDING ON AMOUNT AND QUALITY OF SUPPORT AND TIME STRESS IN RELAXED SITUATIONS

Source		Dependent variable	df	F	Sig.
General Support		Chronic mental fatigue	1	.000	.98
Quantity	Job Stress	Cognitive Anxiety	1	.001	.97
		Somatic Anxiety	1	.32	.58
		General Health	1	.97	.33
		Cardiovascular health	1	.98	.33
		Gastrointestinal health	1	.36	.55
		Joint Pain	1	1.19	.28
		Minor Infection	1	.75	.39
	Time Stress	Chronic mental fatigue	1	1.88	.18
		Cognitive Anxiety	1	.66	.42
		Somatic Anxiety	1	.23	.63
		General Health	1	2.31	.14
		Cardiovascular health	1	1.06	.31
		Gastrointestinal health	1	2.28	.14
		Joint Pain	1	3.05	.09
		Minor Infection	1	5.07	**.029**
General Support					
Quality	Job Stress	Chronic mental fatigue	1	2.19	.15
		Cognitive Anxiety	1	.24	.63
		Somatic Anxiety	1	.19	.66
		General Health	1	.08	.78
		Cardiovascular health	1	.04	.85
		Gastrointestinal health	1	.56	.46
		Joint Pain	1	.28	.60
		Minor Infection	1	.55	.47
	Time Stress	Chronic mental fatigue	1	2.50	.13
		Cognitive Anxiety	1	.71	.41
		Somatic Anxiety	1	.48	.49
		General Health	1	2.66	.11
		Cardiovascular health	1	1.05	.32
		Gastrointestinal health	1	1.99	.17
		Joint Pain	1	.007	.93
		Minor Infection	1	.006	.94

TABLE C15. TWO-WAY ANOVAS FOR INTERACTIVE EFFECT OF GENERAL SUPPORT AND STRESS ON HEALTH

Time Stress Levels	General Support Quantity	N	Mean	Std. Deviation
Low	Low	13	2.00	5.77
	High	11	1.45	.820
	Total	24	1.75	.737
High	Low	15	1.47	.516
	High	17	1.71	.588
	Total	32	1.59	.560

TABLE C16. DIFFERENCES IN MINOR INFECTION LEVELS DEPENDING ON TIME STRESS AND AMOUNT OF SUPPORT TO DISCUSS GENERAL IDEALS

Time Stress Levels		df	F	Sig.
Low	Between Groups	1	3.64	.07
	Within Groups	22		
	Total	23		
High	Between Groups	1	1.48	.23
	Within Groups	30		
	Total	31		

TABLE C17. DIFFERENCES IN MINOR INFECTION LEVELS DEPENDING ON TIME STRESS AND AMOUNT OF SUPPORT TO DISCUSS GENERAL IDEALS

Minor infection

General support quantity		N	Mean	Std. Deviation
Low amount	Low	13	2.00	.577
	High	15	1.47	.516
	Total	28	1.71	.600
High amount	Low	11	1.45	.820
	High	17	1.71	.588
	Total	28	1.61	.685

TABLE C18. DIFFERENCES IN MINOR INFECTION LEVELS DEPENDING ON THE AMOUNT OF SUPPORT TO DISCUSS GENERAL IDEALS AND TIME STRESS

Minor infection

General support quantity		df	F	Sig.
Low amount	Between Groups	1	6.660	.016
	Within Groups	26		
	Total	27		
High amount	Between Groups	1	.895	.353
	Within Groups	26		
	Total	27		

TABLE C19. DIFFERENCES IN MINOR INFECTION LEVELS DEPENDING ON THE AMOUNT OF SUPPORT TO DISCUSS GENERAL IDEALS AND TIME STRESS

Source	Dependent variable	df	F	Sig.
Intimate Support	Chronic mental fatigue	1	.18	.67
Quantity	Cognitive Anxiety	1	.01	.91
Job Stress	Somatic Anxiety	1	.36	.55
	General Health	1	1.87	.18
	Cardiovascular health	1	1.85	.18
	Gastrointestinal health	1	.46	.50
	Joint Pain	1	3.28	.07
	Minor Infection	1	1.77	.19
	Chronic mental fatigue	1	1.34	.25
Time Stress	Cognitive Anxiety	1	1.07	.31
	Somatic Anxiety	1	1.12	.30
	General Health	1	2.25	.14
	Cardiovascular health	1	.36	.55
	Gastrointestinal health	1	4.52	.039
	Joint Pain	1	1.01	.32
	Minor Infection	1	3.34	.07
Intimate Support	Chronic mental fatigue	1	1.58	.22
Quality	Cognitive Anxiety	1	9.00	.005
Job Stress	Somatic Anxiety	1	3.49	.07
	General Health	1	1.36	.25
	Cardiovascular health	1	3.76	.06
	Gastrointestinal health	1	1.85	.18
	Joint Pain	1	.66	.42
	Minor Infection	1	1.43	.24
	Chronic mental fatigue	1	4.48	.04
Time Stress	Cognitive Anxiety	1	5.61	.02
	Somatic Anxiety	1	2.87	.10
	General Health	1	1.77	.19
	Cardiovascular health	1	3.30	.08
	Gastrointestinal health	1	1.25	.27
	Joint Pain	1	1.10	.30
	Minor Infection	1	5.16	.03

TABLE C20. TWO-WAY ANOVAS FOR INTERACTIVE EFFECT OF INTIMATE SUPPORT AND STRESS ON HEALTH

Time Stress Levels	Intimate Support Quantity	N	Mean	Std. Deviation
Low	Low	13	15.38	5.66
	High	11	11.91	2.55
	Total	24	13.79	4.76
High	Low	17	12.76	3.80
	High	15	14.47	4.81
	Total	32	13.56	4.32

TABLE C21. DIFFERENCES IN GASTROINTESTINAL HEALTH DEPENDING ON THE AMOUNT OF SUPPORT FOR INTIMATE DISCUSSIONS AND TIME STRESS

Time Stress Levels		df	F	Sig.
Low	Between Groups	1	3.52	.07
	Within Groups	22		
	Total	23		
High	Between Groups	1	1.25	.27
	Within Groups	30		
	Total	31		

TABLE C22. DIFFERENCES IN GASTROINTESTINAL HEALTH DEPENDING ON THE AMOUNT OF SUPPORT FOR INTIMATE DISCUSSIONS AND TIME STRESS

PH Gastrointestinal

Intimate support quantity		N	Mean	Std. Deviation
Low amount	Low	13	15.3846	5.66478
	High	17	12.7647	3.80015
	Total	30	13.9000	4.79475
High amount	Low	11	11.9091	2.54773
	High	15	14.4667	4.80872
	Total	26	13.3846	4.14803

TABLE C23. DIFFERENCES IN GASTROINTESTINAL HEALTH DEPENDING ON TIME STRESS AND AMOUNT OF INTIMATE SUPPORT

PH Gastrointestinal

Intimate support quantity		df	F	Sig.
Low amount	Between Groups	1	2.298	.141
	Within Groups	28		
	Total	29		
High amount	Between Groups	1	2.563	.122
	Within Groups	24		
	Total	25		

TABLE C24. DIFFERENCES IN GASTROINTESTINAL HEALTH DEPENDING ON TIME STRESS AND AMOUNT OF INTIMATE SUPPORT

Stress Levels		Quality of Intimate Support	N	Mean	Std. Deviation
Time Stress					
Low	Cognitive Anxiety	High	10	12.60	3.72
		Low	6	16.17	3.43
		Total	16	13.94	3.92
	Chronic mental fatigue	High	10	15.30	5.140
		Low	6	21.33	5.92
		Total	16	17.56	6.05
	Minor Infection	High	10	1.40	.699
		Low	6	2.17	.752
		Total	16	1.69	.793
High	Cognitive Anxiety	High	13	14.23	4.62
		Low	9	11.00	4.36
		Total	22	12.91	4.70
	Chronic mental fatigue	High	13	16.92	4.59
		Low	9	15.56	3.24
		Total	22	16.36	4.07
	Minor Infection	High	13	1.77	.44
		Low	9	1.44	.73
		Total	22	1.64	.58
Job Stress					
Low	Cognitive Anxiety	High	10	11.10	3.21
		Low	8	14.75	5.18
		Total	18	12.72	4.47
	Cognitive Anxiety	High	12	15.42	4.25
		Low	7	11.14	3.44
		Total	19	13.84	4.41

TABLE C25. DESCRIPTIVES FOR HEALTH LEVELS DEPENDING ON THE QUALITY OF SUPPORT FOR INTIMATE DISCUSSIONS AND STRESS

Stress Level			df	F	Sig.
Time Stress					
Low	Cognitive Anxiety	Between Groups	1	3.65	.08
		Within Groups	14		
		Total	15		
	Chronic mental fatigue	Between Groups	1	4.62	.05
		Within Groups	14		
		Total	15		
	Minor Infection	Between Groups	1	4.27	.06
		Within Groups	14		
		Total	15		
High	Cognitive Anxiety	Between Groups	1	2.72	.12
		Within Groups	20		
		Total	21		
	Chronic mental fatigue	Between Groups	1	.59	.45
		Within Groups	20		
		Total	21		
	Minor Infection	Between Groups	1	1.72	.21
		Within Groups	20		
		Total	21		
Job Stress					
Low	Cognitive Anxiety	Between Groups	1	3.38	.09
		Within Groups	16		
		Total	17		
High	Cognitive Anxiety	Between Groups	1	5.09	.04
		Within Groups	17		
		Total	18		

TABLE C26. DIFFERENCES IN HEALTH DEPENDING ON THE QUALITY OF INTIMATE SUPPORT FOR INTIMATE DISCUSSIONS AND STRESS

Cognitive Anxiety

Intimate support quality		N	Mean	Std. Deviation
High quality	Low	10	11.1000	3.21282
	High	12	15.4167	4.25245
	Total	22	13.4545	4.32850
Low quality	Low	8	14.7500	5.17549
	High	7	11.1429	3.43650
	Total	15	13.0667	4.68229

TABLE C27. DIFFERENCES IN COGNITIVE ANXIETY DEPENDING ON JOB STRESS LEVELS AND QUALITY OF INTIMATE SUPPORT

Cognitive Anxiety

Intimate support quality		df	F	Sig.
High quality	Between Groups	1	6.966	.016
	Within Groups	20		
	Total	21		
Low quality	Between Groups	1	2.444	.142
	Within Groups	13		
	Total	14		

TABLE C28. DIFFERENCES IN COGNITIVE ANXIETY DEPENDING ON JOB STRESS LEVELS AND QUALITY OF INTIMATE SUPPORT

Intimate support quality			N	Mean	Std. Deviation
High quality	Chronic Fatigue	Low	10	15.3000	5.14350
		High	13	16.9231	4.59096
		Total	23	16.2174	4.79542
	Cognitive Anxiety	Low	10	12.6000	3.71782
		High	13	14.2308	4.62158
		Total	23	13.5217	4.24124
	Minor infection	Low	10	1.40	.699
		High	13	1.77	.439
		Total	23	1.61	.583
Low quality	Chronic Fatigue	Low	6	21.3333	5.92171
		High	9	15.5556	3.24465
		Total	15	17.8667	5.20805
	Cognitive Anxiety	Low	6	16.1667	3.43026
		High	9	11.0000	4.35890
		Total	15	13.0667	4.68229
	Minor infection	Low	6	2.17	.753
		High	9	1.44	.726
		Total	15	1.73	.799

TABLE C29. DESCRIPTIVES FOR HEALTH DEPENDING ON TIME STRESS LEVELS AND INTIMATE SUPPORT QUALITY

Intimate support quali			df	F	Sig.
High quality	Chronic Fatigue	Between Group	1	.637	.434
		Within Groups	21		
		Total	22		
	Cognitive Anxie	Between Group	1	.829	.373
		Within Groups	21		
		Total	22		
	Minor infection	Between Group	1	2.412	.135
		Within Groups	21		
		Total	22		
Low quality	Chronic Fatigue	Between Group	1	6.019	.029
		Within Groups	13		
		Total	14		
	Cognitive Anxie	Between Group	1	5.926	.030
		Within Groups	13		
		Total	14		
	Minor infection	Between Group	1	3.460	.086
		Within Groups	13		
		Total	14		

TABLE C30. DIFFERENCES IN HEALTH DEPENDING ON TIME STRESS LEVELS AND INTIMATE SUPPORT QUALITY

Source	Dependent variable	df	F	Sig.
Family support Quantity	Chronic mental fatigue	1	.61	.44
	Cognitive Anxiety	1	3.68	.06
	Somatic Anxiety	1	.03	.87
Job Stress	General Health	1	2.24	.14
	Cardiovascular health	1	.75	.39
	Gastrointestinal health	1	2.85	.10
	Joint Pain	1	1.03	.32
	Minor Infection	1	1.03	.32
	Chronic mental fatigue	1	2.89	.096
	Cognitive Anxiety	1	.67	.417
Time Stress	Somatic Anxiety	1	.05	.818
	General Health	1	1.74	.194
	Cardiovascular health	1	.23	.637
	Gastrointestinal health	1	.19	.662
	Joint Pain	1	.09	.765
	Minor Infection	1	.05	.826
Family support Quality	Chronic mental fatigue	1	2.08	.156
	Cognitive Anxiety	1	1.63	.209
Job Stress	Somatic Anxiety	1	.000	.993
	General Health	1	2.74	.105
	Cardiovascular health	1	.04	.842
	Gastrointestinal health	1	.25	.617
	Joint Pain	1	1.00	.322
	Minor Infection	1	1.02	.318
	Chronic mental fatigue	1	1.63	.208
Time Stress	Cognitive Anxiety	1	1.10	.301
	Somatic Anxiety	1	.006	.941
	General Health	1	1.00	.322
	Cardiovascular health	1	1.13	.295
	Gastrointestinal health	1	.32	.576
	Joint Pain	1	.19	.665
	Minor Infection	1	.000	.983

TABLE C31. TWO-WAY ANOVAS FOR INTERACTIVE EFFECT OF FAMILY SUPPORT AND STRESS ON HEALTH

Source	Dependent variable	df	F	Sig.
Friend Support Quantity	Chronic mental fatigue	1	.000	.997
	Cognitive Anxiety	1	1.52	.224
	Somatic Anxiety	1	1.61	.211
Job Stress	General Health	1	1.52	.223
	Cardiovascular health	1	2.03	.160
	Gastrointestinal health	1	.71	.405
	Joint Pain	1	3.31	.075
	Minor Infection	1	.75	.389
Time Stress	Chronic mental fatigue	1	.010	.920
	Cognitive Anxiety	1	.38	.542
	Somatic Anxiety	1	1.57	.217
	General Health	1	.001	.978
	Cardiovascular health	1	.001	.981
	Gastrointestinal health	1	.031	.873
	Joint Pain	1	.51	.481
	Minor Infection	1	5.07	**.029**
Friend Support Quality	Chronic mental fatigue	1	.86	.360
	Cognitive Anxiety	1	1.21	.280
Job Stress	Somatic Anxiety	1	.11	.745
	General Health	1	.92	.343
	Cardiovascular health	1	.08	.784
	Gastrointestinal health	1	1.33	.256
	Joint Pain	1	1.15	.292
	Minor Infection	1	.76	.388
Time Stress	Chronic mental fatigue	1	2.97	.093
	Cognitive Anxiety	1	4.27	**.046**
	Somatic Anxiety	1	4.85	**.034**
	General Health	1	3.43	.072
	Cardiovascular health	1	1.50	.228
	Gastrointestinal health	1	2.99	.092
	Joint Pain	1	1.01	.321
	Minor Infection	1	1.56	.220

TABLE C32. TWO-WAY ANOVAS FOR INTERACTIVE EFFECT OF FRIEND SOCIAL SUPPORT AND STRESS ON HEALTH

Time Stress Levels	Friend Support Quantity	N	Mean	Std. Deviation
Low	Low	13	2.00	.577
	High	11	1.45	.820
	Total	24	1.75	.737
High	Low	15	1.47	.516
	High	17	1.71	.588
	Total	32	1.59	.560

TABLE C33. DESCRIPTIVES FOR DIFFERENCES IN MINOR INFECTION DEPENDING ON AMOUNT OF SUPPORT FROM FRIENDS AND TIME STRESS

Time Stress Levels		df	F	Sig.
Low	Between Groups	1	3.636	.070
	Within Groups	22		
	Total	23		
High	Between Groups	1	1.477	.234
	Within Groups	30		
	Total	31		

TABLE C34. DIFFERENCES IN MINOR INFECTION LEVELS DEPENDING ON AMOUNT OF SUPPORT FROM FRIENDS AND TIME STRESS

Minor infection

Friend support quantity		N	Mean	Std. Deviation
Low amount	Low	13	2.00	.577
	High	15	1.47	.516
	Total	28	1.71	.600
High amount	Low	11	1.45	.820
	High	17	1.71	.588
	Total	28	1.61	.685

TABLE C35. DIFFERENCES IN MINOR INFECTION LEVELS DEPENDING ON TIME STRESS LEVELS AND AMOUNT OF SUPPORT FROM FRIENDS

Minor infection

Friend support quantity		df	F	Sig.
Low amount	Between Groups	1	6.660	.016
	Within Groups	26		
	Total	27		
High amount	Between Groups	1	.895	.353
	Within Groups	26		
	Total	27		

TABLE C36. DIFFERENCES IN MINOR INFECTION LEVELS DEPENDING ON TIME STRESS LEVELS AND AMOUNT OF SUPPORT FROM FRIENDS

Time Stress Levels		Co-worker at work Quality	N	Mean	Std. Deviation
Low					
	Joint Pain	High	12	12.50	3.56
		Low	5	16.20	3.83
		Total	17	13.59	3.92
	Minor Infection	High	12	11.58	2.237
		Low	5	16.20	3.11
		Total	17	12.94	3.25
High					
	Joint Pain	High	13	13.54	4.54
		Low	14	11.57	4.20
		Total	27	12.52	4.40
	Minor Infection	High	13	11.23	3.61
		Low	14	11.14	2.91
		Total	27	11.19	3.20

TABLE C37. DESCRIPTIVES FOR DIFFERENCES IN HEALTH DEPENDING ON QUALITY OF SUPPORT FROM FRIENDS AND TIME STRESS

Time Stress Level			df	F	Sig.
Low	Cognitive Anxiety	Between Groups	1	3.66	.075
		Within Groups	15		
		Total	16		
	Somatic Anxiety	Between Groups	1	12.04	**.003**
		Within Groups	15		
		Total	16		
High	Cognitive Anxiety	Between Groups	1	1.37	.253
		Within Groups	25		
		Total	26		
	Somatic Anxiety	Between Groups	1	.005	.945
		Within Groups	25		
		Total	26		

TABLE C38. ONE-WAY ANOVAS FOR DIFFERENCES IN HEALTH DEPENDING ON QUALITY OF SUPPORT FROM FRIENDS AND TIME STRESS

Friend support quality			N	Mean	Std. Deviation
High quality	Cognitive Anxiety	Low	12	12.5000	3.55477
		High	13	13.5385	4.53900
		Total	25	13.0400	4.04640
	Somatic Anxiety	Low	12	11.5833	2.23437
		High	13	11.2308	3.60911
		Total	25	11.4000	2.97209
Low quality	Cognitive Anxiety	Low	5	16.2000	3.83406
		High	14	11.5714	4.20099
		Total	19	12.7895	4.51638
	Somatic Anxiety	Low	5	16.2000	3.11448
		High	14	11.1429	2.90509
		Total	19	12.4737	3.67224

TABLE C39. DESCRIPTIVES FOR DIFFERENCES IN HEALTH DEPENDING ON TIME STRESS LEVELS AND QUALITY OF SUPPORT FROM FRIENDS

Friend support quality			df	F	Sig.
High quality	Cognitive Anxiety	Between Groups	1	.401	.533
		Within Groups	23		
		Total	24		
	Somatic Anxiety	Between Groups	1	.084	.774
		Within Groups	23		
		Total	24		
Low quality	Cognitive Anxiety	Between Groups	1	4.655	.046
		Within Groups	17		
		Total	18		
	Somatic Anxiety	Between Groups	1	10.785	.004
		Within Groups	17		
		Total	18		

TABLE C40. DIFFERENCES IN HEALTH DEPENDING ON TIME STRESS LEVELS AND QUALITY OF SUPPORT FROM FRIENDS

Source of Support		Dependent variable	df	F	Sig.
Co-worker at work		Chronic mental fatigue	1	.001	.973
		Cognitive Anxiety	1	.05	.821
Quantity	*Job Stress*	Somatic Anxiety	1	.17	.682
		General Health	1	3.99	.052
		Cardiovascular health	1	.67	.418
		Gastrointestinal health	1	1.08	.304
		Joint Pain	1	6.09	**.017**
		Minor Infection	1	1.76	.191
	Time Stress	Chronic mental fatigue	1	1.61	.211
		Cognitive Anxiety	1	1.07	.307
		Somatic Anxiety	1	.45	.508
		General Health	1	.30	.588
		Cardiovascular health	1	1.43	.237
		Gastrointestinal health	1	1.70	.198
		Joint Pain	1	1.49	.228
		Minor Infection	1	4.38	**.042**
Co-worker at work		Chronic mental fatigue	1	.54	.468
Quality	*Job Stress*	Cognitive Anxiety	1	2.71	.108
		Somatic Anxiety	1	.69	.411
		General Health	1	.12	.730
		Cardiovascular health	1	.08	.776
		Gastrointestinal health	1	1.40	.244
		Joint Pain	1	.001	.975
		Minor Infection	1	.26	.611
	Time Stress	Chronic mental fatigue	1	.03	.856
		Cognitive Anxiety	1	.11	.742
		Somatic Anxiety	1	46	.503
		General Health	1	.09	.769
		Cardiovascular health	1	.04	.837
		Gastrointestinal health	1	.021	.886
		Joint Pain	1	.000	.983
		Minor Infection	1	.16	.692

TABLE C41. TWO-WAY ANOVAS FOR INTERACTIVE EFFECT OF SUPPORT FROM CO-WORKER AT WORK AND STRESS ON HEALTH

Stress Levels		Co-worker at work Quantity	N	Mean	Std. Deviation
Job Stress					
Low	Joint Pain	High	14	6.43	1.91
		Low	12	7.75	2.93
		Total	26	7.04	2.47
High	Joint Pain	High	15	8.93	2.34
		Low	14	7.07	2.62
		Total	29	8.03	2.62
Time Stress					
Low	Minor Infection	High	13	2.00	.577
		Low	11	1.45	.820
		Total	24	1.75	.737
High	Minor Infection	High	16	1.50	.516
		Low	16	1.69	.602
		Total	32	1.59	.560

TABLE C42. DESCRIPTIVES FOR DIFFERENCES IN HEALTH DEPENDING ON THE AMOUNT OF SUPPORT FROM CO-WORKERS AT WORK AND STRESS

Stress Level			df	F	Sig.
Job Stress					
Low	Joint Pain	Between Groups	1	1.91	.180
		Within Groups	24		
		Total	25		
High	Joint Pain	Between Groups	1	4.09	.053
		Within Groups	27		
		Total	28		
Time Stress					
Low	Minor Infection	Between Groups	1	3.64	.070
		Within Groups	22		
		Total	23		
High	Minor Infection	Between Groups	1	.89	.352
		Within Groups	30		
		Total	31		

TABLE C43. DIFFERENCES IN HEALTH DEPENDING ON AMOUNT OF SUPPORT FROM CO-WORKERS AT WORK AND STRESS

Joint pain

Co-work @ work		N	Mean	Std. Deviation
Low amount	Low	14	6.4286	1.91007
	High	15	8.9333	2.34419
	Total	29	7.7241	2.46253
High amount	Low	12	7.7500	2.92715
	High	14	7.0714	2.61547
	Total	26	7.3846	2.72876

TABLE C44. DESCRIPTIVES FOR JOINT PAIN DEPENDING ON JOB STRESS LEVELS AND AMOUNT OF SUPPORT FROM CO-WORKERS AT WORK

Joint pain

Co-work @ work		df	F	Sig.
Low amount	Between Groups	1	9.863	.004
	Within Groups	27		
	Total	28		
High amount	Between Groups	1	.390	.538
	Within Groups	24		
	Total	25		

TABLE C45. DIFFERENCES IN JOINT PAIN DEPENDING ON JOB STRESS LEVELS AND AMOUNT OF SUPPORT FROM CO-WORKERS AT WORK

Minor infection

Co-worker @ work		N	Mean	Std. Deviation
Low amount	Low	13	2.00	.577
	High	16	1.50	.516
	Total	29	1.72	.591
High amount	Low	11	1.45	.820
	High	16	1.69	.602
	Total	27	1.59	.694

TABLE C46. DESCRIPTIVES FOR MINOR INFECTION DEPENDING ON TIME STRESS LEVELS AND AMOUNT OF SUPPORT FROM CO-WORKERS AT WORK

Minor infection

Co-worker @ work		df	F	Sig.
Low amount	Between Groups	1	6.052	.021
	Within Groups	27		
	Total	28		
High amount	Between Groups	1	.727	.402
	Within Groups	25		
	Total	26		

TABLE C47. DIFFERENCES IN MINOR INFECTION DEPENDING ON TIME STRESS LEVELS AND AMOUNT OF SUPPORT FROM CO-WORKERS AT WORK

Source of Support		Dependent variable	df	F	Sig.
Co-workers outside work *Quantity*	*Job Stress*	Chronic mental fatigue	1	.91	.345
		Cognitive Anxiety	1	.93	.340
		Somatic Anxiety	1	.04	.851
		General Health	1	.01	.912
		Cardiovascular health	1	.17	.679
		Gastrointestinal health	1	.03	.857
		Joint Pain	1	.001	.972
		Minor Infection	1	.42	.520
	Time Stress	Chronic mental fatigue	1	6.22	**.016**
		Cognitive Anxiety	1	5.70	**.021**
		Somatic Anxiety	1	2.05	.158
		General Health	1	5.02	**.030**
		Cardiovascular health	1	5.36	**.025**
		Gastrointestinal health	1	1.25	.269
		Joint Pain	1	5.40	**.024**
		Minor Infection	1	4.91	**.031**
Co-workers outside work *Quality*	*Job Stress*	Chronic mental fatigue	1	5.24	**.030**
		Cognitive Anxiety	1	4.08	.053
		Somatic Anxiety	1	1.92	.176
		General Health	1	.35	.562
		Cardiovascular health	1	2.01	.168
		Gastrointestinal health	1	2.19	.150
		Joint Pain	1	.38	.544
		Minor Infection	1	1.96	.172
	Time Stress	Chronic mental fatigue	1	6.38	**.017**
		Cognitive Anxiety	1	2.43	.129
		Somatic Anxiety	1	.35	.557
		General Health	1	1.96	.171
		Cardiovascular health	1	2.34	.137
		Gastrointestinal health	1	2.54	.121
		Joint Pain	1	.001	.972
		Minor Infection	1	.70	.410

TABLE C48. TWO-WAY ANOVAS FOR INTERACTIVE EFFECT OF SUPPORT FROM CO-WORKERS OUTSIDE WORK AND STRESS ON HEALTH

Stress Levels		Co-worker outside work Quality	N	Mean	Std. Deviation
Job Stress					
Low	Chronic mental fatigue	High	6	13.00	3.90
		Low	12	18.33	3.89
		Total	18	16.56	4.58
High	Chronic mental fatigue	High	9	18.00	4.66
		Low	8	15.75	6.54
		Total	17	16.94	5.56
Time Stress					
Low	Chronic mental fatigue	High	6	14.00	4.47
		Low	8	20.13	6.22
		Total	14	17.50	6.20
High	Chronic mental fatigue	High	10	17.50	4.74
		Low	12	15.42	3.32
		Total	22	16.36	4.07

TABLE C49. DESCRIPTIVES FOR DIFFERENCES IN CHRONIC MENTAL FATIGUE DEPENDING ON QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE WORK AND STRESS

Stress Level			df	F	Sig.
Job Stress					
Low	Chronic mental fatigue	Between Groups	1	7.50	**.015**
		Within Groups	16		
		Total	17		
High	Chronic mental fatigue	Between Groups	1	.68	.423
		Within Groups	15		
		Total	16		
Time Stress					
Low	Chronic mental fatigue	Between Groups	1	4.16	.064
		Within Groups	12		
		Total	13		
High	Chronic mental fatigue	Between Groups	1	1.46	.240
		Within Groups	20		
		Total	21		

TABLE C50. DIFFERENCES IN CHRONIC MENTAL FATIGUE DEPENDING ON QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE WORK AND STRESS

Time Stress Levels		Co-worker support outside work	N	Mean	Std. Deviation
Low	Chronic mental fatigue	Low	12	19.58	6.26
		High	12	14.83	5.016
		Total	24	17.21	6.05
	Cognitive Anxiety	Low	12	14.92	3.82
		High	12	12.00	3.64
		Total	24	13.46	3.95
	General Health	Low	12	27.17	6.46
		High	12	24.33	5.57
		Total	24	25.75	6.07
	Cardiovascular health	Low	12	12.50	1.68
		High	12	9.75	1.42
		Total	24	11.13	2.07
	Joint Pain	Low	12	8.50	2.32
		High	12	6.00	1.91
		Total	24	7.25	2.44
	Minor Infection	Low	12	2.00	.74
		High	12	1.50	.67
		Total	24	1.75	.74
High	Chronic mental fatigue	Low	17	14.94	4.38
		High	15	17.20	3.95
		Total	32	16.00	4.27
	Cognitive Anxiety	Low	17	11.82	3.75
		High	15	13.53	4.34
		Total	32	12.63	4.06
	General Health	Low	17	22.30	4.40
		High	13	26.21	4.97
		Total	30	24.00	4.98
	Cardiovascular health	Low	17	10.51	3.10
		High	15	10.73	2.22
		Total	32	10.63	2.69
	Joint Pain	Low	17	7.41	2.27
		High	15	8.13	3.10
		Total	32	7.75	2.67
	Minor Infection	Low	17	1.47	.51
		High	15	1.73	.59
		Total	32	1.59	.56

TABLE C51. DESCRIPTIVES FOR DIFFERENCES IN HEALTH DEPENDING ON THE AMOUNT OF SUPPORT FROM CO-WORKERS OUTSIDE WORK AND TIME STRESS

Time Stress Level			df	F	Sig.
Low	Chronic mental fatigue	Between Groups	1	4.22	.052
		Within Groups	22		
		Total	23		
	Cognitive Anxiety	Between Groups	1	3.66	.069
		Within Groups	22		
		Total	23		
	General Health	Between Groups	1	1.32	.262
		Within Groups	22		
		Total	23		
	Cardiovascular health	Between Groups	1	18.75	**.000**
		Within Groups	22		
		Total	23		
	Joint Pain	Between Groups	1	8.33	**.009**
		Within Groups	22		
		Total	23		
	Minor Infection	Between Groups	1	3.00	.097
		Within Groups	22		
		Total	23		
High	Chronic mental fatigue	Between Groups	1	2.32	.138
		Within Groups	30		
		Total	31		
	Cognitive Anxiety	Between Groups	1	1.43	.241
		Within Groups	30		
		Total	31		
	General Health	Between Groups	1	5.28	**.029**
		Within Groups	28		
		Total	29		
	Cardiovascular health	Between Groups	1	.05	.834
		Within Groups	30		
		Total	31		
	Joint Pain	Between Groups	1	.58	.454
		Within Groups	30		
		Total	31		
	Minor Infection	Between Groups	1	1.80	.190
		Within Groups	30		
		Total	31		

TABLE C52. DIFFERENCES IN HEALTH DEPENDONG ON AMOUNT OF SUPPORT FROM CO-WORKERS OUTSIDE WORK AND TIME STRESS

Co-worker outside			N	Mean	Std. Deviation
Low amount	Chronic Fatigue	Low	12	19.5833	6.25893
		High	17	14.9412	4.37993
		Total	29	16.8621	5.63613
	Cognitive Anxiety	Low	12	14.9167	3.82476
		High	17	11.8235	3.74559
		Total	29	13.1034	4.02088
	General Health	Low	12	27.1667	6.46435
		High	17	22.2941	4.39836
		Total	29	24.3103	5.78238
	PH Cardiovascular	Low	12	12.5000	1.67874
		High	17	10.5294	3.10479
		Total	29	11.3448	2.75520
	Joint pain	Low	12	8.5000	2.31595
		High	17	7.4118	2.26547
		Total	29	7.8621	2.31029
	Minor infection	Low	12	2.00	.739
		High	17	1.47	.514
		Total	29	1.69	.660
High amount	Chronic Fatigue	Low	12	14.8333	5.00606
		High	15	17.2000	3.94968
		Total	27	16.1481	4.52092
	Cognitive Anxiety	Low	12	12.0000	3.64318
		High	15	13.5333	4.34029
		Total	27	12.8519	4.04498
	General Health	Low	12	24.3333	5.56504
		High	13	26.2308	4.96914
		Total	25	25.3200	5.24182
	PH Cardiovascular	Low	12	9.7500	1.42223
		High	15	10.7333	2.21897
		Total	27	10.2963	1.93778
	Joint pain	Low	12	6.0000	1.90693
		High	15	8.1333	3.09069
		Total	27	7.1852	2.80161
	Minor infection	Low	12	1.50	.674
		High	15	1.73	.594
		Total	27	1.63	.629

TABLE C53. DESCRIPTIVES FOR DIFFERENCES IN HEALTH DEPENDING ON TIME STRESS LEVELS AND AMOUNT OF SUPPORT FROM CO-WORKERS OUTSIDE WORK

Co-worker outside			df	F	Sig.
Low amount	Chronic Fatigue	Between Group	1	5.547	.026
		Within Groups	27		
		Total	28		
	Cognitive Anxiety	Between Group	1	4.715	.039
		Within Groups	27		
		Total	28		
	General Health	Between Group	1	5.862	.022
		Within Groups	27		
		Total	28		
	PH Cardiovascul	Between Group	1	3.982	.056
		Within Groups	27		
		Total	28		
	Joint pain	Between Group	1	1.594	.218
		Within Groups	27		
		Total	28		
	Minor infection	Between Group	1	5.201	.031
		Within Groups	27		
		Total	28		
High amount	Chronic Fatigue	Between Group	1	1.889	.181
		Within Groups	25		
		Total	26		
	Cognitive Anxiety	Between Group	1	.956	.337
		Within Groups	25		
		Total	26		
	General Health	Between Group	1	.811	.377
		Within Groups	23		
		Total	24		
	PH Cardiovascul	Between Group	1	1.767	.196
		Within Groups	25		
		Total	26		
	Joint pain	Between Group	1	4.366	.047
		Within Groups	25		
		Total	26		
	Minor infection	Between Group	1	.913	.348
		Within Groups	25		
		Total	26		

TABLE C54. DIFFERENCES IN HEALTH DEPENDING ON TIME STRESS AND AMOUNT OF SUPPORT FROM COWORKERS OUTSIDE OF WORK

Chronic Fatigue

Co-work outside wk		N	Mean	Std. Deviation
High quality	Low	6	13.0000	3.89872
	High	9	18.0000	4.66369
	Total	15	16.0000	4.92805
Low quality	Low	12	18.3333	3.89249
	High	8	15.7500	6.54108
	Total	20	17.3000	5.12065

TABLE C55. DESCRIPTIVES FOR DIFFERENCES IN CHRONIC MENTAL FATIGUE DEPENDING ON JOB STRESS LEVELS AND QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE WORK

Chronic Fatigue

Co-work outside wk		df	F	Sig.
High quality	Between Groups	1	4.680	.050
	Within Groups	13		
	Total	14		
Low quality	Between Groups	1	1.237	.281
	Within Groups	18		
	Total	19		

TABLE C56. DIFFERENCES IN CHRONIC MENTAL FATIGUE DEPENDING ON JOB STRESS LEVELS AND QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE WORK

Chronic Fatigue

Co-work outside wk		N	Mean	Std. Deviation
High quality	Low	6	14.0000	4.47214
	High	10	17.5000	4.74342
	Total	16	16.1875	4.81966
Low quality	Low	8	20.1250	6.22065
	High	12	15.4167	3.31548
	Total	20	17.3000	5.12065

TABLE C57. DESCRIPTIVES FOR DIFFERENCES IN CHRONIC MENTAL FATIGUE DEPENDING ON TIME STRESS LEVELS AND QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE WORK

Chronic Fatigue

Co-work outside wk		df	F	Sig.
High quality	Between Groups	1	2.126	.167
	Within Groups	14		
	Total	15		
Low quality	Between Groups	1	4.889	.040
	Within Groups	18		
	Total	19		

TABLE C58. DIFFERENCES IN CHRONIC MENTAL FATIGUE DEPENDING ON TIME STRESS LEVELS AND QUALITY OF SUPPORT FROM CO-WORKERS OUTSIDE WORK

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