

HARDINESS AND TENURE IN SHIFTWORK AS PREDICTIVE VARIABLES FOR COPING WITH SHIFTWORK

by

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Professor Lawrence Smith of the Institute of Work Psychology, University of Sheffield for his assistance in providing questionnaires and research information.

The many shiftworkers who willingly provided valuable inputs into shiftwork research.

The Management of General Tyre and Rubber Co. (SA)

*Then Africa sons rejoice, that we
Are working a futurity,
Which will reflect a halo bright,
And lift the darkness of our night;
That night in which so long we've slept,
And in its shadow sternly kept,
Contented with our fathers' ways
And the inertia of their days
'Tubb,B(1890)'*

oooOOooo

*The belt starts up at eight...
It's when the dreams begin, when all the others, still clumsy and cold
with sleep, bend their heads to catch the first batch, and she bends
hers too, the memories blurring like her body.*

*She hates to sweat while half-asleep...
The belt starts up at eight.
'Watson,S(1986)'*

SUMMARY**HARDINESS AND TENURE IN SHIFTWORK AS
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DEGREE : M.A.
SUBJECT : INDUSTRIAL PSYCHOLOGY

The aim of this study was to establish whether hardiness and tenure are predictive variables for coping with shiftwork.

The extent of shiftwork and shiftwork research has expanded internationally in the past decade. It has been established that shiftwork has a negative effect on shiftworkers who are predisposed to certain strain symptoms such as inefficiency, impaired health and domestic problems. However, certain inter individual differences do moderate coping with shiftwork through a process of cognitive and behavioural protective acts which modify the stressful situation and neutralise the experience of problems.

Using questionnaires (Biographical, Hardiness Index and Coping with Shiftwork Questionnaire), a sample group of 75 cases was analysed. A 95 percent confidence level was used throughout with a multiple stepwise regression analysis computed. The significant r^2 value = 0.18. Focus group discussions were conducted to add qualitative information to the areas of social, domestic, work and sleep problems as well as coping strategies.

The predictive variables were regressed onto a number of criterion variables, namely coping with shiftwork, work, sleep, domestic and social problems, as well as engagement and disengagement strategies including both strategies in all four domains (work, sleep, social and domestic).

It was found that hardiness and tenure are not predictive variables for coping with shiftwork. However, hardiness, commitment and challenge are predictors for disengagement strategies so that hardy, challenged and committed individuals will use less disengagement coping strategies and more specifically, use less domestic disengagement coping strategies.

The research established hardiness as an additional personality variable linked to a primary scale of coping with shiftwork, namely disengagement. The longer term adjustment of shiftworkers (through tenure) was not established.

Recommendations were made for targeted shiftwork coping programmes and more extensive classical shiftwork research in South Africa.

Title of Dissertation:

**HARDINESS AND TENURE IN SHIFTWORK AS PREDICTIVE VARIABLES
FOR COPING WITH SHIFTWORK.**

Key Terms:

**Hardiness, shiftwork, stress, coping, tenure, experience in shiftwork,
salutogenesis, healthy personality, coping mechanisms and strain.**

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CHAPTER 1

1. INTRODUCTION

This study is concerned with variables that may act as predictors for coping with shiftwork with the aim of the research being an addition to the existing body of knowledge about coping mechanisms in shiftwork as well as some recommendations for shiftworkers and managers who are not yet aware of, nor are using these coping strategies.

In the following chapter the background to this research will be outlined. In doing so shiftwork will be defined; evidence of its wide ranging use and effects will be provided and it will be concluded that as a phenomena, shiftwork may be considered a stressor.

The theoretical orientations of the study and the contribution of research into shiftwork as a field of study will be addressed.

Problem statements, together with the aim and outline of the study will be posed.

The constructs such as shiftwork, coping, hardiness and tenure and their role in solving the problem statements will be discussed.

1.1 BACKGROUND AND FIELD OF STUDY

1.1.1 Definition of Shiftwork

Shiftwork is usually defined in terms of the hours and schedules which people work.

Folkard and Monk (1992, p. 1) define shiftwork as:

"Any regularly taken employment outside the day working window, defined arbitrarily as the hours between 7:00am and 6:00pm...any work taken on a regular basis outside that interval...any individuals involved in that work as shift workers...includes part-timers, full-timers, evening shift workers, early morning shift workers, as well as the rotating and fixed shift workers covered by the more restricted definition."

Shiftwork normally involves a schedule of variable work hours and rotating shifts (Jamal, 1989); it also refers to an arrangement of work involving two or more teams to cover production; non-traditional schedules (Boer, 1994) and shifts outside of normal daylight hours (Hertz & Charlton, 1989).

Shiftwork is also more than just a work schedule - it is a lifestyle that negatively affects health, family and social life (Overman, 1993) as well as productivity and quality time off (Boer, 1994). It holds workers captive in a permanent sort of jetlag (Halcrow, 1988).

Shiftwork affects both the use of capital and labour resources (Boer, 1994) and schedules are developed to respond simultaneously to production requirements and fluctuations in demand (Kogi & Thurman, 1993).

Ultimately, any unusual work schedule or pattern of work which is developed to suit the needs of the organisation and which is undertaken on a regular basis by employees may be seen as a benchmark for defining shiftwork, the domain of this study.

1.1.2 Scope of Shiftwork

Shifting international trends

Since the advent of the lightbulb, over a hundred years ago, the world has seen an increase in the extent of shiftwork (Filipowski, 1993) and a substantial increase over the last three decades in the incidence of 24 hour operations (Stam & Sodano, 1991).

"Approximately 25 percent of the North-American workforce is now on some type of variable, or non-conventional work schedule" (Klein, 1994, p.1).

In South Africa, Adler (1991) reported that 26 percent of the working population work shifts of some kind and that this figure is expected to rise.

Again in the United States, more than 20 percent of males and 15 percent of females work "non-traditional" schedules - an increase of 18 percent and 13 percent over eight years (Filipowski, 1993).

It is evident that shiftwork is an international phenomena with an increase in shiftwork reported in:

- a) Canada of one percent per year (Tippins & Stroh, 1991); and in
- b) Britain by the 1965 British Ministry of Labour Survey (Akinnowo, 1988) showing that the number of people employed on shiftwork rose by 50 percent between 1955 and 1965; while
- c) a similar increase was evident in Nigeria in the 1980's (Akinnowo, 1988).

Expanding Categories of Occupations

Folkard and Monk (1992) attribute this trend to technological advances such as computerisation of systems which now allows 24 hour operations as well as an increase in demand for the provision of "round the clock" services such as medical care, grocery stores and transport services. This changes the nature of shiftwork from purely manual labour as well as certain skilled occupations (for example, bakers) to that of a more cognitive nature. For instance (Jamal, 1989) noted higher proportions of shiftwork employees in occupations requiring 24 hour services such as:

- protective agencies (61 percent)
- food services (43 percent)
- health services (36 percent)

Other occupations noted by Jamal (1989) for their need for "off-hours" work include:

- police and fire protection
- transportation
- utilities (such as electricity undertakings)

- medical care
- and in addition, the following occupations require shiftwork:
- financial data systems needed to generate the global economy (Tippins & Stroh, 1991)
- airlines and railroads (Halcrow, 1988).

Continuous 24 Hour Operations

In the manufacturing environment global competition has necessitated

"the introduction of continuous production processes as an effort by manufacturing firms to optimise their capital utilisation" (Bosworth & Pugh, 1985, p. 658).

Boer (1994) stated the obvious - that 168 hours per week operations make economic sense, particularly within the South African context of decreasing tariff protection, the subsequent increase of foreign competition and the drive to export manufactured products.

However, whilst making economic sense - (24 hours a day, seven day a week businesses experience 40 percent increases in production and similar decreases in product costs due to a spread of these costs over a larger base without major expenditure), people within the organization will not easily accommodate the demands of continuous operations (Stam & Sodano, 1991) and common problems of shiftworkers include the following:

- chronic fatigue (60 percent of US industrial workers report having regularly fallen asleep) (Filipowski, 1993)
- increased alcohol and drug use and abuse (Gordon in Folkard & Monk, 1992)

- high rate of stomach problems
- higher divorce rates
- impaired social life
- less job satisfaction (Filipowski, 1993).

1.1.3 Contribution of Scientific Research on Shiftwork

Existing Shiftwork Research

Tippins and Stroh (1991) quote descriptive statistics provided by Syncro Tech (a work schedule management organisation) that up to 20 percent of the shiftwork population leave to seek daytime/traditional work and of the remaining population, that 80 percent experience medical, social, family and personal problems that relate to working on the shiftwork schedule.

Given the wide use and scope of shiftwork worldwide, research has followed suit with prolific American and especially European research (Tepas, 1979).

Debates include the effects of shiftwork on people such as the development of physical disease (Bohle & Tilley, 1989); the creation of organisational and social problems (Iskra-Golec, 1993) and the disruption of shiftworkers' circadian rhythms (Menna-Barreto, Benedito-Silva, Moreno, Fischer & Marques, 1993).

Comprehensive publications outlining shiftwork consequences and coping strategies (Folkard & Monk, 1992) add to the information available.

The Relevance of Shiftwork Research in South Africa

This shiftwork research should contribute towards an understanding of "how" and "why" people cope with shiftwork as part of a highly active field of research. In South Africa shiftwork research will also be relevant for the following reasons:

- a) Adler's (1991) statistics on the extent of shiftwork in the South African economy (26 percent) and in the tyre and rubber industry (76,51 percent), highlights the large numbers of people involved in shiftwork in South Africa.
- b) The contribution to shiftwork research in South Africa is limited to a few studies such as:
 - a descriptive statistical report commissioned by the tyre and rubber industry (Adler, 1991)
 - Shiftwork and its effects on family structure (Brophy, 1993)
 - The wellbeing sequelae of shiftworkers (Goldman, 1992).
- c) Within the context of a developing democracy, with a new Bill of Rights, pressure will be exerted on employers who discriminate by using age as a variable. Managers will have to prove "age related intolerance" to shiftwork (Folkard & Monk, 1992). Valid arguments (backed up by research) will need to be provided to prove fairness in selection decision making.

Contribution of the Study

This research project draws its sample from a multicultural blue collar male and female worker population in the South African tyre manufacturing industry. This has the advantage of having drawn conclusions from a heterosexual group of shiftworkers who have worked on various shift patterns (five and seven day work weeks) over different time frames.

In addition, whilst individual differences in adaption to continuous shift systems have been linked to factors such as personal characteristics (morningness/eveningness; sleep duration preference) and even genetic background, it still remains important to search for other relevant factors to analyse individual differences (Menna-Barreto, *et al.*, 1993). Presently, no specific South African studies link coping with shiftwork to generalised resistance resources as described by Strümpfer (1990) and other individual differences such as tenure. This study may therefore add value to the body of knowledge internationally available on shiftwork coping as a function of individual salutogenesis.

1.1.4 Theoretical Orientation

This research problem needs to be approached from three different but overlapping perspectives. Firstly, as an ergonomic construct (effective functioning between humans and systems); secondly, within the classical shiftwork research domain (as individual differences on the effects of coping with shiftwork) and thirdly as a personality construct issue (hardiness is a salutogenic dimension).

Ergonomics - Systems/Multidisciplinary Approach

The research problem will attempt to explore the process of interfacing of workers within an occupational environment but also within a shiftwork environment.

If the definition of ergonomics is that of a multidisciplinary field of study of the interaction between the human being and the wide range of environments (including work) within which the person is functioning, then this study may take on an ergonomic theoretical orientation because the problem statement focuses on human functioning within a physical work system/shift system.

The problem itself is of a complex nature and is studied on a micro level (intra individual and inter individual). However, the ultimate aim of research must be to translate these results into recommendations which will enhance the achievement of a balance of design and management of human-environmental systems to achieve a better quality of life without impairing progress, in this case with specific reference to shiftwork systems.

Classical Shiftwork Construct - Tenure in Shiftwork

The effects of shiftwork on the physical, psychological and psychosocial experiences of individuals has been widely investigated (Drenth, Thierry, Williams & De Wolff, 1984).

The problem effects of shiftwork include:

- Biological effects (disturbances of physiological rhythms, including sleep patterns)-(Monk, 1986; Tippins & Stroh, 1991)
- Physical and psychosomatic complaints such as digestive problems (Frese & Okonek, 1984; Filipowski, 1993)
- Psychological wellbeing effects such as anxiety and depression (Bohle & Tilley, 1989)
- Social and domestic problems such as divorce, alcohol and substance abuse (Gannon, Norland & Robesen, 1983; Jackson, Zedeck & Summers, 1985)
- Work performance problems such as memory and safety problems (Monk, Knauth, Folkard & Rutenfranz, 1978)
- Job satisfaction problems (Filipowski, 1993)

Shiftworkers have been grouped into the following groups:

- a) those coping reasonably well;
- b) those 'getting by';
- c) those not coping (Folkard & Monk, 1992)

Certain inter individual differences between these groups have been related to coping with shiftwork. A demographic factor such as age for instance, is a negative variable for shiftwork coping ability (Folkard & Monk, 1992; Barsley & Dutta, 1992).

Various interpersonal differences such as circadian type with morningness and eveningness dimensions have also been established (Folkard and Monk, 1992).

Much of this research (Schroeder & Goulden, 1983) has been confined to specific populations such as medical staff and blue collar workers, perhaps raising questions as to the generalisability of results.

The construct of tenure (or experience) in shiftwork falls within the classic inter individual shiftwork research domain and more specifically into the growing field of shiftwork coping theories. Tenure relates to the experience that a shiftworker has of working shifts expressed in length of time (months, years).

Foret (in Folkard and Monk, 1992) established that experience with shiftwork was not a positive but a negative factor relating to sleep disorders in shiftworkers.

However, according to Folkard and Monk (1992, p. 45), the construct of experience is closely linked to age : "Although old age does not always bring wisdom, it invariably brings experience".

It could be argued that after several years of experience of working shifts, that most old age shiftworkers have developed coping strategies, have better houses and sleeping conditions and on the whole require less sleep than younger, more inexperienced shiftworkers (Folkard and Monk, 1992). However, Folkard and Monk (1992) report that so far, both age and experience have been found to be negative factors in shiftwork coping ability as older workers seem to be slower in re-aligning circadian rhythms under conditions involving acute changes in routine. An interesting fact is that females' rating of subjective health generally improves after the critical decade of 40 - 50 years whilst males experience a deterioration in health with advancing age (Oginska, Pokorski &

Oginski, 1993).

The research problem will focus on confirming or discrediting the generalised assumption that "tenure" be used as a variable to predict coping with shiftwork.

Personality Research and Constructs - Hardiness

This research project will specifically investigate the predictive effect of the personality construct of hardiness for coping with shiftwork. This, therefore, falls within the domain of personality research. As this construct relates to intra individual functioning and inter individual differences, it may be possible to add an additional personality variable to the understanding of shiftworker coping styles (Folkard and Monk, 1992).

Within the realm of personality research, shiftwork researchers have attempted to establish differences in coping strategies based upon circadian types (morningness, eveningness) as well as various personality factors which may impact upon coping, namely sleep pattern rigidity, vigour and neurotic extrovertism (Folkard & Monk, 1979; 1992).

The construct of hardiness itself developed within a salutogenic paradigm (Strümpfer, 1990) which implies that individuals fall somewhere on a continuum of "total terminal illness and total wellness", and that any clinical interventions should be aimed at moving groups or individuals along the continuum towards the wellness pole.

This concept may be expanded to become 'fortigenesis', which refers to the origins of psychological strength in general (Strümpfer, 1995).

Strümpfer (1995) presents three areas of research in which the origin of strength flows from different work experiences (under ordinary, combat and dual role conditions).

Both the salutogenic and fortigenic paradigms accept that stressors are not necessarily bad and may even be necessary for certain individuals to maintain their position or to move along the continuum towards health/wellness or strength.

Studying hardiness as a predictive variable for coping with shiftwork within this theoretical orientation, will then focus on those individuals who are able to cope and live well, even with or as a result of the stressor of shiftwork being present.

1.2 PROBLEM STATEMENT

1.2.1 Shiftwork as a Stressor

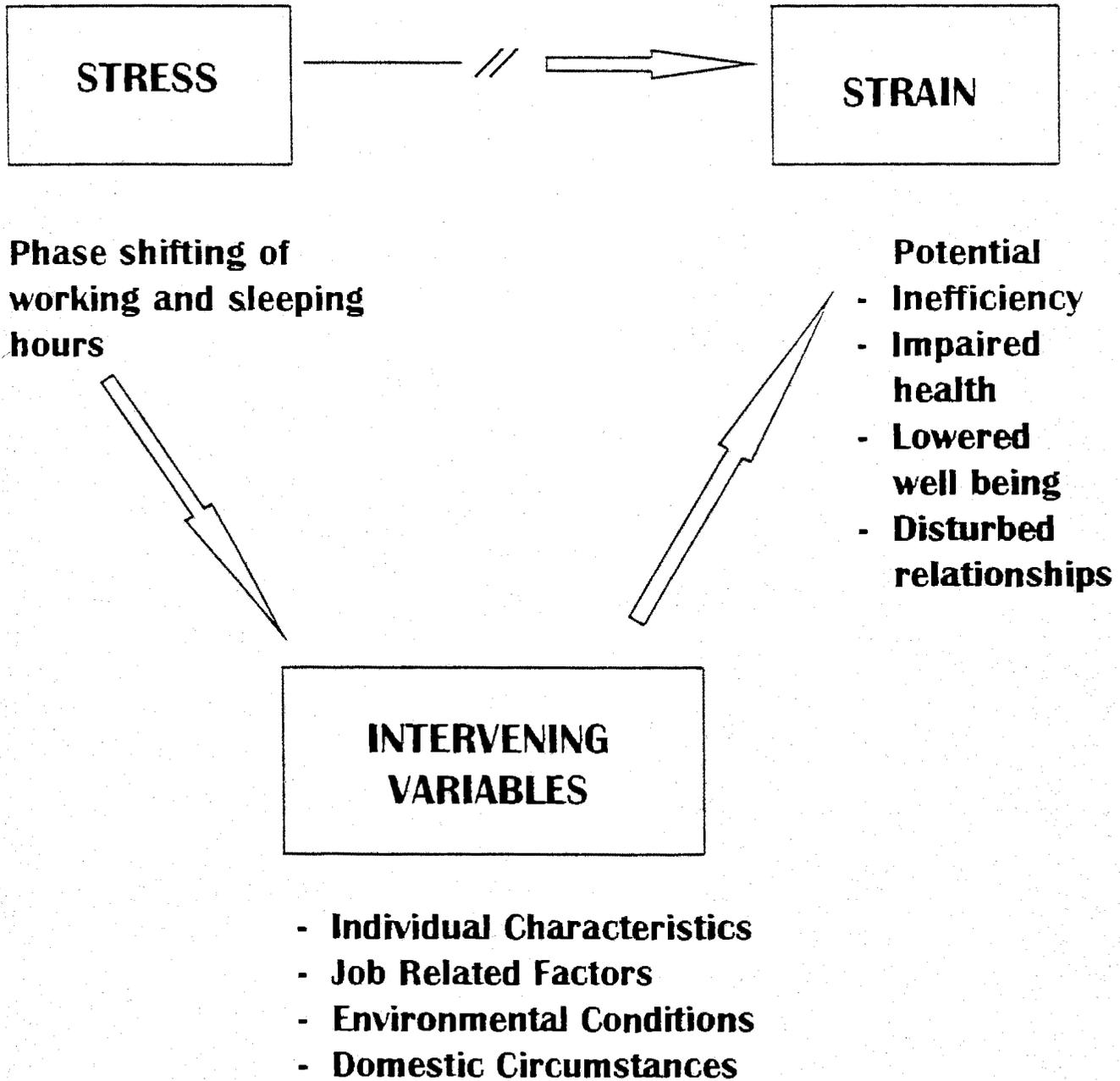
Stress is defined by Spelten, Smith, Totterdell, Barton, Folkard and Bohle (1993, p. 1) as "an imbalance between perceived demands and perceived resources". Prolonged exposure can damage health and wellbeing.

Shiftworkers are often unable to balance the demands of shift systems with their own physical and social resources and also experience this stress for long periods of time (years, decades) (Folkard & Monk, 1992).

It is then obvious why shiftwork is found to be fundamentally disruptive for the shiftworker (Smith, Norman & Spelten, 1994) and may manifest in various areas of life, namely; biological disturbances of physiological rhythms, including sleep patterns (Monk, 1986); physical and psychological wellness (Frese & Okonek, 1984); problems in social and family life (Gannon, *et al.*, 1983; Jackson *et al.*, 1985) and work performance problems (Monk *et al.*, 1978).

Using the stress and strain model (FIGURE 1) of Colquhoun and Rutenfranz (1980 in Folkard & Monk, 1992, p.25), it is evident that there is a "potential for strain in those unable to make the successful transition to a shiftwork lifestyle and that even though shiftwork is inherently unnatural, that it is not necessarily harmful.

FIGURE 1 : STRESS AND STRAIN MODEL



(After Colquhoun & Rutenfranz in Monk & Folkard, 1992)

This model outlines that negative effects result from strain developed within an individual trying to cope rather than from the real stress of working shifts.

This has obvious connotations for it implies that strain could be reduced by learning new coping strategies or from changes in intervening variables such as changes in domestic circumstances or the actual environment such as the shift system itself.

Ryan and Cullen (in Folkard & Monk, 1992) conducted a longitudinal study of nurses on a weekly rotating night shift system and concluded that the cumulative effects of nightwork were so severe on coping resources and adjustment that interventions should be aimed at the redesign of shift schedules rather than the assessment of potentially "healthy" workers, because the effects in their studies due to individual variations were either weak or absent.

However, certain individual differences in tolerance to non-standard work hours have been found (Smith *et al.*, 1994) and many of these differences have been attributed to biological and psychological patterns (e.g rhythms peak and circadian type).

Certain questionnaires including the Composite Morningness Questionnaire and the Circadian Type Inventory have been developed to identify different personality types and relate these personality traits to shiftwork tolerance (Smith *et al.*, 1994).

While these are useful indicators, further research is necessary in terms of additional personality variables which may impact on tolerance to shiftwork and coping mechanisms in an attempt to "unravel the mystery of health" (Antonovsky in Strümpfer, 1995).

Pearlin and Schooler (in Strümpfer, 1990, p. 266) observe that "many of the difficult problems with which people cope are not unusual problems impinging on exceptional people in rare situations, but are persistent hardships experienced by those engaged in mainstream activities within major institutions".

Shiftwork could quite easily fall into the above definition as a stressor.

Shift systems involving night work result in the disruption of shiftworker circadian rhythms across a large number of physiological and psychological variables (Menna-Barreto *et al.*, 1993).

The nature of circadian rhythms is such that they are endogenous and resistant to change and have various properties which lead to significant adjustment problems for the shiftworker (Folkard & Monk, 1992).

In his study of Nigerian shift workers, Akinnawo (1988) found shiftworkers to show significantly more psychopathological symptoms than the non-shift workers with disorders such as sleep, mood and general somatic complaints most prominent.

1.2.2 Coping with Shiftwork

Research into coping with shiftwork has often used general occupational stress and coping models or used qualitative (interview) data (Spelten, *et al.*, 1993).

According to Folkman (1984, p. 84), coping refers to "cognitive or behavioural efforts to master, reduce or tolerate the internal and/or external demands that are created by the stressful transaction".

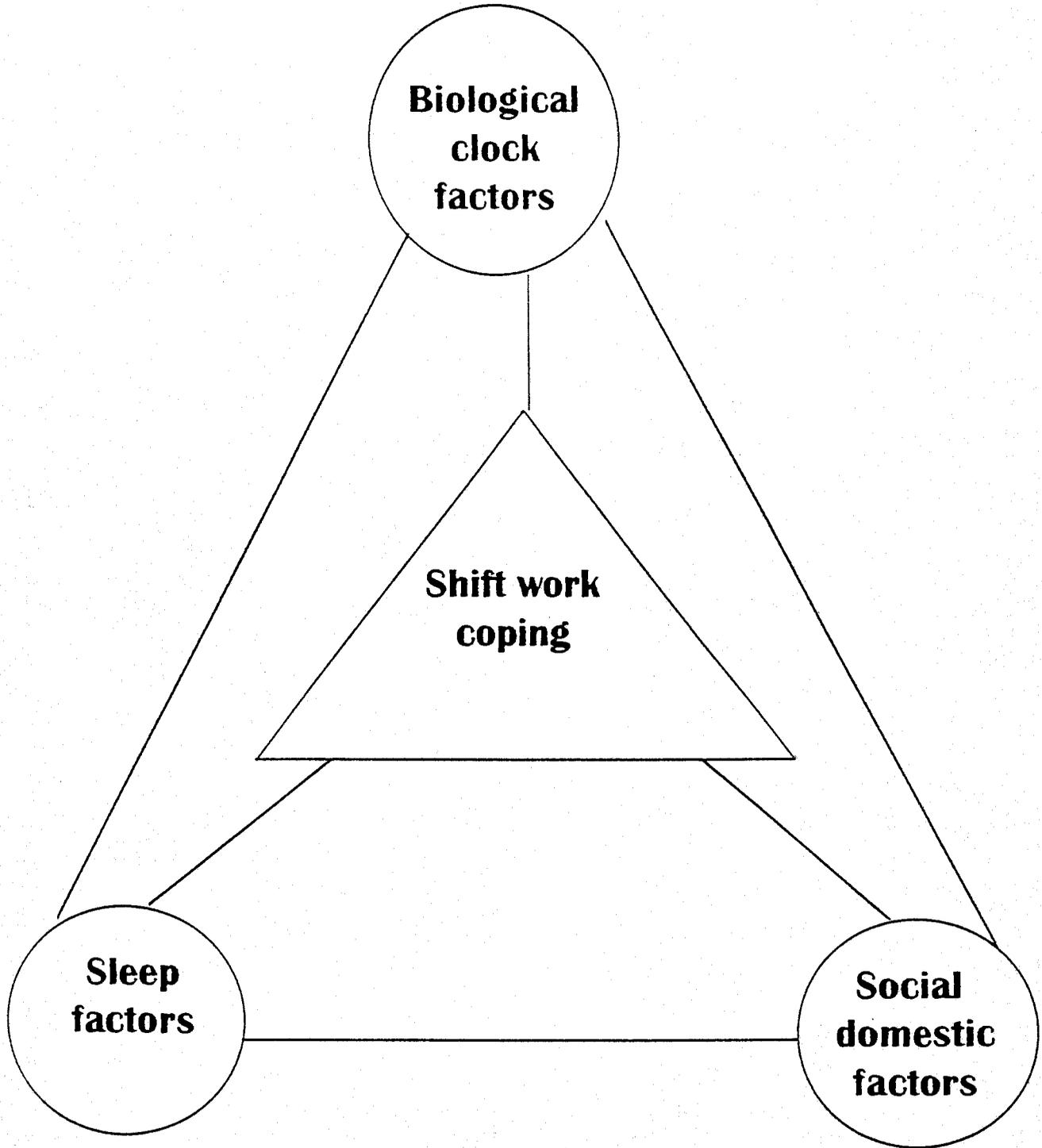
Thus coping is not a goal or end result but a process of cognitive and behavioural acts (Appley & Trumbell, 1986).

Coping provides a protective function by eliminating or modifying stressful conditions; by controlling the meaning of experiences to neutralise problems and by keeping the emotional consequences of problems manageable (Pearlin & Schooler, 1978).

Sometimes the term tolerance to shiftwork is used to describe the long term manifestation of coping with shiftwork. Costa, Lievore, Casaletti, Gaffuri & Folkard (1989) investigated the inter individual differences in tolerance and adjustment to shiftwork based upon multifactorial individual and societal factors such as circadian adjustment and ability to overcome drowsiness.

It has now become clear that there are many individual differences in tolerance to shiftwork (Smith *et al.*, 1994) and that personal resourcefulness in using various coping strategies to manage the problems of non-standard work hours as well as the capacity for self regulation may also play a role in coping.

FIGURE 2 : SHIFT WORK STRAIN MODEL



(After Monk & Folkard, 1992)

The Shiftwork Strain Model (FIGURE 2) (Folkard & Monk, 1992) explains how strain arises as a function of three factors in the shiftworker.

All three areas need to be functioning effectively for strain to be absent and for coping to be predisposed.

However, invariably one area is obtained at the expense of others, for example, the shiftworker may meet his social and domestic obligations at the expense of proper sleep patterns. Ultimately, due to the inherent imbalance between these demands and actual resources, most shiftworkers settle on a compromise and juggling of resources in order to not critically impair any one area.

Theoretically based questionnaires have subsequently been developed to study coping with shiftwork more systematically. These include the Coping Strategies Inventory (Tobin in Spelten *et al.*, 1993) and The Shift Work Standard Index (Barton, Folkard, Smith, Spelten & Totterdell, 1993).

The research on shiftwork as a stressor is extensive but according to Klein (1994), the conclusions are far reaching. Poor adjustment strategies result in increased health costs, higher absenteeism, higher rate of accidents returning home from work and increased turnover.

Klein (1994, p.2) refers to the result of shiftwork stressors as the "costly breakdown of the human system".

1.2.3 Hardiness as a Predictive Variable for Coping with Shiftwork

Rosenbaum (1988) refers to the construct of learned resourcefulness as "an acquired repertoire of self-control skills" which assists the individual's ability to cope effectively with stressful events such as shiftwork. Learned resourcefulness is also operationally defined as "behaviours and skills (mostly cognitive) by which a person self regulates internal responses, such as emotions, pain, and cognitions, that interfere with the smooth execution of an ongoing behaviour" (Rosenbaum, 1988, p.492).

Shiftwork involving nightwork has been found to impair worker performance (Wynne, Ryan & Cullen, 1990). However, from the perspective of existential theory, the hardiness construct in personality was developed to clarify how some individuals tend to maintain wellness even in situations which would normally be characterised as intolerable or stressful.

Hardiness is an individual predisposition which has been found to be a moderator variable under conditions of stress (Manning, Williams & Wolfe, 1988; Strümpfer, 1990). By consciously recognising and acting upon their environments (existential theory), hardy individuals are able to combine certain dimensions of the construct hardiness (namely, commitment, control and challenge) which then function as resistance resources in their encounter with the stressful situation. Antonovsky's concept (in Strümpfer, 1995, p. 81) of a generalised resistance resource is described as "any characteristic of the person, the group, the subculture or society that facilitates avoiding or combating of a wide variety of stressors".

While shiftwork has been found to cause stressful physical, social and psychological effects (Finn, 1981), many shiftworkers manage to cope with this lifestyle and are significantly satisfied with it. As hardiness is found to be a moderator of stress, then this variable may also influence coping with shiftwork.

The focus of this research will be upon the more "healthy aspects" involved in shiftworkers' attempts to maintain their adjustment to their unusual and stressful work hours rather than on studying the negative effects of shiftwork on the lives of workers, already so well documented.

1.2.4 Tenure and Coping with Shiftwork

There is a school of thought (Folkard & Monk, 1979; Akerstedt, Patkai & Dalhgren, 1977) who believe that experienced shiftworkers may show some form of long term adjustment of circadian rhythms as a result of prolonged experience of a particular shift system.

Knutsson, Akerstedt and Jonsson (1990) report a curve shaped relationship between the years of shiftwork and heart disease with a positive correlation up to the second decade of exposure to shift work, after which the period of relative risk declines rapidly despite the shift load. This could be as a result of continuous self selection resulting in a highly select group of hardy and healthy workers.

Folkard and Monk (1979) postulate that experienced shiftworkers appear to be more committed and adapted to their particular work schedules and it is possible that this construct of commitment may be a form of psychological adaptation and is described by Zedeck, Jackson and Summers (1983) as satisfaction with and intention to remain in shiftwork as well as an ability to adjust to changing meals and sleep schedules (Akerstedt *et al.*, 1977).

Zedeck *et al.* (1983) conclude that more experienced shiftworkers show a higher level of satisfaction with shiftwork. However, this phenomena requires a greater in-depth study.

As discussed, because of the process of natural selection and attrition (through resignations, ill-health retirements etc.) of those individuals unable to adapt to shiftwork due to a lack of psychological resources to buffer the stressful situation, it could be expected that a greater number of shiftworkers with long term tenure (+ 10 years) will have a greater psychological adaptation to shiftwork because they are the 'survivor' population. In a rubber industry survey (Adler, 1991), the percentage of shiftworkers found working after the age of 40 (survivor population), indicated that 10 to 30 percent of an original shiftworking population will be unable to cope and will leave shiftwork altogether (Adler, 1991).

While a study by Folkard and Monk (1979) implies that performance efficiency may show long term adjustment, only a few studies have shown long term adjustment from the psychological perspective of worker coping strategies where coping with shiftwork is also a function of long term adjustment (Spelten *et al.*, 1993).

However, no such studies have been conducted in South Africa. South Africa's multicultural mix of workers (in terms of race, culture, class, gender, social support, infrastructure, transport and housing) differs from that of our overseas counterparts and it is this uniqueness which may influence the results of studies on coping strategies in relation to shiftwork.

1.2.5 **Problem Statements**

The problems under investigation in this research project are:

If shiftwork has such a devastating influence on the physical, psychosocial and psychological health of individuals, will any "deviant" individuals actually show or develop fortigenic behaviour consequences (coping with shiftwork) out of this long term stressor?

If so, will hardiness and/or any of its three dimensions (control, commitment and challenge) be a significant discriminating variable in these "deviant" individuals compared to the rest of the group who supposedly are not coping well?

Is there a significant relationship between tenure for shiftwork and coping with shiftwork?

Are these relationships true for a multicultural South African industrial context?

1.3 AIM OF RESEARCH

Following on from the abovementioned problem statements, the aim of this proposed study is to investigate the relationship between hardiness and tenure for coping with shiftwork.

It follows, if significant predictive relationships are established, that this may have implications in terms of manning and recruitment strategies as well as education and shiftwork awareness programmes for industries in which shiftworkers are required.

Smith *et al.* (1994, p. 29) suggest using certain scales to establish a shiftwork monitoring program to aid the identification of individuals with greater tolerance to working shifts who may be safer workers due to "their cognitive and behavioural acumen".

If a significant relationship can be found between coping with shiftwork to hardiness and tenure, then we may provide evidence for a certain level of longterm psychological adjustment (fortigenesis) to shiftwork in certain groups of South African workers which also has implications for personality research within the salutogenic paradigm.

We may also be able to determine the most likely period of adjustment (i.e. 1 year, 5 years, 10 years) and then target inexperienced and other high risk shiftworkers for special adjustment training to coach them to manage their meal times, sleep schedules and social roles to help speed up and optimise their coping with particular shift systems (Ehret, 1984; Folkard and Monk, 1992).

This training programme could contribute to industry in South Africa by ultimately improving worker adjustment and satisfaction with

shiftwork and so improve performance efficiency and reduce accident rates in this group of inexperienced workers.

1.4 OUTLINE OF STUDY

The first chapter in this study covers the background to the problem and outlines shiftwork as a field of study.

The possible contributions of this particular research project towards the fields of ergonomics, shiftwork research and personality research (specifically within the salutogenic paradigm) is discussed.

The various constructs to be studied are elaborated on (namely, coping with shiftwork; tenure in shiftwork and hardiness). Problem statements and aims are also provided.

The second chapter includes a full theoretical orientation to the various concepts and constructs applicable in this field including humanism, existentialism, salutogenesis, hardiness, shiftwork research, coping strategies, shiftwork locus of control, adaptation to shiftwork, educating shiftworkers and management strategies.

The third chapter outlines the method of investigation including the research strategy, elements of the research (questionnaires, group discussions), hypotheses and samples.

The results and a discussion of these results are then forwarded and finally, conclusions are drawn from these results with recommendations forwarded to the research community.

CHAPTER 2

THEORETICAL ORIENTATION

There are three relevant theoretical frameworks within this review of literature :

- a) Ergonomic factors in classical shiftwork research;
- b) Humanist theories of man; and
- c) Specific coping strategy models for shift workers.

2.1 CLASSICAL SHIFTWORK RESEARCH

2.1.1 Ergonomics in Shiftwork

Ergonomics is a multidisciplinary field of study, using psychologists, physiologists, biologists, designers, engineers and ergonomists on its team of specialists. Blignaut (1988, p. 13) defines ergonomics as:

" The generation and application, particularly, of experimental psychological data and methods, so as to assist primarily in adjusting the physical environment in which man operates, to best suit his or her limitations and capabilities".

Shiftwork research is ideally suited to the field of ergonomics because it involves experimental research and interventions in the field of human-environment interactions.

Ergonomists adopting a systems approach, concentrate on the development of efficient functioning between human, machines and the environment. In the case of shiftwork researchers, their work does not fall within the domain of one profession as the interaction between humans and their shift patterns needs to be studied from a biological, sleep, physiological and psychological perspective (Folkard & Monk, 1992).

2.1.2 Shiftwork Research

Methodological approaches

There are four methodological approaches to studying shiftwork (Tepas, 1979).

Researchers will choose the most appropriate methodology, based upon "our training or inclinations". . . some "will emphasize the utilitarian or 'person centred' nature of findings . . . other will find satisfaction in laboratory experiments and the controllable, . . . 'principle centred' aspects of research" (Webb, 1979, p. 24).

The first approach is a record study strategy. Using personnel records, insurance/lost time claims, absentee records, company clinic records and accident reports, the researchers are able to access large samples without depending upon the co-operation of line subjects (shift workers) (Colligan, Smith & Hurrell, 1979). An example of this approach was a retrospective study regarding absenteeism among shiftworkers in Brazil by Fischer (1986).

Field studies are not cost effective and require that a large amount of time is spent on a small volunteer sample size (Folkard & Monk, 1992). They usually focus on sleep-work problems.

Laboratory methods simulate shift patterns (Folkard & Monk, 1992). Work schedules and interactions with sleep, performance and mood are usually analysed with the objective of investigating "the effects of chronic, reality based shift schedules on workers" (Walsh, Gordon, Maltese, McGill & Tepas, 1979, p.18).

The survey method is the method employed in this study and is popular because it provides a rapid method of collecting detailed information from a large sample at a low cost. The survey questionnaire method is best suited to "measures of the many diverse and subtle factors relating to shift work and health, such as adjustment" (Smith, Colligan & Tasto, 1979). An example of such a measure is the "reminiscent" study, using a questionnaire constructed and devised from measures on the Standard Shiftwork Index, in which shiftworkers (now retired) perceive working shifts as being worse than they realised at the time of actually working the shifts (Spelten *et al.*, 1993).

2.1.3 Ergonomic factors in shiftwork

The use of a monocausal approach for understanding shiftworkers may limit the understanding of the complexity of the origin of disease and health among shiftworkers (Agervold, 1976). Therefore one should consider a combination of work elements, biological, social, health and psychological factors.

Many of these factors have already been investigated. Firstly, the actual elements making up shift days and cycles have been studied. The working time versus leisure time versus sleeping times were analysed (Rutenfranz, Knauth & Colquhoun, 1976), with proposals made for optimal shift scheduling (Rutenfranz *et al.*, 1976; Klein, 1994; Morris & Showalter, 1983; Roscoe & Haig, 1990).

Biological factors are probably one of the critical aspects in the origin of shiftworker problems (Folkard & Monk, 1992), as the endogenous circadian rhythms (cycles of approximately one day) have a major impact on the sleep requirements of shiftworkers. As Monk (1986, p.553) so clearly states:

"Basically, there are two things wrong with night work: having to work when you should be asleep, and having to sleep when you should be awake".

Different variables such as oral temperature, cortisol, heart rate and blood pressure are used to measure changes in the circadian rhythms of shiftworkers (Folkard & Monk, 1992). Because the circadian rhythms are constant and resistant to change, forced changes to sleep and eating patterns cause an imbalance in the human system, causing tiredness, irritability and gastrointestinal problems (Folkard & Monk, 1992); mood affects (Lortie, Foret, Teiger & Laville, 1979); partial sleep loss (Smith, 1979) and decreased alertness (Akerstedt *et al.*, 1977).

Quality of social and domestic life is disturbed in many shiftworkers and this is another area of investigation for researchers (Gannon *et al.*, 1983). The effects on social and domestic life may be explained by the role conflict the shiftworker experiences (husband, worker, friend, father, mother, parent, etc) and in the time available to do so (Jackson *et al.*, 1985). Shiftworkers who are able to balance leisure time activities and work-related activities will express greater satisfaction with their jobs (Gannon *et al.*, 1983).

Community integration (the social support networks) of shiftworkers has also been identified as a variable with an effect on satisfaction with shiftwork. A small town in which a large percentage of the population works shifts actually facilitates adjustment to shiftwork, whereas in other communities where there is only a small proportion of shiftworkers who have a low status amongst community members, adjustment to shiftwork becomes more difficult (Gannon *et al.*, 1983).

Health issues are of concern to both shiftworkers and researchers. There are however, problems in proving causal interaction effects due to the fact that a large number of existing shiftworkers (the surviving population) will consist of fairly robust physical profiles and may be employing effective coping strategies. Those who have been unable to cope due to endogenous health reasons or through ineffective coping strategies are either singled out of studies used for research purposes (Agervold, 1976), or have transferred out of or have resigned from shiftwork themselves (Folkard & Monk, 1992). Former shiftworkers are therefore often included in studies of health consequences, for example in the comparison study of stress

and psychosomatic complaints between workers of different shiftwork schedules, non-shiftworkers and former shiftworkers (Frese & Semmer, 1986).

Given these research problems, we are still able to conclude certain health effects on shiftworkers who are not coping well (Folkard & Monk, 1992) and for this group the following quote provided by Folkard & Monk (1992, p.32) is most applicable:

"Shiftwork is probably bad for the heart, almost certainly bad for the head and definitely bad for the gut".

Coupled to lifestyle and palliative issues such as smoking, and a high fat intake, shiftworkers may be at higher risk of cardiovascular disease (Folkard & Monk, 1992). In addition, a study conducted at Heathrow Airport suggests an interaction effect between circadian manipulation and psychiatric symptoms such as depression (Folkard & Monk, 1992).

Shiftworkers are also at risk of gastrointestinal dysfunctioning due to shiftwork (Rutenfranz *et al.*, 1976). Symptoms usually include ulcers, loss or increase in appetite, constipation and indigestion (Finn, 1981).

Within the field of ergonomics, performance consequences have also been considered areas for investigation (Folkard & Monk, 1992).

Workers have been shown to have a clear 24 hour variation in capacity to work, with efficiency at its lowest level during night shift (Folkard & Monk, 1992) and adjustment (flattening of the temperature curve) only appearing towards the end of a night work week (Patkai, Akerstedt & Pettersson, 1977). Longer shift rotations have been recommended by Patkai *et al.*, (1977) as the present popular weekly alternating shifts are too short in duration for shiftworkers.

Folkard and Monk (1992) also postulate that ultimately, performance efficiency is a function of a number of factors including the shift system task demands, individual differences, the normal performance rhythm, affective state and subjective health.

Finally, inter individual differences (such as age and gender) have been used as variables in shiftwork research. Within this context, the variables of tenure (as a biographical variable) and hardiness (as a personality variable) will be investigated.

Tenure (experience in shiftwork) has been extensively defined and outlined in Chapter 1. Suffice to say that it is an area which requires a more in-depth investigation. Given the hard physical manual nature of work conducted by shiftworkers in this study, sampled from a tyre manufacturing operation, the effects of experience (tenure) on coping with shiftwork makes an interesting problem as conventional wisdom might indicate that tolerance to shiftwork and subjective health may be affected by the deterioration of health due to advancing age which is obviously linked to longer tenure experienced in years (Monk & Folkard, 1992; Oginska *et al.*, 1993). The main effect of ageing on

sleep is a decrease in slow wave activity and an increase in number and duration of arousals (Härmä, 1993) as well as indications of slower circadian adjustment of shiftwork in middle aged shiftworkers compared to younger ones. However, this study will investigate the opposite effect. Could the self selected groups of shiftworkers (those who did not leave shiftwork) and those who have longer years of experience, be inherently better at coping with shiftwork because of a long term adjustment effect?

Studies have measured differences in immediate memory and other performance factors (Folkard & Monk, 1979), in which performance is dependant on task type, shift system and individual, working via the circadian rhythm. In these studies the focus has always only been on short term adjustment (over 48 hours).

However, Patkai *et al.* (1977) also indicated possible long term adjustment to shifts as a result of experience on shifts.

This seems to take place as a result of the speeding up of short term adjustment over successive night shifts (Folkard & Monk, 1979) and so the need for further investigation of longer term adjustment is open for debate and requires more empirical evidence, hence the use of tenure as a variable in this study.

Finally, personality types have also been used as variables to explain inter-individual differences in shiftwork tolerance. These differences will be outlined in more detail in ensuing sections.

2.1.4 Strategies for Managing Shiftwork

Emerging from the vast field of shiftwork research, are a number of recommendations for individual and employer strategies to manage shiftwork and its negative effects.

In 1976, Rutenfranz *et al.* forwarded criteria for optimal shift schedules such as single night shifts with the length of the shift related to the type of work. These were the first tentative steps to giving sound, practical advice to employers and shiftworkers.

Synchro-Tech, an American shift scheduling consulting firm specialise in shiftwork educational programmes. They recommend evaluation, improvement and design of work schedules and practices (by management), whilst recommending adjustment strategies regarding the structure and timing of sleep, meals and social activities (for individual employees). Klein (1994, p.2) considers that in so doing, it is possible to "reduce the costly breakdown of the human system".

Valuable inputs into both employer and individual coping strategies are forwarded by Folkard & Monk (1992) and these interventions include a) increasing management awareness, b) developing shift systems which take account of circadian, sleep and performance demands, c) providing daylight illumination, d) clinical support, e) canteen facilities and f) shiftwork awareness programmes. In these programmes, families of shiftworkers and shiftworkers themselves are then given information to empower them with skills to manage sleep, eating, social and domestic activities.

In addition, Ehret (1984) suggests a disciplined plan for mealtimes and foods to help workers adjust to shifts; Morris and Showalter (1983) forward linear programming as a solution to scheduling problems while Reese (1988) suggests that night shift naps will ease shiftworkers' fatigue.

Certain of the more specific recommendations need to be evaluated in terms of their acceptability and practical efficacy among shiftworkers (Wedderburn & Scholarios, 1993). Whilst Tepas (1993) provides guidelines for the design of educational programmes for shiftworkers, their families and prospective shiftworkers, he states that these only form part of a process which still requires validity testing.

In summary then, the ergonomic study of the human and his/her environment (systems, processes, machines) as part of a systems approach has therefore already made a major contribution to knowledge in the field of shiftwork. In this particular study an ergonomic theoretical orientation is used to explain the concepts of tenure as a predictive variable of coping with shiftwork.

2.2 THE HEALTHY PERSONALITY

Psychological health remains an elusive concept. If one uses a medical model, then one could define a psychologically healthy person as someone who is not sick mentally (Chiang & Maslow, 1977), or if using an adjustment model, if the person's behaviour was within acceptable social norms.

The concept of psychological health/well-being is linked to the values and paradigms within which we think. Chiang and Maslow(1977) argue for a definition based upon empirical data but which could accommodate values as valuable psychological elements.

Erikson and Maslow (in Hershenson, 1982) offer empirically based criteria for healthy development. They are survival, growth, communication, recognition, mastery and understanding. These take into account both intra- and interpersonal functioning. These are then integrated into a counselling model based upon ethos, relationship and procedures, with the aim of promoting the healthy development of clients.

2.2.1 Humanist Theories

The humanist model focuses on the creative and potential drive of individuals towards self fulfilment which is considered an essential criteria for psychological health (Chiang & Maslow, 1977).

Humanist theorists share similar assumptions; with a model of a human as a responsible, worthy being who is constantly striving towards self actualisation in a conscious, active manner. Psychologically healthy individuals are used as the criteria for examining human functioning (Meyer, Moore & Viljoen, 1992).

Allport (in Chiang & Maslow, 1977) explores the concept of health in the personality using values as a frame of reference. He notes that while many theorists operate within different paradigms, that they remain with common and overlapping goals for therapy;

for behaviourists, efficiency is a primary goal; for non-directive therapy it is growth; for Maslow it is self actualisation and for Frankl it is meaningfulness and responsibility. He uses a holistic approach with both scientific and value based criteria for maturity, including factors such as emotional security and a realistic perception of reality.

Rogers believes implicitly in "the individual's capacity for exploring and understanding themselves and their troubles and their ability to resolve those problems" (Chiang & Maslow, 1977, p.23).

Maslow views optimal development as the ideal - "it is someone who has overcome the restrictions of his environment and meets his deficiency needs regularly" (Chiang & Maslow, 1992, p.49).

For Fritz Perls the ultimate goal of here and now therapy is to become "truly aware at every instant of himself and his actions . . . to be able to see what his present difficulties are and help himself to solve them in the present, in the here and now" (Chiang & Maslow, 1992, p. 49).

Moving towards an integrated existential philosophy, Frankl (1959) believes that the mature man is free from internal needs and outside pressures - given any set of circumstances. Because man has a freedom of will, this gives him the ability to rise above such circumstances. In addition, these individuals who have attained psychological health, have a realistic perception of their situation and employ a number of effective coping strategies to manage life.

These include using a sense of humour, a dedication to the search for a meaning in life, an active seeking of opportunities for the future and a regard for work as a profession in which he or she can make a worthwhile contribution while remaining fulfilled and involved.

These humanist theories are the basis for the second part of this study, in which it is assumed and investigated that a minority of workers will retain psychological health, using effective strategies to deal with the difficult circumstances arising from working shifts, rather than decompensating and displaying pathogenic behaviour.

2.2.2 Salutogenic Paradigm

To add to the richness of our understanding of human functioning, the aforementioned concepts around the healthy personality were integrated into the salutogenic paradigm (Antonovsky, 1984). This paradigm is in direct contrast to the medical model with its pathogenic (origins of disease) mindset in which at best man was encouraged to move from 'abnormal' to normal behaviour (Chiang & Maslow, 1977) or to reach 'homeostasis' (Strümpfer, 1990).

The salutogenic paradigm has three assumptions. Firstly, that stressors (either acute, catastrophic, continuous, low-key or only visible as daily demands), are constantly present (Strümpfer, 1990).

Consider shiftwork within this context - using Pearlin and Schooler's (1978, p. 3) definition of stress as - "many of the difficult problems with which people cope are not unusual problems impinging on exceptional people in rare situations, but are persistent hardships

experienced by those engaged in main stream activities within major institutions".

The circumstances relating to shiftwork are then clearly evident as possible predecessors for stress even though the stressors of shiftwork themselves are smaller but more continuous in nature than the traumatic circumstances related to the concentration camp experience, for instance.

Antonovsky asked the question - "Whence the strength?". He is trying to explain the existence of groups of people who have not given in to the constant demands of their daily existence (Strümpfer, 1990, p. 267). From this developed generalised resistance resources (GRR's) such as intelligence and social support which are used as buffers or moderator variables of stress.

GRR's include strategies such as physical and biochemical (caffeine use); artefactual (shiftpay); cognitive (educational awareness and shiftwork information); and emotional/social support (Strümpfer, 1990).

Ganster and Victor (1988) for instance, proved that social support may buffer some people from the effect of some of life's problems.

This study will focus on the emotional and cognitive GRR's employed by shiftworkers, with specific reference to the engagement of appropriate coping strategies such as problem solving, cognitive restructuring, social support and expressing emotions (Barton *et al.*, 1993).

The second assumption of the salutogenic paradigm is that human functioning can be described along a disease - health continuum. This opens up the entire population as a subject of study; in the case of this study - the entire population of shiftworkers in a plant (both "copers" and "non-copers"), rather than groups of shiftworkers in which those that are not coping are excluded.

It will be attempted to answer the salutogenic question posed by Antonovsky - "How can we learn to live, and live well, with stressors, and possibly even turn their existence to our advantage?" (Strümpfer, 1990, p. 267).

If one works within this theoretical paradigm, even though a high stress load is inherent to shiftwork, it is expected that some shiftworkers will maintain a position on the disease-health continuum close to the wellness pole.

Finally, Antonovsky (1984) uses the sense of coherence (SOC) as a construct in the salutogenic model. This SOC originates from the use of GRR's over a period of time in which people make sense out of the countless stressors with which they are bombarded, which ultimately results in the use of specific GRR's to cope with work challenges and concludes with the individual perceiving work as motivational and challenging rather than stressful.

2.2.3 Hardiness as a construct

Kobasa, Maddi and Kahn (1982) investigated the existence of GRR's which may "neutralize the otherwise debilitating effects of stressful life events". Various of these resources were integrated into the concept of hardiness. They included; constitutional strengths, social supports, health practices and personality dispositions. Hardiness is "a constellation of personality characteristics that function as a resistance resource into the encounter with stressful life events" (Kobasa *et al.*, 1982, p.169).

Given that hardiness was found to have a significant direct effect on emotional and psychological factors related to personal well-being and work performance (Manning *et al.*, 1988), hardiness as a construct has been used as a predictive variable for coping with shiftwork in this study.

Various inter individual personality differences in tolerance to shiftwork have been determined. Folkard and Monk (1992) classified these differences according to circadian types resulting in a "morning lark" (M-type) or a "night owl" (E-type). The Composite Morning Questionnaire (Barton *et al.*, 1993) was developed to measure this construct.

Secondly, the Circadian Type Inventory identifies three circadian factors which describe inter individual differences: morningness, sleep pattern rigidity and vigour.

Vigour and less sleep pattern rigidity have been found to have a positive effect on shiftworkers (Folkard & Monk, 1992).

Thirdly, the use of neuroticism and extraversion, is a further consideration of personality factors in shiftworkers. The Eysenck Personality Inventory (Barton *et al.*, 1993) is used to measure these dimensions.

The need to include a study of hardiness as a predictive variable for coping with shiftwork developed out of the abovementioned theoretical orientations, as well as the need to test other personality variables with respect to coping with shiftwork.

Integral to hardiness, are three personality dispositions, namely commitment, control and challenge (Kobasa *et al.*, 1982).

The commitment (versus alienation) component of hardiness incorporates the recognition of one's own goals and priorities, allowing for a valid assessment of one's self in terms of values and ability. Rather than feeling alienated, committed persons feel an integral and important part of the situation they find themselves in because they identify with, and appreciate, the meaning of events and the environment in which they have become actively involved (Kobasa *et al.*, 1982).

The second hardiness characteristic is control (versus powerlessness). Hardy individuals believe and act as if they influence the course of events (Kobasa *et al.*, 1982).

They have a feeling of responsibility for what is happening around them and they see events as a consequence of their own actions. Even if an event or situation is not under their control, they incorporate the event, through processes and actions, into a longer term plan and, as such, the situation seems consistent with their view of life (Kobasa, 1979).

Challenge (versus threat), the third component of hardiness, involves seeing change as a necessary and integral part of life. Hardy individuals find transformation exciting and each change just a temporary hurdle in which they must readjust so as to prove self worth and allow for growth (Kobasa *et al.*, 1982). They are stimulated by, rather than afraid of, the unknown for they are sufficiently aware of their own environment and where to turn for needed resources (Kobasa, 1979). They are continually setting personal goals and aims. By actively involving themselves in problem solving, they are always utilising their skills of appraisal and integration.

Hardiness has been shown to have moderating effects on the negative consequences of interrole conflict in marital adjustment (Barling, 1986) and has a buffering effect on life stress because hardy individuals are more likely to perceive events as desirable and controllable (Rhodewalt & Agustscloittir, 1984).

2.2.4 Fortigenesis

Strümpfer (1995) argues for the expansion of the concept of 'salutogenesis' to 'fortigenesis' which relates to the origins of psychological strength, because by using health as the end point on the ease/disease continuum, we may be limiting the paradigm. It seems as though Antvosky was moving towards an understanding for the meaning of salutogenic strength.

Strümpfer (1995), in his discussion of this new paradigm "fortigenesis", attempts to build upon a philosophy which helps psychologists to understand the origins of strength which assist people to withstand the pressures of their "bleak and dismal" lives (Strümpfer, 1995, p. 87).

Physiological toughness is a strength factor which can lead to enhanced work performance, emotional stability and stress tolerance (Strümpfer, 1995). In addition, physical fitness has been found to be a factor which increases tolerance to shiftwork (Härmä, 1993). This metaphor of strength is also found in the construct of hardiness (Kobasa, 1979).

In three examples, Strümpfer (1995) highlights the routes of fortigenesis as flowing from either

a) conducive work environments, or

- b) from demanding experiences such as military combat in which exposure to stress would result in positive developmental effects; and also
- c) in work experiences involving high psychological demands of role overload and role conflict.

These assumptions support the hypothesis of this study because origins of strength may then also flow out of shiftwork. Whilst shiftworkers in a manufacturing plant do not necessarily experience conducive work environments, (in fact they experience just the opposite as they are not able to control the pace of their work or make decisions, are closely supervised and have to complete routine and repetitive tasks), they do experience work as physically demanding due to the shifts in circadian rhythms and changes to sleep patterns and also experience constant role overload and role conflict problems.

This study of hardiness and its interaction effect to coping with shiftwork (which is considered to be at the wellness end of the psychological strength continuum) may then also be influenced by the fortigenesis process.

2.3 COPING WITH SHIFTWORK

2.3.1 Health

Shiftwork is related to health problems (Härmä, 1993) with 20 to 30 percent of shiftworkers leaving within the first 3 years of working shifts due to health problems. However, questions still remain as to why, among those who continue with shiftwork, do a select few continue to report subjective well-being?

2.3.2 Shiftwork Locus of Control

More research is necessary on personality variables which may influence an individual's tolerance to shiftwork (Smith, *et al.*, 1994).

Rotter developed the locus of control (LOC) as a personality characteristic which has been used in a variety of settings (Smith *et al.*, 1994). "Individuals with an internal locus of control believe reinforcements to be contingent upon their own behaviours or attributes" (Smith *et al.*, 1994, p.6).

The shiftwork specific locus of control scale has been developed in response to the need for a domain specific scale which had greater predictive power than Rotters' internal-external scale (Smith *et al.*, 1994).

The result of their study of midwives indicates that a shiftwork specific internal locus of control "may mediate the negative impact of non standard work hours" (Smith *et al.*, 1994, p. 31).

The control sub scale of hardiness has already been described and may be linked to the abovementioned construct.

2.3.3 Coping with Shiftwork

As discussed in Chapter 1, coping is a process of acts used to control the individual's meaning of his/her experiences. These efforts (Folkman, 1984) help the individual to manage (reduce, minimize or tolerate) experienced levels of stress (Spelten *et al.*, 1993).

The distinction between emotion - focussed coping (regulating emotions) and problem - focussed coping (aimed at dealing with the problem) was used together with the approach - avoidance dicotomy, which distinguishes between engagement and disengagement processes to develop a shiftworker specific coping questionnaire (Barton *et al.*, 1993).

Based upon Folkard's conceptual model of shift work and the shift system (in Folkard & Monk, 1992), coping strategies are employed as intervening variables on the effects of mood and performance which are caused by disturbed sleep, work, family and social life and on the chronic effect of mental health caused by negative mood and performance patterns.

2.3.4 Tolerance with Shiftwork

Individuals differ in the degree to which their circadian rhythms adjust to shifts (Folkard & Monk, 1979).

Vigour and flexibility of sleeping habits seems to impact positively on this adjustment (Costa *et al.*, 1989). Other individual differences in coping with shifts may be discussed in various ways.

Firstly, according to Härmä (1993), individuals have different capabilities to deal with the load of shiftwork.

Commitment was found to be the most critical factor in dealing with shifts (Härmä, 1993), resulting in better sleep hygiene, circadian adjustment and ultimately in better adjustment to shiftwork. Commitment also forms part of the construct of hardiness which has been discussed.

Secondly, faster circadian adjustment may be beneficial in slowly (several weeks) rotating shift systems (Härmä, 1993).

Thirdly, certain individual differences may modify the strain of shiftwork. For instance, certain people with health problems (such as organic sleep disorders) may experience problems with sleep rigidity with a subsequent decreased tolerance to shiftwork (Härmä, 1993). In addition, those shiftworkers with a larger amplitude of circadian rhythm than their colleagues were found to be more tolerant to shiftworker health effects (Härmä, 1993).

Therefore, the degree of adjustment to shiftwork is also a function of inter individual differences. As a concept it is interchangeable with coping with shiftwork and is measured as such.

This theoretical orientation has included a discussion of shiftwork from an ergonomic viewpoint by concentrating on inter-individual differences and their effect upon coping with shiftwork. Specific reference has been made to tenure as a biographical factor which falls in the field of ergonomics. Finally, individual personality differences have been investigated and the construct of hardiness has been posed as a variable which may also further explain the relationship to coping with shiftwork. The development of the salutogenic approach with humanist theories forms the backdrop for the discussion.

CHAPTER 3

METHOD OF INVESTIGATION

3.1 METHODOLOGICAL STRATEGY

3.1.1 Research goal

The aim of this study is to predict the interaction effect that two variables measuring inter-individual differences (namely, hardiness and tenure in shiftwork) have on the coping strategies of shift workers.

Being a predictive study, it is in the sub-category of explanatory studies (Mouton & Marais, 1990). Although research in the field of shiftwork and even studies investigating coping strategies in shiftwork is prolific, there is still a need to indicate causality between inter individual variables in this field (Folkard & Monk, 1992) in a systematic fashion (Spelten *et al*, 1993).

3.1.2 Research Design and Process

New data ^{were} was collected by means of indirect observation (completion of questionnaires); using a quantitative content analysis which was focused on generalisable findings (Mouton & Marais, 1990).

In this discourse, the theoretical validity of the research process has been outlined in the previous chapter review of literature when the various theories and models were used as a framework. The conceptualisation phase is therefore complete.

The operationalisation phase in which the measuring instruments which will be used to obtain accurate data will now follow. As an internal validity issue, it will be important to prove that the operationalisation of the instruments to be measured have construct and predictive validity (Mouton & Marais, 1990).

These considerations will continue with a discussion of the reliability of the study with specific reference to the data collection phase and to the control of confounding variables in the research, the measuring instrument, the sampling of the group as well as the circumstances in which the research took place.

The analysis of data will be determined by the eventual inferential validity of the research. All of the above factors will then lead to a summary of findings and a decision as to the generalisability of the findings to the defined population (Mouton & Marais, 1990).

The process to be followed in this project is:

- i. Statement of the problem: Are hardiness and tenure in shiftwork predictive variables of coping with shiftwork?
- ii. Conceptualisation and operationalisation: Using Kobasa's construct of hardiness, measured in three domains - commitment, challenge and control. Using ergonomic information, years of experience of shiftwork as a variable measured by category. The coping strategies theory of Tobin (in Barton *et al.*, 1993) operationalised and measured on the subscales of engagement and disengagement coping strategies.

- iii. **Data Collection:** Obtaining data by making use of quantitative methods (survey questionnaires). In addition, qualitative methods (focus group discussions) were employed as a means of enriching the empirical evidence.

- iv. **Analysis and interpretation:** The analysis of data is made with specific reference to
 - a) the three dimensions of hardiness (commitment, challenge and control) and

 - b) tenure - the length of experience of working shifts

 - c) to the two strategies of coping with shiftwork (engagement and disengagement) in the four domains of life, namely work, sleep, domestic and social (Mouton & Marais, 1990).

3.1.3 Research approach

This study attempts to explain the psychosocial individual differences between shiftworkers using an objective, planned approach, that is a quantitative research study. A questionnaire survey approach is used as this method produces information which cannot be derived from other objective methods such as using company safety records or a laboratory experiment (Smith, 1979) because it is able to

measure variables not found in health, clinical or safety records. In this case these variables include coping with shiftwork in the social, domestic, sleep and work domains. The use of standardised instruments also permits direct comparisons with other studies using different subject populations (Walsh *et al.*, 1979). The method of collection (using pre-planned inventories) makes for more consistent data as compared to clinical evaluations, for example. However, the data obtained from self-report inventories will be less objective than records data (Smith, 1979).

In addition, focus group discussions are utilised as a means of gaining systematic but qualitative data about the coping strategies used by shiftworkers in the four dimensions (sleep, work, domestic and social life). This would then derive information to enrich the interpretation of information collected in the empirical section of the study as a measure of reliability and validity (Walsh *et al.*, 1979). Although the structured questions call for only brief responses, the group process encourages participants to amplify their responses to give more complete information and to raise topics of concern.

3.2 LISTING OF VARIABLES

3.2.1 Predictive and criterion variables:

The predictive variables are:

- Hardiness expressed as values for:
 - * Commitment
 - * Challenge
 - * Control

- Tenure expressed as:
length of shiftwork service

The criterion values are:

- Coping with shiftwork expressed as:
 - * influence on sleep
 - * influence on social life
 - * influence on domestic life
 - * influence on work

On two scales - engagement and disengagement.

All the abovementioned criterion and predictive variables assume a continuum of values (Mouton & Marais, 1990) and are therefore measured on scales that allow a wide spectrum of values.

3.2.2 Defining the Variables

- Hardiness is a "constellation of personality characteristics that function as a resistance resource in the encounter with stressful life events" (Kobasa *et al.*, 1982, p.169). As a construct, it is synonymous with the term "hardy personality" or "personality hardiness" as coined by Kobasa *et al.* (1982). Hardiness is a function of three personality dispositions - commitment, control and challenge (Kobasa *et al.*, 1982).

Coping with shiftwork is a pattern of proactive cognitive and behavioural strategies (engagement) used to adapt to and function within the problem areas usually associated with shiftwork such as sleep, social life, domestic life and work.

- Tenure may be defined as: The experience that a shiftworker has of working shifts expressed in length of time (months, years).

3.2.3 Extraneous/Confounding Variables

This study was conducted in a tyre manufacturing plant which is typically unionised and blue collar in nature. The population consists of a gender mix of approximately 20 percent females and 80 percent males. All shiftworkers in this sample work on a rotating, continuous 24 hour, seven day week shift pattern, including night work.

South Africa is a multicultural society and language in the questionnaires may be an extraneous variable. Rather than classifying responses into language groups, bilingual questionnaires were made available to shiftworkers who so required. The group discussions were also conducted in the language of choice and a facilitator who spoke that language was provided.

3.3 FORMULATION OF HYPOTHESES

The purpose of this study is to investigate whether hardiness and tenure are significant predictors of coping with shiftwork.

The null hypothesis:

The predictive variables have no significant predictive value for the criterion variables.

The alternative hypothesis:

The predictive variables do have significant predictive value for the criterion variables.

3.4 OPERATIONALISING THE HYPHOTHESIS

3.4.1 Aim of Study

The aim of this study was to investigate the relationship between hardiness (using three personality dispositions of commitment versus alienation; control versus powerlessness and challenge versus threat)

to coping with shiftwork measured on two scales, that is engagement and disengagement strategies (in four domains - sleep, work, social and domestic life).

Secondly, to investigate the relationship from tenure in shiftwork to coping with shiftwork.

The outcome of such research will be to link additional inter individual variables into a coping model for shiftwork.

3.4.2 Sample

A sample of 150 workers (using clock numbers) was selected from the population of 1 500 shiftworkers at the plant using random sampling from a list of randomly assorted digits (in Coolican, 1990). The sample was stratified to ensure a representative sample of females.

The tyre manufacturing industry was selected because of its large (76,51 percent) number of shiftworkers (Adler, 1991) and the nature of its operation (continuous, seven day week). The reason for requiring continuous operations includes:

- Maximising capital utilisation to maintain global competitiveness.
- The nature of the process and long start up times, for example of boilers required for curing.

- The ageing limits of rubber and steel cords.
- The opening up of job opportunities due to expanding of shifts.

3.4.3 Methodologies

i) Survey Procedures

Ensuring that employees co-operate in a study requiring questionnaires can be difficult (Smith *et al.*, 1979).

Once consent was obtained from management, a group discussion was held with union representatives to ensure their understanding and acceptance of the project.

Arrangements to administer the questionnaires were made using the sample group listed by clock number - totalling 150 employees.

Each prospective participant was contacted through the Human Resources Consultant or the line manager in his/her unit. They were given a packet containing a cover letter (Appendix 1) which briefly described the project and the questionnaires. Participants were asked to return the completed survey forms to the researcher's office on-site in the plant. Each questionnaire was expected to take one hour to complete.

The overall response rate of 50 percent ($n = 75$) was disappointing. The workers were asked to fill in their questionnaires at home and because there was no reward (such as a monetary amount), strong motivators to ensure adequate participant response were lacking. Managers are unable to make work time available for surveys because of the loss of productivity resulting from workers being off the line. A monetary incentive for returning the questionnaires seems to be the most effective alternative and solution.

ii) Group discussions

Group discussions were held with ten groups of approximately 12 participants. These groups were chosen from natural work teams and time was allocated at the daily lunchtime safety workshop which these work teams attend on a rotating basis once every three months. An hour was allocated to each group.

The group leader (researcher) and an additional (trilingual) facilitator made initial contact with the group at the beginning of the workshop, beginning with a personal introduction and a brief description of the purpose and content of the discussion.

Four structured questions were asked but the group discussions were facilitated in such a way as to allow for freedom of expression through confidentiality and openness.

The group was led through a broad process made up of the following phases (Appendix II):

- Explanation to gain informed consent
- Specific questions posed
- Group discussion -factual experiences
- Emotions around experiences
- Coping strategies used.

This method of observation using groups was intended to provide a qualitative flavour to the research project by sourcing additional information on coping strategies used by shiftworkers which may not form part of the questionnaire survey. This information could be used to enrich the interpretation of the empirical evidence.

3.4.4 Measuring Instruments

i) Coping (CSI) Questionnaire

The shiftwork-specific questionnaire has been chosen from a standardised battery of questionnaires developed at the request of the Scientific committee on Night and Shiftwork of the International Congress of Occupational Health. (Barton *et al.*, 1993).

Based on the Coping Strategies Inventory and The Ways of Coping Questionnaire; Barton *et al.*, (1993) developed this questionnaire as a situation specific method for measuring coping with shiftwork.

This is the first standardised instrument developed to measure coping among shiftworkers and plays an important role in determining tolerance to shiftwork.

This theoretically based questionnaire for coping with shiftwork was developed for the Standard Shiftwork Index (SSI). It taps four basic areas for shiftworkers as well as providing information on the various coping strategies used to deal with these areas.

The questionnaire (Appendix III) consists of 32 items, covering eight basic coping strategies. The subject is asked to indicate to what extent these eight strategies are used with regard to four problem areas concerning shiftwork. These areas are:

Sleep, social, domestic and work life.

The questionnaire contains a 5 point response option ranging from 1 = not used to 5 = used a great deal (Barton *et al.*, 1993). The subscales of the Coping Questionnaire (CSI) are:

Primary: Problem solving, cognitive restructuring, social support, express emotions, problem avoidance, wishful thinking, social withdrawal and self criticism.

Secondary: Problem focussed engagement, emotion focussed engagement, problem focussed disengagement, emotion focussed disengagement.

Tertiary: Engagement and disengagement.

Scoring: Two scores per area: one for engagement and one for disengagement.

However, because most existing standardised coping questionnaires are too long and general, this coping questionnaire was chosen because it is short and specific. It has only 32 items covering eight basic coping strategies.

The psychometric qualities of this questionnaire were found to be satisfactory. Internal reliability using Cronbach's Alphas for the subscales was reasonably high (0.30 to 0.63), while a factor analysis replicated the factor structure found in the previous Coping Strategies Inventory (Spelten *et al.*, 1993). Up to 53 percent of the variance for all four domains was explained with factor loadings ranging from 0.60 to 0.81.

ii) **The Hardiness Index (Appendix IV)**

Fifty bilingual questions measuring the hardy personality characteristics of commitment, control and challenge make up this questionnaire. The three dimensions of commitment, control and challenge were summed to produce the hardiness index developed by Kobasa (Manning *et al.*, 1988). In previous studies, the main effects for hardiness were replicated when data was analysed using an analysis of variance (Anova) but not in the case of multiple regression (Funk & Houston, 1987).

iii) Biographical information regarding tenure

The information sheet (Appendix V) identifies gender group as well as information on tenure, accident rate, time of accident and seriousness of accident. All questionnaires were completed anonymously.

3.4.5 Contextual Problems in Measurement

Continuous Shift Pattern/Time Factor

The rapidly rotating shift patterns made it difficult to contact shiftworkers to ensure a response to questionnaires as some shiftworkers may be offsite during the day shift for weeks.

The plant had changed over from a five and a half day week, to a seven day week six months prior to the project and this may have confounded the results as workers were still adjusting to the new shift patterns.

Literacy levels

The workers have an average literacy level of Std eight. Some illiterate workers were unable to respond. It is possible that these workers may experience more significant problems with shiftwork, thus providing another contextual problem. In a few cases, parts of the questionnaires which needed clarification were administered through field interviews with the researcher.

3.4.6. Data Analysis

a) Statistical Programme

The BMDP Statistical Software package was used in the following statistical analyses.

b) Descriptive Statistics

Each variable (both predictive and criterion) was analysed according to:

- Frequency and percentages
- Mean and median
- Standard deviation
- Standard Error of Mean
- Coefficient of variance
- Z - scores
- Smallest and largest values

The variables include:

Predictive:

Tenure

Hardiness

Hardiness (Commitment)

Hardiness (Control)

Hardiness (Challenge)

Criterion:

Coping with shiftwork
Engagement
Disengagement
Domestic Disengagement
Domestic Engagement
Social Disengagement
Social Engagement
Sleep Disengagement
Sleep Engagement
Work Disengagement
Work Engagement
Domestic Problems
Social Problems
Sleep Problems
Work Problems.

c) Stepwise Multiple Regression Analysis

Hardiness, hardiness (commitment), hardiness (challenge), hardiness (control) and tenure were used as the independent variables predicting the value of the dependent variables which are coping with shiftwork and subsets of this dimension measured as engagement and disengagement and problems in the four domains of social, sleep, domestic and work life. Secondary scales included engagement and disengagement scores along the four dimensions measured as social, work, sleep and domestic engagement/disengagement.

All the dependent variables were measured on ordinal scales.

The dependent variables of coping and work, social, domestic and sleep problems were adjusted from negative scores to positive to ensure consistency in the same direction so that 1 = Very poor and 5 = Very good.

These significant values were included in each regression analysis to determine which independent variables regressed significantly onto the dependent variables. A 95 percent confidence level was used throughout the analysis. The stepwise regression analysis method was used to compute a regression co-efficient to determine the incremental fit between the criterion and predictor variables. At each step, parameters (significant independent variables) were added or deleted from the model to produce a regression co-efficient (r^2) for the dependent variables.

When hardiness was included in the regression model, the variables of commitment, challenge and control were excluded. When these variables were included in the model, hardiness was excluded. A multiple linear stepwise regression model was computed with an F to enter of 0.40.

The use of the subscales of hardiness (commitment, challenge and control) may then increase the accuracy of the prediction more than if only hardiness was used.

d) Qualitative Analysis

Information obtained from the group discussions was initially categorised into problems and coping strategies experienced in the four domains, work, sleep, social and domestic life. Meanings were then attributed to the problems and themes developed in each area. The coping strategies were categorised into engagement and disengagement strategies for each domain.

Descriptive strategies were analysed for the groups according to:

- Themes emerging
- Frequency of problems reported per work domain
- frequency of disengagement versus engagement coping strategies employed per domain.

CHAPTER 4

4. RESULTS

4.1 Descriptive Statistics

The sample size in this study has 75 cases. Each predictive variable was analysed by means of a frequency table. Table 1 provides this information. Each criterion variable was then analysed according to frequency and percentage for scores obtained (Table 2).

The cases include 18,7 percent females, a similar level to that found in the population. The results should be considered as generalisable only to this particular population of tyre manufacturing shiftworkers on a continuous shift pattern.

Various descriptive statistics in the form of means, standard deviations, skewness, kurtosis values and smallest and largest values are summarised in Table 3.

4.2 Stepwise Multiple Regression Analysis

Two models were used in the analysis.

In model A, using hardiness and tenure as independent variables in the regression model separate r^2 scores were obtained for each of the dependent variables. Table 4 illustrates the results of the regression model .

TABLE 1 : FREQUENCIES - PREDICTIVE VARIABLES

			Tenure	Frequency	Percentage
			0 - 1 yrs	12	16.0%
			1 - 3 yrs	19	25.3%
			4 - 9 yrs	26	34.7%
			10+ yrs	18	24.0%
			TOTAL	75	100.0%
Hardiness	Frequency	Percentage	Commitment	Frequency	Percentage
0-30	0	0.0%	0-10	1	16.0%
31-60	12	16.0%	11-20	16	25.3%
61-90	30	40.0%	21-30	21	34.7%
91-120	33	44.0%	31-40	28	
121-150	0	0.0%	41+	9	24.0%
TOTAL	75	100.0%	TOTAL	75	100.0%
Control	Frequency	Percentage	Challenge	Frequency	Percentage
0-10	0	0.0%	0-10	5	6.7%
11-20	7	9.3%	11-20	37	49.3%
21-30	17	22.7%	21-30	31	41.3%
31-40	29	38.7%	31-40	2	2.7%
41+	22	29.3%	41+	0	0.0%
TOTAL	75	100.0%	TOTAL	75	100.0%

TABLE 2 : FREQUENCIES - CRITERIUM VARIABLES

Coping with shift work	Frequency	Percentage	Social Engagement	Frequency	Percentage
5	23	30.7%	4-6	10	13.3%
4	7	9.3%	7-10	15	20.0%
3	23	30.7%	11-13	17	22.7%
2	9	12.0%	14-17	21	28.0%
1	13	17.3%	18-20	12	16.0%
TOTAL	75	100.0%	TOTAL	75	100.0%
Social Disengagement	Frequency	Percentage	Domestic Engagement	Frequency	Percentage
4-6	27	36.0%	4-6	8	10.7%
7-10	25	33.3%	7-10	19	25.3%
11-13	13	17.3%	11-13	14	18.7%
14-17	9	12.0%	14-17	23	30.7%
18-20	1	1.3%	18-20	11	14.7%
TOTAL	75	100.0%	TOTAL	75	100.0%
Domestic Disengagement	Frequency	Percentage	Sleep Engagement	Frequency	Percentage
4-6	20	26.7%	4-6	11	14.7%
7-10	26	34.7%	7-10	19	25.3%
11-13	18	24.0%	11-13	16	21.3%
14-17	11	14.7%	14-17	21	28.0%
18-20	0	0.0%	18-20	8	10.7%
TOTAL	75	100.0%	TOTAL	75	100.0%
Sleep Disengagement	Frequency	Percentage	Work Engagement	Frequency	Percentage
4-6	34	45.3%	4-6	10	13.3%
7-10	18	24.0%	7-10	24	32.0%
11-13	14	18.7%	11-13	10	13.3%
14-17	9	12.0%	14-17	26	34.7%
18-20	0	0.0%	18-20	5	6.7%
TOTAL	75	100.0%	TOTAL	75	100.0%
Work Disengagement	Frequency	Percentage	Engagement	Frequency	Percentage
4-6	29	38.7%	4-6	11	14.7%
7-10	23	30.7%	7-10	19	25.3%
11-13	14	18.7%	11-13	16	21.3%
14-17	9	12.0%	14-17	23	30.7%
18-20	0	0.0%	18-20	6	8.0%
TOTAL	75	100.0%	TOTAL	75	100.0%
Disengagement	Frequency	Percentage	Social Problems	Frequency	Percentage
4-6	33	44.0%	4-6	10	13.3%
7-10	19	25.3%	7-10	3	4.0%
11-13	14	18.7%	11-13	22	29.3%
14-17	9	12.0%	14-17	11	14.7%
18-20	0	0.0%	18-20	29	38.7%
TOTAL	75	100.0%	TOTAL	75	100.0%
Domestic Problems	Frequency	Percentage	Sleep Problems	Frequency	Percentage
4-6	8	10.7%	4-6	12	16.0%
7-10	5	6.7%	7-10	12	16.0%
11-13	22	29.3%	11-13	26	34.7%
14-17	17	22.7%	14-17	6	8.0%
18-20	23	30.7%	18-20	19	25.3%
TOTAL	75	100.0%	TOTAL	75	100.0%
Work Problems	Frequency	Percentage			
4-6	32	42.7%			
7-10	17	22.7%			
11-13	14	18.7%			
14-17	2	2.7%			
18-20	10	13.3%			
TOTAL	75	100.0%			

TABLE 3 : DESCRIPTIVE STATISTICS

Variable	Frequency	Mean	SD	Skewness	Kurtosis	Smallest value	Largest value
Gender	75	1.1867	0.39227	1.576	0.492	1	2
Tenure	75	2.6667	1.0179	-0.222	-1.093	1	4
Hardiness	75	83.76	21.161	-0.397	-0.85	37	118
Commitment	75	29.013	8.9992	-0.102	-1.238	10	45
Control	75	34.84	8.985	-0.399	-0.678	15	49
Challenge	75	19.907	6.0876	0.258	0.218	7	39
Coping with shift work	75	3.24	1.4504	-0.153	-1.278	1	5
Social Engagement	75	12.333	4.5332	-0.147	-0.79	4	20
Social Disengagement	75	8.8533	3.6454	0.658	-0.649	4	18
Domestic Engagement	75	12.4	4.3215	-0.223	-0.802	4	20
Domestic Disengagement	75	9.2533	3.5492	0.164	-0.995	4	17
Sleep Engagement	75	11.653	4.584	-0.071	-0.923	4	20
Sleep Disengagement	75	802533	3.7779	0.561	-0.966	4	16
Work Engagement	75	11.467	4.2723	-0.081	-0.734	4	20
Work Disengagement	75	8.4133	3.8242	0.407	-1.019	4	17
Engagement	75	47.853	16.029	-0.111	-0.807	16	79
Disengagement	75	34.773	12.935	0.441	-0.895	16	64
Social Problems	75	2.3867	1.3842	0.594	-0.831	1	5
Domestic Problems	75	2.44	1.2865	0.544	-0.689	1	5
Sleep Problems	75	2.8933	1.3811	-0.024	-1.159	1	5
Work Problems	75	3.7867	1.3783	-0.903	-0.421	1	5

TABLE 4 : STEPWISE REGRESSION MODEL A

DV	Constant value	Tenure weight	Hardiness weight	r ²	Steps
Coping with shift work	0.9416		0.0274	0.1608	1
Social Engagement	F-levels insufficient for further stepping				
Social Disengagement	14.3677		-0.0658	0.1461	1
Domestic Engagement	9.6522	1.0304	0.0589	0.0589	1
Domestic Disengagement	15.5331		-0.075	0.1998	1
Sleep Engagement	F-levels insufficient for further stepping				
Sleep Disengagement	13.6206		-0.0641	0.1288	1
Work Engagement	7.8261	1.3652		0.1058	1
Work Disengagement	14.7035		-0.0751	0.1727	1
Engagement	37.3374	3.9435		0.0627	1
Disengagement	58.2249		-0.28	0.2098	1
Social Problems	F-levels insufficient for further stepping				
Domestic Problems	0.9666		0.0176	0.0837	1
Sleep Problems	0.8002		0.025	0.1466	1
Work Problems	1.9360		0.0221	0.1151	1

Significant value for 75 cases is = 0.18

Results - Model A

The independent variables of tenure and hardiness did not regress significantly onto the dependent variable of social engagement, sleep engagement and social problems.

At a significant value level of $r^2 = 0,18$ for 75 cases, the independent variables regressed onto criterion variables with the following results:

Hardiness regressed with a negative relationship onto domestic disengagement (-0,075) with $r^2 = 0,1998$ and onto disengagement (-0,28) with $r^2 = 0,2098$. This means that 19,98 percent of the shared variance between low hardiness (unhardy) and domestic disengagement can be explained by hardiness while 20,98 percent of the shared variance between disengagement and low hardiness is explained by hardiness alone.

While hardiness formed part of the regression analysis for coping with shiftwork, in social disengagement, domestic engagement, sleep disengagement, work disengagement, domestic problems, sleep problems and work problems, none of the r^2 co-efficients was found to be significant at the 95 percent confidence level.

Tenure also formed part of three runs, namely onto domestic engagement, work engagement and engagement but in all of the runs the r^2 coefficient was not considered significant at the 95 percent confidence level.

Therefore in Model A the null hypothesis may be rejected for the following predictive variables onto the following criterion values:

(-) indicates a negative relationship

Predictive Variable

Criterion Variable

Hardiness (-)

D o m e s t i c
Disengagement

Hardiness (-)

Disengagement

So given these results, these alternative hypotheses may be accepted:

- a) Hardiness is a predictive variable for domestic engagement
- b) Hardiness is a predictive variable for disengagement

The null hypotheses for hardiness and tenure as predictive variables for coping with shiftwork, social engagement, sleep disengagement, work engagement, work disengagement, domestic problems, work problems, social disengagement, domestic disengagement, sleep engagement, engagement, social problems and sleep problems may be accepted.

Results - Model B

Model B excluded hardiness as a variable but included the three scales of hardiness (commitment, control and challenge) as well as tenure. Table 5 depicts the results. A negative score on commitment indicates alienation, on control indicates powerlessness, and on challenge indicates threat.

The dependent variable F levels were insufficient for stepping onto social engagement, sleep engagement and social problems.

Using the same significance level as Model A the results were:

Commitment and challenge regressed onto domestic disengagement and 25,27 percent of the shared variance for domestic disengagement was expressed by these two variables with the regression co-efficient at the required level for 75 cases. These two dimensions of hardiness therefore have a predictive value for the use of certain coping strategies amongst shiftworkers in their domestic lives.

The independent variables did not meet the r^2 significant value level of 0,18 for the criterion variables of coping with shiftwork, social disengagement, sleep disengagement, work engagement, work disengagement, domestic problems domestic engagement, engagement, sleep problems and work problems.

TABLE 5 : STEPWISE REGRESSION MODEL B

DV	Constant value	Commitment	Challenge	Control	Tenure	r ²	Steps
Coping with shift work	1.1762			0.0592		0.1347	1
Social Engagement	F-levels insufficient for further stepping						
Social Disengagement	13.3211	-0.154				0.1445	1
Domestic Engagement	9.6522				1.0304	0.0589	1
Domestic Disengagement	15.7965	-0.1012	-0.1812			0.2527	2
Sleep Engagement	F-levels insufficient for further stepping						
Sleep Disengagement	13.0183	-0.1642				0.153	1
Work Engagement	7.8261				1.3652	0.1058	1
Work Disengagement	13.5389		-0.2575			0.168	1
Engagement	37.3374	0.7168			3.9435	0.0627	1
Disengagement	53.8999	-0.6592				0.2104	1
Social Problems	F-levels insufficient for further stepping						
Domestic Problems	1.0312		0.0708			0.1121	1
Sleep Problems	1.2178	0.0578				0.1416	1
Work Problems	2.1880	0.0551				0.1294	1

Significant value for 75 cases is = 0.18

The results for Regression Model B therefore indicate that the null hypothesis may be rejected for the following predictive variables and criterion variables:

(-) indicates a negative relationship

<u>Predictive Variable</u>	<u>Criterion Variable</u>
Commitment (-) & Challenge (-)	Domestic disengagement
Commitment (-)	Disengagement

Given these results the following alternative hypothesis may be accepted:

- a) Commitment and challenge are predictive variables for domestic disengagement coping strategies
- b) Commitment is a predictive variable for disengagement coping strategies.

The null hypotheses for coping with shiftwork, social engagement, social disengagement, sleep disengagement, work engagement, work disengagement, domestic problems, domestic engagement, sleep engagement, engagement, social problems, sleep problems and work problems are accepted in Model B.

4.3 Focus group discussions analysis

Ten groups with an average size of 12 members were facilitated. Participation from the groups was spontaneous. However, the use of a structured process allowed for an analysis of data using descriptive statistics such as percentages (Table 6). Problems with sleep were evident in 80 percent of group responses and domestic problems emerged, such as arguments with spouses (100 percent), family confusion over shift times (90 percent), worry about families safety (100 percent). Social problems were also experienced with social isolation (80 percent) and missing social events (80 percent) ranking as the most important social problems experienced with shiftwork.

Problems with work performance was reported in 100 percent of group responses with lethargy and depression as highly ranked work problems.

Table 6 has a breakdown of the reported problems as well as coping strategies employed to deal with the problems in the four domains of sleep, domestic, social and work life.

Certain positive coping strategies were reported and these are sleep discipline (30 percent), darkening the bedroom (100 percent), getting enough sleep (100 percent), family turning down noise level of television and radio (80 percent), using an alarm clock (80 percent) and having a bath to relax after shifts (20 percent).

TABLE 0
FOCUS DISCUSSIONS

N = 10 groups x group size = 12 members

THEMES					
	Group Response	%		Group Response	%
PROBLEMS			COPING STRATEGIES		
SLEEP			SLEEP		
Badly affected	8	80	Engagement		
No real sleep problems	2	20	Be disciplined	3	30
Sleep lightly	2	20	Close curtains & door	10	100
Difficulty sleeping during day	4	40	Get enough sleep	10	100
			Family turns down television & radio	8	80
DOMESTIC			I wait before going to bed and have a bath	2	20
Increased arguments with spouse	10	100	Use an alarm clock	8	80
Confusion over shift times (family)	9	90			
I worry about my family's safety	10	100	Disengagement		
Problems taking children to school and doctor	1	10	I take sleeping tablets or casual alcoholic drinks	8	80
Divorced - less contact with children	1	10			
			DOMESTIC		
SOCIAL			Engagement		
Do not experience problems	2	20	Family have learnt to accept it	3	30
Feel completely isolated	8	80	Kids do homework quietly	5	50
Miss out on social events	8	80	I try and play with my children during day	2	20
Had to give up sport as missed evening practices	6	60	Ask neighbours/family or hire someone to watch my house	10	100
More time to pursue hobbies	3	30	Ask police to drive by my house	2	20
			Put in security equipment	1	10
WORK			My family sleep over at friends/family	2	20
Feel lethargic, tired and depressed	10	100			
Different reactions daily	5	50	Disengagement		
Work is no longer fun	3	30	We argue	10	100
Stress at work decreases performance	1	10			
Miss breaks if work through tea/lunch to repair a machine	1	10	SOCIAL		
			Engagement		
			Change hobbies from group to solitary past times (gardening, fishing, going to town)	10	100
			Disengagement		
			I go and gamble	2	20
			WORK		
			Engagement		
			Take breaks to relax and enjoy time off	6	60
			Work better on right shift work, faster, less people, less pressure	2	20
			We work together as a team to finish outputs as soon as possible	2	20
			Disengagement		
			May leave shift work altogether	1	10

Eighty percent of the groups' responses involved the use of sleeping pills and alcohol to assist sleep.

In the domestic domain, asking neighbours/family or hiring someone to watch over your house was reported in all groups (100 percent). Arguing with one's spouse was reported in all cases as a strategy to deal with conflict arising from domestic problems with shiftwork. Asking police to drive by one's house (20 percent), installing security equipment (10 percent) and having one's family sleep over at friends or other family (20 percent) was used to deal with the problem of safety while away from home over night shifts.

Social adjustment strategies were reported with changing hobbies to solitary pursuits evident in all groups' responses (100 percent). Twenty percent of responses reported gambling as a strategy used to make use of spare time while others are working.

The full use of lunchtimes and tea times (60 percent) and team work (20 percent) were cited as strategies used to cope with lethargy in work performance. The night shift was reported in 20 percent of groups' responses as being a shift which enhanced better work performance (20 percent). Certain groups (10 percent) indicated leaving shiftwork altogether as a desired solution to problems related to shiftwork.

On a qualitative level, the use of positive/engagement coping strategies especially social support is noted as significant.

4.4 Discussion of Results

These results clearly support the original aims of research - that of investigating the relationship from hardiness and tenure to coping with shiftwork and certain of its sub scales of disengagement and engagement along the four areas of sleep, social, domestic and work life. However, the relationships to many of the criterion variables are not at the necessary significance level to allow for a further discussion.

Coping with Shiftwork

Hardiness and tenure were not found to be significant predictive variables for coping with shiftwork as single variables.

Whilst hardiness did regress onto coping with shiftwork in Model A, ($r^2 = 0,1608$), it had to be excluded as it did not meet the required significance level ($r^2 = 0,18$). We are therefore able to confirm that for this specific population, levels of hardiness may not be reliably added as a variable for selection of shiftworkers for this population. This finding has implications for the salutogenic paradigm. The need to test other personality variables in addition to circadian type, morningness - eveningness and extraversion/neuroticism must continue. The shiftwork locus of control may be considered as one such variable which requires further research in the manufacturing environment.

In addition, direct support has not been found for the assumption about shiftworkers based on the proposal by Kobasa, *et al.* (1982); that hardiness has a significant direct effect on emotional factors related to well being and work performance already well documented in various studies (Manning *et al.* 1988). It may be possible that well being and work performance are based upon multifactorial interactions between many individual variables, not only hardiness and tenure.

The exclusion of tenure as a variable in prediction for coping with shiftwork also rules out the idea that hardiness and coping with shiftwork are as a result of long term adjustment to shifts. This is an area of research which requires more empirical evidence (Folkard & Monk, 1979).

Control within the situation (shifts) was found to be a predictive variable for coping with shiftwork but not at a significance level of 95 percent. It may be useful to establish the level of control in the initial selection stages and reinforce this throughout the length of service of the shiftworker (through induction programmes and involvement in shift scheduling) and so prevent any feelings of powerlessness about the shiftwork situation by the shiftworker.

Engagement Coping Strategies

Tenure, commitment, control as well as challenge were not found to be predictive variables for the use of any engagement coping strategies.

Engagement coping strategies include so called positive techniques which the shiftworker employs to cope with shifts. These are problem solving, cognitive restructuring, social support and expressing emotions.

Tenure is not a significant predictive variable for engagement coping strategies. The use of effective coping strategies is therefore not used more often by experienced shiftworkers. This then precludes any form of long term adjustment in this population. The longer term shiftworkers are unable to employ more effective and positive coping strategies to increase their tolerance to shiftwork in the long term.

Hardiness was not found to be a predictive variable for engagement coping strategies. Therefore, as a construct, it cannot explain the use of proactive coping resources to moderate and improve the shiftworkers situation. However, the personality disposition of commitment does have a small but insignificant (at the 95 percent level) prediction value for engagement coping strategies. Committed shiftworkers who feel an integral part of their situation and identify with shifts could become more involved in the situation and so use positive coping strategies more easily. Given this information, it is implied that there is a need to identify groups for specific coping with shiftwork education programmes which focus on commitment to shiftwork and more importantly on the use of positive engagement coping strategies.

Disengagement Coping Strategies

Disengagement refers to the use of "negative" or ineffective coping strategies such as problem avoidance, wishful thinking, social withdrawal and self criticism.

Hardiness and commitment predict disengagement coping strategies. In all cases a negative relationship exists. This means that less hardy individuals will employ more disengagement coping strategies whilst hardy individuals will employ less. Hardiness has been found to be a moderator of well being and work performance (Manning *et al.*, 1988). Evidence has been found in this model for a process in which a moderating influence takes place. Based on the stress and strain model (Colquhoun & Rutenfranz in ^{Folkard + Monk} ~~Monk & Folkard~~, 1992), certain intervening variables may reduce the potential for experienced strain as a direct result of stress related to phase shifting of working and sleeping hours.

It seems as though hardiness will act as an intervening variable by reducing the amount of disengagement coping strategies used by shiftworkers. By using less of the negative, dysfunctional coping strategies, such as social withdrawal and avoiding issues, these hardy shiftworkers face less problems related to shiftwork. This increases their experienced levels of commitment to their problems in the social, work, sleep and domestic domains.

In other words, the shiftworker experiences higher levels of perceived hardiness which in turn locks him/her into a virtuous cycle by reducing the amount of disengagement coping strategies used.

To continue, the less hardy individuals may then find themselves in a similar loop, however in one which reinforces the use of dysfunctional coping techniques. Less hardy individuals will use more disengagement strategies and so feel more alienated from the situation. Because they cannot appreciate the meaning of the events surrounding them, they reinforce their experience of problems related to shiftwork, finally reducing their levels of commitment to shiftwork and overall perceived hardiness. This loop may be likened to a vicious cycle.

In addition, less committed/more alienated and threatened shiftworkers use these disengagement strategies more than committed and challenged shiftworkers. It follows that the use of ineffective coping strategies such as social withdrawal and avoidance of problems will further reinforce the lack of commitment to shiftwork. In the case of the focus groups discussions, methods given included going off for the day to gamble (social withdrawal), and taking sleeping tablets (problem avoidance).

Tenure does not predict the use of these coping strategies. It may therefore be inferred that there are no significant differences between the use of such coping strategies between experienced and inexperienced shiftworkers .

This means that experience of working shifts plays no role in moderating the use of such ineffective techniques. This rules out any form of long term adjustment in this population.

Social Problems

No predictive variables were established. Therefore hardiness and tenure are not predictive variables for the existence or lack of social problems. This contradicts the hypothesis that certain groups experience more social problems than others. In fact the social problems discussed in the focus groups such as feeling isolated and missing weekend social events is as true for all groups, experienced and inexperienced and for less hardy and hardy individuals.

It is therefore possible that the impact on shiftworkers' social lives is unavoidable or that there are other variables which have an interaction effect such as social environment (noise), societal perceptions towards shiftworkers and social support (Folkard & Monk, 1992) which have not been included in this study.

Domestic Problems

Contrary to expectations, tenure was not found to be a predictive variable for domestic problems. Therefore in this population older and more experienced shiftworkers did not report having experienced significantly less domestic problems than less experienced shiftworkers.

The responses in the group discussions indicated consensus across the groups as to the existence of domestic problems especially increased arguments with spouses, worry over the families' safety while working on night shift and family confusion about the shift schedules. Therefore, whilst the existence of domestic problems is evident (100 percent of group discussions and 53,4 percent of questionnaire responses), the independent variables were not accountable for a significant prediction value.

However, hardiness and challenge were found to be predictors of domestic problems but not at the required significance level. It seems then that for this population, hardiness cannot reliably be used as a moderator of domestic problems with challenge as the personality disposition which specifically predicts domestic problems.

Sleep and Work Problems

Tenure and hardiness were not found to predict sleep and work problems in this model.

The disturbance of the normal circadian rhythms during nightshift is partially moderated by a phase-shift which never reaches a complete inversion (Costa *et al.*, 1989). Support for an increase in the magnitude of phase-shift due to work experience has not been found for this population. In addition, evidence for hardiness as an additional personality factor determining tolerance to shiftwork is weak.

Morningness/eveningness for instance, is believed to affect tolerance to nightwork with morning types less able to adapt to this phase-shifting (Costa et al., 1989).

Hardiness and even tenure then would not be useful characteristics to use in either selection or periodical monitoring of health status and work performance of shiftworkers.

Domestic, Sleep, Work and Social Engagement

Tenure and hardiness as well as challenge, commitment and control are not significant predictors of any specific domestic engagement strategies, which means that hardy individuals and more experienced shiftworkers will not use more of these engagement strategies than less hardy and less experienced shiftworkers. 30,7 percent of respondents experienced severe domestic problems. As the level of domestic problems increases, it seems to have no effect on their ability to utilise effective domestic engagement strategies such as communicating about the problems related to shiftwork and building family quality time around the shifts. Some examples of engagement strategies were cited in the group discussions and these included trying to play with children, asking neighbours to watch over house and family and learning to accept shiftwork. However, these were mostly reactive rather than proactive strategies. It may be most effective to concentrate shiftworker coping programmes on these engagement strategies, involving the family in such workshops.

This is supported by Ganster and Victor (1998) who mention that social support may be the most effectively used strategy to buffer people from the effects of shiftwork .

Hardiness and tenure, were not found to be predictors of work engagement strategies. Therefore in this population hardy and more experienced shiftworkers will not employ more of the engagement coping strategies at work than less hardy and less experienced shiftworkers. This is significant because, according to a salutogenic paradigm, hardy individuals will be in a position to employ effective coping strategies at work. A certain amount of inner fortitude is also expected to flow from these difficult experiences over time.

Shiftwork (especially involving nightwork), has severe detrimental effects on individuals, which manifests in a number of areas of life such as biological, psychological, social, domestic and work (Smith et al., 1994). Comprehensive documented evidence for these negative results of shiftwork have been provided in previous chapters.

Given this, as well as the limited results for hardiness as a predictive variable in this model, it may now be argued (for this population working a fast rotating continuous shift pattern), that the effects of working shifts may be so devastating on the overall functioning of the shiftworker so as to render many incapable of effective functioning by means of long term adjustment to shifts or through the use of hardiness as an individual personality variable.

Domestic, Sleep, Work and Social Disengagement

Hardiness is a predictive variable for the criterion variables of domestic disengagement with a negative but significant relationship. This confirms that hardy individuals will use less of the "ineffective" coping strategies than less hardy individuals. Examples of disengagement strategies elicited from the group discussions include using medication and alcohol, arguing with spouse to solve domestic problems, and gambling on days off in order to withdraw from the family.

When hardiness was excluded in the model, commitment and challenge were also found to predict domestic disengagement so that more committed and challenged individuals use less disengagement strategies.

As predictive variables for the use of less "dysfunctional" methods for coping it may be concluded that hardiness, commitment and challenge moderate the effect of the stressful shiftwork situation on the shiftworker by buffering the need to use less effective methods of coping, which in themselves may eventually lead to longer term behaviour patterns such as substance and alcohol abuse.

Again, as for disengagement strategies, shiftworkers may find themselves in either a virtuous or vicious cycle.

The less hardy individuals will tend to use more dysfunctional coping techniques which in turn causes more experienced domestic problems and later less commitment to their family, feelings of powerlessness over their domestic situation and even feelings of fear and threat within their domestic environment. Shiftworkers may then feel impaired in their ability to rely on emotional resources from either their spouse or other family members and so will increase their use of disengagement coping strategies - a typical vicious cycle. A simple example of this could be illustrated in the following scenario. The spouse complains about the difficult hours a shiftworker must work; in turn the shiftworker feels alienated from his spouse as he/she is unable to change his/her working hours; he/she therefore tends to spend as much time as possible working on his/her solitary hobbies, or doing "moonlighting" jobs which take him/her away from home (disengagement) which culminates in increased levels of arguments (domestic problems) with his/her spouse who now complains bitterly about his/her absence. This particular pattern was cited in the group discussions as a typical scenario occurring within the domestic domain of these shiftworkers.

However, the interplay with hardy individuals seems quite different. A balanced relationship develops between hardiness and disengagement. Hardiness is a collection of personality characteristics which assists in resisting the effects of stressful life events (Kobas et al., 1983).

In this model, hardy individuals will use less of the dysfunctional coping strategies to deal with domestic problems and so will perceive their situation from a position of strength and control which in turn reduces the necessity to use less effective coping behaviours. Because the shiftworker has not withdrawn from his/her domestic situation, less experienced domestic problems will be evident and so the shiftworker perceives higher levels of inner fortitude.

Whilst these interactions allow the shiftworker to maintain a semblance of "normality" within a stressful situation, hardiness will not be expected to provide a proactive impetus to the use of engagement coping strategies which are more functional and which will move the shiftworker along towards a position of self actualisation, rather than remain "stuck" in a comfortable, albeit compromised situation.

It is therefore important to stress that the thrust of shiftworker education needs to focus on the use of the correct coping strategies in all domains with a focus on their domestic life.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 THEORETICAL IMPLICATIONS

While certain theoretical assumptions about shiftworkers and the prediction of coping based upon inter individual differences has been proved, others remain inconclusive.

Hardiness

Hardiness is not a significant predictor for coping with shiftwork. However, hardiness is a significant predictor for the decreased use of disengagement coping strategies and more specifically domestic disengagement strategies. This justifies the decision to investigate whether additional personality variables play a role in understanding and predicting the behaviour of shiftworkers. With respect to the coping strategies used by these shiftworkers, we are able to determine that evidence of hardiness will inhibit the use of disengagement coping strategies such as social withdrawal. In addition, less hardy individuals will be expected to make use of more disengagement coping strategies, rather than using more GRR's (generalised resistance resources) such as social support which are known to be effective coping mechanisms which buffer the negative effects of stressful situations.

In fact, less hardy individuals will use more ineffective mechanisms in all four of life's domains - sleep, work, domestic and social. In other words, the lack of hardiness has all pervasive influences on the important areas of a shiftworkers life, namely their ability to control their sleep patterns and behaviours; their performance at work; their relationships with spouses, children and families; and their interactions with friends and their communities.

Whilst hardiness predicts a decreased use of ineffective coping strategies, a relationship to the use of more engagement strategies is not significant. In addition, the sub scales of commitment and challenge are significant predictors for disengagement strategies. These scales then seem to be powerful indicators that committed and challenged individuals use less disengagement strategies than less committed and less challenged individuals. Commitment stems from an involvement in the meaning of events and the environment. Because committed individuals recognise their priorities in life, set themselves goals and allow for a realistic appraisal of their situation, based upon their abilities and values, we are able to draw the conclusion that they will not use dysfunctional coping strategies to deal with the problems they experience as shiftworkers. We may conclude that the actual involvement and appraisal of their problems in a realistic fashion could mean that while committed individuals may experience their sleep and work life as problematic, that they employ fewer ineffective coping strategies to deal with these.

Challenged individuals experience change as exciting and merely a temporary hurdle in which they need to readjust their lives to allow for growth. These challenged individuals are significantly aware of their own environments to know where to find resources to assist them in solving their problems. So they will approach inherent domestic problems as worth solving and will involve themselves, their families and other resources in integrating these solutions into their lives.

In this model, the personality disposition of control did not show a significant prediction value as a specific variable, but only as part of the construct of hardiness for disengagement. Because individuals high on control believe and act as if they influence the course of events, they should be able to incorporate what happens to them or their families into their view of life. Instead of feeling helpless about the safety of their families or the lack of time they have to spend with them, they should actively use many methods to take control of the situation. Control, however, is not a significant predictor of coping with shiftwork, nor does it predict the use of more engagement coping strategies in the domestic domain.

It is possible that the individuals in this population are "frozen" by their lack of ability to take charge of their situation and positively reappraise it. Their feelings of powerlessness about their situation are reinforced by recent unpopular changes to shift schedules and experimentation in shiftwork design in the plant, such as the change to a seven day work week.

This may have affected the shiftworkers' lives to such an extent so as to dampen any salutogenic process of using various forms of resistance resources to cope with shiftwork and perceive it as motivational and challenging.

In general, the conclusions for hardiness as a predictor of disengagement coping strategies falls within a broader theoretical domain, that of the salutogenic paradigm. For shiftworkers, hardiness is a significant personality variable in that it moderates or inhibits the use of negative coping strategies. The relationship between coping with shiftwork and personality variables has thus been extended. Classical shiftwork research requires even further identification of additional such inter individual variables.

Therefore the original problem statement has been solved. Although shiftwork has a negative influence on the physical, psychosocial and psychological health of individuals, it may be predicted that certain hardy individuals do show evidence of specific, moderated behaviour even while affected by this long term stressor, shiftwork.

Hardiness, commitment and challenge have been found to be significant predictive variables in determining the differences between individuals on the continuum of coping with shiftwork but only with specific reference to one of the primary scales, namely disengagement coping strategies.

Tenure

No significant predictive relationship was established from tenure to coping with shiftwork. While Knutsson *et al.*, 1990 reported a relationship between years of shiftwork and heart disease, the phenomena of long term adjustment required further analysis.

Therefore for this multicultural population, length of experience did not moderate the negative effects of working shifts. The use of more engagement coping strategies, specifically domestic and work related strategies was also not significant for more experienced shiftworkers. Folkard & Monk (1979) postulated that experienced shiftworkers appear to be more committed and adapted to shiftwork. The use of these strategies was assumed to be as a result of two factors:

a) That those individuals who are unable to buffer the stressful situation through the use of effective coping strategies, leave shiftwork - resulting in a survivor population who can.

or

b) That the use of more engagement strategies flows out of the actual shiftwork situation itself, forming part of a fortigenic reaction to the continual stressors being experienced as a result of working shifts.

However, with respect to tenure we are able to conclude that for this population, no indication of long term adjustment was evident and that the use of more positive coping strategies does not increase over time. The case for long term tolerance or adjustment was not proved in this specific study for this population of shiftworkers.

5.2 CONTRIBUTION OF RESEARCH

Firstly, any South African shiftwork research is relevant because of the low levels of published research in the country. With a new bill of rights protecting employees and candidates from unfair discrimination based on gender, age, culture, social values and race, it has become vitally important for employers to understand these issues.

The implications of shiftwork for older "more experienced" shiftworkers needs to be scientifically validated. This study found that experience on shifts has no significant relationship to coping with shiftwork.

Whilst limited to a blue collar population in the tyre manufacturing industry, this research has drawn its conclusions from a heterosexual population working continuous, rapidly rotating shifts while previous shiftwork studies have been confined to only one gender and different shift patterns and their findings have been limited by these demographics. By including males and females in the study, the research is less restricted as results may be generalised across gender, rather than isolating females as a "special group". In fact, the ILO (International Labour Organisation), have warned their members to prohibit night work for women in industry. This is ratified by the ILO Convention 89 - Revised in 1948 (Murray, 1984). In direct contrast, countries such as New Zealand and South Africa wish rather to assert and enhance equal opportunities for women by removing all legislation protecting them (Murray, 1984).

Due to the uniqueness of South Africa as a heterogeneous population combining race, class and gender and due to the fact that females are allowed to work night shifts in this country, the influence of gender could also be investigated as an additional inter individual variable.

Further, an additional individual personality variable, hardiness has been identified as a factor linked to a primary scale of coping with shiftwork, namely disengagement. It therefore adds value to the body of knowledge currently available on shiftwork coping as a function of individual salutogenesis.

5.3 PRACTICAL IMPLICATIONS

This study, in order to be relevant must be of practical value to shiftworkers and employers.

We know that less hardy individuals would benefit from shiftwork awareness and coping education programmes. The focus would have to be on teaching these shiftworkers how to employ the use of the resources available to them such as social interaction with other shiftworkers; disciplined sleeping and eating routines and ergonomic changes to their homes and bedrooms. In addition, the involvement of their families in these awareness programmes would increase the level of social support they receive for working shifts. The use of disengagement strategies such as social withdrawal and isolation from their families should be discouraged.

Because perceived alienation and threat (sub dimensions of hardiness) predicts the use of disengagement coping strategies, it is important then for employers to consider collaborating with shiftworkers on changes to their shiftwork patterns so that information is shared openly and individuals have a sense of ownership and control over their environment. The benefit will be that shiftworkers who have accepted these changes will be able to cognitively and emotionally readjust their world view to incorporate the changes while being actively involved in problem solving and decision making in the plant.

5.4 SUGGESTIONS FOR IMPROVEMENT ON RESEARCH

This study could be expanded to include various industries rather than being limited to a specific one with a specific nature which cannot be generalised to other industries. This would then involve a larger sample size and obvious increased generalisability. The investigation of gender differences and more specific personality variables such as shiftwork locus of control is strongly suggested.

Shiftwork research in South Africa would also require financial funding to provide incentives for shiftworkers to participate in research.

Finally, as most shiftwork questionnaires originate in Europe, their reliability and validity for South Africa needs to be established as the average literacy level of South African shiftworkers is lower than in England and Europe. Language may also pose a problem in South African shiftwork research because South African shiftworkers as a group are represented by many different languages (Adler, 1991).

5.5 SUMMARY

The aim of this study was to establish whether hardiness and tenure are predictive variables for coping with shiftwork.

The extent of shiftwork and shiftwork research has expanded internationally in the past decade. It has been established that shiftwork has a negative effect on shiftworkers who are predisposed to certain strain symptoms such as inefficiency, impaired health and domestic problems. However, certain inter individual differences do moderate coping with shiftwork through a process of cognitive and behavioural protective acts which modifies the stressful situation and neutralises the experience of problems.

Using questionnaires (Biographical, Hardiness Index and Coping with Shiftwork Questionnaires), a sample group of 75 cases were analysed. A 95 percent confidence level was used throughout with a multiple stepwise regression analysis computed. The significant $r^2 = 0,18$. Focus group discussions were conducted to add qualitative information to the areas of social, domestic, work, sleep problems and coping strategies.

The predictive variables were regressed onto a number of criterion variables, namely coping with shiftwork; work, sleep, domestic and social problems; and engagement and disengagement strategies including both strategies in all four domains (work, sleep, social and domestic).

It was found that hardiness and tenure are not predictive variables for coping with shiftwork. However, hardiness, commitment and challenge are predictors for disengagement strategies and for domestic disengagement so that hardy, challenged and committed individuals will use less disengagement strategies and more specifically, use less domestic disengagement strategies.

The research established hardiness as an additional personality variable linked to a primary scale of coping with shiftwork, namely disengagement. The longer term adjustment of shiftworkers, through the use of more effective coping strategies over time (tenure) was not established.

Recommendations were made for targeted shiftwork coping programmes and more extensive classical shiftwork research in South Africa, with specific reference made to gender differences and additional personality variables such as shiftwork locus of control.

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APPENDIX I

SHIFTWORK

We are looking at the problems various people may experience as a result of working shifts.

This is an independent research project and any responses you may give will be treated in the strictest of confidence. No person will be connected or affected by their individual responses. We are primarily concerned with information obtained from groups of shiftworkers.

Please note that any information you provide in the questionnaire will be treated in the strictest of confidence and will not be divulged to anyone (including yourself).

Thank you for your co-operation.

APPENDIX II

GROUP DISCUSSION
COPING WITH SHIFTWORK

PHASE 1 - GAINING INFORMED CONSENT

Read the following:

We are looking at the experiences various people may have as a result of working shifts.

This is an independent research project which is not linked to the Company in any way. No person will be connected or affected by their individual responses. We are primarily concerned with information obtained from groups of shiftworkers.

Information gained from this sort of group discussion is valuable but it comes with a condition:

Are you willing to agree that any information shared by members in this group will be treated in the strictest of confidence and not divulged to anyone? (Ask each individual in a round robin).

Thank you for your co-operation.

PHASE 2 - FACTUAL INFORMATION

Use the following four questions as prompt for discussions on how people cope with shiftwork. Try and focus on facts and actual experiences, reinforcing positive and negative statements with reflection of meaning and summarising.

In general, to what extent does working shifts cause you problems with:

Sleep

Social life

Domestic life

Work performance

What do you do when you have problems with your social life caused by working shifts?

What do you do when you have problems with your domestic life caused by working shifts?

What do you do when you have problems with your sleep caused by working shifts?

What do you do when you have problems with you work caused by working shifts?

APPENDIX III

5. Coping

Shiftwork affects many people in a variety of ways, for example in terms of their social and domestic life. Consequently shiftworkers tend to cope with the effects of shiftwork in different ways and to different degrees. Below is a list of 8 different strategies people can use to cope with problems they experience.

In relation to the different problem areas stated below, please indicate the extent to which you use (or have used) each of the coping strategies listed.

The problem areas relate to:

your social life	e.g. going out, visiting friends, etc.
your domestic life	e.g. domestic tasks, jobs around the house, childcare, etc.
the sleep you get	e.g. problems falling asleep, disturbed sleep, etc.
your job	e.g. organisation of work, job performance, etc.

It might help to actually think of an event concerning each of the areas. For sleep an example could be: difficulty with sleeping during the day, because of light and noise.

For example, to what extent do you:

- work on solving the problems in this situation, e.g. darken room. If you don't do that at all you circle 1.
- re-organise the way you look at the situation, e.g. think that it is only three more nightshifts. If you do that quite a bit you circle 4.

Not used	Used a little	Used some-what	Used quite a bit	Used a great deal
----------	---------------	----------------	------------------	-------------------

5.1 To what extent do you use the following strategies when you have problems with your social life caused by working shifts?

(a) I work on solving the problems in the situation	1	2	3	4	5
(b) I re-organize the way I look at the situation, so things don't look so bad	1	2	3	4	5
(c) I let my emotions out	1	2	3	4	5
(d) I talk to someone about how I feeling	1	2	3	4	5

	Not used	Used a little	Used somewhat	Used quite a bit	Used a great deal
(e) I avoid thinking or doing anything about the situation	1	2	3	4	5
(f) I wish the situation would go away or somehow be over with	1	2	3	4	5
(g) I criticize myself for what is happening	1	2	3	4	5
(h) I spend more time alone	1	2	3	4	5

5.2 To what extent do you use the following strategies when you have problems with your domestic life caused by working shifts?

(a) I work on solving the problems in the situation	1	2	3	4	5
(b) I re-organize the way I look at the situation, so things don't look so bad	1	2	3	4	5
(c) I let my emotions out	1	2	3	4	5
(d) I talk to some-one about how I am feeling	1	2	3	4	5
(e) I avoid thinking or doing anything about the situation	1	2	3	4	5
(f) I wish the situation would go away or somehow be over with	1	2	3	4	5
(g) I criticize myself for what is happening	1	2	3	4	5
(h) I spend more time alone	1	2	3	4	5

5.3 To what extent do you use the following strategies when you have problems with your sleep caused by working shifts?

(a) I work on solving the problems in the situation	1	2	3	4	5
(b) I re-organize the way I look at the situation, so things do not look so bad	1	2	3	4	5

	Not used	Used a little	Used somewhat	Used quite a bit	Used a great deal
(c) I let my emotions out	1	2	3	4	5
(d) I talk to some-one about how I am feeling	1	2	3	4	5
(e) I avoid thinking or doing anything about the situation	1	2	3	4	5
(f) I wish the situation would go away or somehow be over with	1	2	3	4	5
(g) I criticize myself for what is happening	1	2	3	4	5
(h) I spend more time alone	1	2	3	4	5

5.4 To what extent do you use the following strategies when you have problems with the way you perform your work caused by working shifts?

(a) I work on solving the problems in the situation	1	2	3	4	5
(b) I re-organize the way I look at the situation, so things do not look so bad	1	2	3	4	5
(c) I let my emotions out	1	2	3	4	5
(d) I talk to some-one about how I am feeling	1	2	3	4	5
(e) I avoid thinking or doing anything about the situation	1	2	3	4	5
(f) I wish the situation would go away or somehow be over with	1	2	3	4	5
(g) I criticize myself for what is happening	1	2	3	4	5
(h) I spend more time alone	1	2	3	4	5

5.5 In general, to what extent does working shifts cause you problems with:

	Never		Somewhat		Always
(a) sleep	1	2	3	4	5
(b) social life	1	2	3	4	5
(c) domestic life	1	2	3	4	5
(d) work performance	1	2	3	4	5

5.6 To what extent do you think there are organisational problems at your work (e.g. the way your work is organised, staffing is arrange, or management decisions are implemented)?

Not at all		Somewhat		Very much so
1	2	3	4	5

5.7 Do you find it difficult to cope with these problems?

No		Sometimes		Yes
1	2	3	4	5

APPENDIX IV

QUESTIONNAIRE / VRAELYS 1

Below are some statements that you may agree or disagree with. Please indicate how you feel about each one by marking a cross (X) in the allotted block provided next to each statement. A zero (0) indicates that you feel the item is not at all true; choosing three (3) means that you feel the statement is completely true.

As you will see, many of the statements are worded very strongly. This is to help you decide the extent to which you agree or disagree. Please read all the statements carefully. Be sure to answer all statements on the basis of the way you feel now. Do not spend too much time on any one statement.

Hieronder volg sekere stellings waarmee jy mag saamstem of nie. Toon asseblief aan hoe jy voel deur 'n kruisie (X) in die blokkie wat langs elke stelling voorsien is, te maak. Die nul (0) toon aan dat jy voel die stelling is glad nie waar nie, terwyl die drie (3) aantoon dat jy voel die stelling absoluut die waarheid is.

Jy sal opmerk dat baie van die stellings sterk bewoord is. Dit is om jou te help om te besluit tot watter mate jy saamstem of verskil. Lees asseblief al die stellings deeglik. Antwoord al die vrae op die basis van hoe jy nou voel. Moenie te veel tyd aan een enkele stelling bestee nie.

	0	1	2	3
0 = Not at all true / Glad nie waar nie 1 = A little true / Effens waar 2 = Reasonably true / Redelik waar 3 = Completely true / Absoluut waar				
1. I often wake up eager to take up my life where it left off the day before. <i>Ek word dikwels wakker en sien daarna uit om met my lewe aan te gaan waar ek dit die vorige dag gelaat het.</i>				
2. I like a lot of variety in my work. <i>Ek hou van baie verskeidenheid in my werk.</i>				
3. Most of the time, my bosses or superiors will listen to what I have to say. <i>Meestal luister my hoofde of base na wat ek te sê het.</i>				
4. Planning ahead can help avoid most future problems. <i>Voouruitbeplanning kan die meeste toekomstige probleme help voorkom.</i>				
5. I usually feel that I can change what might happen tomorrow, by what I do today. <i>Ek voel gewoonlik dat ek dinge wat môre mag gebeur, kan verander deur wat ek vandag doen.</i>				

<p>0 = Not at all true / Glad nie waar nie 1 = A little true / Effens waar 2 = Reasonably true / Redelik waar 3 = Completely true / Absoluut waar</p>	0	1	2	3
<p>6. I feel uncomfortable if I have to make any changes in my everyday schedule. <i>Ek voel ongemaklik as ek my daaglikse program moet verander.</i></p>				
<p>7. No matter how hard I try, my efforts will accomplish nothing. <i>Dit maak nie saak hoe hard ek probeer nie, my pogings sal niks bereik nie.</i></p>				
<p>8. I find it difficult to imagine getting excited about working. <i>Ek kan my moeilik voorstel dat ek opgewonde sal raak oor werk.</i></p>				
<p>9. No matter what you do, the "tried and true" ways are always the best. <i>Maak nie saak wat jy doen nie, die gebaande weë is altyd die beste.</i></p>				
<p>10. I feel that it's almost impossible to change my spouse's mind about something. <i>Ek voel dit is byna onmoontlik om my eggenoot van iets te laat afsien.</i></p>				
<p>11. Most people who work for a living are just manipulated by their bosses. <i>Die meeste mense wat vir 'n bestaan werk, word net deur hulle base gemanipuleer.</i></p>				
<p>12. New laws shouldn't be made if they hurt a person's income. <i>Nuwe wette behoort nie gemaak te word as dit 'n mens se inkomste benadeel nie.</i></p>				
<p>13. When you marry and have children you have lost your freedom of choice. <i>As jy trou en kinders het, verloor jy jou vryheid van keuse.</i></p>				
<p>14. No matter how hard you work, you never really seem to reach your goals. <i>Dit maak nie saak hoe hard jy werk nie, dit lyk nie of jy ooit werklik jou doelwitte bereik nie.</i></p>				
<p>15. A person whose mind seldom changes can usually be depended on to have reliable judgment. <i>'n Persoon wat nie maklik van opinie verander nie, kan gewoonlik op staatgemaak word vir sy betroubare oordeelsvermoë.</i></p>				

	0	1	2	3
0 = Not at all true / Glad nie waar nie 1 = A little true / Effens waar 2 = Reasonably true / Redelik waar 3 = Completely true / Absoluut waar				
16. I believe most of what happens in life is just meant to happen. <i>Ek glo dat die meeste dinge wat in die lewe gebeur, maar bedoel is om te gebeur.</i>				
17. It doesn't matter if you work hard at your job, since only the bosses profit by it anyway. <i>Dit maak nie saak of jy hard werk nie, dit is tog net die base wat in elk geval daarby baat.</i>				
18. I don't like conversations when others are confused about what they mean to say. <i>Ek hou nie van gesprekke as die ander persone deurmekaar is omtrent dit wat hulle wil sê nie.</i>				
19. Most of the time it just doesn't pay to try hard, since things never turn out right anyway. <i>Dit is die meeste van die tyd maar net nie die moeite werd om hard te probeer nie, aangesien dinge in elk geval nooit reg uitwerk nie.</i>				
20. The most exciting thing for me is my own fantasies. <i>Die opwindste ding vir my is my eie fantasieë.</i>				
21. I won't answer a person's questions until I am very clear as to what he is asking. <i>Ek sal nie 'n persoon se vrae beantwoord, voordat ek baie seker is presies wat hy vra nie.</i>				
22. When I make plans I'm certain I can make them work. <i>Wanneer ek planne beraam, is ek seker dat ek dit sal kan laat werk.</i>				
23. I really look forward to my work. <i>Ek sien werklik baie uit na my werk.</i>				
24. It doesn't bother me to step aside for a while from something I'm involved in if I'm asked to do something else. <i>Dit hinder my nie om iets waarby ek betrokke is eers vir 'n tydjie te los as ek gevra word om iets anders te doen nie.</i>				
25. When I am at work performing a difficult task I know when I need to ask for help. <i>Wanneer ek by die werk met 'n moeilike taak besig is, weet ek wanneer ek om hulp moet vra.</i>				

	0	1	2	3
0 = Not at all true / Glad nie waar nie 1 = A little true / Effens waar 2 = Reasonably true / Redelik waar 3 = Completely true / Absoluut waar				
26. It's exciting for me to learn something about myself. <i>Dit is opwindend vir my om iets van myself te leer.</i>				
27. I enjoy being with people who are unpredictable. <i>Ek geniet dit om saam met onvoorspelbare mense te wees.</i>				
28. I find it's usually very hard to change a friend's mind about something. <i>Ek vind dit is gewoonlik baie moeilik om 'n vriend van plan te laat verander.</i>				
29. Thinking of yourself as a free person just makes you feel frustrated and unhappy. <i>Om aan jouself te dink as 'n vrye mens, laat jou net gefrustreerd en ongelukkig voel.</i>				
30. It bothers me when something unexpected interrupts my daily routine. <i>Dit pla my wanneer iets onvoorsiens my daaglikse roetine onderbreek.</i>				
31. When I make a mistake, there's very little I can do to make things right again. <i>Wanneer ek 'n fout begaan, is daar baie min wat ek kan doen om dinge weer reg te stel.</i>				
32. I feel no need to try my best at work, since it makes no difference anyway. <i>Ek het geen behoefte om my beste by die werk te lewer nie, aangesien dit in elk geval geen verskil maak nie.</i>				
33. I respect rules because they guide me. <i>Ek respekteer reëls aangesien dit my lei.</i>				
34. One of the best ways to handle most problems is just not to think about them. <i>Een van die beste maniere om die meeste probleme te hanteer, is om net nie daaraan te dink nie.</i>				
35. I believe that most athletes are just born good at sports. <i>Ek glo dat die meeste atlete goed in sport gebore is.</i>				
36. I don't like things to be uncertain or unpredictable. <i>Ek hou nie daarvan as dinge onseker of onvoorspelbaar is nie.</i>				

0 = Not at all true / Glad nie waar nie 1 = A little true / Effens waar 2 = Reasonably true / Redelik waar 3 = Completely true / Absoluut waar	0	1	2	3
37. People who do their best should get full financial support from society. <i>Mense wat hul beste lewer, behoort ten volle finansieel deur die gemeenskap ondersteun te word.</i>				
38. Most of my life gets wasted doing things that don't mean anything. <i>'n Groot deel van my lewe gaan verlore deur goed te doen wat niks beteken nie.</i>				
39. Lots of times I don't really know my own mind. <i>Ek verstaan dikwels nie regtig my eie gedagtes nie.</i>				
40. I have no use for theories that are not closely tied to the facts. <i>Ek het geen nut vir teorieë wat nie direk verband hou met feite nie.</i>				
41. Ordinary work is just too boring to be worth doing. <i>Gewone werk is net te vervelig om dit die moeite werd te maak om te doen.</i>				
42. When other people get angry at me, it's usually for no good reason. <i>Wanneer ander mense vir my kwaad word, is daar gewoonlik nie goeie redes daarvoor nie.</i>				
43. Changes in routine bother me. <i>Veranderinge in roetine kwel my.</i>				
44. I find it hard to believe people who tell me that the work they do is of value to society. <i>Ek vind dit moeilik om mense te glo wat sê dat hulle werk van waarde vir die samelewing is.</i>				
45. I feel that if someone tries to hurt me, there's usually not much I can do to try and stop it. <i>Ek voel dat wanneer iemand my te na wil kom, daar gewoonlik nie veel is wat ek kan doen om dit te verhoed nie.</i>				
46. Most days, life just isn't very exciting to me. <i>Die lewe is meestal nie baie opwindend vir my nie.</i>				
47. I think people believe in individuality only to impress others. <i>Ek dink mense glo in individualiteit net om ander te beïndruk.</i>				

0 = Not at all true / Glad nie waar nie 1 = A little true / Effens waar 2 = Reasonably true / Redelik waar 3 = Completely true / Absoluut waar	0	1	2	3
48. When I'm reprimanded at work, it usually seems to be unjustified. <i>Wanneer ek by die werk aangespreek word, blyk dit gewoonlik ongeregverdig te wees.</i>				
49. I want to be sure someone will take care of me when I get old. <i>Ek wil seker wees dat iemand na my sal omsien as ek oud is.</i>				
50. Politicians run our lives. <i>Politici reël ons lewens.</i>				

APPENDIX V

BIOGRAPHICAL QUESTIONNAIRE

Please will you answer the following questions and complete this biographical information
Please tick whichever is applicable

1 GENDER

Male	Female
------	--------

2 TRANSPORT

What form of transport do you use to get to work?

Own vehicle	Taxi	Bus	Walk
Lift with a co-worker		Bicycle	

3 How long have you been working shifts? (include shiftwork outside this company).
Years

0 - 1 years	1 - 3 years	4 - 9 years	10 and more years
-------------	-------------	-------------	-------------------

4 Have you ever had a work related injury or been involved in an accident at work?

Yes	No
-----	----

5 What year was this accident?
19.....

6 What shift were you working on at the time?

6 - 2	2 - 10	10 - 2
-------	--------	--------

7 Were you booked off as a result of this accident?

Yes	No
-----	----

8 How long were you off?

Not at all	1 - 5 hours	1 day	2 days - 1 week
2 weeks	2 weeks - 1 month	1 month - 3 months	+ 3 months