

THE EFFECT OF A PHYSICAL WELLNESS PATHWAY ON THE CHRONIC
ABSENTEEISM OF SHIFT WORKERS AT AN ESKOM POWER STATION

DARCELLE D. SCHOUW

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STUDY LEADER: PROF. J.G. BARNARD

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DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

ABSTRACT

For many companies, health care can consume half of corporate profits or more. Some employers look to cost sharing, cost shifting, managed care plans, risk rating and cash based rebates or incentives. These methods merely shift costs.

Absenteeism in South Africa claims 3.2% of all scheduled work hours, 43 000 work hours per week, 9 days lost per employee per year and 1 employee in every 15 on a weekly basis.

The main objective of this study was to establish the effect of a physical wellness intervention on the chronic absenteeism of a governmental company like Eskom. Fifty-four males with a mean age of 42.13 years, participated in the program. Morphological and physiological variables included fat percentage; body mass index (BMI), cholesterol, blood pressure (BP), flexibility, cardiovascular endurance, waist circumference and muscle endurance.

The participants were divided into four groups consisting of 12-15 individuals. Data was collected over a period of six months (March-August 2001). There were six sessions in which the subjects participated namely: wellness awareness, general body wellness, heart wellness, stress wellness, posture wellness and nutritional wellness. These sessions focussed on education, testing and physical activity, with follow-ups and maintenance at the Biokinetic rehabilitation station.

Trends for the group were traced using a statistical analysis for absenteeism tallying the GSAR (gross sickness absentee rate) and AFR (absentee frequency rate) for the participants. The GSAR and AFR were significantly lower during the intervention. The return of investment was calculated based on the amount of hours worked per month on the August 2001 payroll, where the increment figure is based on an average increase of 7.9%. The result of the study concluded that work-site body wellness is health care reform that works, with absenteeism decreasing significantly and an improved employee health status.

OPSOMMING

Baie maatskappye kan die helfte of meer van hul wins aan gesondheidsorg spandeer. Sommige werkgewers oorweeg kostedeling, verskuiwing van kostes, gesondheidsorgplanne, risikobepaling en kontantkortings of aansporings. Hierdie metodes skuif eerder net koste.

In Suid-Afrika word 3.2% van alle geskeduleerde werksure as gevolg van afwesigheid verloor, 43 000 werksure per week, 9 dae per werknemer per jaar en 1 werknemer uit elke 15 op 'n weeklikse basis.

Die hoofdoel van hierdie studie was om die effek van 'n fisieke welstand intervensie op die chroniese afwesigheid van 'n parastatale maatskappy soos Eskom daar te stel. Vier en vyftig mans met 'n gemiddelde ouderdom van 42.13 jaar het aan die program deelgeneem. Morfologiese en fisiologiese veranderlikes het vetpersentasie; liggaamsmass-indeks (LMI), cholesterol, bloeddruk (BD), soepelheid, kardiovaskulêre uithouvermoë, abdominale omtrek en spieruithouvermoë ingesluit.

Die deelnemers is in vier groepe verdeel wat uit 12-15 persone bestaan het. Data is oor 'n periode van ses maande ingesamel (Maart-Augustus 2001). Die deelnemers het aan die volgende ses sessies deelgeneem: bewustheid van welstand, algemene liggaamlike welstand, hartwelstand, streswelstand, postuurwelstand en dieetwelstand. Hierdie sessies het op die opvoeding, toetsing en fisieke aktiwiteit gefokus met opvolg-ondersoeke en instandhouding by die Biokinetika rehabilitasiestasie.

Neigings vir die groep is opgevolg deur statistiese analise vir afwesigheid deur die TSAS (totale siekte afwesighedsyfer) en AFS (afwesighedsfrekwensiesyfer) vir die deelnemers aan te teken. Die TSAS en AFS was beduidend laer tydens die intervensie. Die beleggingsopbrengs is bereken op die aantal ure per maand op die Augustus 2001 betaalstaat met die toenamesyfer gebaseer op die gemiddelde verhoging van 7.9%. Die resultaat van die studie is dat liggaamlike welstand by die werksplek voordelig is vir gesondheidsorgverbetering en dat afwesigheid beduidend afneem terwyl daar ook 'n verbetering in die gesondheidstatus van werknemers was.

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“Interdependence has a higher value than independence” (S. Covey)

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Abbreviations

AFR	-	Absentee frequency rate
AFS	-	Afwesigheidsfrekwensiesysfer
AIDS	-	Acquired immune deficiency syndrome
BP	-	Blood pressure
BD	-	Bloeddruk
BMI	-	Body mass index
CBA	-	Cost benefit analysis
CEA	-	Cost effective analysis
CUA	-	Cost utility analysis
CHD	-	Coronary heart disease
CVD	-	Cardiovascular disease
DBP	-	Diastolic blood pressure
EAP	-	Employee assistance program
GM	-	General motors
GDP	-	Gross domestic product
GSAR	-	Gross sickness absentee rate
HRA	-	Health risk appraisal
HIV	-	Human immunodeficiency virus
HDL	-	High density lipoprotein
KPI	-	Key performance indicators
LMI	-	Liggaamsmassaindeks
LDL	-	Low density lipoprotein
MHR	-	Maximum heart rate

MI	-	Myocardial infarction
PVC	-	Premature Ventricular Complex
RHR	-	Resting heart rate
RPE	-	Rating of perceived exertion
RSBP	-	Resting systolic blood pressure
SA	-	South Africa
SKF	-	Skinfolds
STD	-	Short term disability
SBP	-	Systolic blood pressure
TSAS	-	Totale siekte en afwesigheidsyfer
USA	-	United States of America

CHAPTER ONE

Setting the problem

Introduction

The World Health Organisation has defined health as a “state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity” (Fedotov, 1998).

One popular description of health expands the definition supplied by the World Health Organisation. Holistic health extends the physical, mental, and social aspects of the definition to include intellectual and spiritual dimensions. The holistically healthy person functions as a total person and is said to have reached a “high-level of wellness.” In a working environment, these factors can be examined quantitatively with regard to absenteeism, job satisfaction and work stability (Fedotov, 1998).

Health was not always regarded important in the medical field. Historically, health was connected with “wholeness”. Previously, health was considered to be an autonomously created “whole rule of life”, which did not require personal effort or an individual’s intervention (Seedhouse, 1986:2). Previously, health and illness were defined as opposites. Wellness and illness function on a continuum which involves the primary dimensions of wellness namely; body, mind and soul as well as secondary dimensions, namely; social, emotional and occupational (Murray and Zentner, 1989:569).

Health promotion is seen as central to those activities intended to prevent disease, improve health and enhance well-being (Naidoo and Wills, 1998:1). An important aspect of health promotion is that it aims to empower individuals to have more control over aspects of their lives that affect their health. A range of factors which affect an individual’s life include; genetic make-up, gender, family, religion, culture, friends, income, advertising, social life, age, working conditions, health services, access to leisure facilities and shops, housing, education and much more (Ewles and Simnett, 1999:7).

Wellness defined

High-level wellness suggests an optimistic way of looking at an individual's health. Wellness supports the concept that an individual's health should not be judged from a medical or scientific standpoint, but from the standpoint of realizing human potential. Wellness is a process for the continuous self-renewal that is needed for an exciting, creative, fulfilling life (Payne and Hahn, 1995). According to the Safety Policy Manual (2001), wellness is an "ideal state of health and well-being for employees, the creation of a safe and healthy workplace that enhances employee job satisfaction and productivity.

Wellness means having a change in attitudes and behaviours that enhance quality of life and maximise personal potential (Anspaugh *et al.*, 1994:2). In order for individuals to reach their potential, they have to become aware of their life choices and take ownership in making the correct choices towards living wellness and improving their quality of life. Wellness is not a state that you arrive at, but a continuous process of awareness, education, and growth (Figure 1.1).

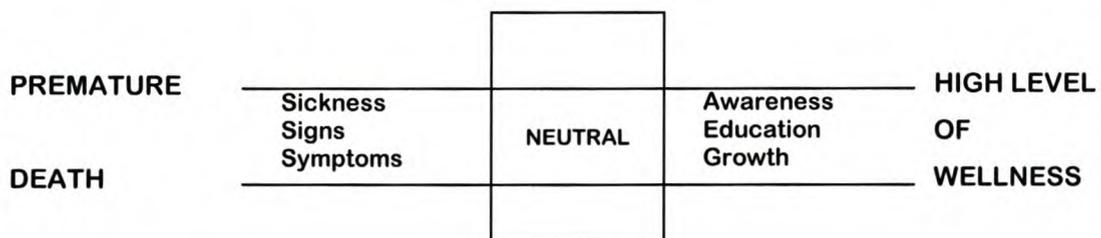


Figure 1.1: Illness - wellness continuum: (Hockey, 1996:2)

Wellness and holistic health are greatly influenced by Chinese health practices, eastern philosophy and the early 19th century western health practices. Much emphasis is placed on interaction of body, mind, soul and environment dimensions. The early supporters of wellness movements advocated personal responsibility for their well-being and minimized their dependency on doctors (Johnson, 1986:9).

The ongoing process of wellness requires daily decision-making in nutrition, stress management, physical fitness, preventative health care, emotional health, and various aspects of health (Murray and Zentner, 1989:510; Anspaugh *et al.*, 1994:2).

Wellness in the work place

Since the 1980's, there has been a growing trend for companies to offer health promotion programmes at the worksite. "Employee wellness programmes," "health enhancement programmes," "health promotion programmes," or "disease prevention programmes," as they are commonly referred to, all describe a series of activities that advocate adopting healthier lifestyles. Examples might include programmes directed towards smoking cessation, physical fitness, stress management, nutrition education, weight management, cardiopulmonary resuscitation, alcohol and drug abuse counselling and employee assistance programmes (Klarreich, 1987:5; Fronstin, 1996; Shephard, 2000).

Since corporate health care costs have been increasing at an escalating rate, corporate health care has become increasingly proactive. This could possibly be the underlying explanation of the movement toward wellness (Klarreich, 1987:5). Companies are entering an era where health promotion programmes may make the difference in recruitment and retention decisions. New workers have stringent values, which include wanting a healthy and supportive environment in which to work (Bellingham and Cohen, 1987:9). For many companies, medical costs can consume half of corporate profits or more. Some employers look to cost sharing, cost shifting, managed care plans, risk rating, and cash-based rebates or incentives. But these methods merely shift costs. Only worksite health promotion stands out as the long term answer for keeping employees well in the first place (WELCOA, 2001).

Health and wellness programmes in the workplace resulted primarily as a remedy for the growing health care costs. In 1982, over \$300 billion was spent on health care in the United States of America (USA). Of that amount, corporations contributed \$77 billion because of decreased productivity, increased health insurance costs, and absenteeism costs. To demonstrate how health care costs are climbing, expenditures

in the USA in 1965 were \$42 billion, \$132 billion in 1975 and were projected to be \$462 billion by 1985. While the overall inflation rate was 3.9% in 1982, health care costs rose by a staggering 11% (Klarreich, 1987:11).

Wellness is often seen as something that will produce an outcome or result. Health, which is the payoff of living a wellness lifestyle, is seen as secondary. For an organization; the reduction in absenteeism, medical claims, improved morale, or increased profits is the result. Wellness then serves as a means to produce an outcome, which is considered to be of greater worth (Johnson, 1986:10).

The lifestyle of the Western culture has become more sedentary and has been associated as a major contributor to certain diseases such as coronary heart disease (CHD), and to work related injuries. The enormous increase in health care costs associated with work related injuries and employee diseases, have forced businesses, big and small, to consider alternative approaches to controlling and reducing these costs (WELCOA, 2001).

According to Shiftwork Practices in North America, shift workers and management have difficulties with poorly designed schedules that lead to production problems, low morale, health and safety concerns, worker fatigue, absenteeism and high turnover. Shift workers have more health problems than nine-to-five workers. Workers have increased health problems due to a disruption of their human circadian rhythms. Gastrointestinal disorders, such as heartburn and indigestion are prevalent among shift workers. They are at an increased risk for high blood pressure and heart disease (Mitchell, 2001; Van Amelsvoort *et al.*, 2001). Shift workers are at risk to develop premature ventricular complexes (PVC) (Van Amelsvoort *et al.*, 2001), which is associated with extra heartbeats and an increased risk of death due to heart disease, according to a study done by Mercola (2001). The study found that approximately half the shift workers experienced an increase in PVC's in contrast to a quarter of day-shift workers who experienced an increase.

The South African electricity utility, Eskom, accounts for more than half the total electricity generated in Africa and is the world's fifth biggest electricity supplier. Eskom has a simple vision – “to be the lowest cost producer of electricity in the world”. It has

tailored its operations to meet the demands of a country in reconstruction and a market that is growing and changing daily. Through its technology and human resources, Eskom has created unique solutions for the generation, supply and sale of its product at prices that make it accessible to all. Eskom has accepted a leading role and responsibility in developing the economic infrastructures of South Africa, its regional neighbours and sub-Saharan Africa (Rolfe and Alfred, n.d.).

Eskom's highest priorities are the health and safety of their employees, both as a caring employer and as a specification of the Occupational Health and Safety Act. Wellness has been strategically launched throughout all of Eskom, however, within certain power stations, the concept has not been sold or presented as a viable and economical support in cutting costs and improving productivity. Through this study, the researcher aims to show how a six-month wellness intervention can impact the health and safety of their employees, coupled to a return on their investment.

Aim of the study

This study involves the use of a physical wellness programme to attempt to identify the effect thereof on shift workers at an Eskom power station and what difference it makes to the bottom line profit margin. The particular power station involved in the study, as with all companies only equated an intervention worthwhile if it affected the bottom line profit margin. The power station also had the largest absentee rate within Eskom. To remain competitive and leading in its field, the researcher in partnership with Eskom initiatives intervened with the security officers in a wellness project. They are functionally responsible for the safety of the employees and the plant.

Summary

To be seen as successful, corporate health promotion and preventative medicine programmes must prove that they can improve the risk profile of all employees. In addition to this, corporations are concerned about profits and how a large-scale intervention such as wellness will bring about a return on investment. Should the

results of this study provide such evidence, then a physical wellness programme is indeed an investment which should be implemented at all levels within the organisation and serve as a tool in demonstrating the philosophy of health and caring.

CHAPTER TWO

Related Literature

Introduction

Work consumes more of an individual's life for the most important years of a lifetime and is usually second to sleep in the number of occupied hours (Dhanesar and Hales, 1994). Nearly all adults devote at least half their waking time to work (Bellingham and Cohen, 1987:30). The rapid growth of worksite health promotion programmes has partially resulted from the belief that an organisation should take some responsibility for the welfare of its most valuable resource, the worker.

"Wellness could be described as a mountain riddled with deep gorges, giant boulders, and dense forests must be climbed in order to reach the sunny peak of high level wellness, maximum longevity, and enhanced quality of life. The obstacles start with the recognition of negative lifestyles, and go on to include action to reduce them, elimination of risk factors, and adoption of positive lifestyles. This leads to optimum physical, mental, and social functioning. In contrast, instead of ascending, one can take the easier trail and descend into the valley of illness and death. Many people are speeded along this descent by negative lifestyles, symptoms, signs, disease, and disability; at the bottom they fall into premature death. A complement to wellness is health promotion. It is the process of creating awareness of health risks, influencing attitudes, and identifying alternatives. The goal is to motivate people to improve their health and environment in order that they may function at their optimum level. Wellness means fostering attitudes and actions which can lead to health and ultimately reduce health care costs for both employer and employee" (Berry and Berry, 1984 in Johnson, 1986:13).

The key to striving for high-level wellness is motivation. To make lasting changes you need to understand the resultant causes to an individual's behaviour. A significant contribution to accepting the challenge of wellness is the knowledge and attitudes acquired during a lifetime. For change to occur, an individual's belief system must be affected. People are motivated by their values. For some individuals, it is the desire to look better, feel better or be more self-reliant. The more a health benefit is valued, the greater the chance of making the change (Anspaugh *et al.*, 1994:2; Johnson, 1986:13; Dines and Cribb, 1993:16).

The concepts of health and wellness overlap to a great extent, and should be regarded as separate entities (Dines and Cribb, 1993:14). An individual, who is terminally ill and has family support, is, compared to another who is always unhappy, lonely, anxious, and have no illness, considered unhealthy. There are various dimensions of health. The terminally ill person will not have physical health but possibly have good emotional, spiritual and mental health. The depressed individual would have physical wellness but be lacking in the other dimensions. Wellness and the presence of disease can co-exist along the dimensions of body, mind, soul, emotional and social health (Dines and Cribb, 1993:16).

Wellness is a lifestyle approach for realising the best possibilities for well-being. The key is lifestyle, an entire spectrum of actions that is under the control of most individuals. These include nutrition, exercise, stress, medication, environmental factors, alcohol, and tobacco. The inherited/biological factors that influence the body such as age, gender, and genetics cannot be changed and only accounts for a small percentage of lifestyle behaviours. Wellness is a positive approach. The reasons for pursuing wellness are always related to satisfaction, not sickness avoidance or life extension. Wellness lifestyles are unique to each individual (Ardell, 1999:6).

Dimensions of wellness

Achieving a high level of wellness requires constant balance and effort of the following dimensions (Johnson, 1986:14; Murray and Zenter, 1989; Dines and Cribb, 1993:16 Anspaugh *et al.*, 1994:3; Van der Merwe, 2000; Dugdill, 2000).

The body:

The physical dimension involves regular exercise for cardiovascular endurance, muscle endurance and flexibility; adequate nutrition, avoiding substance abuse and maintaining a healthy body mass (Johnson, 1986:14; Anspaugh *et al.*, 1994:3; Van der Merwe, 2000). Each person has a number of physiological and structural characteristics such as body weight, susceptibility to disease, visual ability, strength, co-ordination,

endurance and powers of recuperation to accomplish their developmental tasks (Hahn and Payne, 1994:8). Physical health refers to the optimal functioning of the body (Ewles and Simnett, 1999:7). The physical dimension is the pathway toward greater psychological and emotional returns (Ardell, 1999:7). More emphasis is placed on the physical dimension in wellness programmes and serves as a catalyst to restoring the other dimensions (Johnson, 1986:14).

The mind:

Mind wellness is the ability to think clearly and coherently (Ewles and Simnett, 1999). The mind encourages creative, stimulating, mental activities and enables one to utilise the available resources to the individuals best advantage (Van der Merwe, 2000). If an individual has a poor self-concept and views life as being meaningless, the physical dimension will be less valued (Johnson, 1986:14).

The emotions:

Emotional health is the ability to recognise and accept feelings and to not be defeated by setbacks and failures (Anspaugh *et al.*, 1994:3). The emotional dimension includes the degree to which a person is able to cope with stress, remain flexible, and compromise to resolve conflict (Hahn and Payne, 1994:8; Ewles and Simnett, 1999:7). Emotional wellness encompasses the degree to which an individual feels enthusiastic about self and life.

Soul/Spiritual:

The spiritual component provides meaning and direction in life, and enables the individual to grow, learn and meet new challenges. Optimal soul wellness is the ability to discover, articulate, and act on one's basic purpose in life (Anspaugh *et al.*, 1994:3). For some individuals, soul wellness is about spirituality, meditation and religious

practices. For others, it has to do with morals, ethics, principles, code of conduct and the existence of peace (Ewles and Simnett, 1999:7).

Social:

Social wellness is the ability to interact successfully with one's human and physical environment. It includes the ability to live in peace and have respect for those you interact with (Anspaugh *et al.*, 1994:3; Ewles and Simnett, 1999:7; Van der Merwe, 2000). Since most of a person's growth and development occurs in the presence of others, this dimension is seen as a critically important factor in an individual's life (Hahn and Payne, 1994:8).

Occupational:

This component involves gaining personal satisfaction through contributions made to work-life. It involves having a positive attitude towards work, pursuing excellence and accomplishing desired goals (Van der Merwe, 2000).

Wellness risk factors and personal responsibility

An individual's general health and well-being are influenced by factors other than exercise only. Degenerative diseases such as cancer and heart attacks are the major causes of death in the USA where previously, tuberculosis and pneumonia were rife (Powers and Howley, 1994:294).

Wellness focuses on self-responsibility. It is the acknowledgement that an individual must exercise control over the factors or forces that reduce the chance of premature death from lifestyle diseases. Having good health is not a result of luck but evolves as a result of a combination of factors at any one time (Ewles and Simnett: 1999:9). Figure 2.1 shows the three major risk factors associated with health and disease, with specific risk factors identified under each. Environmental and behavioural risk factors can be changed to a large degree, and this would require individual responsibility as a major force in determining one's well-being (Powers and Howley, 1994:294). There exists a

basic responsibility of maintaining and improving ones health and that of others. Other challenges include being responsible for recognising, improving and using those strengths that constitute ones physical, emotional, social, intellectual, and spiritual make-up. No area of responsibility pertaining to life itself, can be undertaken with maximum effectiveness unless an individual makes a commitment to be responsible for his or her own health (Hahn and Payne, 1994:6).

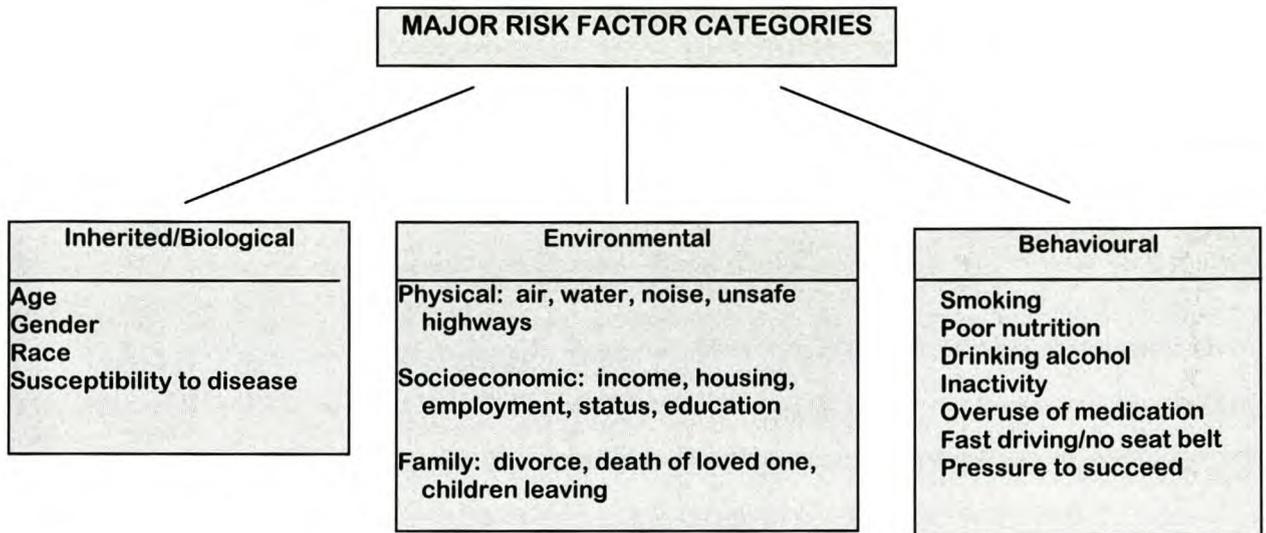


Figure 2.1: Categories of major risk factors: (Powers and Howley, 1994:295)

The embracing of a wellness lifestyle from an early childhood will form part of the make-up, personality and character of an individual. Wellness is unique and adaptable to suit the nature and personality of an individual. It is a way of being, and forms part of what you are made of, and cannot be manufactured. Wellness as a way of living is available to all on the illness-wellness continuum. It is evident in the lives of those who demonstrate a balance of body, mind and soul; and whose lives have meaning and purpose (Johnson, 1986:14).

On the illness-wellness continuum (Figure 1.1), traditionally the illness model was used. If an individual was ill or not in good health, he or she would seek medical treatment. The signs, symptoms and eventual disability, would be present, and ultimately result in premature death. On the wellness slide of the continuum, an individual can experience a high level of wellness by becoming aware, attending workshops and reading wellness related articles or books.

Holistic health is based on the law of nature that “a whole is made up of interdependent parts”, which are the physical, mental, emotional and spiritual components. When one component is not operating functionally, it impacts the rest of the parts. Wellness, then, is defined as “ the state of well-being in which an individual’s body, mind, emotions and spirit are in harmony with, and guided by, an awareness of society, nature and the universe” (Van Velden, 2001).

According to the post-modern-holistic bio-psycho-social approach in Figure 2.2 of Van Velden (2001), health is viewed holistically, with the emphasis on the interrelationship between the mind and the body. There is a move away from unnecessary tests and evaluations, and the doctor becomes more patient-centred. The patient-centred model relies on effective communication skills. Exercise is portrayed as part of an active lifestyle with the emphasis on feeling good and having fun, rather than on attaining a target heart rate. According to Van Velden (2002), you do not have to be perfect to be well. A wheelchair bound or overweight individual can also possess wellness. Cardiovascular fitness rather than performance fitness is reflective of wellness. A fit body enables creative thoughts and one is able to ventilate feelings through movement. The relationship between health and creativity (a hobby) is a central theme in post-modern society (Van Velden, 2001).

Exercise, fitness and well-being

Absence of disease is positively related to well-being, but does enhanced health and increased fitness grant a high quality of well-being? Immediately after moderate to prolonged exercise, most people report that they feel good or even better. Part of this feeling of well-being may be attributed to perceived reductions in anxiety and depression. Some individuals claim a type of euphoria by running. Morgan in Spirdussa (1995) gives an elegant description of the runner’s high:

“Thirty minutes out, and something lifts. Legs and arms become light and rhythmic. My snake brain is making the most of it. The fatigue goes away and feelings of power begin. I think I’ll run twenty-five miles today. I’ll double the size of the research grant request. I’ll have that talk with the dean... Then, sometime in into the second hour comes the spooky time. Colours are bright and beautiful, water sparkles, clouds breathe, and my body swimming,

detaches from the earth. A loving contentment invades the basement of my mind, and thoughts bubble up without trails. I find the place I need to live. The running literature says that if you run six miles a day for two months you are addicted forever. I understand. A cosmic view and peace are located between six and ten miles of running. I found it so everywhere... After the run I can't use my mind. It's empty. Then a filling begins. By afternoon I'm back into life with long and smooth energy, a quite feeling of strength, the kind wisdom afforded those without fear, those detached yet full. The most delicious part is the night's sleep. Long and illusive, fickle dealer with me, Father Sandman now stands ready whenever I want. Maybe the greatest power of the second cycle is the capacity to decide when to sleep."

This type of testimonial about the feelings of running and the after-effects is found in popular research. Several studies have concluded that jogging enhances mood and decreases anxiety (Spirdussa, 1995).

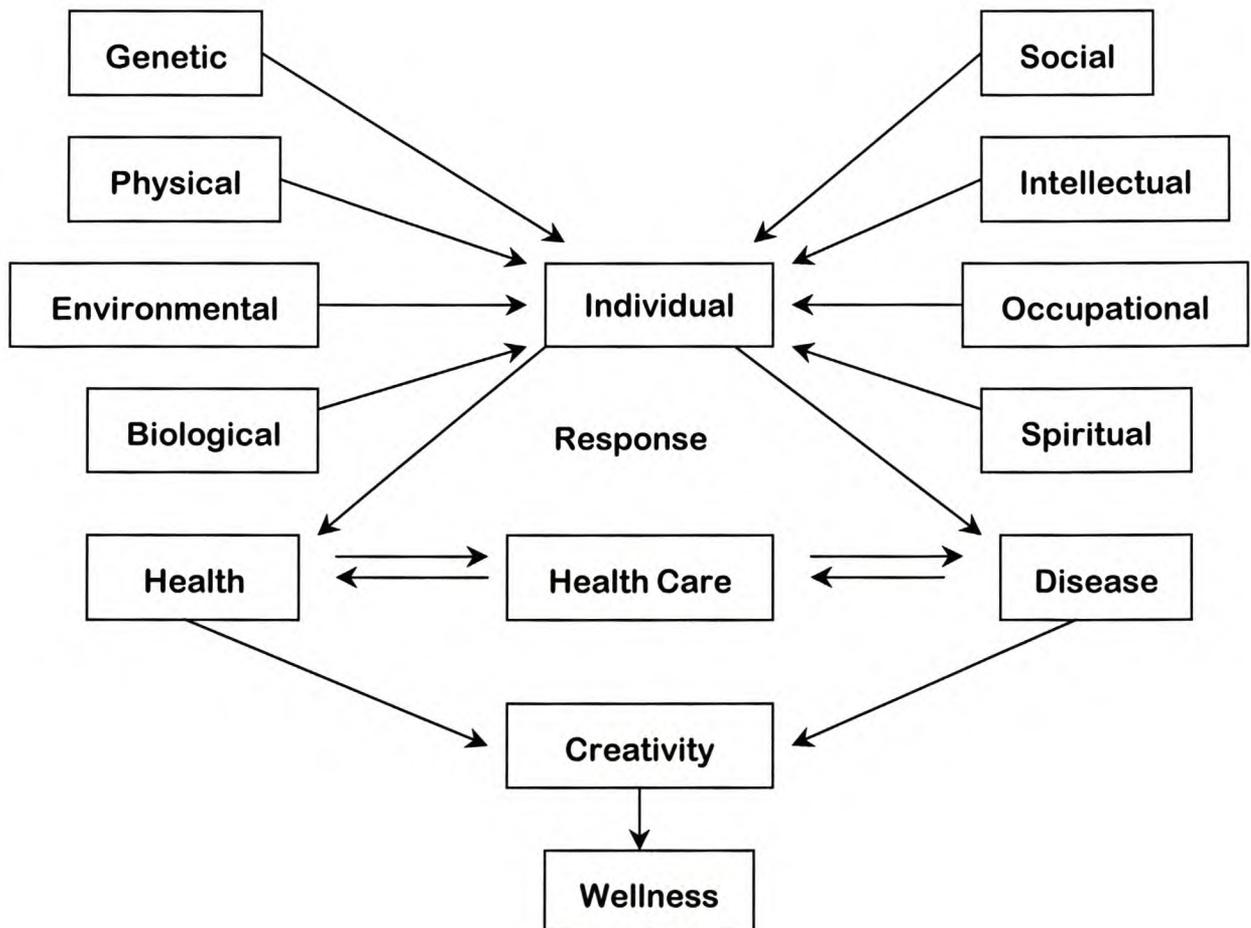


Figure 2.2: Bio-psycho-social model on health/disease (Van Velden, 2002)

Table 2.1: The benefits of regular physical activity (ACSM, 1995:5)

<p>Improved cardiorespiratory function</p> <ol style="list-style-type: none">1. Increased maximal oxygen uptake due to both central and peripheral adaptations.2. Lower myocardial oxygen cost for a given absolute sub-maximal intensity.3. Lower heart rate and blood pressure.4. Increased exercise threshold for the accumulation of lactate in the blood.5. Increased exercise threshold for the onset of disease symptoms (e.g. angina pectoris).
<p>Reduction in coronary artery disease risk factors</p> <ol style="list-style-type: none">1. (Modestly) reduced resting systolic and diastolic pressures in hypertensives.2. Increased serum high-density lipoprotein (HDL) and decreased serum triglycerides (LDL). Reduced body fatness.3. Reduced insulin needs, improved glucose tolerance.
<p>Decreased mortality and morbidity</p> <ol style="list-style-type: none">1. <i>Primary prevention</i>: Lower activity and/or fitness levels are associated with higher death rates from coronary artery disease.2. <i>Secondary prevention</i>: Few randomised exercise studies have had a sufficient number of patients and duration to demonstrate the protective effects of exercise; however most randomised trials report a positive effect of exercise on longevity. Meta-analysis (pooled data across studies) involving post Myocardial Infarct patients provide supportive evidence that a comprehensive cardiac rehabilitation programme can reduce premature cardiovascular mortality but probably not nonfatal events.
<p>Other postulated benefits</p> <ol style="list-style-type: none">1. Decreased anxiety and depression.2. Enhanced feelings of well-being.3. Enhanced performance of work, recreational and sport activities.

The health habits associated with the sedentary lifestyle have led to a series of diseases and work related disease (Van der Merwe, 2000).

- The leading causes of death in SA are high blood pressure and atherosclerosis; cancer and infectious diseases such as HIV/AIDS.
- Depression and hypertension are the two main reasons for absence from work and low productivity.
- Tobacco kills 25 000 SA's every year.
- 52 700 SA's are infected by HIV every month. 22.8% of the population in SA is HIV positive.
- Hypertension is the most prevalent disease in SA (18% of 20-50 year old SA males have hypertension).
- 25% of the general population has some form of heart disease.
- 32% of people with high blood pressure do not know that they have it and will only realise it once they either have a heart attack or stroke.

At the end of the day, the company's primary objective is to make a profit. One of the largest costs to an employer is the replacement of intellectual capital – the replacement and re-education of a person with the skills necessary for job completion. The Occupational Health and Safety Act (1993) requests employers to formulate a health and safety policy, including guidelines, and to integrate these into company culture. The question that remains is how to implement health related changes in the workplace that are cost effective, lasting, manageable and legislatively compliant (Beira, 2000).

According to WELCOA (2001), there are seven steps that drive the wellness process in the workplace: enlist senior management support, create strong wellness teams, continuous collection of health and wellness information, drafting a business plan,

choose appropriate interventions, create a supportive environment and there should be consistent evaluations of wellness programmes.

Worksite wellness

Comprehensive worksite-health promotion programmes were first introduced in the USA in the late 1970's and early 1980's. The goals were to improve employee health, reduce health care costs and demonstrate senior management's commitment to the health and well-being of workers (Ozminkowski *et al.*, 2002). The concept of corporate wellness has a dual role. The first role of a wellness programme, is to assist each employee to be healthier and feel more energetic, enabling them to get more enjoyment out of life and work. The second role is to provide managers with a proven strategy for controlling certain costs while increasing productivity (Davie, 2001).

Many organisations have responded to the needs of their employees and the increase of the healthcare costs by adopting innovative strategies to change their corporate culture. Other companies have used wellness programmes as a vehicle for achieving multiple goals. This includes reducing the "indirect" costs of lost productivity (absenteeism, turnover, stress, reduced job performance) as well as the direct costs of medical treatment (Dhanesar and Hales, 1994; Fronstin 1996; Aldana, 2001).

Worksite wellness programmes in South Africa are still in their infancy. A company-health promotion programme encompasses more than just sweaty aerobic classes. It concentrates on healthcare and not disease care (Dhanesar and Hales, 1994).

Types of fitness and wellness programmes

Eskom has a wellness programme, which is projected by various wellness custodians at a national level. The approach is multidisciplinary with on-site medical staff (biokineticist, doctor, nurses, social worker, psychologist, human resources, communication, HIV/AIDS coordinator, occupational safety hygienist and a department

representative. Medical screenings, fitness assessments, lifestyle and interactive workshops, wellness week and wellness programmes are run throughout the year.

According to Dhanesar and Hales (1994), First National Bank has a wellness programme that adopted a multidisciplinary approach to healthcare in the organisation. This approach provides employees access to a medical doctor, orthopaedic, cardiologist, physiotherapist, occupational therapist, biokineticist, psychologist, social worker and other healthcare specialists. Services offered to the staff include: health and fitness assessments and physical evaluations, preventative exercise, orthopaedic and cardiac rehabilitation, employee assistance programmes, personalised training programmes, fully equipped gymnasium, a complete lifestyle evaluation and a “Lean on me” fat loss program (Dhanesar and Hales, 1994).

One South African corporation undertook a project over a six-month period in a construction worker’s camp, by implementing lifestyle and exercise programs. With the help of a multi-disciplinary team, which included nursing staff and biokineticists, they introduced fitness programmes, healthy diets and education on HIV/AIDS and lifestyles. The programme had decreased an under-recovery from R 500 000 to R3 000 000, hereby having a direct impact on productivity (Mead, 1998).

Fitness and wellness programs can be implemented at three functional levels (Gebhardt and Crump, 1990). Level one focuses on awareness programmes that include newsletters, screening sessions, posters, flyers, and health-related workshops. These programmes assist individuals in becoming aware of specific consequences of poor lifestyle habits. Level one programmes generate interest and motivation for level two and three programmes, and help reinforce positive behaviours. At level two, various ongoing workshops on lifestyle modification are offered to the employees. These workshops educate the workers in assisting them on how to alter negative health habits. Examples of level two programmes that have been established by employers include: (a) self-administered fitness programmes, (b) memberships at local exercise gymnasiums, (c) classes addressing ergonomics and adjustment of workstations. The goal of level three programs is to create an environment for individuals to maintain and sustain their healthy lifestyles and behaviours.

At some of America's healthiest companies, they have recognised that keeping knowledgeable and skilled-workers healthy, require new approaches. It costs an organisation millions of dollars to replace knowledgeable workers. One organisation, Gallup, uses a different approach from traditional wellness programmes. According to them, workers need to know what is expected of them, feel cared about and feel connected with co-workers before they engage in a wellness programme. Gallup has a 24-hour nurse line and an on-line lifestyle management service. They make use of a "strength finder" survey, which is a personnel assessment instrument. The survey addresses 34 different "life themes" ranging from thought patterns, behaviour and feelings. The themes are divided into four groups namely; comprehension of the job, how individuals relate to other co-workers, the impact on the organisation and being productive (WELCOA, 2001).

Johnson & Johnson, a pioneer in the field, had its first wellness programme implemented in 1979 with the expressed aim of making "Johnson & Johnson employees the healthiest in the world". Millions of dollars were spent to evaluate the programme, examining its effects on health and risk factors, health care costs, absenteeism and employee attitudes (Ozminkowski *et al.*, 2002).

General Motors in Detroit offers yoga and tai chi (a martial art known for its stress-reduction capabilities) at its headquarters as part of their corporate wellness programme (Palm, 2000).

At Providence Everett Medical Centre, eligible employees are given cash rewards of \$250 - \$300 as an incentive to participate in the wellness programme. By using this approach, the programme attracted over 52% of the 2 700 employees to participate and earn 3:1 return on investment over a nine year period (WELCOA, 2001).

The goals of any wellness programme according to Dhansar and Hales, 1994; Mead, 1998; Van der Merwe, 2000; WELCOA, 2001; Aldana, 2001; Ozminkowski *et al.*, 2002; include:

- Reducing medical aid claims and enhancing managed health care
- Reducing absenteeism and sick leave

- Encouraging a pro-active approach to health care through:
 - Scientific screening procedures.
 - Education and empowerment.
 - Improving the health and wellness awareness in organisations and South Africa.

- Improved morale and overall well-being.
- Employees to assume self-responsibility for own well-being through awareness, education and growth.
- Discovering your purpose.

Job specific fitness programmes:

Job specific exercise programmes are used for employees in physically demanding employee and public safety jobs. For employees to perform the duties efficiently, they should be performing at 50% or less of their maximum aerobic capacity. Most fire-fighting tasks have an oxygen requirement of 22.5ml of oxygen per kilogram of body weight per minute. The workers' maximum oxygen uptake must be 45ml/kg/min to perform the fire-fighting task at 50% aerobic capacity. The average person would not be able to perform the fire-fighting or similar demanding job at that level. Job specific fitness programmes are developed for public and corporate safety personnel such as security officers, fire-fighters and police officers. The results of a study where fire-fighters were required to participate in a 45 minutes exercise programme, three times per week, showed a decline in work capacity and flexibility, for workers between age 40 to 59 years (Gebhardt and Crump, 1990).

The health and economics of employee and wellness programmes

South African workers tend to be very unhealthy due to unhealthy lifestyles and poor nutrition. By adopting a risk management approach to disease prevention and healthcare utilisation, high-risk cases amongst employees can be identified.

Management will gain better insight into what is happening at ground level by having a health profile and providing measurements against which to plot productivity and absenteeism improvements. In a report released by the National Productivity Institute on labour productivity (GDP {Gross domestic product} per employee per hour) South Africa ranks 29th out of 44 countries on overall productivity (GDP per person employed). South Africa ranks 31st out of 45 countries on worker motivation (Mead, 1998).

Johnson & Johnson, the largest and most diversified health-care corporation in the world, have a staff complement of 100 000 employees worldwide. In 1993, they developed a services concept, integrating employee health, wellness, disability management, employee assistance and occupational health programmes. The Johnson & Johnson Health and Wellness programme partnered with Johnson & Johnson's Health Care Systems, one of its operating companies, for health promotion and fitness services. Financial incentives were given to employees who participated in the programme. The programme focussed on changing individual behavioural risk factors, and also emphasized awareness among employees through health education, prevention activities, self-responsibility, and self-care. The programme saw a participation rate of 90% because of the financial incentive and having a corporate culture that supported health promotion activities (Ozminkowski et al., 2002).

Corporate health promotion and disease prevention programmes must demonstrate that they can improve the risk profile of employees to be viewed as successful, specifically those employees at highest risk (Goetzel *et al.*, 2002). Wellness can be promoted by including employee wellness or health promotion in the overall strategy of the organisation, adopting employee wellness into the culture of the organisation, involving role players and key decision-makers as well as developing and implementing health promotion policies. An organisation, which ignores the promotion of employee health and well-being, will not be successful (Matlala, 1999).

HIV and AIDS education should be integrated into the organisational health promotion policy. Employees should be trained, counselled and informed about the direct and indirect impact this epidemic will have on the organisation, family, economy and social life (Matlala, 1999).

Despite the temporary decline in economic activity, many organisations are offering wellness programmes to enhance productivity, reduce absenteeism and realise the benefits of reduced medical costs. The health and well-being of employees have become a corporate responsibility. Billions of dollars are spent annually on employee absenteeism due to poor lifestyle related diseases (Trifit, 2002).

During times of economic restraint, many organisations are downsizing or retrenching. This places an enormous amount of stress on employees who are faced with increased responsibilities. In the USA, stress accounts for 15% of workman's compensation claims (Trifit, 2002).

A work force with aging adults is prone to suffer from back problems, be at high risk for CVD and have repetitive strain injuries. By educating employees on lifestyle related diseases, the company would save more on costs for ill health and diseases (Trifit, 2001). The wellness programmes at Eskom focuses on lifestyle related diseases. Back safety workshops are held throughout the Eskom sites where there is a large proportion of workers employed for more than 20 years. These programmes are structured according to the type of work and location, ranging from secretaries to blue-collar workers.

For many years work-site health promotion programmes were pressurised to quantify return-on investment to justify resource allocation. Most companies are not happy just to receive subjective feedback such as a how employees feel. They require precise evidence in terms of monetary value in the form of reduced absenteeism and lower medical aid costs (Serxner *et al.*, 2001).

A study was done on 43 large private and public employers to assess the impact of wellness on recruitment and retention, absenteeism, productivity and disability rates. According to the study, the median annual health and productivity costs amounted to \$9 992, of which 47% were group health costs and 3% were workers compensation. Turnover was 37%, absenteeism 8% and non-occupational disability was 5%. The cost saving for health and productivity was approximately \$2 600 per employee (Serxner *et al.*, 2001).

Research on assessing the outcome of work-site wellness programmes on absenteeism, turnover and retention has been limited. Whilst doing the research in terms of the cost benefit of wellness programmes, the field worker found limited South African information.

A study done by Serxner *et al.*, (2001), in North Carolina, examined the impact of an on-site wellness programme, it included a refunding model as incentive for participation on short-term disability (STD). The study involved 8 500 employees in a large telecommunications company called Raleigh, operating in 20 different stations. Eskom as a large electricity supply corporation has a large staff complement and has 20 power stations. Each business unit functions independently and have diverse ways of implementing wellness programmes at their sites.

The wellness programme at Raleigh included both employees and family members. Services offered, included, occupational health services, physical therapy, gymnasium, lifestyle workshops, ergonomics, nutrition counselling, massage therapy, weight management and smoking cessation programmes. For very remote places where access to the above-mentioned facilities were difficult, telephonic risk-reduction intervention programmes, telephonic support counselling, self care booklets, health risk assessments (HRA) and a fitness and wellness reimbursement for participating or belonging to community based wellness activities were given (Serxner *et al.*, 2001).

Assessing the return of investment is more difficult than deciding if the programme worked in non-rand terms. The first difficulty is determining how much it will accurately cost to implement the programme. Hidden costs include, the time employees spent in the planning of the programme, the depreciation of space used for the programme, overheads and much more (Bellingham and Cohen, 1987:26). One possible solution is to look at the cost of ill-health and see what proportion of it can be reduced through employees participating in a wellness programme or related programme. This amount should then be compared to the cost of not doing any intervention. Another solution might be to concentrate on cost-effectiveness analysis, directed to answering the question of how much is required to improve certain health conditions, example, what is the cost involved in sustaining a smoking cessation programme?

There are various approaches that can be utilised in the assessment of wellness programmes (Biddle and Mutrie, 1991:245). The cost benefit analysis (CBA) approach is used to measure the effectiveness of an intervention. By using a cost-effective analysis (CEA), resources competing are considered. A cost utility analysis approach is implemented to evaluate the quality of life for workers. The evaluation of the programme should be ongoing and should include the evaluation of health and lifestyle factors, attitudes, turnover and productivity (Biddle and Mutrie, 1991:247). The researcher made use of the CBA approach to quantify what effect the wellness programme had on absenteeism costs.

Absenteeism

Health promotion programmes can reduce absenteeism by preventing certain diseases caused by poor lifestyle habits (WELCOA, 2001).

Employer-sponsored health promotion can improve employee health and morale, reduce medical claims and absenteeism. The programme will only be effective, if there is a sufficient level of participation of employees who are at increased risk of ill health. A programme called "HealthPlus Quotient" is an incentive/disincentive approach to health promotion. "The employer's contribution to the package was adjusted on the basis of an annual health risk appraisal". Individuals who participated in activity related health promotion programmes, improved their subsequent-year health risk, more than those who did not participate. Participation was associated with reduced illness-related absenteeism (Stein *et al.*, 2000).

At Du Pont, a corporation in the United States, each dollar that was invested into the onsite wellness programme, produced \$1.42 over two years in lower absenteeism costs. At 41 industrial sites where wellness programmes were offered, absences from sickness unrelated to the job among 45 000 blue-collar workers dropped by 14% (WELCOA, 2001).

According to a nation wide survey done by Tucker in 1990, in North America on 8 301 employees, an inverse relationship was established between absenteeism and fitness

level. Employees in the lowest fitness categories had 2.5 times the rate of extended sick leave when compared to employees in the highest fitness category (Trifit, 2002).

According to WELCOA (2001), the Travelers Corporation found that for each dollar that was invested in health promotion, a \$3.40 return was made. This resulted in a total corporate savings of \$146 million in cost benefits. Due to the wellness programme, sick leave was reduced by 19% over a four-year period. The overall health of its 36 000 employees improved and the number of unnecessary visits to a doctor were reduced. Members of the company's fitness centre were absent significantly less than non-members were.

A nurse managed wellness centre in a 1 000 employee company demonstrated how their services could reduce medical costs, foster employee satisfaction and address health needs. In the first six months of the programme an estimated \$100 000 was saved on health care costs and absenteeism. Health behaviours were impacted through primary care linked with health promotion activities (Lugo, 1997).

Reduced employee turnover

In the light of high employee turnover, organisations are using health promotion and individual wellness assessments as an additional perk to retain skilled workers (WELCOA, 2001).

Employee turnover among programme participants at the Canada Life Assurance Company in Toronto had been sustained at an 8% advantage over a seven-year follow-up when compared to programme drop-outs (Shephard, 1992 in Trifit, 2002).

Improved morale

As the organizational culture begins to change as a result of health and wellness initiatives, a new level of energy will be visible in the company (WELCOA, 2001). When employees perceive that their employer is concerned about their health and well-being, the likely effect is increased productivity (Dhanesar and Hales, 1994; Fronstin, 1996).

Increased recruitment potential

In the midst of a competitive labour market, organisations are compelled to use innovative strategies to recruit new talent. Health and wellness programmes can be a valuable tool in winning an individual for the organisation (WELCOA, 2001). Companies that invest in their employees' health motivate their workers to remain with the organization (Dhanesar and Hales, 1994). The type of individual attracted to a company offering a health and wellness programme will be a high achiever, have a lower absenteeism record and be very productive. An appropriate advertising campaign could focus on wellness and fitness, such as the "strength", "fitness/leanness", or "power" of the company. All of these factors could possibly, increase worker satisfaction (Biddle and Mutrie, 1991).

Reduced cardiovascular risk

Individuals at the Northern Telecom Bramlea Switching plant in Toronto, who exercised regularly, had a reduction in their cardiovascular risk factor, according to an 18-month study. Cardiovascular risk profiles improved for all employees attending the programme irrespective of job classification and gender (Trifit, 2002).

Reynolds Electrical and Engineering Company in Las Vegas have a health programme called "Stay Alive and Well". Up to 80% of the 1 600 employees participated in the intervention programmes which resulted in decreased cholesterol levels, blood pressure, weight loss and had 21% lower lifestyle-related claim costs than non-participants (WELCOA, 2001).

Reduced medical aid claims

At Steelcase, a furniture company, the average medical costs of employees were 75% higher for those whose lifestyles included two to four health risks than those employees at low risk. The average medical costs were reduced to 35% when employees in the high-risk category participated in the health promotion programmes. A projected

savings of \$20 million over three years would yield, should all high risk employees in one location change their lifestyles to become low risk (WELCOA, 2001).

Workplace wellness programmes can save employers \$80 to \$225 per employee per year in medical care costs and an equal amount in productivity gains, according to the Health Medical Research Council in the USA (Edington, 2001).

Union Pacific Railroad in the USA, introduced the wellness concept to its 28 000 employees where medical costs amounted to \$6 000 per employee per year. Self-care programmes cost \$50 per employee that yielded net-savings of \$1.26 million per year. A voluntary programme aimed at lowering employees' health risks resulted in a cost-benefit ratio 1:1.57 after one year. Employees on treatment, lowered their risk of high blood pressure (45%), high cholesterol (34%), weight loss (30%) and smoking cessation (21%) (WELCOA, 2001).

Return on investment

A wellness and Employee Assistance Programme (EAP) produced a savings/cost ratio of 4:1 according to a study at McDonnell Douglas. This represents an estimated \$5.1 million in savings, \$4.3 million in reduced medical claims and \$800 000 in reduced absenteeism. Employees who made use of the programme had fewer medical claims, had fewer absences and stayed with the company longer than those who received treatment outside the programme for similar problems (Trifit, 2002). Return on investment ratios for different companies from various studies are listed in table 2.3.

According to Davie (2001), three of Canada's biggest banks averaged an approximate 8% return on assets during 2000. If a programme improves an employee's well-being, the measurable cost savings improve from between \$2 and \$4 for each dollar spent. A wellness programme is likely the most profitable enterprise the company undertakes.

Improved employee health status

Well-designed health promotion programmes can successfully impact an employee's health and overall well-being. The individual's quality of life can also be improved by saving him health care costs (Davie, 2001).

Table 2.2: Employee benefits of wellness (Anspaugh *et al.*, 1994:7)

- Improves cardiovascular system.
- Increases muscle tone, strength, flexibility and endurance, resulting in improved physical appearance.
- Decreases risk of developing or dying from chronic diseases and accidents.
- Decreases recovery time after injury, illness and childbirth.
- Regulates and improves overall body function.
- Helps prevent some form of diabetes.
- Increases the energy level and job productivity and decreases absenteeism.
- Increases the ability to cope with stress and resists depression.
- Delays the aging process.
- Increases the ability to communicate emotions to others and to act assertively.
- Supplies the body with proper nutrition.
- Expands and develops intellectual abilities from a cognitive base and is utilised in society.
- Acts from an internal locus of control.
- Learns to view life's difficulties as challenges and opportunities.

Table 2.3: Return on investment ratios estimated for corporate fitness and wellness in dollars (\$)

Programmes Study	Annual Return on Investment	Company
Bernstein (1986)	1.95	NY Telephone
Browne <i>et al.</i> , (1984)	1.91	Prudential Life
Damberg (1989)	3.63	Pilsbury
Gettman (1986)	1.07	Mesa Petroleu
Herd <i>et al.</i> , (1987)	2.16	ALLEF
McGinnis (1980)	3.00	Motorola
Reed <i>et al.</i> , (1986)	2.51	Indiana Blue
Terborg (1988)	3.75	Coors' Beer

Adapted from (Shephard, 1992), Medical and Science in Sports and Exercise (Trifit, 2002)

Wellness and absenteeism

Absenteeism or “absence from work” is commonly defined as “non-attendance of an employee when he is expected to work, for any reason at all, medical or other” (Mets, 1986; Oxford English Mini Dictionary, 1995:2).

Absenteeism concerns employers since it is expensive and negatively impacts profitability (Barmby, 2002). A high rate of absenteeism among employees is identified as one of the manpower problems in South African industry that contributes to this country’s lower productivity. Absenteeism is a costly and complex socio-industrial problem. Absenteeism has adverse effects on the company in that it disrupts the flow of production, it forces management to find a replacement for the absent employee, and increases overtime for other employees (Butler, 1995; Applesforthhealth.com, 2001).

Years of isolation and lack of global competition in the past have led to extremely complacent attitudes towards high and costly levels of absence in organisations. Absenteeism can lead to planning problems, lower skills on the job, and cessation of job, lower quality of goods, customer dissatisfaction, reduced production and safety/security threats. According to Oates (1999), absenteeism is caused by two reasons namely: absenteeism as a result of sickness and absenteeism as a result of external factors. Harrison (2000), schematically illustrates two types of absences (Figure 2.3). Involuntary absenteeism is beyond the employee's immediate control. Voluntary absence is to the benefit of the employee. It is imperative that action be taken, be it managerial or medical. Precise records and investigation of problem areas is needed as a control measure (Mets, 1986).

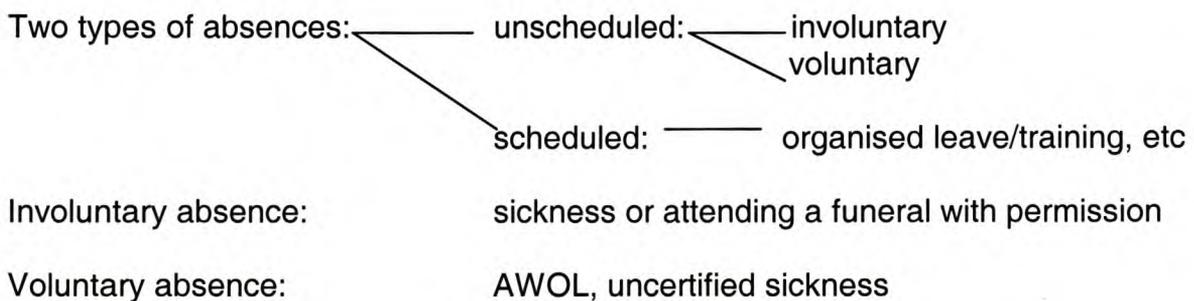


Figure 2.3: Types of absences (Harrison, 2000)

In South Africa absenteeism claims 3.2% of all scheduled work hours, 90 million hours per week, 416 million workdays per year, 9 days lost per employee per year, and one employee in every 15 on a weekly basis. Absentee costs are difficult to quantify. Experts in the USA estimate direct wage losses of more than \$30 billion per year. Supplementary costs include “regular wages, overtime wages, company benefits, workers compensation and unemployment compensation, administration of recruitment, selection and orientation, and training” (Tylczack, 1990; Harrison, 2000). There exists a considerable amount of data to suggest that “high levels of stress, excessive body weight, and multiple risk factors” are associated with increased health care costs and illness-related absenteeism (Aldana, 2001).

The most common causes for absenteeism from work according to the Safety Policy Manual (2001) in the USA are:

- Sickness and non-occupational injury
- Lifestyle-related disorders (alcohol and substance abuse, smoking, obesity, etc)
- Mental and emotional health issues
- Stress
- Family responsibilities
- Financial problems

There are seven influences affecting absenteeism (Figure 2.4); job situation, employee values and job expectation, personal characteristics, job satisfaction, pressure to attend, attendance motivation and the ability to attend (Harrison, 2000).

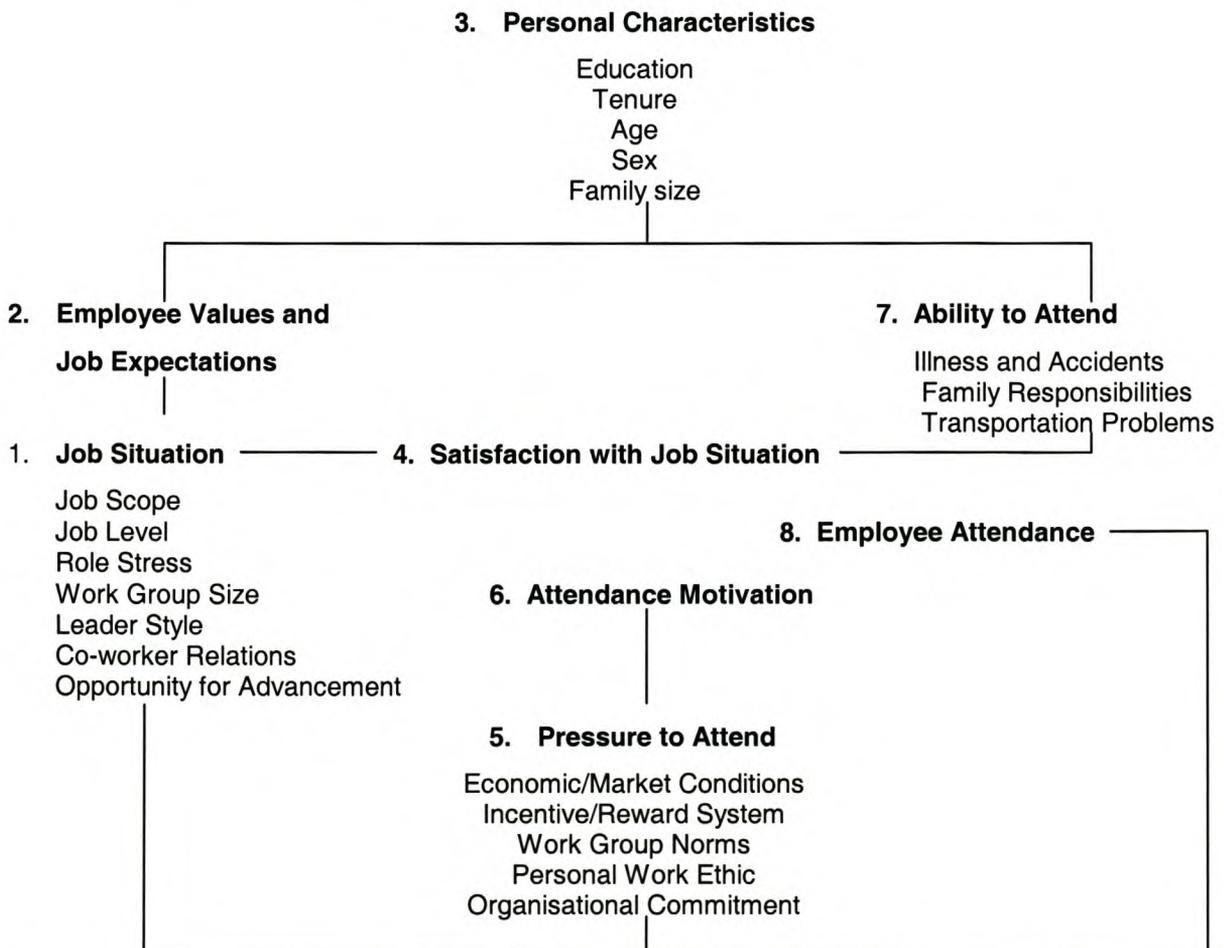


Figure 2.4: Major influences on employee attendance (Harrison, 2000)

Non-occupational related absenteeism is reduced by keeping people interested in their jobs, productively dedicated, energetically focused and connected socially through the various wellness initiatives. Employees who are satisfied in their jobs take pride in their contributions they make to the organisation and to their communities (Safety Policy Manual, 2001). Absenteeism of a section of the working population may reflect the “illness” of the whole company (Mets, 1986).

Full time employees in the public sector were more absent in the year 2000, due to illness, disability, personal or family responsibilities (an average of 10.2 days per year) compared to the private sector (7.4 days). A fact sheet on work absences in Canada showed a statistical update of workers in health care and social assistance, who were absent for an average of 12.5 days. Following them, federal government employees lost an average of 10.4 days (Figure 2.5). The absence rate for full time workers in all industries was 8.0 days, which translates into 3.2% of scheduled working time. Professional, scientific and the technical industry lost an average of 4.0 days per year (Akyeampong, 2002).

According to the Vancouver Labour Market Bulletin (2000), close to half of all Canadian adults over the age of 30 felt severely stressed by their jobs. Employees absent from work due to illness or disability, were recorded between 1997 and 1998. Men had a lower absentee rate than women. Employees with higher qualification levels were less likely to have long-term absences from work. Employees belonging to unions tend to have more work absences than non-unionised industries. Days lost tended to rise with firm size, increasing from a low of 6.5 days in firms with fewer than 20 employees, to a high of 9.4 days in firms with 100 or more employees (Akyeampong, 2002).

The physical and social environment, in which the employee works, can be a source of workplace stress. Researches have found a positive link between the amount of physical and social stressors and the amount of absenteeism. Examples of physical stressors are bad air, poor workspace and poor lighting. Examples of social stressors can be strained interpersonal relations, absence of job control and poor management practices. These two types of stressors lead to sicknesses, injury and absence from work (Vancouver Labour Market Bulletin, 2000).

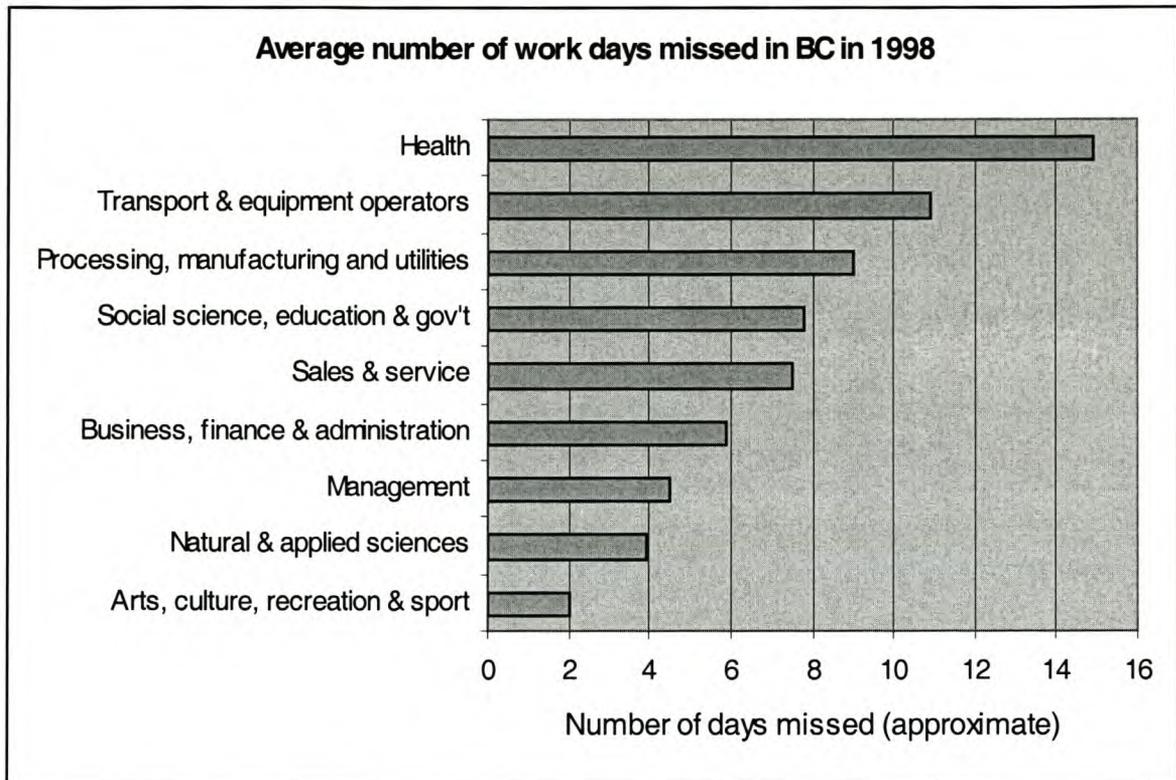


Figure 2.5: Average number of work- days missed in British Columbia (BC) in 1998 Vancouver labour market (Vancouver Labor Market, 2000).

Quality of work life measurements

According to Harrison (2000), quantifying the rates of absenteeism, accidents, employee turnover, and grievances filed, the quality of work life can be measured. A high quality of work life perception can increase productivity, loyalty, absenteeism and levels of morale, which all directly impact the bottom line.

The most annoying problem relating to absenteeism is in the measurement thereof. Most companies are unaware of what the financial implications are on a monthly basis, since they do not measure the absence accurately. A perception exists amongst many South Africans that it is their right to utilise all the sick leave given to them by the company. In some companies this will be up to thirty days per year or one hundred days per three-year cycle (Harrison, 2000). According to Eskom's conditions of service, employees are entitled to 45 days per annum.

The financial implications for any company would be disastrous should employees utilise their full quota of sick leave. It is therefore important to have a sort of “work-site-quality-of-life-programme” in place, to maintain and sustain any competitive advantage in the increasing competitive global marketplace (Harrison, 2000).

Measuring sickness absenteeism

Sick leave is one of the Key Performance Indicators (KPI) that is used in Eskom and other companies. To facilitate uniformity and consistency in Eskom, sick leave is measured and indicated in the following way:

Gross Sickness Absentee Rate (GSAR)

The GSAR measures man days lost due to sick leave as percentage of the total potential man days and translates to higher costs and production losses and is calculated as follows:

$$\text{GSAR} = \frac{\text{Total number of sick absence days over 12 month period} \times 100}{\text{Potential working days for 12 month period}}$$

The GSAR is always expressed as a percentage. The GSAR is the international standard used for comparison of sickness absenteeism between companies, other work forces, and between countries (Mets, 1986). The ideal GSAR to aim for in South Africa is between 2% and 4.5%. A level greater than 5% should be interpreted as a warning signal. If the GSAR is too low, accident rates tend to increase and careless work may become a problem (Simon, 1999 and Harrison, 2000).

Absentee Frequency Rate (AFR)

The AFR is the number of absence incidents per person for a given period and is calculated as follows:

$$\text{AFR} = \frac{\text{Total number of absence incidence over 12 month period}}{\text{Number of employees over 12 month period}}$$

Only the number of incidents and not the duration is to be calculated. A favourable AFR is less than 0.5 (Beaumont, 1991).

Eskom conditions of service for sick leave

- An employee is entitled to 45 days on full pay accumulative to maximum of 180 days per annum.
- A sick certificate is required for absence of three days or more.
- Sick certificates may under certain circumstances be required for three days or less.
- Employees are required on request to submit to medical examination.
- After sick leave exhaustion, the balance of credit annual/occasional leave, then application for extended sick leave (if recommended by Eskom Medical Officer).

The economics of absence

Absence *per se*, and specifically long-term absence, has financial implications on any company. 80% of all recorded absences are due to short-term absences. Long term absences accounts for 20% of all absence cases but costs more than 40% of the total working time lost to absence each year (Spiers, 2001).

Most absences, currently, are as a result musculo-skeletal injuries and psychological illness. 40% of workplace injuries are musculo-skeletal. These affect 1.2 million people in Great Britain a year. Back pain alone results in 12 million days absence each year (Spiers, 2001).

Shift work

There is a trend in our society of working around the clock. Fire, police, security, hospital, communication, and transport personnel already work a 24-hour shift. In some industries restaurants, petrol stations and supermarkets are open 24 hours, in part to accommodate night shift workers. One survey showed, that in the USA, 16% of full time workers were shift workers, which included evening, night and rotating shifts (Geliebter *et al.*, 2000).

The relationship between the productivity and amount of working hours of the company is significant and direct. Payment implications are involved with shift work. The relationship between shift work and productivity is that shift work extends the use of equipment and the plant. This in turn cuts under-utilised capacity and reduces the cost per unit of output (Morgan, 1999).

There are two main reasons why companies run shifts, namely; some companies are not able to produce profitably (it is an economic necessity) unless they run shifts, and the other reason relates to the nature of the process or long start up times (continuous processes). According to international research, shift workers are more at risk than daytime workers for various diseases. Safety and productivity decrease on night shift. Shifts that are longer than eight hours are associated with low levels of performance. South African shift workers are faced with socio-economic conditions, such as employees living a great distance from work (Morgan, 1999). This phenomenon only exacerbates the shift worker dilemmas.

Employees most likely to work long hours with more responsibility are individuals with high education, those employed in white-collar jobs, the self-employed, multiple job holders, and shift workers. According to a National Population Health Survey, the health effects of this behaviour, result in excess weight gain (due to reduced physical activity and poor eating habits) for men who worked a longer workweek. Women who participated in this behaviour increased their weekly alcohol consumption. All smokers increased their amount of daily smoking. These negative lifestyle habits have been linked to health outcomes such as high blood pressure, cardiovascular disease and mental-health problems. Longer workweeks have also been associated with increased

anxiety, sleeplessness, fatigue, appetite problems and digestion as well as loss of satisfaction. These negative conditions can lead to long work absences (Harrison, 2000). Shift workers have disrupted circadian rhythms (it is the biological clock that determines how the body should be functioning during the different stages of the day). A disrupted circadian rhythm results in:

- a disrupted digestive system
- increase in mental stress, irritation and depression
- symptoms of headaches, drowsiness, over-tiredness
- increase in occurrence of ulcers
- decrease in immunity and general health
- risk of injury on duty increases
- decrease in overall well-being

To improve the safety, health, performance and morale of shift workers, a wide range of solutions exist (Mardon *et al.*, 2000:6):

1. Conduct mandated training on the night shift rather reserving it for during the day only.
2. Add an exercise room with a treadmill, recumbent cycles and free weights.
3. Rotate employees and processes.
4. Send health tip inserts into pay envelopes.
5. Increase shift differential.

A metal parts manufacturer, Shape Corporation, devised an operative way to reduce absenteeism amongst their shift workers. The plant functions on fixed 8-hour shifts. Employees with a perfect attendance record, receives a lump sum payment for every hour worked on the afternoon and night shifts. Workers with one-year service at the

company receive 50 cent per hour, 75 cents per hour for two-year service and \$1 for three years. The programme proved successful with attendance for the first three months in 2000 improving from 93.5% to 99% (Mardon *et al.*, 2000:9).

Siecor, a Canadian manufacturer of fibre opticals, provide fruit, vegetables and fruit juices free to workers on night-shifts. Employees are free to exercise at the on site fitness centre during their breaks. Employees can relax in a lounge with dim lighting and listen to soft music. They are at liberty to trade shifts, following approval from their managers (Mardon *et al.*, 2000:15).

Nova Chemical in the USA and Canada approaches shift worker wellness by having new recruits attend educational workshops on driver safety, alertness strategies, nutrition, circadian rhythms, sleeping disorders and the impact of shift work on family and social life. At the plant, treadmills and exercise bicycles are installed in the control rooms. A newsletter containing useful information regarding shift work - specific issues - are given to employees (Mardon *et al.*, 2000:16).

Shift work and health consequences

As the trend towards shift work continues, there is an increased concern about the potential escalating health consequences. A study over 18 months was done to determine whether weight gain was more prevalent in workers on late shifts than those on day shifts. The late shift reported a mean weight gain of 4.3kg compared to the 0.9kg weight gain for the day shift. The weight gain could be related to eating more food, exercising less since starting the shift, having fewer meals, eating the last daily meal later, and taking more frequent and longer naps (Geliebter *et al.*, 2000).

Cardiovascular disease

Cardiovascular disease (CVD) is one of the most important health concerns in modern industrialised societies. In South Africa, it remains the biggest killer in all population groups except blacks (McKibbin and Pretorius, 2002). Hypertension is one of the major risk factors leading to an increased risk of stroke, congestive heart failure, myocardial

infarction, end-stage renal disease, and peripheral vascular disease (Steyn *et al.*, 1998). Hypertension is defined as diastolic blood pressure (DBP) of 90mmHg or higher, systolic blood pressure (SBP) of 140mmHg or higher. Essential hypertension is hypertension without an identifiable cause, and accounts for at least 95% of all cases of hypertension (Dosh, 2002).

One in three men and one in four women suffer from cardiovascular disorders before they reach age 60, according to the South African Heart Foundation. Ten years ago, cardiovascular disease cost SA approximately R5bn/year, excluding the cost of rehabilitation and follow-up work. Direct costs accounted for 42%, while indirect costs accounted for 58%, including loss of income due to premature death. In SA's demanding corporate environment, many professionals are hospitalised because of heart attacks (Gore, 2001).

A greater understanding and awareness exist between occupational exposure and the effect it has on the cardiovascular system. Coronary heart disease (CHD) is associated with a gradual narrowing of the arteries due to a thickening of the inner lining of the artery (atherosclerosis). Change can occur in the majority of risk factors attributed to an individual's lifestyle, to reduce the risk of CHD. The risk of CHD increases with the number of cigarettes smoked, the degree to which blood pressure is increased, and the amount of cholesterol in the blood (Powers and Howley, 1994). The greatest cause of morbidity and mortality on the younger working population aged 35-45 years, is CHD. Higher death rates are reported for manual than for non-manual occupations (Naik and Eloff, 1998).

There are numerous well-documented risk factors for CHD such as hypertension, smoking, diet, hypercholesterolemia and obesity that do not originate as a result of an individual's type of occupation. There is an increased risk of developing the disease when these risk factors work synergistically with occupational exposure. A relationship exists between chemical and non-chemical factors and CVD. Chemical factors include lead, cadmium, arsenic, carbon disulphide, nitroglycerine and organophosphates. Non-chemical factors include shift work, stress, noise, cold, heat and vibration (Naik and Eloff, 1998).

To determine whether shift work has an effect on blood pressure on patients with hypertension, a study was done on 12 male aged shift workers with untreated hypertension. 24 hour ambulatory blood pressure monitoring was performed thrice. A reduction on nighttime blood pressure occurred in the day. Average differences in blood pressure in the sleep-wake cycle were decreased by 8.5% at the beginning of night shift work showing a non-dipper pattern. According to the results, the circadian blood pressure pattern was changed from a dipper to a non-dipper pattern on the first day of night shift and reversed to a dipper within a few days. This implies that night shift work may have negative effects on blood pressure in patients with hypertension (Kitamura *et al.*, 2002).

Physical inactivity (hypokinesia) is an important risk factor for cardiovascular disease and for increased cardiovascular mortality. There is an inverse relationship between physical activity and mortality. Moderate physical activity such as a 30-minute-brisk-walk, can positively improve an individual's overall well-being and reduce the risk of CVD and overall mortality (Van Baak, 1994; Lengfelder, 2001). Hypokinesia results in muscle atrophy, bone demineralisation, decrease in aerobic capacity and maximum ventilatory capacity (Anspaugh *et al.*, 1994).

Shift work is a common occupational stressor and affects neurophysiological rhythms such as blood pressure, metabolic rate, blood sugar levels, mental efficiency and work-motivation, which may ultimately result in stress related disease. Shift work, particularly night shift, is associated with increased risk of disturbed sleep, increased fatigue, disruption of social activities and eating patterns, resulting in gastrointestinal malfunction. Occupational stress can be exacerbated due to poor physical working conditions, especially ergonomics (Naik and Eloff, 1998).

People with CHD who have experienced a cardiac event, attribute it to stress (McKibbin and Pretorius, 2002). Stress directly affects the cardiovascular system through its influence on blood pressure, cholesterol levels and myocardial supply. "Chronic inhibition of anger is associated with elevated blood pressure and suppressed anger is associated with increased renin levels, resulting in borderline hypertension." Occupational stress and future job uncertainty are also associated with increased blood pressure (Naik and Eloff, 1998). If high BP is not recognised or goes untreated, there

will be substantial increases in the morbidity and mortality associated with coronary disease, heart failure, renal failure and stroke. The impact of inadequately controlled blood pressure on morbidity and mortality among individuals with diabetes is problematic (Dosh, 2002).

Shift work and aging

The average age of workers is rising in most countries, and with that a substantial proportion of older workers face chronic health problems. An on-site wellness programme, if properly designed, has the potential to address many of the physical, mental and social problems of the older worker (Shephard, 2000). The quality of life in the aging population depends mainly on socio-economic security, psychosocial well-being, and perceived health (Darnton-Hill, 1995).

An inevitable consequence of the biological aging process is the decline in the physiological capacity of individuals. Reductions in functional capacity can be attributed to loss of cardiovascular, respiratory, neuromuscular, and metabolic functions that normally occur with aging (Rogers and Evans, 1993:65).

Body composition changes with aging

There are marked changes in body composition, an increase in percentage body fat and a converse reduction in lean body mass, when aging occurs (Rogers and Evans, 1993:65; Cousins and Horne, 1998). Aging results in a substantial alteration in body composition, with a marked reduction in skeletal muscle mass, referred to as sarcopenia. An important cause of the age-related loss in bone-mineral-density, may be due to a loss of muscle mass and strength. Intense muscle weakness and extreme difficulty in performing daily activities and tasks, is caused by sarcopenia. The importance of muscle mass in maintaining basal metabolic rate, physical activity levels, and optimal body fat implicates sarcopenia in age related diseases such as, type two diabetes, coronary artery disease, hypertension, and the complications associated with such conditions (Rogers and Evans, 1993).

An increased susceptibility to acute and chronic illnesses, threatens the physical health of the older worker. Because of the stabilising influence of personal life, disruptive minor absenteeism is less likely in an older worker. The immune system deteriorates progressively with age. The immune system is further compromised by a progressive deterioration of lung function, associated with chronic bronchitis and/or many years of cigarette smoking. Regular, moderate exercise enhances the immune system (Shephard, 2000). People with risk factors for functional limitation (older age and chronic diseases) will obtain similar benefits as healthy individuals by participating in activities, which are physically challenging (Huang *et al.*, 1997).

An increase in the incidence of a number of chronic illnesses that can cause prolonged periods of absence from work is associated with age. Common to old age are diseases such as hypertension, myocardial infarction and stroke. Employee wellness programmes can address several of the major risk factors for cardiovascular disease (smoking, physical inactivity, food high in saturated fat, obesity, hypertension and psychological stress).

Muscle strength is the key to productive ability in most types of work, and an age related loss of functional capacity is an important concern for individuals who perform heavy-duty tasks (Shephard, 2000; Powers *et al.*, 1994). A steady decline in VO_2 max and cardiorespiratory fitness, results in their normal activities being reduced (Powers *et al.*, 1994).

Characteristic of aging shift workers is a decline in some physical capabilities, and a decline in reaction time while performing mental tasks at hand. Shift workers display a reduced tolerance to shift work, a reduction of their circadian adjustment, and an increase in sleeping and health disorders with age and the duration of the exposure. Only a small percentage of workers are able to tolerate shift work up to old age without showing signs of increased health problems (Bourdouxhe *et al.*, 1999).

A study done by Bourdouxhe *et al.*, (1999), showed that the most obvious disadvantages of 12 hour shifts were chronic fatigue, impaired recovery and sleep disorders, which inevitably compromised safety. The work schedule also disrupted family and social life. "Shift worker syndrome" (digestive, cardiovascular and

psychological disorders) exists on a large scale. On average, 40% more diseases (gastritis, or gastric or duodenal ulcers, hypertension, chronic anxiety, asthma, back problems, musculo-skeletal injuries, and severe obesity) were diagnosed among the shift workers, with the highest incidences amongst older workers. A work-site wellness programme cannot reverse the aging effects on functional capacity. By adopting an exercise regime and weight loss programme, residual function can be maximised (Shephard, 2000).

Exercise and cardiovascular benefits

The risk factors for cardiovascular disease have been categorised into (a) major risk factors that cannot be changed and (b), risk factors that can be changed (Anspaugh *et al.*, 1994). Risk for cardiovascular disease and high blood pressure is positively correlated; the higher the blood pressure, the higher the risk of both stroke and coronary events. The operational classification of hypertension by the World Health Organisation is shown in table 2.4. According to the South African Hypertension Society, controlled hypertension is 160/95mmHg (Bradshaw and Steyn, 2001).

Only 50% of patients in the USA have their CHD risk factors assessed, treated or controlled. There is a large gap between recommended preventative cure and the preventative therapy or cardiac rehabilitation individuals actually receive. Subjects in this study were made aware of the high risk factors namely; age, smoking, diabetes, obesity, stress, and high cholesterol, which contribute to CHD (Gordan *et al.*, 2001).

Exercise or physical activity is greatly effective in the primary prevention of CHD (Barlow, et al., 1995; Khumbhare and Basmajian, 2000:13). Aerobic exercise involves large movements such as walking, running and swimming where oxygen uptake and heart rate are increased in order to facilitate the extra physical work undertaken. The physiological benefits are lowered resting heart rate and increased vital capacity (the maximum uptake of oxygen the individual is capable of (Carroll, 1992:65).

Regular aerobic exercise reduces resting SBP and DBP (Carroll, 1992:73; Van Baak, 1994; Horan, 1998; Van Baak, 1999). The recommendations for exercise in hypertensive individuals include: a frequency of 3-5 times per week; intensity at 50-85% VO₂ (max), a duration of 20-60 minutes of continuous activity; mode of activity involving large muscle groups and is rhythmic and aerobic in nature, is recognised as an important part of each programme (Van Baak, 1999; Dosh, 2002). A low-fat, low-salt, high fruit and vegetable diet, limited alcohol consumption (less than three drinks per day), and modest weight loss (3% to 9% of total body weight) have shown to modestly reduce BP (Dosh, 2002).

Metlife insurance company in the USA converted a recreational gymnasium into a fitness and wellness centre that was designed to reduce the risk of cardiovascular disease in employees. A comprehensive cardiac programme was implemented. A study involving 152 employees over a six-month period, showed favourable cardiovascular trends. There was a 3.6% decrease in resting heart rate, 6.4% in total cholesterol, 3.5% in SBP, and a 2.8% decrease in DBP (Corry, 1990).

Table 2.4: Classification of hypertension by resting blood pressure level (World Health Organisation). (Macauley 1999:124)

Category	SBP (mmHg)		DBP (mmHg)
Normotension	<140	And	<90 Mild
Mild hypertension	140-160	and/or	90-95
Borderline	140-180	and/or	90-105
Moderate-severe	>180	and/or	>105
Isolated systolic hypertension	>140	And	<90
Borderline	140-160	And	<90

CHAPTER THREE

Methodology

Subjects

The security officers at Eskom who participated in this study did it voluntarily and it formed part of their official training programme (Appendix A). The subjects were divided into five groups, according to the shifts they worked in.

Fifty-four (N=54) males with a mean age of 42.13 years participated in the programme. The subjects were all Eskom employees, shift workers that worked in the same position for an average of 18 years. Their job model required them to perform guard duties, safeguarding areas of responsibility and operating motorised gates. They do access control through searching of personnel, vehicles and material. Patrol duties are carried out as per work instruction, and involve climbing ladders and staircases.

One group out of the five withdrew after the first session. Data was collected at the beginning of the trial period and at the end over a period of six months. The subjects were tested during their training week that they have once a month.

The shifts work on a rotational basis for eight hours at a time with the first shift starting 06:00-14:00, the second from 14:00-22:00 and the third from 22:00-06:00. Prior to the commencing of the shifts, they work one day-shift, followed by two morning-shifts, two afternoons, two nights and three days off.

The type of work the participants do require a fair amount of physical fitness. The individuals were initially assessed when they were employed, and are doing the same kind of work without having been re-assessed. All employees have a pre-employment medical done on them by an occupational health nurse. During the medical, their lung function (at deep inspiration seal mouth over mouth piece of spirometer. Blow out as long and hard as possible until the spirometer beeps. The desired result should not be

less than 75 litres of forced vital capacity), ears, eyes, routine urine tests, blood pressure, medical history and body mass index, are examined and measured.

Testing material

Wellness awareness workshop

Each subject was taken through the Wellness awareness workshop that was compiled by a senior developer in Biokinetics in Eskom. The workshop focussed on the three dimensions of wellness namely; Body, Mind and Soul. An introduction to the primary dimensions (body, mind and soul wellness) and secondary dimensions (occupational, emotional and social) were given, with the emphasis on self-responsibility. Subjects completed a body wellness questionnaire regarding their physical status (Appendix B). The questionnaire included factors relating to heart disease on what factors were changeable or not. A rating for their scores was given. A non-changeable score of four or less indicated a low risk for heart disease. A non-changeable score of nine or more indicated a very high risk. A changeable score of 10 or less indicated a low risk for heart disease and a changeable score of 21 or more, indicated a very high risk.

The mind wellness focussed on the three pillars of intellect: knowledge, insight and wisdom. A practical example to illustrate this application to the groups was that they would have 'knowledge' about exercise after their sessions. Once they have engaged in the exercise programme they would have 'insight' into the positive effects of the programme, and therefore become 'wise' when they realise that they cannot live without exercise. Soul wellness focussed on how the individual sees him/herself in relation to the world that he exists in. Thereafter, one month later, the shifts were taken on a body wellness pathway.

Body wellness pathway

The body wellness workshop comprised an introduction to the various physical pathways to be focussed on. The workshop included; heart wellness, stress fitness, nutritional wellness, and posture wellness. A physical programme was also part of it. Thereafter individuals could go on a maintenance/follow-up programme or rehabilitation to the on-site biokineticist. Physiological variables measured, included:

- *BP:* The measurements were taken in a well-ventilated room after the participant was seated for five minutes using a portable sphygmomanometer and stethoscope. The subjects had not ingested any caffeine or smoked within 30 minutes before the recording of these measurements. The BP and pulse were taken on the left arm, with the palm upward, resting on a table at the level of the heart. Awareness of hypertension, referred to patients who had been informed by a health professional of their high BP. Subjects were instructed to wear comfortable clothes, but preferred to participate in their uniform (collar, pants and shoes).
- *Cholesterol:* A portable accutrend GCT machine was used to test the average high-density lipoprotein (HDL) and low-density lipoprotein (LDL) cholesterol levels. Accutrend test strips were used and a Lancet for the finger prick. The test strip was inserted into the accutrend. The finger was pricked with a lancet to ensure enough blood for the test. The blood was placed on the yellow test field. The measurement time was 180 seconds and the values ranged from 3.88-7.76mmol/l. If the readings were above the level, the meter displayed "HI" or below these levels, "LO".
- *Fat percentage:* A Harpenden skinfold caliper measured the subjects' skinfolds with a constant jaw pressure of 10g/mm² between 09:00-11:00. Measurements were taken on the right side at the thigh, chest and abdomen. Skinfold measurements are one of the least expensive and most economical methods of measuring fat percentage (Anspaugh *et al.*, 1986). The sum of

the chest, abdomen and thigh skinfold was calculated. The procedure for each site included:

- (a) Chest: Take a diagonal fold half the distance between the axillary line and the nipple on the right side of the body.
- (b) Abdominal: Take a vertical fold 5cm approximately in the midline of the navel from the rectus abdominus from the right hand side of the omphalion (De Ridder, 2001:51).
- (c) Thigh: Take a vertical fold on the front of the thigh midway between the hip and the knee joint. The midpoint should be marked while the subject is seated. Anatomical landmarks were made before determining the skinfolds.

Male: 18-61	$BD = 1.109380 - 0.0008267 (\Sigma 3SKF) + 0.0000016 (\Sigma 3SKF)^2 - 0.0002574 (\text{age})$ $\%Fat = [(4.95 / BD) - 4.5] \times 100$
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Men $\Sigma 3SKF$ (skinfolds) = chest + abdominal + frontal thigh

(Jackson and Pollock, 1985)

- *Waist circumference:* A flexible Lufkin W606PM steel tape calibrated in centimetres with millimetre gradations was used. The subject faced the measurer so that the anterior of the waist was measured across the smallest area of the waist. The measurement was taken at the end of a normal expiration and with the arms relaxed at the sides (De Ridder, 2001:29).
- *Body mass index (BMI):* Weight was measured to the nearest 0.1kg using a Healthometer scale. A portable stadiometer was used to determine stature. The subjects were instructed to stand barefoot, with the back and legs straight and the back of the head placed against the wall. The head was positioned in such a way that the angle of the eye and the opening of the external auditory meatus were on a horizontal line. The head was in the Frankfort plane at inspiration. Height was measured to the nearest 0.1cm. BMI is a useful measure of nutritional status that combines height and weight data. BMI is calculated as the weight in kilograms divided by the square of the height in meters (South African Demographic and Health Survey, 1998).

The BMI is then derived from a height and weight table. Height and weight tables and scales act as a standard for total body weight based on height, body frame size, and gender, without regard to the composition of weight (Anspaugh *et al.*, 1986).

- *Flexibility:* The sit and reach test was used to predict hamstring flexibility, where the subject was allowed two attempts and the best score was used. A box with a measurement scale in centimetres was used to perform the test. The subjects' shoes were removed and both feet were placed against the sit-and-reach box. Both legs were fully extended approximately shoulder width apart. Both arms were extended and placed on top of the other, on top of the measuring scale. The object of the test was to lean forward as far as possible whilst sliding the hands along the scale. No prior warm ups were done before the test. A maximum stretch was reached when the subject could not lean further forward. The sit and reach test is a frequently used field test to specifically measure hip, low back, and hamstring flexibility.

Table 3.1: Sit and reach standards (Anspaugh *et al.*, 1994:133)

Flexibility (cm)	Excellent	Average	Fair	Poor
	39-54	28-38	21-27	0-20

- *Cardiovascular endurance:* The three-minute Chester step test was done on a Reebok bench to 100bpm on a quartz metronome (Appendix M). The subject steps up and down in time with each beat of the metronome for three minutes. At the end of the three minutes, the subject's heart rate is taken within the first second over ten seconds, and the amount of beats is recorded and multiplied by six. The post-exercise heart rate was recorded as the score for the test. Rating of Perceived Exertion (RPE) on a scale of one to ten was used to determine the prescription of exercise intensity (Appendix L). With this method, individuals subjectively rate how hard they feel that they are working. A given numerical rating corresponds to the perceived relative intensity of the exercise (Mc Ardle *et al.*, 1996). Subjects were fully informed

to report feelings of dizziness, nausea, out of breath, or feelings of any physical discomfort.

Each session was three hours in duration. The first two hours focussed on education and testing, followed by an hour of physical activity. The mode of physical activity involved brisk walking on the beach, cricket, volleyball and kata-boxing (combination of aerobics and kick-boxing). The physical activity was done at 60-75% of the subjects' heart rate, performed once a week, for example:

Maximum heart rate (MHR)

$$220 - \text{age (40)} = 180$$

$$180 \times .60 = 108$$

Target heart rate (THR)

$$= 108 \text{ beats per minute (Payne and Hahn, 1995:73)}$$

Each subject was given a home programme to perform at least 3-5 times per week. The programme involved a cardiovascular, muscle endurance and flexibility component (Appendix J).

Heart wellness

In the heart wellness, BP was taken prior to the start of the session. The measurements were taken with the subject in a seated position in a well-ventilated room. Cholesterol tests were only done once. All the subjects did not participate in the cholesterol testing. Subjects who showed a high level were instructed to have a fasting cholesterol test to see the difference in HDL and LDL levels. Waist circumference was also measured once at the smallest site across the abdomen.

Heart wellness focussed on the anatomy and physiology of the heart, its chambers and the effect that exercise/physical activity has on it. A questionnaire was completed and subjects were given a rating as to what category they were in according to the scores calculated (Appendix D). If a subject scored between 0 and 5, the risk was below average. A score of 22+ fell in the dangerously high-risk category. The workshop was

very interactive and allowed individuals to share own life experiences. Individuals, who were already on medication for heart related illness, were instructed to participate in an on-site cardiac rehabilitation programme.

Stress wellness

Any stressful situation has an adverse effect on the human body. Stress can be a primary enemy of overall health and a major contributor to disease. Since stress affects the immune system, the body becomes more susceptible to a range of illnesses (Anspaugh *et al.*, 1986). Blood pressure as well as resting heart rate for each subject was measured. The results of both variables were used to calculate the double product (RSBP X RHR), which provides the individual with information as to how much tension his heart muscle is exposed to at that given moment. A subjective risk score for stress was given based on the subject's perception of how he experienced stress on a scale from 1-10 in the following areas: body, money, work, relationships, social, spiritual, and mental. A score of between 0-17 indicated a below average risk for stress, whilst a score of 70+, indicated a dangerously high risk (Appendix E). For each category of risks, the subjects were educated on how to cope and effectively treat stress should the symptoms of stress present itself. The benefits of physical activity were highlighted in the educational component of the programme and how it helps to improve the individual's coping- mechanisms.

Posture wellness

Posture wellness focussed on back safety incorporating an education component. The testing included a one-minute sit up test plus a flexibility test. The subjects had to complete a questionnaire about their habits, posture and type of work done. Their hamstring-flexibility was measured by the field worker, which they had to plot on their questionnaire (Appendix F).

Nutrition

The workshop was very basic and focussed on the food choices according to the food pyramid (Appendix G-H). Healthy eating and physical activity are important contributors to the optimal health of employees. In turn, the health of employees in a workplace can influence productivity, staff morale and general well-being. Nutrition workshops in business and industry may help staff and their families reduce the risk of lifestyle diseases such as CHD and cancer (The Australian Nutrition Foundation, 2001). Those individuals who required more information regarding their nutritional status were referred to a dietician. The session ended with a health lunch.

CHAPTER FOUR

Results and discussion

This chapter presents and discusses the results of the tests done to study the research statement asked in Chapter One. Statistics were considered to be significant at $p \geq 0.05$.

Descriptive data

The study consisted of 68 subjects, divided into five shifts/groups. 54 were active participants and made up four shifts, whilst 14 subjects in one shift withdrew right at the onset of the study.

Statistical analysis of physiological variables

For the purpose of the study, box and whisker plots were used to display the physiological variables. It provides a visual display of the first and third quartile values, and of the median, as well as the maximum and minimum sample values. The box shows the distance between the quartiles and thus contains 50% of the data. A square marker in the box marks the median. The “whiskers” contain the other 50% of the data. The plot is useful for showing the comparison of different groups (Bowers, 2000 and Bland, 1997). The data gathered during the five workshops will be used to support or oppose the research statement.

Research question

- (a) Can the implementation of a physical wellness programme be beneficial to shift workers?

AND

- (b) affect the bottom line profit margin, specifically in the reduction of absenteeism?

Discussion

The statistical analysis of the results of this study proved that the physical wellness of the subjects had improved. Therefore it could be assumed that a shift worker's physical health status would improve following a relatively short physical wellness training programme. This study therefore supports the findings of Corry, 1990; Carroll, 1992; Van Baak, 1994; Horan, 1998; Lengfelder, 2001 and Dosh, 2002. They found a significant change in the physiological profiles of individuals participating in a six-month intervention programme.

Comparison of the interventions

A comparison between the first workshop at the beginning of the study and the last workshop was done to determine whether or not there was a difference in the physiological variables, namely: BMI, SBP, DBP, flexibility and fitness. Paired t-tests were done to determine significant differences.

BMI results

A comparison between the first and last workshop was done to determine whether there was a difference in the BMI of the employees who participated in the workshops. A paired t-test was used to determine the changes in BMI over the six-month period. As shown, changes were statistically significant and in the expected direction (with BMI

declining over time). Figure 4.1 graphically displays the results of the paired t-test of the first and last workshops by means of box plots. The employees' BMI improved significantly since the onset of the workshops ($p < 0.001$), which indicates a significant difference in mean BMI from workshop one to five. The majority of investigators have seen substantial reductions of body fat content in committed exercisers. The mean response, averaged across a number of worksite programmes, was a 13% decrease in body fat content (Shephard, 2000). According to the South African Demographic and Health Survey of 1998, the mean BMI is 23 kg m^{-2} for men and 27 kg m^{-2} for women. Levels of overweight and obesity are highest in the Western Cape, KwaZulu-Natal and Gauteng.

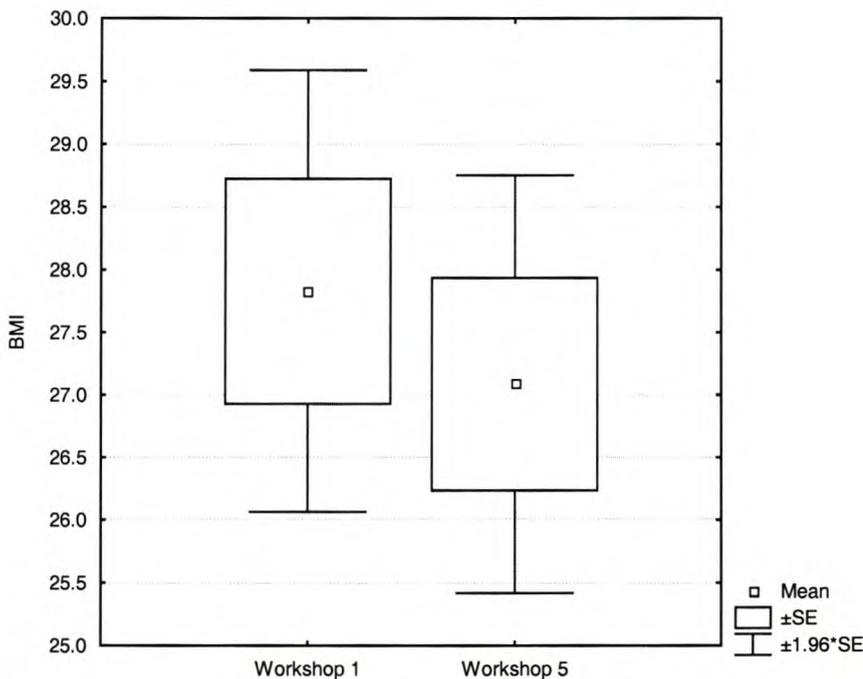


Figure 4.1: Difference in mean BMI between workshops 1 and 5

SBP results

A comparison between the first and last intervention was done to determine whether there was a difference in the SBP of the employees who participated in the workshops. An unpaired t-test was used to determine the changes in SBP over the six-month

period. As shown, changes were statistically significant and in the expected direction (with SBP declining over time). A decline of 3-10mmHg SBP exists among participants engaged in an employee wellness programme (Shephard, 1996). Figure 4.2 graphically displays the results of the unpaired t-test. The employees' SBP improved significantly since the onset of the workshops ($p < 0.001$), which indicates a significant difference in mean SBP from workshop one to five. Regular aerobic training significantly reduced resting SBP over the six-month period, which aids in the reduction of CVD in employees.

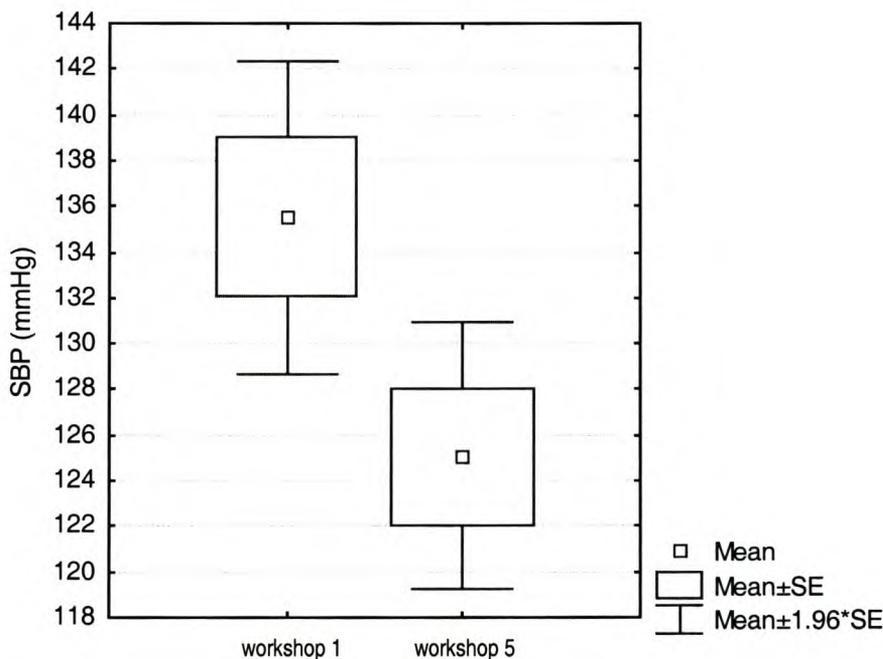


Figure 4.2: Difference in mean SBP between workshops 1 and 5

DBP results

A comparison between the first and fifth workshop was done to determine whether there was a difference in the DBP of the employees who participated in the workshop. A paired t-test was used to determine the changes in DBP over the six-month period. As shown, changes were statistically significant ($p < 0.001$) and in the expected direction (with DBP declining over time). A 2-10mmHg reduction in DBP is found amongst individuals involved in an employee wellness programme (Shephard, 1996). Figure 4.3

graphically displays the results. It could therefore be assumed that the physical wellness intervention significantly improved the DBP of the shift workers A, B, C and E who participated in this study.

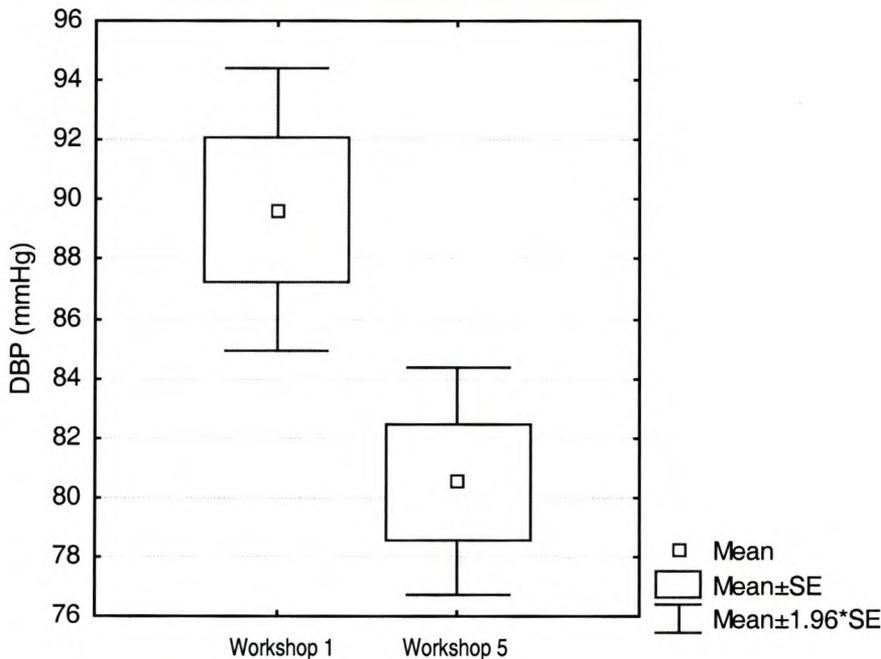


Figure 4.3: Difference in mean DBP between workshops1 and 5

Flexibility results

To investigate whether the groups showed improvement in their flexibility status, a paired t-test was done. A comparison between the first and fourth (no measurement was taken at the fifth) workshop was done to determine whether there was a change in degree of flexibility using the sit and reach test. Figure 4.4 graphically displays the results. There was no significant difference in the hamstring flexibility of the employees according to the t-test, with $p=0.6$. Therefore it can be assumed that the hamstring flexibility of the groups was the same at the start and end of the programme.

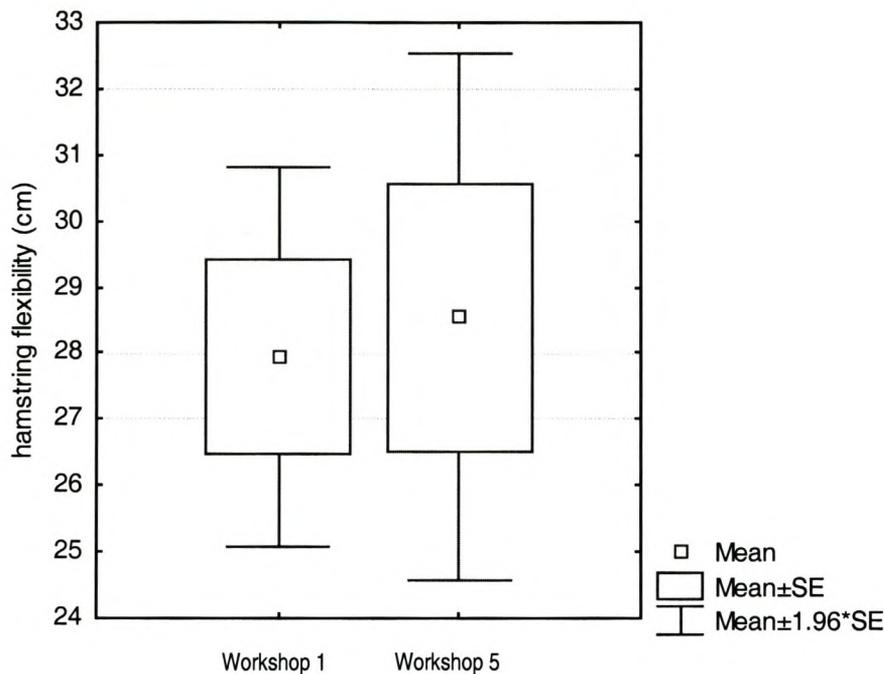


Figure 4.4: Difference in the flexibility results (sit and reach) between workshops1 and 4

Fitness results

A comparison between the first and fifth workshop was done to determine whether there was a difference in the fitness of the employees who were tested using a three-minute Chester step test. A paired t-test was used to test for significant changes in fitness levels over the six-month period. As shown in figure 4.5 changes were statistically significant ($p < 0.001$). From these results it is obvious that regular exercise will significantly reduce the resting heart rate.

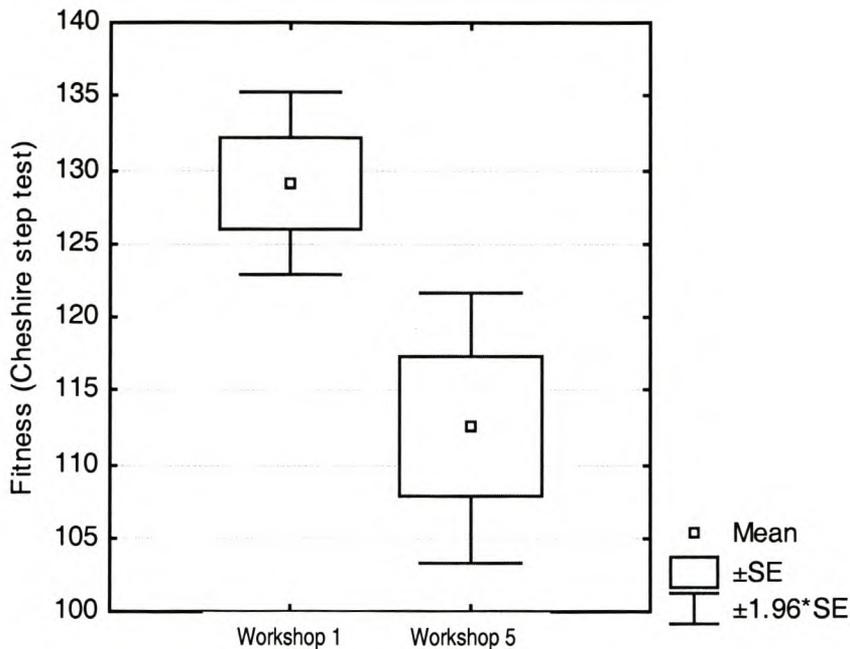


Figure 4.5: Difference in fitness results (Chester step test) between workshops1 and 5

Conclusion

To conclude this section, there was a significant difference between the first and last workshops for the physiological variables BMI, SBP, DBP and fitness. There was, however, no significant difference between the first and last intervention for flexibility. One could therefore state with relative confidence that the physical wellness pathway improved the physical health status of the participants.

GSAR/AFR

To determine whether there was a change in GSAR and AFR for the shift workers, a clustered bar chart was used. Bar charts are used to display qualitative data with a small number of categories (Bowers, 2000).

The statistical analysis for calculating absenteeism in this study was the GSAR and AFR, which is used throughout most companies, including Eskom. GSAR and AFR,

calculated over the six-month period (March to August 2001), were compared to that of March to August 2000. The results for GSAR and AFR can be seen from figures 4.6 and 4.7. There is a difference in the GSAR ratings for all the groups, with the exceptions being A-shift and D-shift. D-shift had withdrawn from the group right at the onset of the intervention. A-shift consisted of the oldest group of subjects, with nearly most of them on some sort of heart medication (costs could not be calculated in terms of the medication reduction). Also, there were incidences of long absences due to hospitalisation for several of the employees in that group.

The group with the most significant decrease in GSAR was C-Shift. Their attitude and commitment to the programme was evident in their approach and embracing of the wellness philosophy. Participation and enthusiasm filtered from supervisory level to the rest of the group.

The chart shows clearly that the GSAR figures are lower for 2001, indicating that the intervention was successful.

AFR, which refers to the number of incidents per person for a given period, is shown in figure 4.7. The clustered bar charts indicate that the number of incidents for absenteeism was reduced for all the shifts, except for D-shift who had withdrawn at the onset of the programme. The chart clearly shows that the AFR for 2001 was lower than in 2000, indicating the success of the intervention. This could possibly be equated to the assuming of personal responsibility of the participants for their well-being.

Security Officers GSAR (March - August)

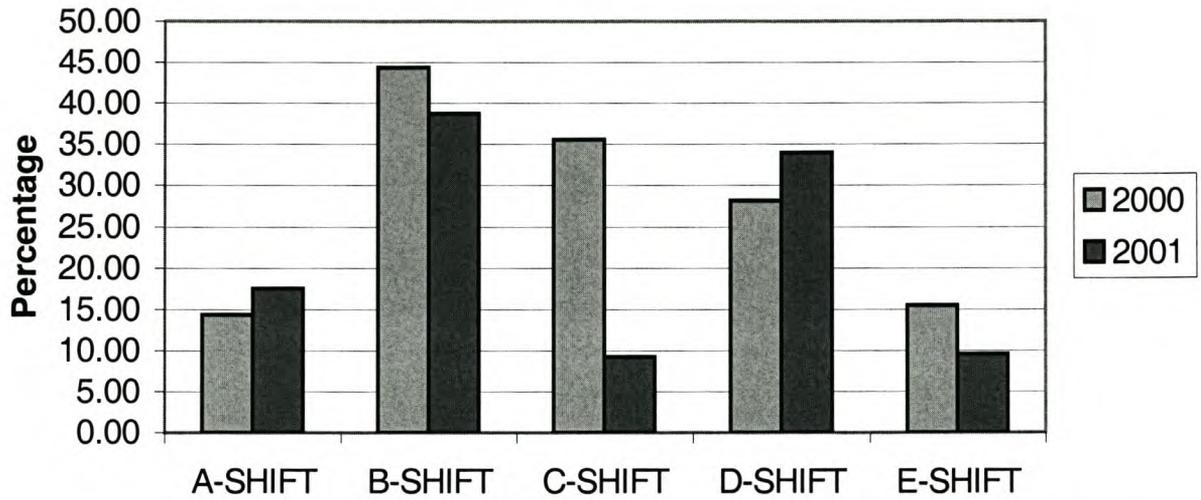


Figure 4.6: Gross Sickness Absentee Rate (GSAR) March - August 2000 and 2001

Security Officers AFR (March - August)

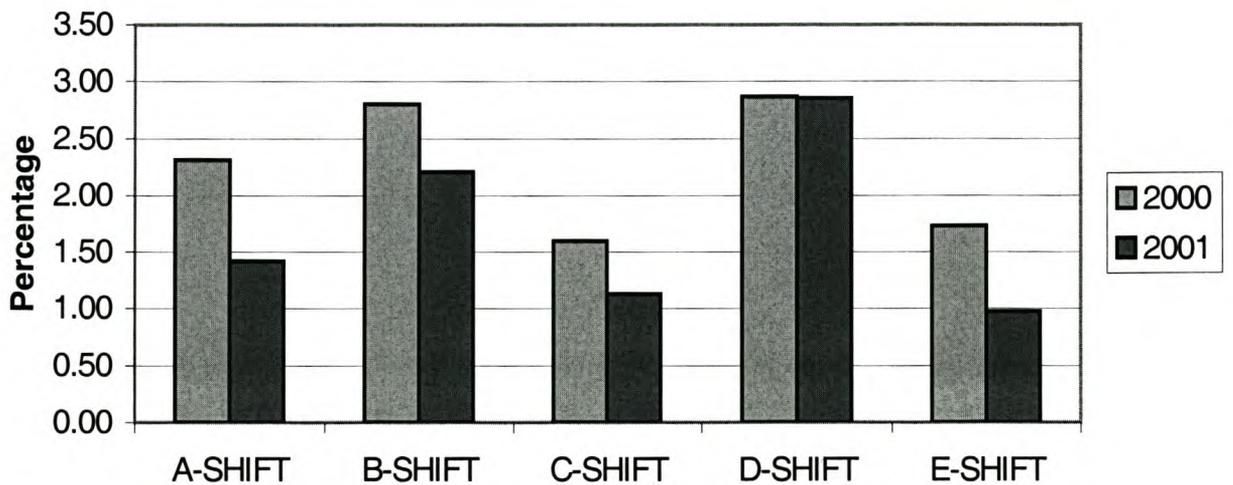


Figure 4.7: Absentee Frequency Rate (AFR) March – August 2000 and 2001

Costs

The average daily monthly salary was based on the August 2001 payroll. The salaries of the employees per group were added together, and the total was divided by the number of the employees. The average daily salary calculations were based on the following: that each employee works 173 hours per month, and that each employee works for eight hours a day. The increment figure of 0.93 is based on the average increase of 7.19%.

Table 4.1 illustrates the cost saving benefit of R81 181 for the year 2000 and the significant cost effectiveness the intervention had in the year 2001. Absenteeism for that group cost the organisation R217 131 for the year 2000 (March–August). In 2001, for that same period, absenteeism and sick leave was reduced significantly to R135 950.

These figures indicate how the reduction in GSAR and AFR scores translated into a saving of R81 181. This study made use of a low-income group and lower educated population. Should the same intervention be implemented amongst a higher income group, the savings would be enormous. The results of this study therefore conclude that the successful implementation of a physical wellness programme can affect the bottom line profit margin, specifically reducing absenteeism.

Table 4.1: Cost of Absenteeism 2000/2001

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
2000	24 496	23 308	30 282	18 811	40 043	40 440	22 216	17 536	217 131
2001	17 463	26 968	27 480	8 607	13 443	7 833	24 044	10 113	135 950
Net Saving / (Loss)	7 033	(3 661)	2 802	10 204	26 601	32 607	(1 828)	7 423	81 181
Year to Saving/ (Loss) date								81 181	

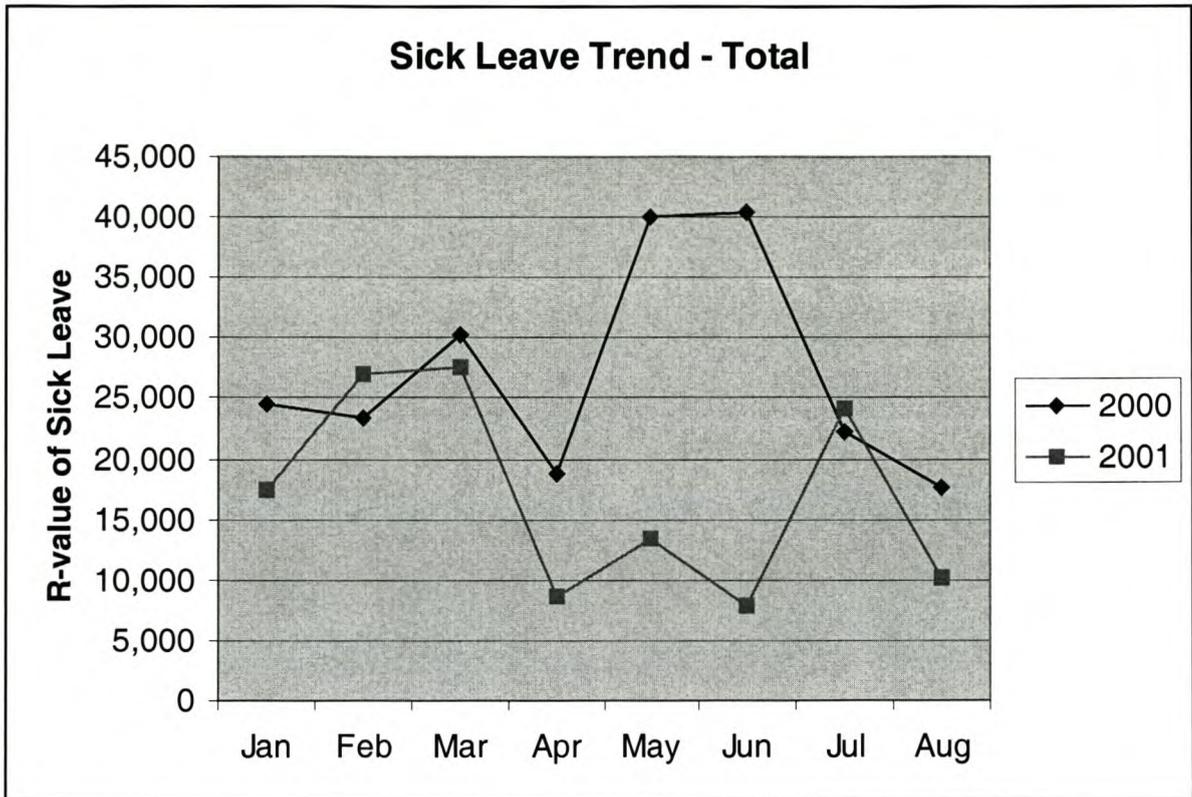


Figure 4.8: Sick leave trend for 54 shift workers

The reduction in sickness-absence from April to June 2001 (Figure 4.8) is especially significant, since it occurs during the winter season when most individuals are ill during that time. The cost for sick leave from April to June 2000 was a R40 000 loss to the company. The sick leave plotted, does not distinguish between the type of illness or the duration. Hence, individuals who have been off sick for an extended period of time for the year 2000 and 2001, along with those with short bouts of illness, are reflected.

CHAPTER FIVE

Conclusions and recommendations

“The biggest benefit of wellness is the attitude that helps each person to see life possibilities and to work towards the ones that are most personally fulfilling” (Ardell, 1999:6).

The purpose of this study was to determine the effect of a physical wellness programme on the chronic absenteeism of shift workers at an Eskom Power Station. The progress made in the various workshops was compared to see if there was any change in the physiological variables for all participating employees. The workshops that encompassed the philosophy of *self-responsibility* were evaluated to see if there was a cost benefit to the organisation.

Various conclusions can be drawn from the results of this study. The subjects being shift workers are at a great risk of developing heart-related disorders and a range of other diseases. The physiological variables namely BMI, SBP, DBP, and cardiovascular fitness are all risk factors for heart disease. By examining changes in the risk profile of the employees who participated in the six-month intervention programme, all of the above variables improved significantly. On the other hand the programme was not successful in improving hamstring flexibility.

The analysis also found that participation in the workshops has had a significant impact on those with hypertension, low morale, and high sickness-absentee turnover. In short, it appears that employees were motivated to improve their behaviours and reduce their risks and that participation in the physical wellness programme may have provided a slightly greater impetus for change.

Why are these findings important? First, the highlight is the positive impact that large-scale corporate health promotion efforts, especially in a South African context, can achieve on employee health and wellness. When positive health improvement results are coupled with results showing financial savings from reduced absenteeism, these

findings are very compelling and reassuring to wellness programme supporters. More important, is a demonstration of a large corporation such as Eskoms ability to efficiently implement a complex, far-reaching population health management programme that achieves high participation rates (95%). Achieving such a high participation rates in a work setting is rare, but as shown here, the positive impact on health, morale, medical costs, and absenteeism can be significant.

To achieve the maximum benefits from the physical wellness programme, it is important to have a high participation rate and have it be effective in modifying employees' behaviour to take self responsibility in reducing their risk factors. If these outcomes are achieved, cost savings will follow.

Recommendations

For the purpose of ongoing work-site wellness programmes amongst shift workers, the following recommendations are made:

1. As health care costs continue to rise, partly as a result of an aging work-force and because of increased stressors on employees' lives, key decision makers will have to make it a business imperative to provide innovative programmes that promote health and reduce costs.
2. A 24-hour gymnasium, fully equipped with competent supervision is an absolute necessity to accommodate the physical well-being of shift workers. Shifts should incorporate a training programme of at least 30 minutes on a rotational basis, so as not to disrupt the production output.
3. Ongoing health promotion and risk appraisals should be conducted on all employees at regular intervals and findings be made readily available, so as to encourage a climate of self-responsibility.

4. A culture within the organisation should be fostered that encourages and promotes a healthy lifestyle, specifically from senior management that would then filter to the rest of the organisation.

5. Evaluation of wellness programmes should be ongoing for health and lifestyle factors, attitudes, turnover and productivity.

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APPENDIX A

Letter to protective services

November 2000

Protective Services Manager
Eskom
CAPE TOWN

Dear John

Protective services have been nominated to participate in the wellness programme.

The programme will be used in my Masters study in Sports Science. Currently, your department have shift workers who have several risk factors for heart disease, are stressed, and have one of the highest sick leave records.

The project will take place over six months during their scheduled training weeks, and start from March 2001 until August 2001. A series of body wellness workshops will be given. The programmes will involve two hours for the workshop and one hour for the physical activity (choice of activity made by the respective shift).

All information will be recorded and individuals will receive feedback. Where personal consultations are needed, individuals will make appointments with me. Please bring along comfortable clothes for the sessions. Participation is voluntary. Please indicate who will not be attending. The entire process is focussed on an integrated wellness approach. It is an Eskom initiative and aims to identify and address risk profiles of all participants, hereby to achieve optimal physical function.

This promises to be lots of fun and will, if nothing else influence the comradeship amongst the staff through the physical activities.

Wellness works, learn it, live it, experience it , and you will love it!!!

Yours faithfully

Darcelle Schouw
BIOKINETICIST

APPENDIX B**Body wellness questionnaire****CIRCLE THE APPROPRIATE ANSWER TO EACH QUESTION**

RISK POINTS					
	1	2	3	4	<i>Score</i>
NON-CHANGEABLE FACTORS					
How old are you?	30 or less	31 - 40	41 - 54	55+	
Do you have a history of heart disease in your family?	Non	Grandparent with heart disease	Parent with heart disease	More than one with heart disease	
What is your gender?	Female		Male		
NON-CHANGEABLE RISK SCORE					
CHANGEABLE FACTORS					
1. What is your body weight	Ideal	1 - 3 kg overweight	4 - 6 kg overweight	7 kg or more overweight	
1. Do you have a high-fat diet?	No	Slightly high in fat	Above normal fat	Eat a lot of meat, fried and fatty foods	
2. What is your blood pressure? (Systolic, or upper score)	<120	121 - 140	141 - 160	>160	
3. Do you have other diseases?	No	Ulcer	Diabetes	Ulcer AND Diabetes	
4. Do you exercise regularly?	4 - 5 days a week	3 days a week	Less than 3 days a week	No	
5. Do you smoke?	No	Cigar or pipe	Less than ½ pack a day	More than ½ pack a day	
6. Do you experience a lot of stress?	Less than normal	Normal	Slightly above normal	Quite high	
CHANGEABLE RISK SCORE					
TOTAL RISK SCORE					
BODY WELLNESS RATING SCALE					
Rating	Non-changeable Score	Changeable Score		Total Score	
VERY HIGH	9 or more	21 or more		31 or more	
HIGH	7 - 8	15 - 20		26 - 30	
AVERAGE	5 - 6	11 - 14		16 - 25	
LOW	4 or less	10 or less		15 or less	

APPENDIX C**Record sheet**

Name and Surname: _____

Unique Number: _____

Age: _____

1. Do you have heart or blood pressure problems?
2. Do you have any injuries at present?
3. Are you suffering from flu today?

TEST	VALUE
1. Blood Pressure	
2. Height	
3. Weight	
4. BMI	
5. Sit and Reach	
6. Push Ups	
7. Sit Ups	
8. Step-up Test	

Fitness Score:

APPENDIX D**Heart wellness**

Risk Identification				
RISK FACTOR	VALUE	LOW	MODERATE	HIGH
Age		1-30 1	31-50 4	51-70 6
Height/weight		<20 BMI 1	20-30 BMI 3	>30 BMI 5
Blood Pressure		<90 2	90-104 4	>104 6
Smoking		Non-smoker 1	Smoke 1-20 4	Smokes > 20 daily 5

RISK CATEGORY	SCORE	TICK
1. Dangerously High Risk	22+	
2. High Risk	18-21	
3. Moderate Risk	12-17	
4. Average Risk	6-11	
5. Below Average Risk	0-5	

Risk Score:

APPENDIX E**Stress fitness**

Where do you experience stress in your life?

Assess yourself on each level from 1-10 (10 = High Stress).

Body	<input type="text"/>
Money	<input type="text"/>
Work	<input type="text"/>
Relationships	<input type="text"/>
Social	<input type="text"/>
Spiritual	<input type="text"/>
Mental	<input type="text"/>

RISK CATEGORY	SCORE	TICK
Dangerously High Risk	+70	
High Risk	54-69	
Moderate Risk	36-53	
Average Risk	18-35	
Below Average Risk	0-17	

Risk Score:

APPENDIX F**Posture wellness**

RISK FACTOR	LOW	MODERATE	HIGH
Flexibility	Good 1	Moderate 4	Poor 6
Kind of Job	Sitting less than 50% of the time- 2	Sitting 51-80% of the time 4	Sitting more than 80% of the time 6
Activity Levels	Training 3 or more days per week 0	Training 1-2 times per week 2	No training at all 4
Sleeping Habits	Sideways posture 0	Sleeping on your back 2	Sleeping on your stomach 4
Headaches/Back pain	Never 0	Often 4	Always 5

RISK CATEGORY	SCORE	TICK
1. Dangerously High Risk	25+	
2. High Risk	17-24	
3. Moderate Risk	10-16	
4. Average Risk	4-9	
5. Below Average Risk	0-3	

Risk Score:

APPENDIX G

Nutrition

A nutritional balanced diet consist of 3 major food groups:

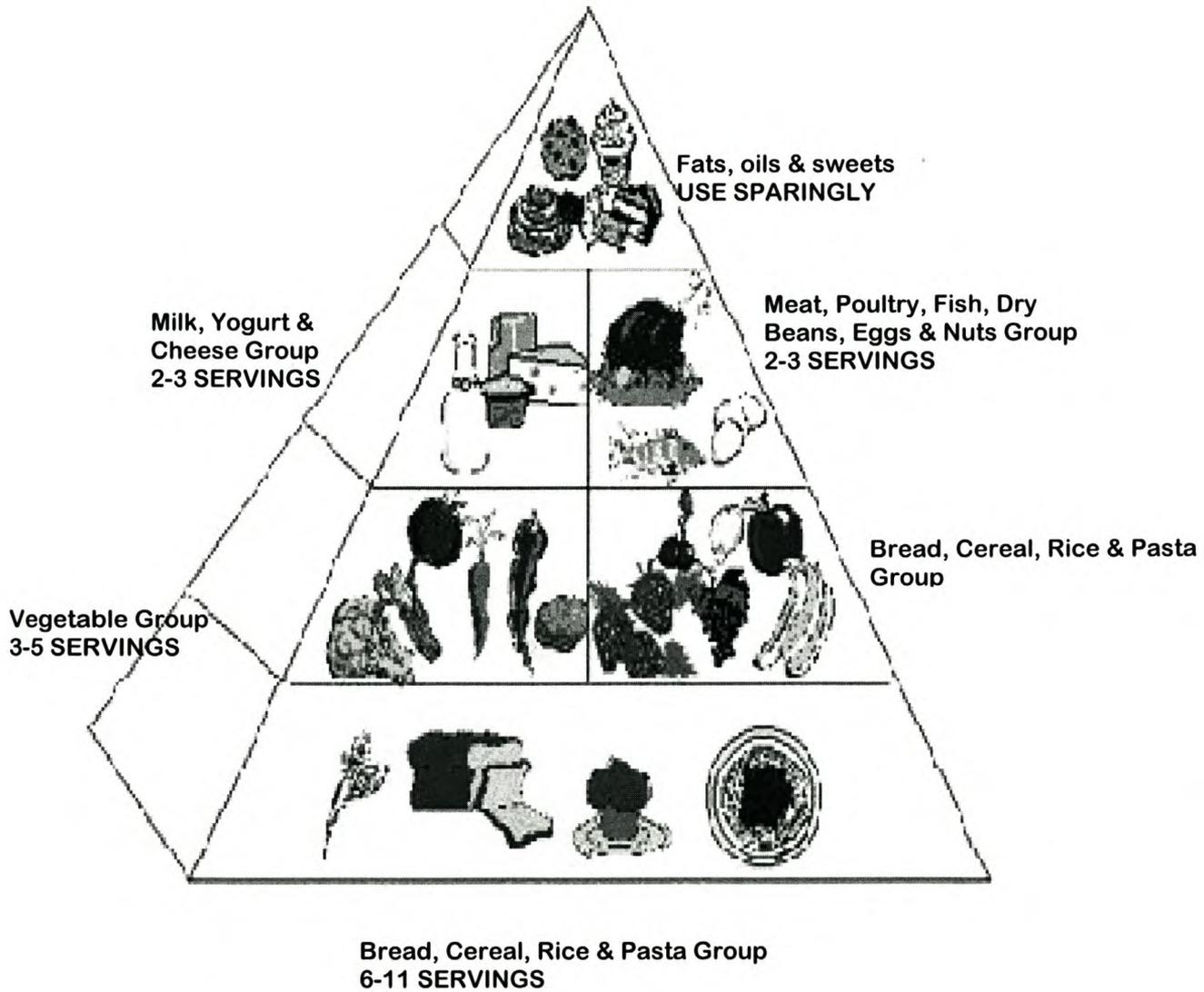
- Protective Foods
- Building Foods
- Energy Foods

How far are you from the recommended balanced diet?

RISK CATEGORY	TICK
1. No Nutrition	
2. Little Nutrition	
3. Moderate Nutrition	
4. Good Nutrition	
5. Excellent Nutrition	

APPENDIX H

Food pyramid



APPENDIX I**Life through movement**

No Movement = No Life
 Modern Lifestyle = Chronic Diseases
 Active Lifestyle = Quality Life

Sport/Activity	Intensity	Duration	Frequency	Score

Physical Activity Index

Intensity	Duration	Frequency
1 = not tired	1 = < 10	1 = less than once/month
2 = slightly tired	2 = 10-19	2 = few times per month
3 = tired	3 = 20-30	3 = 1-2 x per week
4 = very tired	4 = > 30	4 = 3-5 x per week
5 = exhausted		5 = almost daily

RISK CATEGORY	SCORE
1. Very poor fitness	< 20
2. Poor fitness	20 – 39
3. Fair fitness	40 – 59
4. Very good fitness	60 – 79
5. Excellent fitness	80 – 100

Risk Score:

APPENDIX J**Exercise programmes****EXERCISE PROGRAMME - (A)**

- | | |
|------------------|---------------------|
| 1. Brisk walking | 30 minutes |
| 2. Stretching | 10 minutes |
| 3. Push ups | 3 sets (15-20 reps) |
| 4. Sit ups | 3 sets (15-20 reps) |
| 5. Stretching | 5 minutes |

EXERCISE PROGRAMME - (B)

Upper body strengthening

- | | |
|-----------------------|-----------------|
| 1. Walk/cycle/swim | 20 minutes |
| 2. Stretching | 5 minutes |
| 3. Push ups | x3 (20-25) |
| 4. Crunches | X3 (20-25) |
| 5. Dumbbell-flys | x3 (30) |
| 6. Biceps curls | x3 (30) |
| 7. Triceps extensions | x3 (30) |
| 8. Stretching | x2 (20 seconds) |

EXERCISE PROGRAMME - (C)

Lower body strengthening (elastic tubing/free weights)

- | | |
|------------------------|-----------------|
| 1. Walk/cycle/swim | 20 minutes |
| 2. Stretching | x2 (20 seconds) |
| 3. Sit ups | x3 (30) |
| 4. Leg raises | x3 (30) |
| 5. Leg curls | x3 (30) |
| 6. Calf raises | x3 (30) |
| 7. Crunches | x3 (20) |
| 8. Abduction/adduction | x3 (20) |
| 9. Stretching | x2 (20 seconds) |

APPENDIX K**Glossary**

Body composition	amount of lean versus fat tissue in the body
BMI	measure of relative fatness
Cholesterol	steroid that is an essential structural component of neural tissue and cell walls and is required for the manufacture of hormones and bile
Diabetes Mellitus	metabolic disorder involving the pancreas and the failure to produce insulin, a risk factor for CVD
Health	balancing of the physical, emotional, social and spiritual component in a manner that is conducive to optimal well-being and a higher quality of existence
Health promotion	art and science of helping people change their lifestyle to move toward a higher state of wellness
Health related fitness	components of fitness that include cardiorespiratory endurance, muscular strength, muscle endurance, flexibility and body composition
Health risk appraisal	questionnaire used to provide information about health habits, lifestyle and medical history
Hypertension	high blood pressure
Hypokineses	physical inactivity
Morbidity	incidence of disease and or sickness
Myocardial infarction	heart attack, death of heart muscle tissue
Obesity	excessive amount of storage fat
Overweight	excessive weight for one's height without regard for body composition
Skinfold measures	method for determining the amount of body fat by using skinfold calipers
Well-being	good health, happiness and prosperity

APPENDIX L

Intensity (RPE)

0	Nothing at all
1	Very easy
2	Easy
3	Moderate
4	Somewhat difficult
5	Difficult
6	
7	Very difficult
8	
9	
10	Very, very difficult

Borg Scale (Mc Ardle et al., 1996:406)

APPENDIX N**Percentage body fat**

Relative fatness	Male	Female
At risk - too low	0 % - 5 %	0 % - 10 %
Below average	6 % - 14 %	11 % - 22 %
Average	15 %	23 %
Above average	16 % - 24 %	24 % - 31 %
At risk - too high	25 % +	32 %

(Jackson and Pollock, 1985)