The Effect of a Physical and Combined Health Promotion Intervention Programme on Some Selected Health Indicators of South African Colliery Executives

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Declaration

Hereby we the co-authors

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- Prof. dr. G.L. Strydom

give permission that the research articles may form part of the candidate's PhD-thesis. The contribution of the co-authors was limited to their professional advice and guidance as study leaders towards the completion of the study.

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Abstract

The effect of a physical and combined health promotion intervention programme on some selected health indicators of South African colliery executives.

Die effek van 'n fisieke- en gekombineerde gesondheidsbevorderende intervensie program op sekere geselekteerde gesondheidsindikatore van Suid-Afrikaanse steenkoolmyn uitvoerende amptenare.

In many countries the focus of the employer's health policy has shifted from the emphasis of treating the disease to the preventative paradigm, which focuses more on the promotion of employees' health. Literature indicates that health promotion programmes have various positive consequences. The aim of this research is therefore to establish some physical, physiological and bio-chemical health profiles of colliery executives in South Africa as well as to determine the effect of a physical and a combined physical and health promotion intervention programme on the parameters mentioned above. Finally, this study aims to determine the effect of a physical and a combined physical and health promotion intervention programme on coronary prone South African colliery executives.

In this study an availability, non-randomized sample of 143 white male executives from five collieries, aged 26-58 ($\bar{x}$ 41.7, ± 7.98 years), was used. These collieries are spread over two South African provinces namely Mpumalanga and Gauteng. Subjects who were on medication that could affect their cholesterol, blood pressure and aerobic fitness values were excluded from the study. The following parameters were used in this study: aerobic fitness, shoulder/arm, strength/endurance (push-ups) abdominal strength/endurance (sit-ups), flexibility, fat percentage, waist-and-hip circumference, body mass index, blood pressure, cholesterol, smoking and leisure-time physical activity participation. ANOVA was used for statistical data analysis – providing descriptive and summarising statistics. One-way analysis of variance was used to determine relationships between variables. The Tukey post-hoc test was used to determine whether certain groups differed statistically significant from each

other. It is clear from the descriptive data that flexibility (56.7%), sit-ups (39.7%), aerobic fitness (44.8%), fat percentage (31.4%), BMI (35.7%) and WHR (44.7%) fall into the undesired health zone. Regarding the physiological parameter blood pressure, 16.8% (systolic blood pressure) and 21.7% (diastolic blood pressure) fall into the undesired health zone; regarding the bio-chemical parameter cholesterol, 53.2% falls into the undesired health zone.

With regard to some parameters, it appears that the experimental group showed statistically significant changes from Test 1 to Test 3, while the control group showed no statistically significant changes. The reason for this may vary from respondent to respondent already showing "normal" baseline values, probably due to their relative young age ($\bar{x}$=41 years) as to programme preferences and programme adherence. It must, however, be kept in mind that only physical, physiological and bio-chemical parameters were assessed. The health promotion activities focused more on the participants' knowledge empowerment. If these parameters were also included in the assessments the "enriched" programme might have provided some advantages that may have led to long term commitment and behaviour change.

Physical fitness intervention (control group) is equally effective in addressing the primary coronary risk factors compared to a programme enriched with health promotion activities (experimental group). However, it seems that the experimental group showed a better response as far as lifestyle change (smoking) and physical activity were concerned. Assessment of other psycho-emotional parameters might indicate a different picture. Respectively 11.7% and 7.6% of the experimental and control group stopped smoking while 20.8% and 16.3% of the experimental and control group respectively reported a higher leisure-time physical activity participation. Regarding aerobic fitness and blood pressure, the average baseline values moved from the high risk category to the "normal" category, while the total cholesterol concentration in the post training values decreased with 12.5% and 14.8% in the experimental and control group respectively.

Keywords: Executives, health promotion, health, physical, health care costs
Sleutelterme: Uitvoerende amptenare, gesondheidbevordering, gesondheid, fisieke, gesondheidsorgkoste

Sinopsis

Die effek van 'n fisieke- en gekombineerde gesondheidsbevorderende intervensie program op sekere geselekteerde gesondheidsindikatore van Suid-Afrikaanse steenkoolmyn uitvoerende amptenare.

The effect of a physical and combined health promotion intervention programme on some selected health indicators of South African colliery executives.

In baie lande dwarsoor die wêreld het die fokus van werkgewers se gesondheid beleid verander vanaf die behandeling van siektes na die voorkomende paradigma, wat meer fokus op die bevordering van werknemers se gesondheid. In die literatuur dui 'n verskeidenheid van studies op die positiewe effek van gesondheidsbevorderende programme. Die doel van die studie is dus om die fisieke, fisiologiese en bio-chemiese indikatore van Suid-Afrikaanse steenkoolmyn uitvoerende amptenare sowel as die effek van 'n fisieke- en 'n gekombineerde gesondheidsbevorderende intervensie program op bogenoemde gesondheidsindikatore te bepaal. Die studie se doel is ook om te bepaal wat die effek is van 'n fisieke- en 'n gekombineerde gesondheidsbevorderende intervensie program op koronêre geneigde Suid-Afrikaanse steenkoolmyn uitvoerende amptenare.

In hierdie studie is 'n beskikbare nie-ewekansige proefgroep van 143 wit manlike uitvoerende amptenare van vyf steenkoolmyne tussen die ouderdomme van ses en twintig en agt en vyftig jaar (gemiddelde ouderdom van 41.7 jaar) gebruik. Die steenkoolmyne is oor twee provinsies verspei, naamlik Gauteng en Mpumalanga. Proefpersone wat medikasie gebruik het wat die cholesterol, bloeddruk en aërobiese fiksheidwaardes van die proefpersone kon beïnvloed, is van die studie uitgesluit. Die volgende parameters is gebruik: aërobiese fiskheid, skouer/arm-, krag/uithouvermoë (opstote), abdominale krag/uithouvermoë (opsitte), soepelheid, persentasie liggaamsvet, maag-heup omtrek, massa-lengte verhouding, bloeddruk, cholesterol, rookgewoontes en vryetyd fisieke aktiwiteit deelname. Statistiese ontleding van die

data is gedoen deur ANOVA te gebruik vir die beskrywende en opsommende statistieke. Eenrigting variansie analises is gedoen om verhoudings tussen die veranderlikes te bepaal. Tukey post-hoc toetse is gedoen om vas te stel of sekere groepe statististies betekenisvol van mekaar verskil. Volgens die beskrywende satistiek is dit duidelik dat soepelheid (56.7%); opsitte (39.7%); aërobiese fiskheid (44.8%); persentasie liggaamsvet (31.4%); massa-lengte verhouding (35.7%) en maag-heup omtrek (44.7%) in die ongewenste gesondheidsone presenteer. Ten opsigte van die fisiologiese parameter bloeddruk, presenteer afsonderlik 16.8% (sistoliese bloeddruk) en 21.7% (diastoliese bloeddruk) in die ongewenste gesondheidsone, en ten opsigte van die bio-chemiese parameter (cholesterol), presenteer 53.2% in die ongewenste gesondheidsone. Dit wil voorkom asof die eksperimentele groep ten opsigte van sekere parameters statisties betekenisvolle verskille van Toets 1 tot Toets 3 toon, terwyl die kontrolegroep geen statisties betekenisvolle verskille toon nie. Die rede hiervoor mag varieer van respondente wat alreeds met "normale" basislyn waardes presenteer, moontlik as gevolg van 'n relatiewe jong ouderdom ($\bar{x}$=41 jare), sowel as program voorkeure en program navolging van die respondente. Daar moet egter in gedagte gehou word dat slegs die fisieke-, fisiologiese- en bio-chemiese parameters bepaal is. Die gesondheidsbevorderende aktiwiteite het egter daarop gefokus om die kennis van die respondente te verbeter. Indien die parameters ook by die evaluasie ingesluit was, kon die verrykte gesondheidsbevorderende program voordele getoon het wat tot langtermyn verbintenis en gedrags verandering kon lei.

'n Fisieke fiksheids intervensie program (kontrole groep) in vergelyking met 'n gesondheidsbevorderende program (eksperimentele groep) is netso doeltreffend met die behandeling van koronêre risiko faktore. Dit wil egter voorkom asof die eksperimentele groep 'n groter verandering getoon het ten opsigte van lewenstyl verandering (rook) en vryetyd fisieke aktiwiteit deelname. Indien ander psigo-emosionele parameters ge-evalueer is, kon die uitkoms verskil het. Afsonderlik 11.7% en 7.6% van die eksperimentele en kontrole groep het opgehou met rook, terwyl 20.8% en 16.3% van die eksperimentele en kontrole groep afsonderlik 'n hoër vryetyd fisieke aktiwiteit deelname gerapporteer het. Ten opsigte van aërobiese fiskheid en bloeddruk het die gemiddelde basislyn waardes na afloop van die

intervensie periode vanaf 'n hoë risiko kategorie na 'n normale kategorie verskuif, terwyl die totale cholesterol waardes afsonderlik met 12.5% en 14.8% verminder het ten opsigte van die eksperimentele en kontrole groep.

Sleutelwoorde: Uitvoerende amptenare, gesondheidbevordering, gesondheid, fisieke, gesondheidsorgkoste

Keywords: Executives, health promotion, health, physical, health care costs

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List of Abbreviations

ACSM	American College of Sports Medicine
CHD	Coronary heart disease
USA	United States of America
WHO	World Health Organisation
LDL-C	Low-density lipoprotein cholesterol
PWC_{170}	Physical work capacity
ILEA	Indiana law enforcement academy
%	Percentage
BMI	Body mass index
WHR	Waist-hip-ratio
SADHS	South African democratic and health survey
MHHE	McGraw Hill Higher Education
BC	Before Christ
NIOSH	National Institute of Occupational Safety and Health
AIDS	Acquired immunodeficiency syndrome
HIV	Human immunodeficiency virus
BioDoc	Biokinetics, Health & Exercise Epidemiology Consultancy
HP	Health promotion
CEO	Chief executive officer
HRA	Health risk appraisal
EAP	Employee assistance programmes
QWL	Quality work life model
T.A.G	**T**otal commitment to developing human potential
	Access to learning opportunities
	Growth as an individual and as a company
ToC	Traditional or conventional model
HPM	Health and productivity management model
HCM	Health cost management
ROI	Return-on-Investment
Max	Maximum value

Min	Minimum value
N	Number of respondents
SD	Standard deviation
T1	Test 1
T3	Test 3
FITT	Frequency, Intensity, Type, Time
b.min^{-1}	beats per minute
kg.m^{-2}	kilograms by height in meters squared
m.mol.l^{-1}	millimoles per litre
mg/dL	milligram per decilitre
mmHg	millimetre of mercury
kcal.week	kilocalorie per week
$\bar{x}$	Statistical average

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1.1 INTRODUCTION

Business and governmental chief executives recognize, with reference to the heavy burden of health care costs, that not only the growth, but in some cases the sustainability of their organisations, is linked to employee health and that changes in health costs follow changes in health risks (Edington, 2001:342; Musich *et al.,* 2003:393; Cowan *et al.,* 2004:131; Hanway, 2005:6). Forward-looking employers in the USA are beginning to recognize the need to transform the U.S. health system from one that spends most of its resources to treat disease into one focused on preventing disease. Furthermore, organizations can gain bottom line benefits from investing to keep employees healthy (Clymer, 2005:i). In concurrence with this view Leopold (2004:15) maintains that every employer is dealt a unique hand of cards in terms of its employee population and the health benefits strategies any given employer should pursue depends on the cards that are dealt. There is no "one size fits all" solution to health care (Leopold, 2004:15). Therefore, it is important for organisations to identify their leading health cost drivers, both direct and indirect, (e.g. absenteeism, disability claims, presenteeism, workers compensation, productivity, turnover) as emerging research is documenting that indirect costs of poor health can be two to three times the direct medical costs (Edington & Burton, 2003:140; Goetzel *et al.,* 2003:2; Burton *et al.,* 2004:S38; Pelletier *et al.,* 2004:747). Enlightened organizations already are profiting from a primary shift in focus from the cost of health care to the total value of health (Clymer, 2005:i). For each new drug, or surgical procedure, or imaging study, the cost of care is greatly increased with ever smaller increases in longevity and well-being and therefore consequently investment must rather be in preserving health and preventing illness (Molella, 2005:4). It is at this point that companies have to realise the importance of worksite health promotion interventions – not only targeted interventions to reduce health care costs but also as a strategy to create a dynamic work environment (Pfeiffer, 2003:116).

Regular physical activity has long been regarded as an important component of a healthy lifestyle (Francis, 1996:463; Thune *et al.,* 1998:1633; Sesso *et al.,* 2000:975; McArdle *et al.,* 2001:871; Willmore, 2001:S622-S633; MHHE, 2005a; WebMD, 2005b). Physiologically and psychologically there is no replacement for sufficient

exercise and physical activity whether it happens in the working environment or elsewhere (Paffenbarger, 1987:125; Unger, 1995:17; MHHE, 2005a). As early as 370 BC Hypocrates expressed himself clearly on this point: "All parts of the body which have a function, if used in moderation and exercised in labours in which each is accustomed, become thereby healthy, well-developed and age more slowly, but if unused and left to idle they become liable to disease, defective in growth, and age more quickly" (Wallace, 1986:3).

As evidenced by this quote, the value of physical activity has been extolled since antiquity as a means of preserving or enhancing health and that regular physical activity was probably one of the most important factors in the lifestyle of any population, which ultimately determined the quality of their lives and health (Blair *et al.*, 1995:1093; Thune *et al.*, 1998:1633; McArdle *et al.*, 2001:875-876; Willmore, 2001:S622-S633; MHHE, 2005a). Not only is regular physical activity been regarded as an important component of a healthy lifestyle, but a physically active lifestyle promotes good health and can reduce the risk of heart disease (Francis, 1996:463; Thune *et al.*, 1998:1633; Sesso *et al.*, 2000:975; McArdle *et al.*, 2001:875-876; Willmore, 2001:S622-S633; Bolton *et al.*, 2004:56; American Heart Association, 2005). It is stated by McGinnis (1993:2207), Feingold (1996:15) and Bolton *et al.* (2004:56) that 90% of all diseases could be prevented if healthy lifestyle choices were made regarding physical activity, nutrition, smoking, drugs and alcohol.

Ascertaining the physiological component of health promotion intervention programmes, physical activity constitutes a very important aspect of the intervention approach. The *CommonHealth* intervention programme from Virginia assisted their employees to establish and/or maintain a healthy lifestyle through exercise. These employees lost on average 10.8kg per person and 26% have remained free from tobacco after one year (Warner, 2005:17). The *T.A.G.* health risk management and health promotion initiative from Highsmith produced a 53% decrease in high-risk total cholesterol and 52% decrease in high blood pressure (≥140/90mmHg) through physical activity as one of the many interventions utilized (Highsmith, 2005:16). The *Healthy People* health promotion intervention programme initially implemented in the Johnson & Johnson Company eventually ensured a saving of about $9-10 million

per year from reduced medical utilization and a 38% decrease in expenses. This was the result of people being physically active (Weldon, 2005:9). Bezuidenhout (2001:71) indicated that the type of intervention activities which had the biggest impact on healthcare costs in industries is a combination of a physical and psychological intervention programme where the focus is on physical activities with specific reference to accepting self-responsibility within the preventative framework. Personal responsibility is the cornerstone of: a) **Primary prevention** (staying physically active, eating healthfully, managing stress, and following preventive screening recommendations); b) **Risk management** (reducing lifestyle-related factors such as obesity or tobacco use); c) **Medical consumerism** (adherence to cholesterol- or blood pressure-lowering medications, shopping for appropriate health care and using health resources appropriately) (Highsmith, 2005:16). Grace (2001:89) studied the impact of a worksite physical wellness programme on sick leave, absenteeism (absent without a sick note) and health related fitness and found a saving of 4.9 days sick leave and absenteeism per employee per year. The application of abovementioned 4.9 days saved on sick leave and absenteeism at a company employing 450 employees with an average cost of R230.73 per employee per day ads up to an annual saving of R508 759.65 (Discovery Health, 2003). The intervention programme that enabled the saving in sick leave and absenteeism data entailed awareness, health education, assessments and a physical wellness programme.

1.2 PROBLEM STATEMENT

Physical activity has been emphasised by employers in the business sector and implemented as an integral part of the employer's health policy and programme interventions (Harvey *et al.,* 1993:296; McArdle *et al.,* 2001:957; Chapman, 2005:55). In industrialized countries, modern technology has largely eliminated the need for physical exertion on the job, in the home, and for transportation (Science Direct, 2002). Research by Jacobs (1991:64), Van Zyl (1995:iv, 31) and Dreyer (1996:131) confirms this scenario in South Africa. They maintain that due to modernising, technological growth and competition, the South African executive finds him/herself in a stressful and often hypokinetic environment. A study on the physical activity level of South African executives by Dreyer (1996:116) indicates

that 29.9% of the respondents were totally inactive, 49.5% were moderately active and 20.6% were highly active. As maintained by Dreyer and Strydom (1994:1) only 3% of South African executives are physically active at work and 14.3% participate in enough leisure time activities to ensure optimum health. In a follow-up study with 325 white male executives, Dreyer (1996:133-134) indicated that 20.6% of the executives were physical active enough to ensure a health promotion effect. In addition to this, Swanepoel (2001:100) points out that 75.6% of executives do not apply the basic principles of a healthy lifestyle (adhere to less than six of Belloc and Breslow's lifestyle habits) (Belloc & Breslow, 1972:46-64). Another major problem for executives is to establish a balance between their work, family and relaxation (Uys & Coetzee, 1989:4; Dreyer & Strydom, 1994:11). Occupational competition, labour problems and long working hours are just some of the problems that is the cause of stress and other health problems in the executive's career (Van Zyl, 1995:iv; Rothnie-Jones, 1996:7; MHHE, 2005b).

In 1870 Dr Nobel, and in 1906 President Roosevelt of the USA, already emphasized the importance of good health for the executive. The hypothesis of the contributing role of a sedentary lifestyle to the aetiology of coronary heart disease (CHD) has been extensively scrutinized over the past 30 years by observational, epidemiological, post-mortem and physiological studies (Blair *et al.,* 1995:1093; Thune *et al.,* 1998:1640; Strydom *et al.,* 1998:125; Erikssen, 2001:571; Chapman, 2005:76). In a study by Dreyer (1996:457) on 388 South African executives he found that 69.5% of the respondent's total cholesterol was too high. In a similar study by Dreyer *et al.* (1996:461) they found that respectively 38.7% and 58.2% of the executives systolic and diastolic blood pressure levels were higher than the acceptable levels of <140mmHg for systolic blood pressure and <90mmHg for diastolic blood pressure and their fat percentage (4.3%) was very high, with a value of 23.3% body fat. In a follow-up study on 325 South African executives he found that 24.4% of the respondents were smoking (Dreyer, 1996:180). Research by Strydom *et al.* (1998:125) on South African executives from the mining, construction, steel, motor, and financial industries, indicates a very high prevalence of four primary risk factors of CHD (high cholesterol, smoking, hypertension and physical inactivity). The implementation of corporate wellness and health promotion intervention programmes can result in a reduction of CHD and health care costs

(Henritze *et al.,* 1992:129; Cooper & Cartwright, 1994:468; Powell *et al.,* 1997:247-253; McArdle *et al.,* 2001:957; Chapman, 2005:17-18). Erfurt *et al.* (1991:962) investigated four different health promotion intervention programmes in order to establish the most cost effective intervention approach. They concluded that a comprehensive health promotion intervention programme consisting of wellness screenings, counselling and a variety of health promotion intervention activities to be the most cost effective. This is confirmed by Chapman (2005:41-67) who studied three worksite health promotion intervention programmes and found that a comprehensive health and productivity management model of worksite health promotion to be the most effective. This model of worksite health promotion is highly structured, proactive and offers a substantial set of health promotion interventions. The intention of this health and productivity management model is to provide an infra-structure of health promotion activities including physical activity offered to a large portion of the work force and their spouses (Chapman, 2005:57). The rational of health promotion intervention programmes, according to Chapman (2005:17), is initiated by senior management due to their concern about rapid increases in health care costs, high employee absenteeism, presenteeism, injury rates, or general concerns for health and productivity (Chapman, 2005:57; WebMD, 2005a). Likewise, low-risk employees (e.g. 0-2 lifestyle-related risks such as obesity, blood pressure, smoking, etc.) who already have and maintain good health can be viewed as an employer's existing market share. If their continued buy-in is not maintained through relatively low-cost awareness campaigns and other health promotion strategies, research indicates that many of these low-risk employees inevitably join the ranks of the higher-risk/higher-cost employees (Hanway, 2005:6). As the number of health risks increased, the percentage of work limitations also increased. Each additional risk factor was associated with an additional 2.4% excess productivity loss (Burton *et al.,* 2005:769). The *Healthy Lifestyles* programme implemented by Aetna Inc. found that individuals who improved just one risk factor improved their presenteeism by 9% and reduced absenteeism by 2% (Rowe, 2005:5).

Looking at the per capita of the overall South African population the prevalence of executives amongst the total workforce is very scarce. This would generate more pressure on the high level employees, which in turn may result in work and/or stress

related health problems (Strydom *et al.*, 1998:122). It is, therefore, of the utmost importance to maintain the physiological, psychological and physical health status of executives (Uys & Coetzee, 1989:51; Strydom *et al.*, 1998:122).

Furthermore, it is very important to know the status of the executives' physical, physiological and bio-chemical health indicators. It is not possible to manage the executives' health and risk status if the total indirect and direct costs of poor health to the organization is not truly understood. Therefore, the high-risk/high-cost conditions must be effectively identified and managed while proactively keeping low-risk workers at low risk, as well as measuring programme results against benchmarks to evaluate the impact on health and productivity. It is impossible to manage what cannot be measured (NIOSH, 2005). Grobler (1990:2) estimates that training an employee up to executive level already cost some R11 000 000.00 in 1990. Dreyer (1996:43) who stated that the training costs of an executive could escalate to several million rands, confirms this. According to Bischoff (2004), a three- to six-month executive management course, focusing on skills enhancing, high strategy and competitiveness, can cost from R50,000 to R75,000 per individual. An executive, therefore, brings great value to the company, while also being a big investment. Adopting and implementing physical and health promotion intervention programmes for executives will consequently constitute a significant aspect in the maintaining and managing of their health and risk status. If not, research indicates that many of the low-risk employees inevitably join the ranks of the higher-risk/higher cost employees to such an extend that from 2–4% of an employee population is likely to migrate from low-risk status to higher risk within one year in the absence of preventative programmes (Musich *et al.*, 2003:393). Research further postulates that as risks increase – even a single risk – costs also increase. When productivity measures are factored in, the costs are doubled or tripled (Edington & Burton, 2003:140; Burton *et al.*, 2004:S38; Pelletier *et al.*, 2004:747). Maintaining low risk may be at least as cost-effective as addressing high risk, depending on the needs of a given population. The potential savings from average risk reduction is $150 per person per year, compared to savings of $350 from risk avoidance (e.g. prevention) (Edington, 2001:342; Hanway, 2005:6).

From the literature available it is imperative to know the executives physical, physiological and bio-chemical health risk status because it is impossible to manage what is not measured (NIOSH, 2005). Research further highlights the importance of adopting and implementing physical and health promotion intervention programmes for executives in the maintaining and managing of their health and risk status (Strydom *et al.,* 1998:126; Scott, 1999:1).

The effect of a physical and health promotion intervention programme on some physical, physiological and bio-chemical health indicators of South African colliery executives will therefore remain uncertain until research has provided a firmer foundation than that which presently exists. The physical, psychological and perceived benefits of an executive fitness programme in South Africa, as well as the physical activity, lifestyle and physical health profile of South African executives, were studied (Dreyer & Strydom, 1992:24; Dreyer & Strydom, 1994:1; Dreyer, 1996:133-134), since that time considerable changes have taken place in South Africa which could bring about significant changes (Van Zyl, 1997:334; Nel, 2004:16). Various researchers as indicated in this chapter studied worksite health promotion intervention programmes internationally but as ascertained from the above mentioned S.A. literature, it is clear that existing research is either limited or outdated and, to date, no attempt has been made to analyse the combined effect of a physical and health promotion intervention programme on some physical (aerobic/cardiovascular) fitness, flexibility, body mass index, waist-hip-ratio, fat % and muscle endurance), physiological (blood pressure) and bio-chemical (cholesterol) health indicators of South African colliery executives.

The questions that this research endeavours to answer is: Considering that information on the physical, physiological and bio-chemical profiles of South African colliery executives is very scanty, it will be significant to ascertain their present health-risk profiles. In addition, what is the combined impact of a physical intervention and health promotion intervention programme on the health status of these executives in South Africa? Finally, what will be the effect of a physical and a combined physical and health promotion intervention programme on coronary prone South African colliery executives? Answers to these questions should provide important information regarding physical and health promotion intervention

programmes and the physical, physiological and bio-chemical health indicators of South African colliery executives.

1.3 OBJECTIVES

The objectives of this study are the following:

1.3.1. To establish some selected physical, physiological and bio-chemical health profiles of colliery executives in South Africa.

1.3.2. To determine the effect of a physical and a combined physical and health promotion intervention programme on some selected physical, physiological and bio-chemical health parameters of South African colliery executives.

1.3.3. To determine the effect of a physical and a combined physical and health promotion intervention programme on coronary prone South African colliery executives.

1.4 HYPOTHESES

The following hypotheses are related towards the objectives of the study:

1.4.1. Profiles on the physical, physiological and bio-chemical health indicators of colliery executives in South Africa can be compiled from this study.

1.4.2. Executives exposed to a combined physical and health promotion intervention programme will show statistical significant greater improvement in their physical, physiological and bio-chemical health indicators compared to those only exposed to a physical intervention programme.

1.4.3. Coronary prone executives exposed to a combined physical and health promotion intervention programme will show significant greater improvement in their physical, physiological and bio-chemical health indicators compared to those only exposed to a physical intervention programme.

1.5. THESIS STRUCTURE

The structure of this thesis is presented in article format as approved by the North-West University (Potchefstroom Campus) and will be as follows:

Chapter 1: Problem statement and objectives.
Chapter 2: Health indicators in executives regarding some physical, physiological and bio-chemical health parameters.
Chapter 3: Components of a physical and health promotion intervention programme and the benefits to some health parameters.
Chapter 4: (Article 1) Quantitative analysis of some selected health risk profiles of executives in the South African colliery industry.
Chapter 5: (Article 2) The effect of a physical and a combined health promotion intervention programme on some selected health indicators of South African colliery executives.
Chapter 6: (Article 3) The effect of intervention on coronary prone executives in the South African colliery industry.
Chapter 7: Summary, conclusions and further research.

The **references** of Chapter 1, 2, 3 and 7 will be presented at the end of each chapter according to the style as prescribed by the North-West University (Potchefstroom Campus).

The **references** of Chapter 4, 5 and 6 will be presented at the end of each chapter according to the requirements of the specific journal to which the article will be presented for publication. The references therefore may differ from chapter to chapter.

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2

Health Indicators in Executives Regarding Some Physical, Physiological and Bio-chemical Health Parameters – a Literature Review

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2.1 INTRODUCTION

The executives of any company are the most valuable group of employees because of the direct influence they have on the functioning of the company (Wyndham, 1981:411; Uys & Coetzee, 1989:5; Kaplan, 1997:14; Scott, 1999:1). Companies invest large amounts of money to train and develop executives. Grobler (1990:2) estimated that training an employee up to executive level already cost in excess of R11 000 000.00 in 1990. This was confirmed by Dreyer (1996:43) who stated that the training costs can escalate to several million rand. Bischoff (2004) maintained that a three to six-month executive management course, focusing on skills enhancing, high strategy and competitiveness, could cost from R50,000 to R75,000 per individual. An executive, therefore, brings great value to the company, while also representing a big investment. They are "the man in the middle" – the pivot around which the whole organisation revolves (Bates, 2001:32).

South Africa has a unique management culture (Coetzee, 1990:167). Researchers believe that executives are facing some critical problems after the change in government that occurred 1994 in South Africa – including the economic situation as well as political changes (Van Zyl, 1997:334). The economic situation has led to downsizing, which may have negatively influenced executives' self-confidence and self-image. Executives accept too much responsibility in an attempt to reach their company's objectives. In addition, competition may lead to conflict, aggressive conduct, poor communication and low morale (Van Zyl, 1997:334). Though workers on enterprise level did not engage in politics in the past, the current work environment is a milieu in which workers are able to express their political power (Van Zyl, 1997:334; Nel, 2004:16). Furthermore, executives are facing career transitions stemming from corporate relocations, outsourcing, downsizing, or other transitional situations. These transitions can put executives at risk for health and/or behavioural problems that can affect the performance of individuals as well as the entire organisation (Bratton, 2004:34). In order to adapt to the critical problems

mentioned above, organisations will have to continually commit resources to develop executives – to ensure their survival and growth in an increasingly changing and competitive environment (Nel, 2004:16).

South Africa has relatively few executives per capita. Strydom *et al.* (1998:122) estimated that in 2004 only 2.5% of the South African population would have been executives. This adds to the pressure experienced by the executive, which in turn may result in work stress and an increase in work and/or stress related health problems, emphasizing the maintenance of their health once again (Strydom *et al.,* 1998:126). Literature states that a sedentary lifestyle and the stressful environment to which executives are daily submitted may lead to chronic ailments, early retirement, the development of coronary heart diseases (CHD) and even premature death (Strümpfer, 1989:130; Maruyama & Morimoto, 1996:353; Rothnie-Jones; 1996:7; Bolton *et al.,* 2004:56; Wang *et al.,* 2004:428). The preservation of the physiological and psychological status of executives is thus of utmost importance (Strydom *et al.,* 1998:123). The maintaining of executives' health is therefore imperative to ensure optimum productivity and to protect the company's investment in an executive, (Scott, 1999:1; Harris & Witherspoon, 2001:12-13).

The first part of this chapter will address the existing perceptions in literature (regarding health as well as the various dimensions of health), with the intention of putting into perspective the abovementioned aspects regarding executives. The factors influencing the executive's health will also be addressed. Finally, the chapter will conclude with a discussion and analysis of some physical, physiological and bio-chemical health parameters. The researcher studied the four health-related physical fitness components, namely cardiovascular (aerobic) fitness, muscular strength and endurance, flexibility, body composition (fat %, waist-hip-ratio, body mass index) (McArdle *et al.,* 2001:871) and will be discussed under physical health parameters. Blood pressure and total cholesterol will be discussed in terms of physiological and bio-chemical health parameters. Although this study focuses more on the physical,

physiological and bio-chemical health parameters, a brief overview of the literature about total health has been included to allow the reader to appreciate the problem of executive health in a broad perspective.

2.2 TOTAL HEALTH

In 1947, the World Health Organisation defined health as a broad and multifaceted concept. This definition of health implies a state of general physical, spiritual and social well being, and not merely the absence of disease (Goodloe & Arreola, 1992:221; Hales, 1992:4; Webb, 1994:4; Goosen & Klugman, 1996:1; McArdle *et al.*, 2001:871; MHHE, 2005b). It considers good health as the ability to complete physical tasks successfully and maintain functional independence (McArdle *et al.*, 2001:913; O'Donnell, 2002:1). Health is an expression of each individual's functioning as an integrated whole – a totality of body, mind and spirit that includes coping and problem solving skills, a rationale between self-care and health service use, accomplishment at home and at work, successful social interactions, and a positive attitude and outlook (Cmich, 1984:31; O'Donnell, 2002:1; MHHE, 2005d). An ongoing process reflects the continuous change occurring in each individual's life (Cmich, 1984:31). Optimal health is defined as a balance of physical, emotional, social, spiritual and intellectual health (O'Donnell, 2002:1). Hettler (1984:29) and Eberst (1984:101) define health as the product of a balance between six dimensions that are intimately related and function synergistically with one another. The six dimensions of human health comprise of the physical, mental, vocational, emotional, spiritual and social dimensions. It is Hettler's (1984:29) and Eberst's (1984:101) view that these dimensions are separate, but intimately related, and function synergistically with one another, as demonstrated in Figure 2.1.

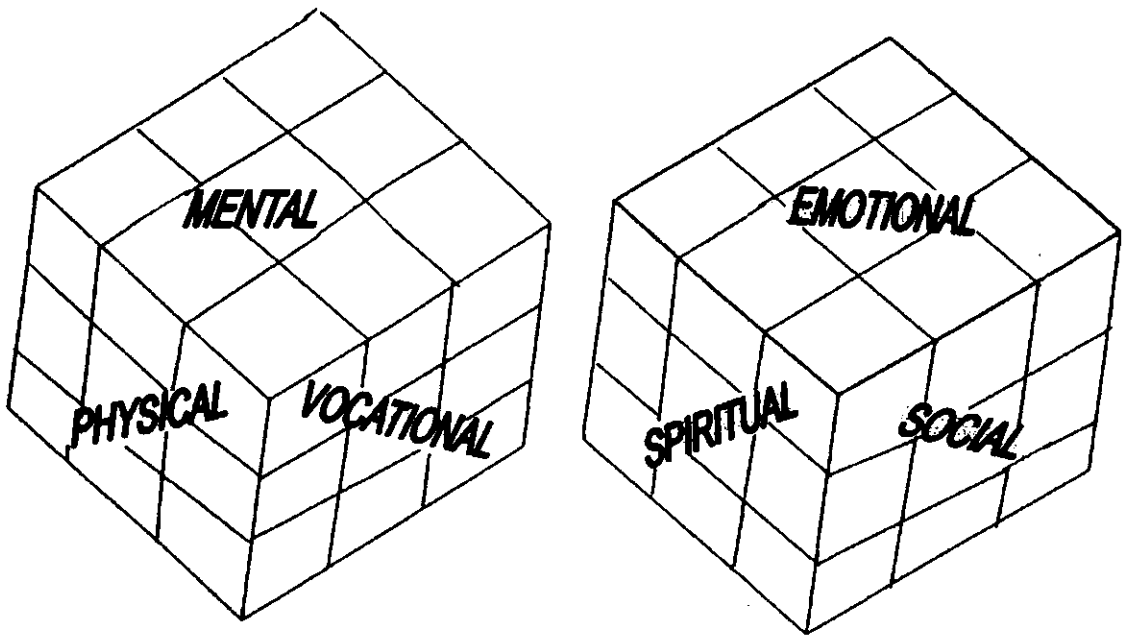

Figure 2.1: Eberst's "cube" model of health (1984:101)

Rubik's cube provides an even better description of health (*In* Eberst, 1984:102), where these six dimensions are represented on a cube known as Rubik's Cube (Figure 2.2). This three-dimensional cube, with its six sides, represents the six health dimensions, and thus allows all six dimensions to "work" together as a whole. Each surface – representing one of the health dimensions – contains nine smaller, moveable sub-elements of the same colour. These sub-elements represent the factors that are influencing each dimension of health.

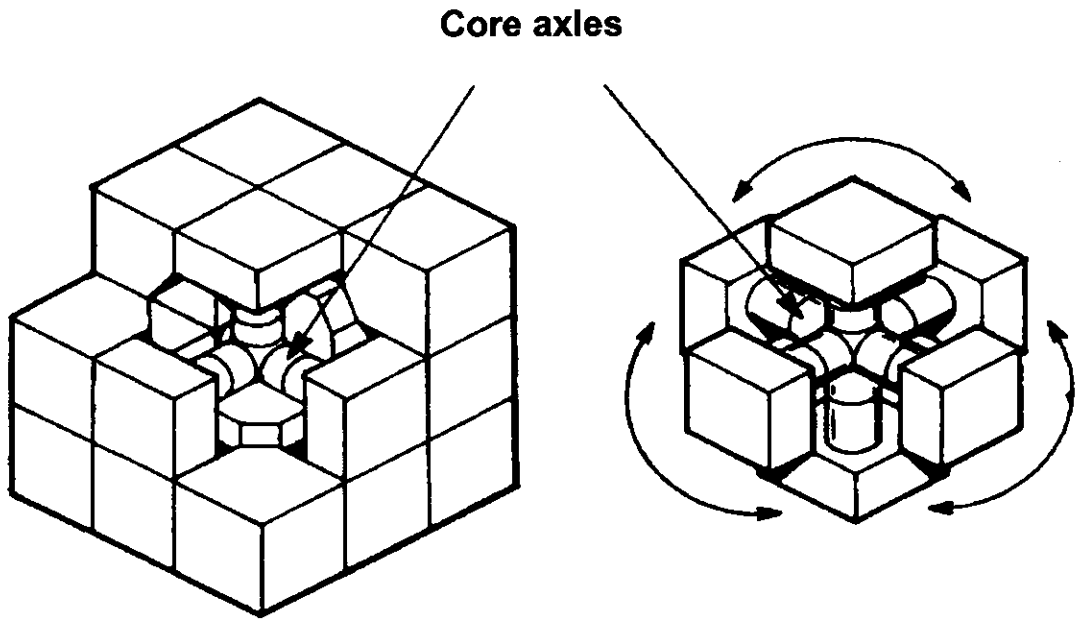

Figure 2.2: Rubik's "cube" model of health (*In* Eberst, 1984:102)

Rubik's cube is interconnected by three intersecting axles (Figure 2.2). Considering the abovementioned description, it is possible to define the three intersecting axles as three constructs determining total wellness: body, mind and soul. Human health requires a core to support and provide for leverage and articulation of the six health dimensions. Employing this "cube" concept as a model of health for the executive, total wellness (highest-level health) in each dimension would theoretically be represented when all of the sub-elements of the entire dimension are the same colour, and each is in its proper position (Eberst, 1984:101).

In 1985, Greenberg defined health as a multifaceted concept addressing the social, mental, emotional, spiritual, and physical dimension (Greenberg, 1985:403) as follows:

- *Social health:* It is the ability to interact well with people and the environment and to have satisfying interpersonal relationships.

- *Mental health:* It is the ability to learn, and includes intellectual capabilities.
- *Emotional health:* It is the ability to control emotions so that one feels comfortable expressing them when appropriate, and expresses them appropriately. It also is the ability not to express emotions when it is inappropriate to do so.
- *Spiritual health:* It is the belief in a certain unifying force. For some, that may be nature, for others it will be scientific laws, and for others it may be a godlike force.
- *Physical health:* It is the ability to perform daily tasks with energy remaining for unforeseen circumstances: the biological integrity of the individual.

The search for a definition of health intensified and in 1994 Gadow (1994:299) postulated that the perception existed that science could not formulate a fundamental definition for health. The reason for this perception can be ascribed to the various and different interpretations and approaches within the health spectrum (Cribb & Dines, 1993:27-28; Webb, 1994:34). Literature indicates that medical and illness care, illness prevention (pathogenic paradigm), and health promotion (salutogenic paradigm) are treated as central concepts of health as illustrated in Figure 2.3 and 2.4 (Berry, 1981:8; Strydom, 2000:14).

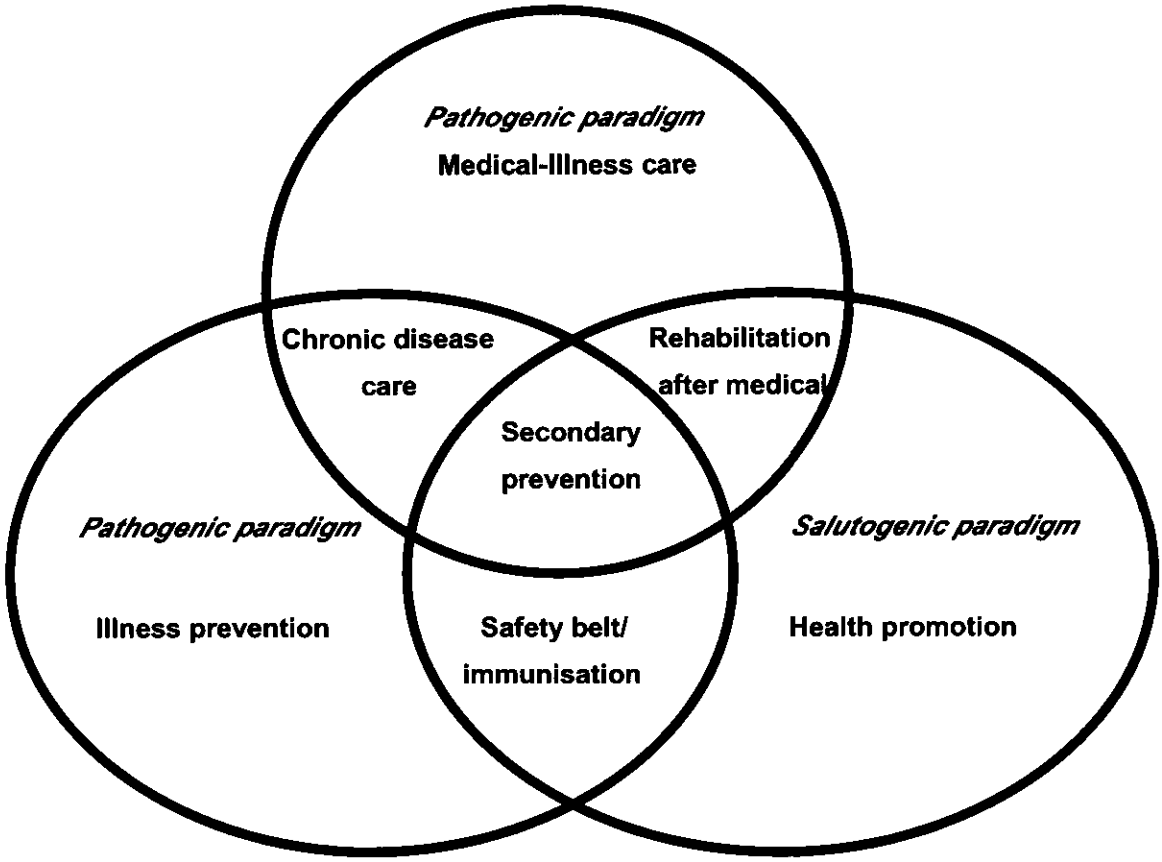

Figure 2.3: The interrelationship of health paradigms (Strydom, 2000:14)

From Figure 2.4 it appears that the most visible peak is *Medical Care*. It is also the area where most of today's actions occur, namely to minimise disability, to make individuals well and keep them alive. It is a continuous process that starts with sick people (medical care/minimise disability) and attempts to reduce the threat to an individual's health (disease prevention) and keep them healthy through health promotion programmes – on a continuous basis.

The right base is *Disease Prevention*. It begins with a threat to health, such as polio, HIV/AIDS and stress, and the effort is to keep as many people as possible from becoming victims to the threat. Executives are more exposed to certain stressors and have higher stress levels, and therefore preventative measures have to be

utilised in order to prevent excess stress levels resulting in depression (Maruyama & Morimoto, 1996:353; Bolton *et al.,* 2004:56).

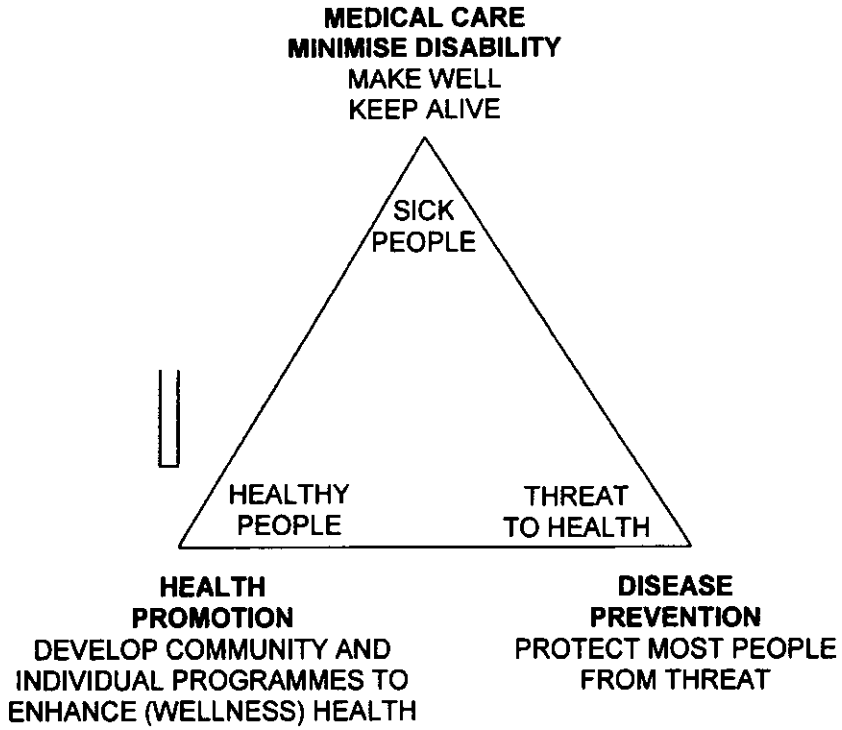

Figure 2.4: Be oroaches to health (Berry, 1981:8)

Finally, the bas left is *Health Promotion.* It starts with healthy people – and the effort is to develop programmes to enhance their state of health, and to help them achieve their highest functioning level. This "approaches to health" pyramid from Berry (1981:8) in this context refers to the broader meaning of health or even to total wellness for the executive, who has to utilise the whole pyramid to ensure optimal health.

In 2000, the multifaceted nature of health expanded towards wellness with Corbin *et al.* (2000:4) considering wellness as the positive component of optimal health. Death, disease, illness and debilitating conditions are negative components that detract from optimal health. Death is the ultimate opposite of optimal health.

Disease, illness and debilitating conditions obviously detract from optimal health. Wellness has been recognised as the positive component of optimal health, as evidenced by a sense of well-being that is reflected in optimal functioning, a good quality of life, meaningful work and a contribution to society. Most people think of wellness in terms of illness and assume that the absence of illness indicates wellness. It is the view of Travis and Ryan (2004:xviii) that there are actually many degrees of wellness, just as there are many degrees of illness. The illness/wellness continuum (Figure 2.5) illustrates the relationship of the treatment paradigm to the wellness paradigm (Travis & Ryan, 1988:27; Travis & Ryan, 2004:xviii).

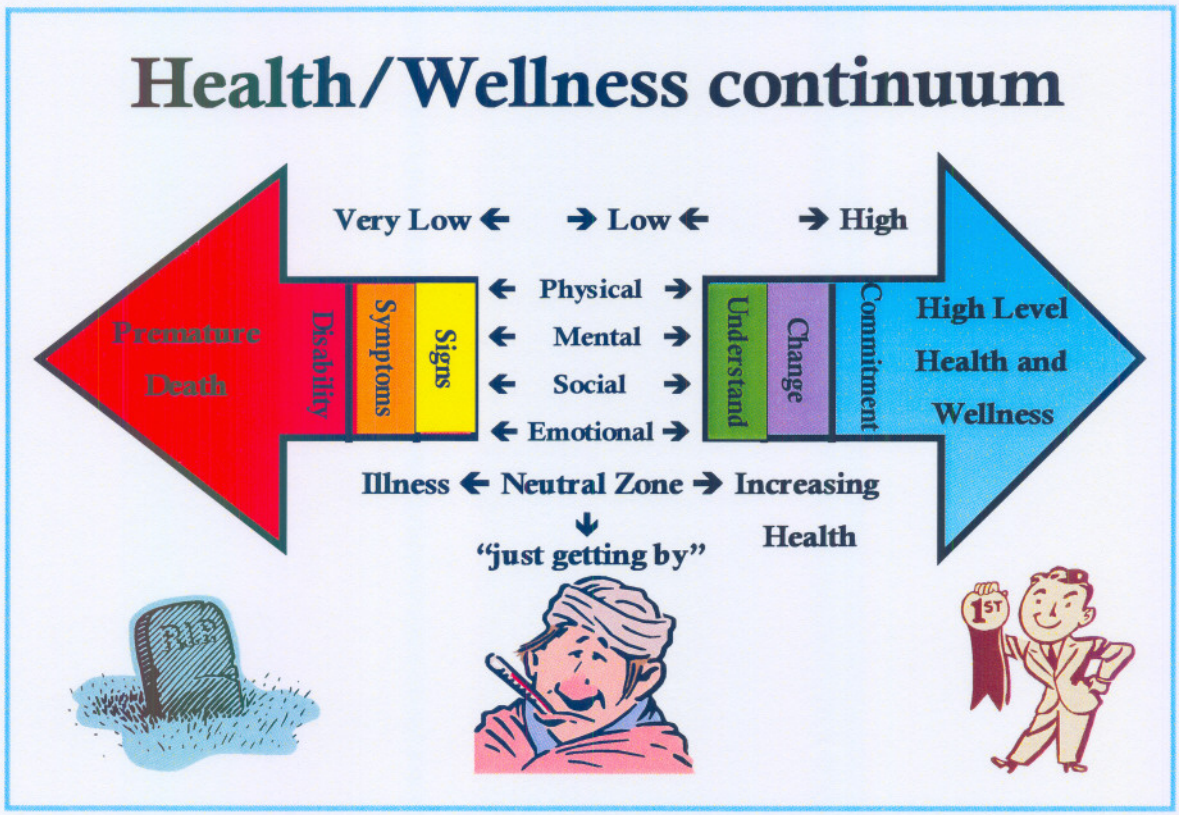

Figure 2.5: Health/Wellness continuum (Travis & Ryan, 1988:27)

The executive's wellness can thus be presented on this continuum stretching from premature death on the one side to high-level wellness on the other side. The neutral zone can be seen as the "illness free" area, with no substantial wellness.

The area between the neutral zone and premature death progressively shows a worsening state of health and is called the "illness/treatment continuum", where treatment is required. The "illness/treatment" continuum (medicine, surgery, biokinetics, herbs etc.) can bring the executive back to the neutral point where the symptoms of disease have been alleviated. The "wellness continuum" is the area between the neutral zone and the high-level wellness area. Here, the primary focus for the executive is to make spontaneous decisions on aspects like lifestyle habits, as well as to accept self responsibility, which directs the executive beyond neutral and encourages him/her to move as far to the right as possible – towards optimal health and wellness (Travis & Ryan, 1988:27; Travis & Ryan, 2004:xviii).

Although this continuum became an immediate success once it was published in 1975, Travis and Ryan (2004:xx) was inspired with another view of this original paradigm in the spring of 1986 (Figure 2.6).

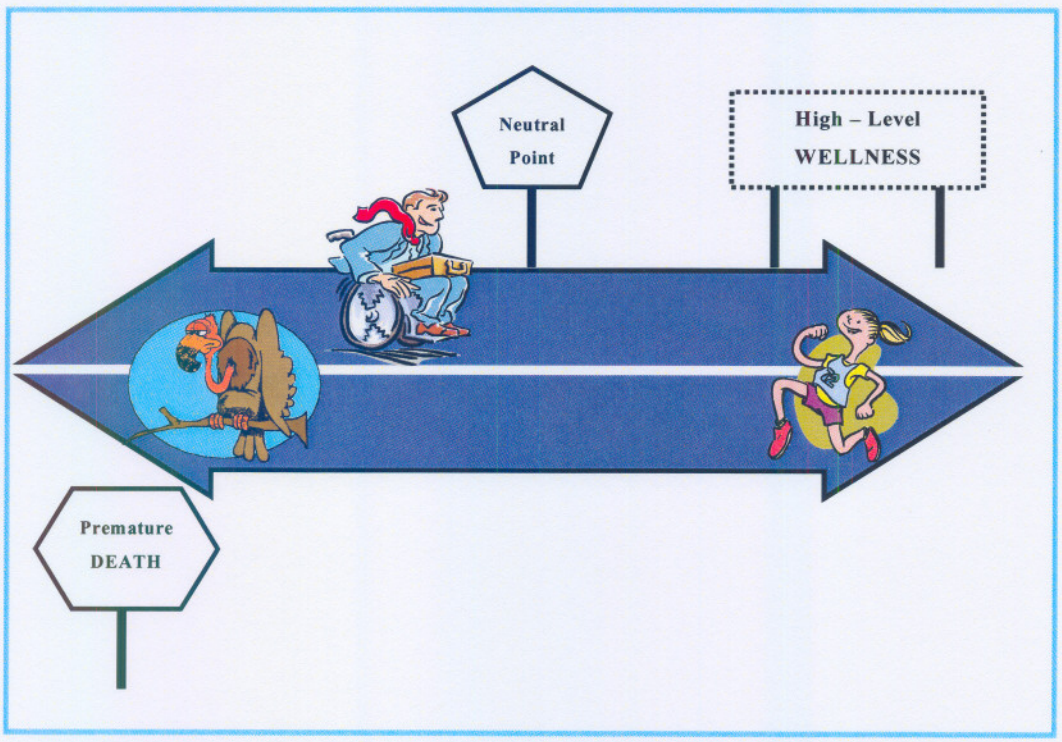

Figure 2.6: Health/Wellness continuum (Travis & Ryan, 2004:xx)

A simple model cannot always convey a complex concept (Travis & Ryan, 2004:xix). For a number of years they recognized that the old continuum could be misleading in one very significant area: it could be possible to be physically ill yet oriented toward wellness, or to be physically healthy but suffer from a mental illness. The old one-dimensional model simply could not show this distinction. For example: imagine disabled, sick or dying people who are taking responsibility for their lives and are consciously engaged in the experience. If only the physical dimension were considered they would fall on the left side of the continuum, but if emotional, intellectual and spiritual dimensions were taken into account they would definitely be on the right side of the continuum (Travis & Ryan, 2004:xix). Travis and Ryan (2004:xix) came to the conclusion that the key difference between illness and wellness – regardless of the point on the continuum at which a person may be – was the direction in which they were facing and moving: toward high-level wellness or toward premature death.

This continuum from Travis and Ryan (2004:xix) can be of benefit to the executive if they consider it as a pathway. They can move in either direction on the continuum. If they are physically in good health, but constantly worry about their work, they may be on the right side of the neutral point, but definitely facing toward the left – toward premature death. Conversely, if they are physically not in good health (high blood pressure, high cholesterol etc.) but still have a genuinely positive outlook – and deal with the problem, they face to the right, in the direction of high-level wellness.

In conclusion Corbin *et al.* (2000:5) define health as consisting of the following five components: emotional (mental), intellectual, physical, social and spiritual;

- *Emotional (mental) health:* A person with emotional health is free from emotional-mental illness or debilitating conditions such as depression, and possesses emotional wellness.

- *Intellectual health:* A person with intellectual health is free from illness that invade the brain and other systems that allow learning. A person with intellectual health also possesses intellectual wellness.
- *Physical health:* A person with physical health is free from illnesses that affect the physiological systems of the body such as the heart, nervous system, etc. A person with physical health possesses an adequate level of physical fitness and physical wellness.
- *Social health:* A person with social health is free from illnesses or conditions that severely limit functioning in society, including antisocial pathologies.
- *Spiritual health:* Spiritual health is considered synonymous with spiritual wellness. It is a person's ability to establish a value system and act on the system of beliefs, as well as to establish and carry out meaningful and constructive lifetime goals. It is based on a belief in a force greater than the individual that helps one contribute to an improved quality of life for all people.

Due to the multidimensional nature of health and wellness it is the view of Corbin *et al.* (2000:5-6) that in reality, health has a positive component – wellness. It is an integrated state of being that is best depicted as many threads that can be woven together to produce a larger, integrated fabric. Each specific dimension relates to each other and overlaps each other. The overlap is so frequent and so great that the specific contribution of each thread is almost indistinguishable when looking at the total (Figure 2.7). The total is clearly greater than the sum of parts (Corbin *et al.,* 2000:5-6).

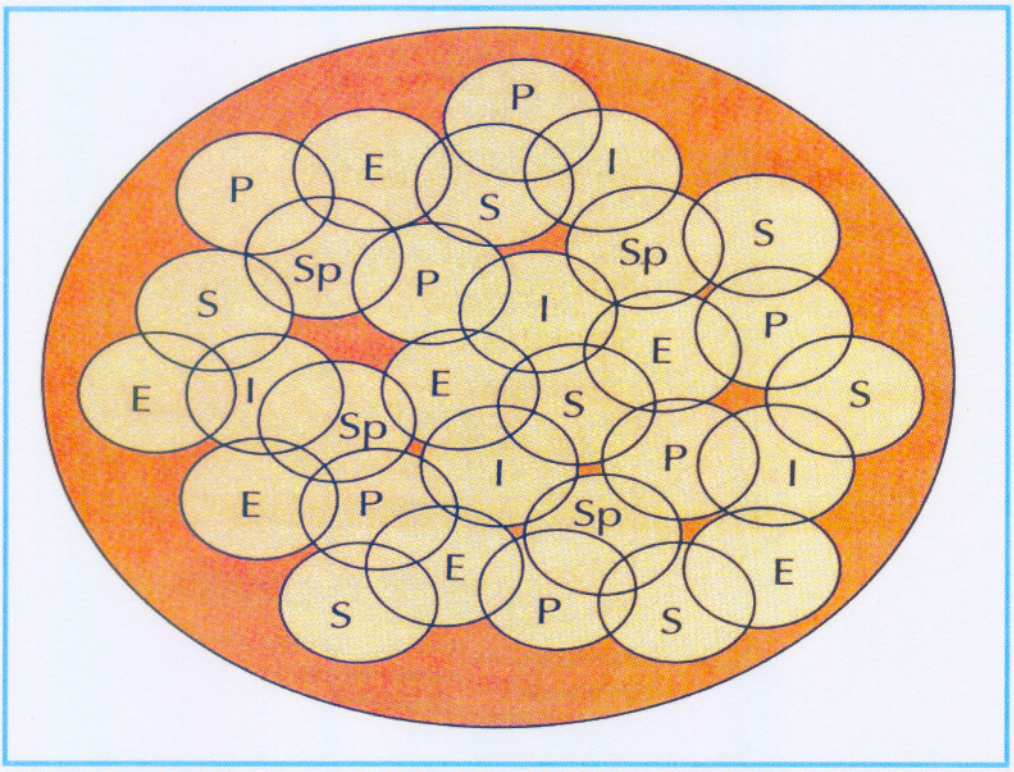

Figure 2.7: The integration of wellness dimensions (Corbin *et al.*, 2000:6)

The only difference between Greenberg's definition of health (1985:403) and that of Corbin *et al.* (2000:6) is that the latter combined the mental and emotional definition in one dimension and added the intellectual dimension. The biggest criticism against these definitions is the absence of the vocational dimension, which is one of the most important dimensions for the executive, and cannot be ignored.

Vocational health involves deriving personal satisfaction from the executive's vocation (Robbins *et al.,* 1991:10) as well as the development process of the executive towards optimum productivity and work satisfaction (Schwartz, 1989:139). Much of the executive's life will be spent at work. Therefore, it is important that their chosen career provides the internal and external rewards they value (Robbins *et al.,* 1991:10). Vocational health also involves maintaining a satisfying balance between

work time and leisure time. According to Robbins *et al.* (1991:10) it involves a work environment that minimises stress and exposure to physical health hazards.

When one considers the abovementioned researchers' findings regarding the different perceptions of health, as well as the factors influencing the executive's health, it becomes clear that optimal health may well be an extremely complex aspect of the executive's life. It is characterized by progressive harmony and integration between the six dimensions within the executive (Figure 2.2), between each executive and other members of society, and between executives and the world in which they are striving towards reaching optimum synergy. These dimensions are interdependent and the importance of treating these dimensions is determined by socio-cultural and spiritual norms, as illustrated in Figure 2.8 by Travis and Ryan's iceberg model (Travis & Ryan, 1988:12).

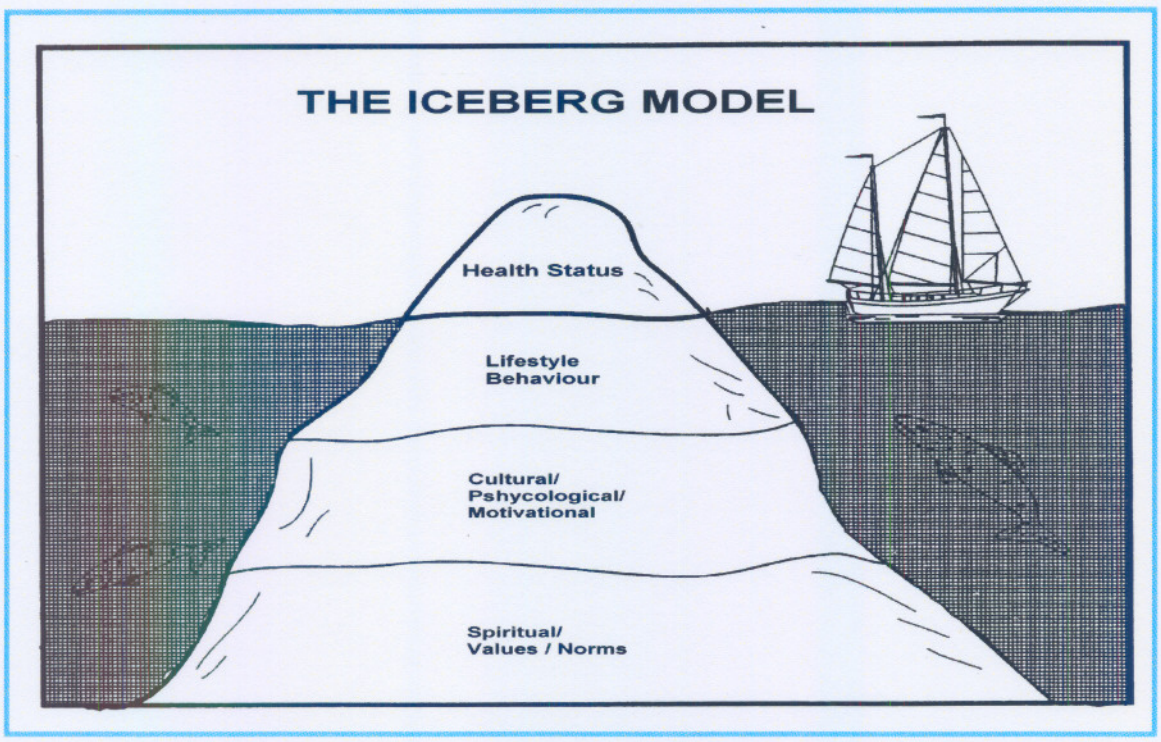

Figure 2.8: Travis and Ryan's iceberg model (Travis & Ryan, 1988:12)

It is the view of Van der Merwe (1997:112) that the abovementioned values and norms significantly influence the executive's lifestyle choices, such as exercise, nutrition, drinking and smoking. Eberst (1984:101) is of the opinion that most individuals who seek to improve their health do so by unfortunately focusing on only one dimension at a time. Many people will for example "sacrifice" parts of their mental, emotional, social, spiritual and physical health in an effort to reach their maximum potential in the vocational dimension. They may work too many hours, ignore a balanced nutritional intake, or expose themselves to excessive stress without adapting to these negative influences on their health. They may spend less "prime" time with others, defer relaxation and be too busy to experience or express their feelings (Eberst, 1984:101; Corbin *et al.*, 2000:354). This description unfortunately holds true for most executives – as portrayed by Uys and Coetzee (1989:4) as well as Dreyer and Strydom (1994:11), who found the abovementioned scenario typical of most South African executives. They contend that the executive's biggest problem is to establish a balance between work, family and relaxation. Work related competition, labour problems and long working hours are just some of the problems causing stress and other health problems in the executive's career (*In* Delport *et al.*, 1985b:114; Strümpfer, 1989:130; Rothnie-Jones, 1996:7; Corbin *et al.*, 2000:369). This is exacerbated in South Africa by the process of transformation (Strydom *et al.*, 1998:124). Maruyama and Morimoto (1996:353) confirm this unfortunate scenario: they found a positive relationship between long working hours, coronary heart diseases, stress, fatigue, depression and work dissatisfaction (Bezuidenhout, 2001:109). Individuals who work longer hours have higher stress levels and an unhealthy lifestyle (Maruyama & Morimoto, 1996:358; MHHE, 2005d). An unhealthy lifestyle, causing coronary heart diseases, was responsible for 16.39% of male deaths in 1994 (Heart Foundation of South Africa, 2002) and in 1998 one in three men had a heart condition before the age of 60 (Heart Foundation of South Africa, 2004). Work prestige turns out to be so important to the South African executive that they sacrifice their personal health in the process by making unhealthy lifestyle choices (Uys & Coetzee, 1989:4; Dreyer *et al.*, 1996:458). They

regard it as the price to pay for success (Uys & Coetzee, 1989:4; Dreyer *et al.,* 1996:458). The abovementioned researchers indicate that it is imperative for the executive to make healthy lifestyle choices to avoid becoming part of the CHD statistics already mentioned. This is further emphasised by McGinnis (1993:2207), Feingold (1996:15), McArdle *et al.* (2001:892) and MHHE (2005b), who found that healthy lifestyle choices are the key to good health. They found that 90% of all diseases could be prevented if healthy lifestyle choices were made regarding physical activity, nutrition, smoking, drugs and alcohol (McGinnis, 1993:2207; Feingold, 1996:15; Bolton *et al.,* 2004:56). Healthy lifestyle choices will improve quality of life (Paffenbarger *et al.,* 1993:539; McArdle *et al.,* 2001:892; Willmore, 2001:S622-S633; MHHE, 2005b). McAllister (1993:52) and MHHE (2005b) define lifestyle as activities or lifestyle patterns which an individual can control and that have a particular influence on a person's health status. Lifestyle and behaviour exhibit complex interrelationships with biological, psycho-emotional, socio-cultural and various other environmental factors (Kulys & Meyer, 1986:63; WHO, 1986:117; McGinnis, 1992:196; Corbin *et al.*, 2000:10). A healthy lifestyle includes regular physical activities, regular meals, enough sleep, relaxation, and stress management (Pender, 1990:117; Willmore, 2001:S622-S633; MHHE, 2005b). It implies that an executive with a healthy lifestyle maintains a balance between work and play, sleep and activities, hunger and over-eating, as well as exercising and relaxation. An unhealthy lifestyle comprises smoking, alcohol abuse, a diet rich in saturated fats and LDL-C, too little physical activities and abusing of calming products and drugs – with chronic diseases as the end result (Beasley & Swift, 1989:11; Blair *et al.*, 1994:25; Corbin *et al.*, 2000:354; Litchy, 2005:17; MHHE, 2005b). Sleeping disturbances, long hours of television watching, eating abnormalities, and long working hours are typical of individuals with an unhealthy lifestyle (Maruyama & Morimoto, 1996:358; O'Donnell, 2002:1). If combined with an inactive lifestyle it will directly influence a company's health care costs, productivity and employee turnover (Edington, 1987:21; Murphy *et al.,* 1987:17; Harris & Witherspoon, 2001:12-13; Wang, 2004:432; Molella, 2005:4). The abovementioned literature indicates that

optimal health is a complex issue for the executive, due to a working environment that forces them to make healthy or unhealthy lifestyle choices (Scott, 1999:92; Harris & Witherspoon, 2001:12-13; Bolton, 2002:85).

In the section that follows, available literature on the health-risk profiles of South African executives regarding some physical, physiological and bio-chemical health parameters will be discussed, as the focus of this study will be on the abovementioned parameters. The literature discussion that follows will point out that information is outdated as well as insufficient in terms of in some physical, physiological and bio-chemical health parameters of South African executives. For this reason information on the general population will be considered.

2.3 PHYSICAL HEALTH

The interrelationship amongst health, physical fitness and physical activity is significant (Figure 2.9) and literature refers to physical activity as a multifaceted concept that includes fitness, exercise and training (Bouchard & Shephard, 1994:78). It is the view of McArdle *et al.* (2001:871) that epidemiology applies specific definitions to characterize behavioural patterns and outcomes of the groups under investigation. It is important to view these definitions, because within this framework it is notable that physical activity becomes a generic term, with exercise the major component:

- *Physical activity:* Body movement produced by muscle action that increases energy expenditure
- *Exercise:* Planned, structured, repetitive and purposeful physical activity
- *Physical fitness:* Attributes related to how well one performs physical activity
- *Health-related physical fitness:* Components of physical fitness associated with some aspects of good health and/or disease prevention (Figure 2.10).

These definitions provide a broad perspective on the role and the purpose to be achieved with physical activity in health and disease. It is the view of McArdle *et al.* (2001:871) that these definitions often challenge the ability to measure and quantify health and fitness objectively. Furthermore, physical activity plays an integral and important role in an individual's life experiences, in all the stages of life (Bouchard & Shephard, 1994:78; Shephard, 1995:300; Corbin *et al.*, 2000:76).

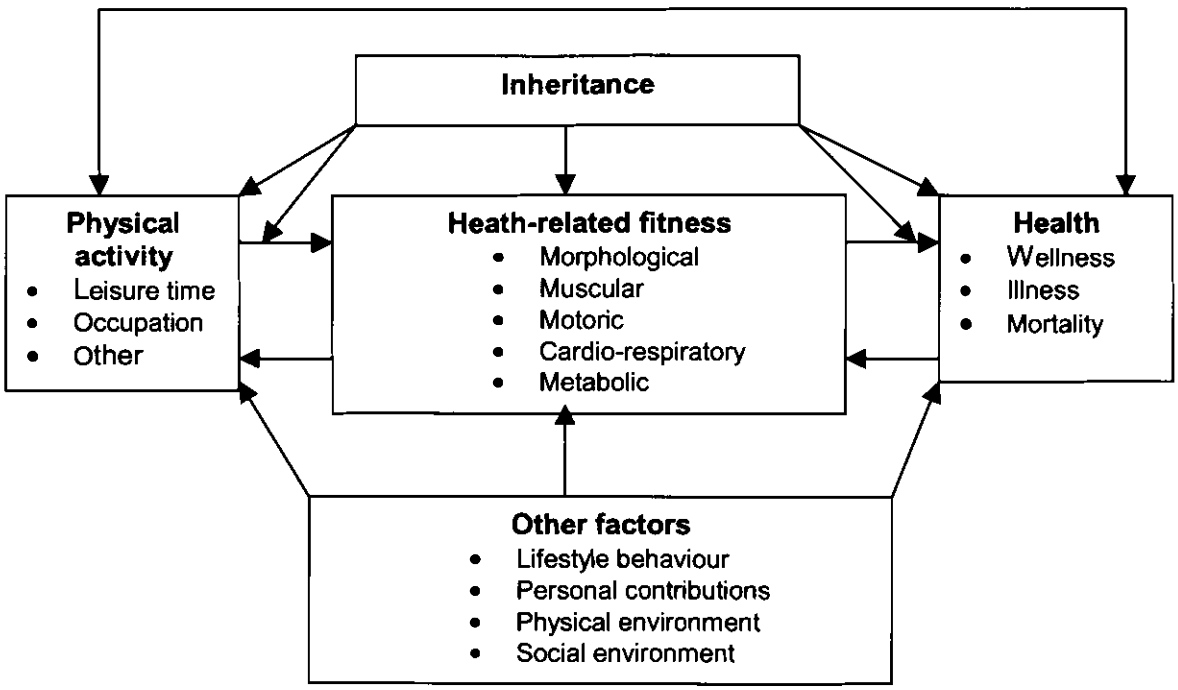

Figure 2.9: The interrelationship amongst physical activity, physical fitness and health (Bouchard & Shephard, 1994:78)

Physical activity entails any type of movement set in motion by skeletal muscle contraction – to the extent that the energy consumption is higher than resting energy levels (Blair *et al.*, 1994:26; Nieman, 1998:4; McArdle *et al.*, 2001:871). To improve health and fitness, activities must regularly challenge the body to work above the resting level. In order to achieve the above, it requires an individual to perform physical activity as part of a daily routine (Corbin *et al.*, 2000:94). Bouchard and

Shephard (1994:78), as well as Rippe and Hess (1998:31) are of the opinion that physical activity entails movement of the big muscle groups on a regular basis, with endurance fitness as the end result (Corbin *et al.*, 2000:94). Robbins *et al.* (1991:41) divide physical activity into the following five *health related components*, which enable a person to take part in the activities mentioned above (active leisure time, exercising, sport, occupational and habitual):

- Aerobic (cardiovascular) fitness
- Muscle strength
- Muscle endurance
- Flexibility
- Body composition.

Physical fitness relates to how well a person performs physical activity and it is the view of McArdle *et al.* (2001:871) that the trend in physical fitness assessment has shifted. The reason for the shift in physical fitness assessments may be that health disciplines like biokinetics, physiotherapy and medicine, for example, have come to realize the importance of utilizing physical activity as an important therapeutic modality. Furthermore, McArdle *et al.* (2001:871) argue that during the past 25 years, physical fitness assessments deemphasised tests that stress motor performance and athletic fitness (i.e. speed, power, balance and agility). Instead, current assessment focuses on functional capacities related to overall good health and disease prevention. Although McArdle *et al.* (2001:871) are of the opinion that physical fitness assessments deemphasise tests that stress motor performance and sport performance, the value of such tests can never be underestimated. McArdle *et al.* (2001:871) maintain that the four most common components of health-related physical fitness are cardiovascular (aerobic) fitness, body composition, abdominal muscle strength and endurance, and hamstring/lower back flexibility (Figure 2.10).

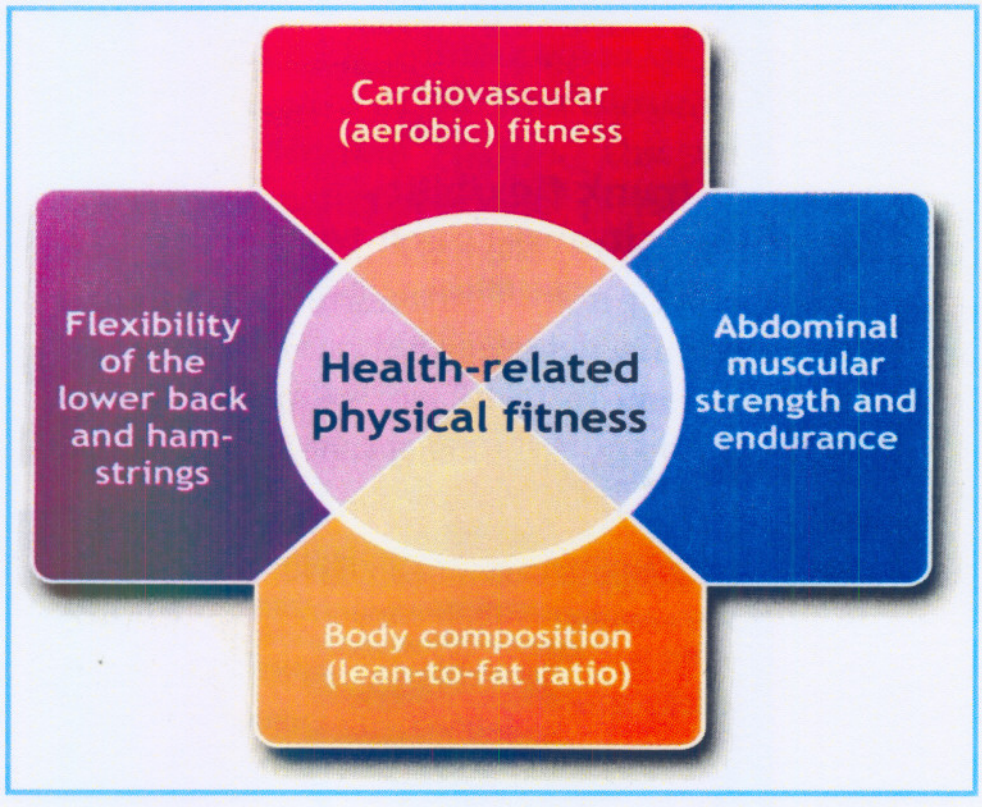

Figure 2.10: Health-related physical fitness components (McArdle *et al.*, 2001:871)

For the purposes of this study the four health-related physical fitness components of physical activity, as defined by McArdle *et al.* (2001:871), are studied: cardiovascular (aerobic) fitness, body composition, abdominal muscle strength and endurance as well as flexibility. The focus of this study will mainly be to elaborate on these components with regard to the physical dimension. Therefore, some literature analysis will be devoted to each of the components.

2.3.1 Physical fitness

Jacobs (1991:125) studied the fitness level of executives and indicated that the PWC_{170} fitness value for the executives was a low 1.9 watt.kg^{-1} if compared to the average PWC_{170} fitness value of 2.5 watt.kg^{-1}, as established by Jones and

Campbell (1982:250). Research by Strydom *et al.* (1998:123) on 392 South African executives from the construction, steel, mining, motor and financial industries, indicates that 74% of the white male executive's PWC_{170} fitness value fell in the undesired level or health risk zone when compared to the average PWC_{170} fitness value of 2.5 watt.kg^{-1}. These poor fitness levels give reason for concern when considering that physical fitness attributes to good health and/or disease prevention for the executive (McArdle *et al.*, 2001:871). Furthermore, good health is the ability to complete physical tasks successfully and maintain functional independence (McArdle *et al.,* 2001:913; O'Donnell, 2002:1). It can be assumed that the executive will have difficulty meeting the physical requirements of the job due to poor fitness levels.

Grace (2001:82) studied the impact of a physical wellness programme on absenteeism, sick leave and health-related fitness of lower level black employees: their fitness level, as determined by a three-minute sub maximal step-up test was 131 b.min^{-1}. This value is very poor if compared to the marginal zone of 96 b.min^{-1} to 119 b.min^{-1} established for the general population (Corbin *et al.*, 2000:119). Furthermore, Jacobs (1991:125) stated that poor fitness levels may increase the prevalence of coronary risk factors amongst South African executives.

Dreyer (1996:116) indicated that 29.9% of executives were totally inactive, while Bolton (2002:76) claimed an increase to 39%. Dreyer and Strydom (1994:1) stated that three percent of South African executives were physically active at work and 14.3% participated in adequate leisure time activities to ensure optimum health and a health promotion effect outside the working environment. In a follow-up study with 325 white male executives Dreyer (1996:133-134) indicated an increased figure of 20.6%. This "inactive" status of the executive must be of concern to companies. Thune *et al.* (1998:1639) claimed that people who were physically inactive carried an average of 1.8kg more body weight compared to those who were physically active. Regular physical activity has been regarded as an important component of a healthy

lifestyle that also promotes good health and reduces the risk of coronary heart disease (Thune *et al.,* 1998:1633; Sesso *et al.,* 2000:975; McArdle *et al.,* 2001:875-876; Willmore, 2001:S622-S633; Bolton *et al.,* 2004:56; American Heart Association, 2005a). Furthermore, ongoing research indicates that the immense, yet measurable impact of poor health on indirect costs, particularly in lost productivity, on and off the job, is borne by all employers, even those who avoid direct costs by not funding health benefits (Oestreich, 2005:4). Research has linked poor health status with the following:

- Higher direct health care costs
- Lower work output (for example presenteeism)
- Higher rates of disability
- Higher workers' compensation
- Higher rates of injury

(Goetzel *et al.,* 1998:844; Burton *et al.,* 2001:65; Edington, 2001:342; Bunn *et al.,* 2003:941; Musich *et al.,* 2003:396; Wright *et al.,* 2004:938). Furthermore, there is a distinct possibility that high level workers could suffer from hypokinetic diseases due to their poor physical activity level (Dreyer & Strydom, 1994:7). The following diseases are inter alia classified as hypokinetic diseases (*In* Bolton 2002:30):

- Certain forms of cardiac diseases
- Certain types of hypertension
- Degeneration of the arteries
- Obesity
- Neurodistonia
- Behavioural disturbances.

2.3.2 Muscle endurance

Muscle endurance is the ability of a muscle to resist fatigue (Nieman, 1998:7; ACSM, 2000:84) and to continue contracting over a long period of time (ACSM, 2000:84; Corbin *et al.*, 2000:168). It involves the ability of a muscle group to repeat identical movements (dynamic) or to maintain a certain degree of tension over time (static) (Durstine *et al.,* 1993:12). It is characterised by activities of long duration but low intensity.

Only one study – by Dreyer and Strydom (1992:27) – could be found that reported on the executive's abdominal muscle endurance. The executives performed 27 sit-ups .min^{-1}, before a six-month intervention programme, and 34 sit-ups .min^{-1} thereafter. It compares well to the Indiana non-executive law enforcement academy's standard of 29 sit-ups .min^{-1} (ILEA, 2004). The standard for the Hampton non-executive police department for the age group 30-39 years was established at 33 sit-ups .min^{-1} and for the 40-49 year age group at 28 sit-ups .min^{-1} (Hampton Police Department, 2004). The 34 sit-ups .min^{-1} performed by the executives as well as the 29 sit-ups .min^{-1} performed by the Indiana law enforcement academy's employees falls in the good category if compared to the standard for the general male population (ACSM, 2000:84).

No literature regarding the executive's upper body muscle endurance could be found. The muscle endurance standard of the upper body area (push-ups) for the non-executive Indiana law enforcement employees was determined as 25 push-ups .min^{-1} (ILEA, 2004). This value falls in the good category compared to the standard for the general male population (ACSM, 2000:85).

From the abovementioned literature it is apparent that the executives' stomach muscle endurance is good if compared to generalised and available South African criteria. Corbin *et al.* (2000:168) emphasize the importance of muscle endurance in

the executive: it increases work capacity, decreases the chance to injury and prevents lower back pain (ACSM, 2000:85), poor posture and other hypokinetic conditions. Considering the abovementioned benefits for possessing good muscle endurance the implications for the executive are as follows:

- Due to their acceptable muscle endurance, they may suffer less from lower back disorders, which have a profound effect on the workforce and the health-care resources available (Hee *et al.*, 2001:176).
- Their work output/capacity (e.g. presenteeism, absenteeism) may improve – lower work output/capacity is quantified as indirect medical costs of poor health, and it can be two to three times the direct medical costs (Edington & Burton, 2003:140; Goetzel *et al.*, 2003:2; Burton *et al.*, 2004:S38; Pelletier *et al.*, 2004:747).
- If individuals or executives improve just one risk factor, their presenteeism can improve by nine percent and their absenteeism reduced by two percent (Rowe, 2005:5), which will improve work productivity as the end result (Chapman, 2005:173).

2.3.3 Flexibility

Flexibility is the ability to move the body parts through a wide range of motion without undue strain to the articulations and muscle attachments (Durstine *et al.*, 1993:14; Nieman 1998:7; ACSM, 2000:85; Corbin *et al.*, 2000:146).

Dreyer and Strydom's research (1992:27) was the only research available that determined the executive's hamstring/lower back flexibility. Executives' flexibility was 34 centimetres before the six-month intervention programme and 38 centimetres thereafter. It can be compared to the 32.8 centimetres hamstring/lower back flexibility of the lower level employees (Grace, 2004:48). The 34 centimetres (Dreyer & Strydom, 1992:27) hamstring/lower back flexibility performed by the

executives before the six-month intervention programme falls in the average category, and the 38 centimetres after the six-month intervention falls in the good category when compared to the standard for the general male population (ACSM, 2000:88).

Considering the abovementioned values it clearly benefits the executive to have good hamstring/lower back flexibility, because flexibility is essential to smooth, efficient movement, and may help prevent injuries to ligaments and joints (Durstine *et al.,* 1993:14; Nieman 1998:7; ACSM, 2000:85; Corbin *et al.*, 2000:146). It is, however, the view of Whitmer *et al.* (2003:917) that if employees are injured or ill they continue to demand expensive, state-of-the-art treatment with a rise in hospital and pharmaceutical costs as the end result. It will also increase the taxpayers' cost due to an increase in health care expenses and an increase in absenteeism (Weldon, 2005:9). Poor lower back and hip flexibility may, in conjunction with poor abdominal strength/endurance or other causative factors, contribute to development of muscular low back pain (ACSM, 2000:87). If one takes into account the abovementioned literature it is imperative that the executive has good lower back flexibility because spinal disorders have a significant effect on the workforce and the health-care resources available (Hee *et al.,* 2001:176). Furthermore, lower back pain disability costs the USA in excess of $36 billion each year in lost workdays and employee compensation, and back injuries account for one-fourth of all work-related injuries and one-third of all compensation costs (McArdle *et al.*, 2001:515). An additional benefit of good hamstring/lower back flexibility is an increase in work output (Edington & Burton, 2003:140; Goetzel *et al.,* 2003:2; Burton *et al.,* 2004:S38; Pelletier *et al.,* 2004:747) when considering the view of Corbin *et al.* (2000:146) that each person must have a reasonable amount of flexibility to perform efficiently and effectively in daily life.

2.3.4 Body composition

Body composition was studied because it is unequivocally acknowledged that obesity, high blood pressure, tobacco use, hypercholesterolemia, and a sedentary lifestyle are the five primary risk factors for developing coronary heart disease (BioDoc, 2000:5; Corbin *et al.*, 2000:279; American Heart Association, 2005b). While it is proven that obesity contributes directly to coronary heart disease (American Heart Association, 2005a), a good body composition is also related to good health (Corbin *et al.*, 2000:279; American Heart Association, 2005a; MHHE, 2005a). The implication of good health with regard to the executive is lower direct and indirect medical costs (Edington & Burton, 2003:140; Burton *et al.*, 2004:S38; Pelletier *et al.*, 2004:747) and an increase in productivity (Edington & Burton, 2003:140; Goetzel *et al.*, 2003:2).

A study by Dreyer and Strydom (1992:27) reported a fat percentage of 13.9% in executives before a six-month intervention programme – and 12.9% thereafter. Both of these fat percentages fall in the good category when compared to the standard for the general male population (Corbin *et al.*, 2000:293). Dreyer *et al.* (1996:461) studied the prevalence of lifestyle-related coronary risk factors amongst South African executives. Conversely, they found that 4.3% of the executives' fat percentage was very high, with a mean value of 23.3% body fat. In addition to this, research by Strydom *et al.* (1998:123), on 392 South African executives from the construction, steel, mining, motor and financial industries, indicates that five percent of the white male executive's fat percentage fell in the undesired level, or health risk zone (>25%). A further concern are the key findings of the South African Democratic and Health Survey, indicating that nine percent of men over the age of 15 years are obese (South African Democratic and Health Survey, 2003) while 55% white males are overweight (BMI >25kg.m^{-2}) (Heart Foundation of South Africa, 2006). In comparison 69.4% white males in the United States of America are classified as being overweight, and 28.2% as obese (American Heart Association,

2006). Molella (2005:5) indicated that "indirect cost" associated with obesity was estimated at $47.6 billion, nearly equalling direct costs. Obesity, physical inactivity and smoking are the three health risks that translate into "significantly higher health care charges" within a short period, even as little as 18 months (Heinen, 2005:6). This once again emphasizes the significant impact executives' obesity can have on health costs.

WHR (waist-hip-ratio) provides an index of relative fat distribution in adults – the higher the ratio, the higher the proportion of abdominal fat. Fat distributed in the abdominal area (upper-body, "apple-shaped", or android obesity) is associated with greater morbidity and mortality than fat distributed below the waist (lower-body, "pear-shaped", or gynoid obesity (Gettman, 1993:239; ACSM, 2000:63; Corbin *et al.*, 2000:278; American Heart Association, 2005a). Body mass index (BMI) is widely used to assess weight relative to height and is calculated by dividing body weight in kilograms by height in meters squared ($kg.m^{-2}$) (ACSM, 2000:63). Although there is insufficient information on the executive's body mass index (BMI) and waist-hip-ratio (WHR), there exists significant literature about the general population is, suggesting that:

- Obesity-related health problems increase beyond a BMI of $25kg.m^{-2}$.
- A BMI of $>35kg.m^{-2}$ is defined as a high risk for developing coronary heart diseases (Atkinson, 1998:546-552).
- Males with a BMI of $>27.5kg.m^{-2}$ have a two times greater risk of dying of all cause deaths, and a 3.3 times greater risk of dying from CHD, compared to males with a BMI $<22.3kg.m^{-2}$ (Lindsted *et al.*, 1991:397-406).
- As BMI increases, mortality from heart disease, cancer and diabetes also increases (Gettman, 1993:238; American Heart Association, 2005a).
- For every BMI category, medical costs increase with additional health risks (high blood pressure, high cholesterol, physical inactivity etc.) (Heinen, 2005:6).

- A person with no health risks, who is classified in the normal BMI category, incurs an annual health expenditure of $2.655, while someone in the same BMI category with four or more health risks incurred average annual costs of $6.555 per year (Heinen, 2005:6).

Considering the abovementioned outdated literature on South African executives' fat percentages and literature on the waist-hip-ratio and body mass index of the general population, the implications to the executive for possessing a poor body composition are as follow:

- Obesity, diabetes, headaches etc. are regarded as unmanaged health issues and it can damage the executives productivity significantly (Kessler *et al.,* 2001:218; Edington & Burton, 2003:140; Goetzel *et al.,* 2003:2; Burton *et al.,* 2004:S38).
- Obesity is a lifestyle-related risk factor and as the health risks increase – even a single risk – health costs also increase (Edington & Burton, 2003:140; Burton *et al.,* 2004:S38; Pelletier *et al.,* 2004:747).
- These costs may double or triple if lost productivity measures are factored in (Edington & Burton, 2003:140; Burton *et al.,* 2004:S38; Pelletier *et al.,* 2004:747).
- The executives' poor health has an immeasurable impact on indirect costs, particularly in lost productivity on and off the job (Oestreich, 2005:4).
- The poor health status is linked with: 1) higher direct health care costs; 2) lower work output (e.g. presenteeism); 3) higher rates of disability; 4) higher workers' compensation; 5) higher rates of injury; 6) higher direct health care costs (Goetzel *et al.,* 1998:844; Burton *et al.,* 2001:65; Edington, 2001:342; Bunn *et al.,* 2003:941; Musich *et al.,* 2003:396; Wright *et al.,* 2004:938).

2.4 PHYSIOLOGICAL AND BIO-CHEMICAL HEALTH

Dr Nobel emphasised in 1870 (and American President Roosevelt in 1906) the importance of good health for the executive. In industrialized nations modern technology has largely eliminated the need for physical exertion at work, in the home, and for transportation (Science Direct, 2002). Research by Jacobs (1991:64), Van Zyl (1995:iv, 31) and Dreyer (1996:131) confirms that this is also the case in South Africa. They maintain that due to modernising, technological growth and stiff competition the South African executive finds him/herself in a stressful environment, with a very low physical activity level. There is no replacement – physiologically or psychologically – for sufficient exercise and physical activity, whether it happens in the working environment or not (Paffenbarger, 1987:118; Unger, 1995:17; MHHE, 2005c). Hypokinetic diseases are the direct cause of low physical activity levels, which is detrimental to a person's health and wellness (Kaplan, 1997:14; Corbin *et al.*, 2000:76; Strydom, 2000:22). Due to a poor physical activity level there is a distinct possibility that executive-level workers could suffer from hypokinetic diseases (certain forms of cardiac diseases, certain types of hypertension, degeneration of the arteries, obesity, neurodistionia, behaviour disturbances etc.) (Dreyer & Strydom, 1994:7).

Coronary heart diseases are the principal cause of male deaths in the Western world (McArdle *et al.*, 1994:515), and in the United States CHD accounts for approximately 32% of all premature deaths (Corbin *et al.*, 2000:78). Furthermore, CHD accounts for a mortality of 45.2% white males in the United States of America (American Heart Association, 2005b). Heart disease and stroke death rates are similar in the United States, Canada, Great Britain, Australia and other automated societies (Corbin *et al.*, 2000:78). Statistics from 2002 indicate that CHD causes one out of every five deaths in the Unites States of America, which makes it the single largest killer of American males and females (American Heart Association, 2005b). In South Africa,

the situation seems to be the same. In 1980 coronary heart disease was the cause of 200 out of every 1000 deaths, for males between the ages of 15 to 64. It caused 16.39% male deaths in 1994 (BioDoc, 2000:5; Heart Foundation of South Africa, 2002). In 1998, one in three men had a heart condition before the age of 60 (Heart Foundation of South Africa, 2004).

Strydom (2000:104) states that the risk factors contributing to coronary heart diseases could be divided into primary and secondary risk factors. Hypertension, hypercholesterolemia, smoking and physical inactivity are recognised as primary risk factors; obesity, diabetes mellitus, stress, age, race, gender and family history are documented as secondary risk factors (ACSM, 1995:18). Due to the mounting evidence of the relationship between obesity and health risk, especially heart disease, the American Heart Association now classifies obesity as a primary risk factor (Corbin *et al.*, 2000:279; American Heart Association, 2005a). A definite inter-relationship also exists between the various risk factors, which can influence the potential of the individual risk factors (Dreyer *et al.*, 1997:18; ACSM, 2000:89).

In the following section literature regarding blood pressure as a physiological health indicator will be discussed. The section will be concluded with the interpretation of the literature and its implications to the executive.

2.4.1 Blood pressure

Blood pressure is included for the reason that high blood pressure, tobacco use, hypercholesterolemia, a sedentary living and obesity are the five primary risk factors for developing coronary heart disease (BioDoc, 2000:5; Corbin *et al.*, 2000:279; American Heart Association, 2005b). High systolic and diastolic blood pressure is prevalent in individuals whose arteries have become "hardened" with arteriosclerotic plaque within their walls and the lost of compliance (McArdle *et al.*, 2001:317). The damaged endotile layers release vasoconstrictive polypeptides, causing blood

vessel vasoconstriction with elevated blood pressure/hypertension as the end result (Opie, 1995:39). McArdle *et al.* (2001:317) state that untreated, chronic hypertension leads to arteriosclerosis, heart disease, stroke and kidney failure. Self-reported annual incidence rate (per 100 000) of hypertension for South African males in the 25-34 year age group is 1.08%, for the 35-44 year age group 2.60% and for the 45-54 year age group 4.42% (South African Democratic and Health Survey, 2006). Furthermore, 6.3 million South Africans have hypertension and 24% have a blood pressure of over 140/90mmHg of which 22.9% are men (Heart foundation of South Africa, 2006). In comparison 32.3% Americans have high blood pressure of which 31.5% are males and 30.6% white males (American Heart Association, 2006).

Research by Strydom *et al.* (1998:125), on 392 South African executives from the construction, steel, mining, motor and financial industries, indicate that these executives find themselves in the high risk zones of four primary risk factors (high cholesterol, smoking, hypertension and physical inactivity) of CHD. They concluded that 38.7% of the executives` systolic blood pressure was higher than the acceptable value of <140mmHg, and 58.2% of the executives` diastolic blood pressure was higher than the acceptable value of <90mmHg.

Considering the above literature on blood pressure, the implications for executives are as follow:

- The more chronic medical conditions an executive has, the higher the probability of absenteeism or presenteeism (Kessler *et al.,* 2001:1257).
- High blood pressure, migraine, asthma attacks etcetera are regarded as unmanaged health issues that can damage their productivity significantly (Kessler *et al.,* 2001:218; Edington & Burton, 2003:140; Goetzel *et al.,* 2003:2; Burton *et al.,* 2004:S38).

- If the executive has high blood pressure it increases the number of health risks, with a consequent increase in work limitations, where each additional risk factor is associated with an additional 2.4% excess productivity loss (Burton *et al.,* 2005:769).

2.4.2 Total cholesterol concentration

In the next section total cholesterol concentration as a bio-chemical health indicator will be discussed. The reason for researching cholesterol is that certain coronary heart disease risks are evident in South African executives (Delport *et al.,* 1985a:4; Jacobs, 1991:115; Dreyer *et al.,* 1996:461; Du Toit, 1996:46) and that 43% of all coronary heart disease deaths are due to high cholesterol levels (Tucker & Silvester, 1996:35). Furthermore, an abnormal blood lipid level of hyperlipidemia is a crucial component in the genesis of atherosclerosis (ACSM, 2000:89). A few of the aspects to consider in the section to follow are:

- The prevalence of lifestyle-related coronary risk factors amongst South African executives
- Whether physical activity can influence the atherogenity of the individual risk factors, by changing the relationship that exists between the coronary risk factors
- The interrelationship with cholesterol and other coronary risk factors
- The prevalence of exercise-induced coronary risk factors and the relationship with the executive's fitness levels.

Dreyer *et al.* (1996:462) studied the prevalence of lifestyle-related coronary risk factors among South African executives and found that:

- Three percent of the executives have none of the abovementioned risk factors
- 25% have one of the risk factors
- 43% have two of the three primary risk factors

- 29% have three primary risk factors
- 69.5% of the executives' total cholesterol concentration was elevated.

Dreyer (1996:132) determined the effect of physical conditioning on some coronary risk factors, as well as their relationship with coronary risk factors, with regard to South African executives. He indicated that executives' average cholesterol was 5.96 m.mol.l^{-1}, which could be classified as elevated according to the ACSM guideline of the normal value of <5.2 m.mol.l^{-1}. He established that physical activity influenced the atherogenity of the executives' individual risk factors, by changing the relationship that exists between the coronary risk factors. In his study, Byrne (1991:9) indicated that an interrelationship exists between cholesterol and other coronary risk factors (stress, obesity, diabetes mellitus) as it increases total cholesterol concentration in the blood.

The Heart Foundation of South Africa (2006) indicates that 4.5 million South Africans have a high cholesterol concentration, and familial hypercholesterolemia affects 1 in 500 South Africans. In comparison 50.4% of the total American male population and 51% white American males have high cholesterol values (American Heart Association, 2006).

From the abovementioned literature it is apparent that executives' cholesterol level is high, which put them at risk for developing coronary heart disease. If they suffer from coronary heart diseases they may become part of the South African statistics – 200 out of 1000 males between the ages 15 to 64 died due to coronary heart diseases (BioDoc, 2000:5; Heart Foundation of South Africa, 2004). The financial burden on companies, to replace an executive, will be immense when considering the training costs of an executive. It may escalate to several million rand as a three to six-month executive management course, focusing on skills enhancing, high strategy and competitiveness, can cost from R50,000 to R75,000 per individual (Bischoff, 2004).

Furthermore, the more chronic medical conditions an executive has, the higher the probability of absenteeism or presenteeism (Kessler *et al.*, 2001:1257). If executives suffer from presenteeism (diminished on-the-job-performance) it will adversely affect their work productivity (Kessler *et al.*, 2001:218; Edington & Burton, 2003:140; Goetzel *et al.*, 2003:2; Burton *et al.*, 2004:S38; Chapman, 2005:173). In addition, each additional risk factor is associated with an additional 2.4% productivity loss (Burton *et al.*, 2005:769). From this point their high cholesterol levels can create a snowball effect, because presenteeism and absenteeism are indirect medical costs, and indirect costs of poor health can be two to three times the direct medical costs (Edington & Burton, 2003:140; Goetzel *et al.*, 2003:2; Burton *et al.*, 2004:S38; Pelletier *et al.*, 2004:747). Due to their presenteeism the financial burden on the company will be immense, because presenteeism may account for up to 60% of employer health costs (WebMD, 2005).

2.5 CONCLUSIONS

It is clear from the relevant literature that executives are a valuable asset to any company and significant investments are made into this "resource". It is also clear that health is a multifaceted concept and various factors may influence the executive's health. It is, therefore, important for companies to determine the risk profiles of the employees in order to implement relevant intervention strategies to manage or improve their risk profile. Regrettably, the literature on South African executives' physical, physiological and bio-chemical health parameters is either limited or outdated, or the research included only a few health parameters. Research has established a connection between executives' physical, physiological and bio-chemical health-risk status and poor health status – resulting in higher direct health care costs, lower work output (e.g. presenteeism), higher rates of disability, higher workers' compensation and higher rates of injury. Furthermore, the executive's poor health will also increase indirect health care costs, particularly in lost productivity – on as well as off the job. The indirect medical costs resulting from

poor health may be two to three times the direct medical costs. If one considers the impact of poor health status, South Africa is in the unfortunate position that it has relatively few executives per capita of the population, which makes the optimizing of their physical, physiological and bio-chemical health-risk status even more important. In conclusion, it is clear that updated information on the South African executive's physical, physiological and bio-chemical health parameters is required, because it is impossible to manage their health status with health promotion intervention programmes, if their status is unknown.

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3 Components of a Physical and Health Promotion Intervention Programme and the Benefits to Some Health Parameters

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3.1 INTRODUCTION

Business and wellness communities believe that health promotion programmes are financially profitable, in addition to, and because of, improving employees' health and their quality of life (Henritze *et al.,* 1992:129; Cooper & Cartwright, 1994:468; Shephard, 1999:48; O'Donnell, 2002:573; Grace, 2004:53; Baase, 2005:16; Chapman, 2005:17-18). This investment in lifestyle risk reduction by employers and their health promotion intervention plans stems from an emerging consensus that keeping employees healthy will save more money than waiting for the natural progression of the group to higher-risk (and cost) profiles (Heinen, 2005:6). In other words, keeping those who are in lower-risk categories from slipping into the high-risk categories can have financial benefits. The more high-risk behaviours an individual has, the higher his or her health care costs and the greater the probability of future health problems will be (Goetzel *et al.,* 1998:843; Edington, 2001:342; Wright *et al.,* 2004:937). As a result, many multinational corporations are now taking a closer look at the health status of their global workforce and are designing and implementing health promotion programmes to respond to their needs by spending most of their resources to treat disease into one focused on preventing disease (O'Donnell, 2002:573-574; Chapman, 2005:17-19; Clymer, 2005:i). Approximately 90% of all workplaces with 50 or more employees and virtually all employers with over 750 employees offer some form of health promotion programme at their workplace (O'Donnell, 2002:32). In 1996, approximately 70% of the adult population was employed in the USA, but only 32% of American companies, with 250-749 employees, supported a comprehensive health promotion programme. Of the 20% of the employees that did participate, only half are estimated to maintain participation for the long term (Bungum *et al.,* 1997:60). As maintained by Powell (1999:20), 91% of organizations had some type of health promotion programme in place by 1998, versus only 78% a decade earlier. Of these, only 35%-45% had a comprehensive programme entailing health risk appraisals and intervention programmes (Milligan, 2000:4). Currently, 50% of Canadian companies offer some sort of wellness initiative but only 5% of these companies evaluate their efforts (Davie, 2001:66). From the above it becomes clear that USA companies value the importance of health promotion intervention programmes hence the bigger growth in

the implementing of such programmes compared to Canadian companies. Unfortunately, it seems as if the Canadian companies do not evaluate their programmes.

Literature on health promotion intervention programmes in South Africa is scanty. Ferreira (2006:104) reported that the companies placed among the top 50 profit takers in South Africa who responded to his survey, 25% indicated that they did not run a corporate wellness programme at their main worksite or any of their worksites. Critique on his study is that he had only a 22.86 % response rate therefore the 25% cannot be regarded as a true reflection.

Health promotion is a multidisciplinary field that relies on education and targeted interventions to help change behaviours and environments in ways conducive to health (Pfeiffer, 2003:115). It refers to mainstream interventions such as exercise, nutrition and stress management that have relevance to a variety of diseases or disabilities, or to immunizations that are targeted to prevent specific diseases (Stanaland *et al.,* 1995:59; Haber, 2002:71). Health promotion programmes are those designed to assist employees and their family members in making voluntary behaviour changes that promote health, reduce illness-producing behaviour, and enhance their individual productivity (Robbins *et al.,* 1991:4; Cribb & Dines, 1993:24-25; Lusk, 1997:190; O'Donnell, 2002:143; Chapman, 2005:17-19). It implies the process of creating an organizational culture that fosters awareness, vitality, motivation and influencing attitudes and identifying alternatives so that executives can make informed choices and change their behaviour in order to achieve an optimum level of physical, mental and spiritual well-being, and improve their physical and social environment (Robbins *et al.,* 1991:4; Cribb & Dines, 1993:24-25; Lusk, 1997:190; McArdle *et al.*, 2001:957; O'Donnell, 2002:569; Pfeiffer, 2003:115; Chapman, 2005:170). The abovementioned views correlates with O'Donnell's (2002:49) definition of health promotion namely:

"It is the science and art of helping people change their lifestyle to move toward a state of optimal health. Optimal health is defined as a balance of physical, emotional, social, spiritual and intellectual health. Lifestyle change

can be facilitated through a combination of efforts to enhance awareness, change behaviour and create environments that support good health practices. Of the three, supportive environments will probably have the greatest impact in producing lasting changes."

3.2 REASONS FOR INVESTING IN HEALTH PROMOTION PROGRAMMES

When reviewing the literature, it is noticeable that most organizations have multiple motives for establishing their health promotion programmes of which some of these motives may not be entirely rational. Historically it was argued that employers invested in health promotion programmes to reduce medical care costs, enhance productivity and image, and since, most of the published research focused on those areas (O'Donnell *et al.,* 1994:5). Savings in those areas can justify a health promotion programme, just as savings in electricity can justify using a new energy efficient light bulb. Unfortunately, a health promotion programme that contributes only to cost savings will suffer the same fate as a light bulb. Sadly, when it burns out, it will be discarded (O'Donnell, 2002:24). In order to consequently prevent such a fate there will have to be a subtle but important shift in the way organizations perceive and investigate the financial or broader organization return of health promotion programmes. Furthermore, besides the reasons mentioned above for investing in health promotion programmes Chapman (2005:17) argues that employers invest in and initiate health promotion programmes due to senior management's concerns about rapid increases in health care costs, personal biases of a senior manager, high employee absenteeism and presenteeism, injury rates and general concerns for health and productivity. The most important reasons contributing to a business decision to offer a health promotion programme is cited below (O'Donnell *et al.,* 2002:33):

- Keep workers healthy (84%)
- Improve morale (77%)
- Retain good employees (76%)
- Reduce medical care costs (75%)

- Attract good employees (67%)
- Improve productivity (64%)

In contrast to O'Donnell's and Chapman's views above regarding why companies invest in and initiate health promotion programmes, it is the belief of Randolfi (2006:1) that worksite health promotion programmes must go beyond just focussing on reducing health care costs, prevent diseases or maintain health, but rather have a holistic view on employee health focussing on primary, secondary and tertiary prevention strategies for employees. As maintained by Chapman (2005:17-18) the underlying principle for introducing health promotion programmes are usually based on two major premises: *tangible benefits* to be gained by implementing a programme for example reduced workers' compensation, health benefit cost savings, sick leave reductions, fewer workplace injuries and reduced presenteeism-related losses. The *intangible benefits* to be gained for example are improvement in employee morale, need for improved physical conditioning, a more productive workforce, enhanced decision-making capabilities, less organizational conflict or the desire to do something good for employees. It must be kept in mind however that a few programmes will survive or thrive on a long-term basis unless it contributes to the mission, long-term goals and short-term priorities of the organization, or to the special interests of those who approve budgets and top management sees data on a regular basis that shows the connection between the programme and those organizational outcomes (O'Donnell, 2002:46). In the next section the most important tangible and intangible benefits will be discussed.

3.2.1 Medical care costs

Medical care costs have risen substantially during the past four decades in many developed nations around the world and will continue to affect an organization's bottom line (O'Donnell, 2002:25; Cowan *et al.*, 2004:131). Employers continue to pass cost increases onto workers through higher cost sharing. Powell (1999:15) reiterates that the rapidly increasing healthcare costs lead to the allocation of more than 50% of company's profits to cover the expenses. According to Pronk *et al.* (1999:2236) employees with cardiovascular disease cost companies 150% more

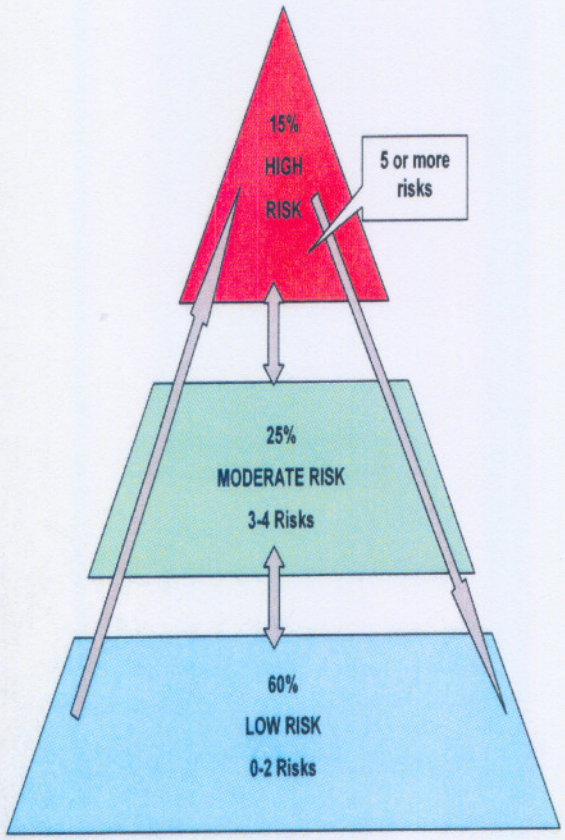
than those without a chronic disease risk profile. However, such a short-term fix does not address the primary driver of soaring health costs due to an inadequate investment in health through for example primary prevention, health risk reduction and disease management (Whitmer *et al.,* 2003:916). The more high-risk behaviours an individual has, the higher his or her health care costs (Goetzel *et al.*, 1998:843; Edington, 2001:342; Wright *et al.,* 2004:937). To succeed in moving 70% of the people to low-risk status, it is advisable to have 80% of the population participate in a health risk assessment or other health promotion intervention at least once over 3 years, and to have 60% and 40% participate at least two and three times, respectively, over a 3- to 5- year period (Musich *et al.,* 2001:37; Serxner *et al.,* 2003:1196). It is, therefore, important that organizations understand fully that the risk status of their populations is not static. If their continued buy-in is not maintained through relatively low-cost awareness campaigns and other health promotion intervention programmes, research indicates that many of these low-risk employees inevitably will join the ranks of the higher-risk/higher cost employees (Figure 3.1). From 2% to 4% of an employee population is likely to migrate from low-risk status to higher risk within one year in the absence of preventative programmes in order to help low-risk individuals maintain their low-risk status (Musich *et al.,* 2003:393).

Implications for employers with employees at high and moderate risk

- Higher prevalence of chronic health conditions
- Higher direct medical costs
- Higher absenteeism
- Higher disability & workers' compensation costs
- Lower productivity due to higher presenteeism

Implications for employers with employees at low risk

- Healthier, productive workforce
- Lower direct and indirect health-related costs



Implications for employees at high to moderate risk

- Greater probability of chronic health conditions
- Higher out-of-pocket medical & pharmaceutical costs
- Greater pain and suffering
- Lower quality of life
- Lower personal effectiveness on and of the job

Implications for employees at low risk

- More independence/health
- Lower medical costs
- Greater energy & vitality
- Increased life and job satisfaction

Figure 3.1: Distribution and migration of employees according to number of health risks (the arrows indicate risk for migration between risk groups) (Musich *et al.*, 2003:393)

The abovementioned literature and figure illustrate once again the utmost importance of investing and implementing health promotion intervention programmes in medical cost containment.

Riedel *et al.* (2001:21) provide furthermore a simplistic model suggesting that medical costs are influenced favourably through a chain of events that begins with education about the implications of personal health behaviour. This model indicates that education leads to increased awareness of the influence of risk factors on health status, which should lead to changes in health behaviour. This in turn would lead to

improvements in personal health status, reduction in health risk-based illness and therefore lower medical utilization and subsequent reductions in medical care costs. Goetzel *et al.* (1998:844) calculated the risk factors responsible for higher medical expenditures of over 46 000 employees from six large health care purchasers. Employees with certain illnesses had a certain percentage higher medical cost in comparison with employees without these illnesses; such as the following:

- Depression (70% higher expenditures)
- High levels of stress (46% higher expenditures)
- High blood glucose (35% higher expenditures)
- Extremely high or low body weight (21% higher expenditures)
- Former (20% higher expenditures) and current (14% higher expenditures) tobacco use
- High blood pressure (12% higher expenditures)
- Poor exercise habits (10% higher expenditures)

This study portrays that an individual cannot underestimate a risk factor that is not usually associated with high costs and that one cannot over estimate the risk factors that are usually associated with high health care costs. This study furthermore indicates the importance of an employee needs assessment prior to planning and implementing a comprehensive health promotion intervention programme, because industry norms are not always a reliable source to use when gauging the importance of certain health risk factors within an organization.

In conclusion, the relationship between medical care costs and risk factors that can be modified by health promotion intervention programmes is quite clear. Furthermore, to achieve an effective health promotion programme that maintains both high participations rates and a low-risk population, an organization needs to provide support across all levels. As maintained by Edington (2001:342) and Musich *et al.* (2003:394), greater cost savings can be achieved from keeping the low-risk employees at low risk and healthy, than focusing exclusively on high-risk populations.

3.2.2 Productivity enhancement

It has long been argued that health promotion programmes enhance productivity (Aldana, 2001:297; O'Donnell, 2002:32), yet little research has attempted to measure this impact, primarily because productivity is often difficult to measure and the impact of a specific factor, such as a health promotion programme, is even more difficult to measure. Within the health promotion community, most of the focus to date on productivity has been on absenteeism, primarily because absenteeism is easy to measure. Presenteeism is relatively new and there is not yet a standard set of rules for measuring this business outcome (Riedel *et al.,* 2006:10). Emerging research is documenting that the indirect cost (e.g. absenteeism, presenteeism) of poor health can be two to three times the direct medical costs (Edington *et al.,* 2003:140; Goetzel *et al.,* 2003:2; Burton *et al.,* 2004:S38; Pelletier *et al.,* 2004:747). Up to 10% of South African companies, annual payrolls go towards the direct costs of worker absenteeism while indirect costs, including temporary staff and lost productivity, can be the equivalent of four times the salary of the absent worker (Myers, 2001:17). In order to clarify the impact it has on productivity, a short discussion of absenteeism and presenteeism will follow.

- **Absenteeism**

Absenteeism measures productivity loss and is broadly defined in six ways: days missed (full or partial), hours missed, work loss associated with use of medical services, percentage of work time available, days in bed, and disability days (Riedel *et al.,* 2006:10). Table 3.1 portrays the research of Aldana (1998:101) on the impact of absenteeism on productivity.

Table 3.1: Impact of health promotion on absenteeism (Aldana, 1998:101)

Absenteeism	(N) of Studies	% of Total
Reduced absenteeism	14	87
No change	1	6
Increased absenteeism	1	6
Total	16	100

Of the 16 studies on this topic, 14 (87%) reported reductions in absenteeism after the introduction of a health promotion programme, one study reported no change, and one study reported an increase in absenteeism because of the programme (Table 3.1). Five of the studies reported cost/benefit analysis values, with a range of $2.50 to $10.10 saved for every $1.00 invested and an average savings of $4.90. These results are very encouraging and one can conclude that some health promotion programmes can reduce absenteeism and that in some cases, those savings may more than pay the cost of the programme. It must be mentioned however that these results are based on a small number of studies.

- **Presenteeism**

Each study used a different approach for defining and measuring presenteeism. Riedel *et al.* (2006:10) define it as reduced performance on the job or percentage of normal efficiency e.g. "percentage of usual productivity achieved while working over the past 4 weeks," "difficulty in day-to-day work and in completing all work tasks". It coincides with Chapman's (2005:173) definition as the measurable extent to which health symptoms, conditions and diseases adversely affect the work productivity of individuals who choose to remain at work. In the process of quantifying presenteeism, different variables are used to define and measure presenteeism within different job classifications, for example (Rowe, 2005a:5):

- Specified production standards may not be met by a physical labourer with low back pain that stems from poor lifting habits;
- Data entry output may be measurably slowed when a keyboard operator suffers from untreated carpal tunnel syndrome;
- Telephone on-hold times may be exceeded when a customer service representative suffers from unrecognized, untreated clinical depression.

When a job presents no measurable productivity variables, as in the case of most white-collar workers, self-reported survey instruments can provide useful, reliable data for informed decision-making (Kessler *et al.*, 2001:219).

Of significance is the finding by Riedel *et al.* (2006:10) that presenteeism represents a significantly greater proportion of the total indirect costs than absenteeism. Furthermore, across studies the magnitude of differences is two to six times the cost of absenteeism. The reason for this might be that with presenteeism the employees choose to stay at work regardless of health symptoms, conditions and diseases adversely affecting their work productivity compared to absenteeism where an employee has to provide an official medical certificate. The implication of the above findings is that these indirect costs impose a sizeable economic burden on employers.

3.2.3 Image enhancement

There are very little data to support the impact of health promotion on image, but it remains a very important motivation for many employers who develop health promotion programmes. The survey of workplace health promotion programmes did show that attracting employees was identified as an important reason for developing a health promotion programme by 67% of employers and retaining existing employees was cited by 76% of employers (O'Donnell, 2002:55).

Some of the early health promotion programmes in the 1970's were developed primarily for image-related reasons. New health promotion programmes were also developed by companies who went through rapid industrial growth, other companies added health promotion programmes because it was consistent with their products. Health promotion programmes also seem to develop in industry clusters with these clusters illustrating how benefits are typically added (O'Donnell. 2002:35-36). A rational perspective will led to the conclusion that companies conduct organized prospective cost/benefit analysis to decide which benefits to add and retain. The desire to match the benefits of major competitors is likely to help spread health promotion workplaces internationally. It is the view of O'Donnell (2002:35) as companies around the world start to compete globally, they will need to establish an image at least as polished as their major American competitors.

3.3 THE WORKPLACE AS A SETTING FOR HEALTH PROMOTION PROGRAMMES

In addition to the evidence in the evaluation and research literature about tangible and intangible benefits of worksite-based health promotion programmes, the workplace is an ideal site for the establishment of a health promotion programme and is described as one of the most influential environments for adult health awareness programmes. The many reasons for this are that the population is characterized as captive; there is an excellent potential for effective behavioural incentives; the potential to influence behaviour is high; the ability to provide preventative medical services at lower costs and there are clear organizational rewards for employers and finally, potentially all parties can benefit (Glasgow *et al.*, 1995:209; Chapman, 2005:17-19).

3.3.1 The population is characterized as captive

Approximately 84% of adult Americans over the age of 18 years work at sites that are solely devoted to work activity, in other words, a "workplace". The vast majority of those individuals return five days a week to the same site. The potential for effective long-term health behaviour change is greater if the target population is captive and reasonable stable (Glasgow *et al.*, 1995:209; Chapman, 2005:18).

3.3.2 An excellent potential for effective behavioural incentives

As maintained by Chapman (2005:18-19), a large portion of the employees can be motivated to participate in health promotion activities by means of utilizing a wide variety of formal and informal incentives. Incentives can add significantly larger impact to a programme's effect on the participation and health behaviour of employees and their families.

3.3.3 The potential to influence behaviour is high

Due to the repeated exposure possibilities associated with the worksite, along with the large number of people exposed to communication vehicles and messages, incentives and possible social and cultural reinforcement, the potential to influence behaviour of adults in the worksite is significant (Chapman, 2005:19).

3.3.4 Clear organizational rewards for employers

As a long term source of motivation for employer management teams to conduct health promotion activities at the worksite, the economic consequences of unhealthy lifestyle choices of the work enterprise are becoming more widely known and understood and therefore, stronger. As health care costs continue to increase, it is becoming more important for employers to implement successful health promotion programmes. As maintained by Chapman (2005:19), the existence of clear tangible and intangible organizational rewards will also help assure long-term commitment to health promotion programming, particularly if the economic benefits are shared directly with employees.

3.3.5 Economies of scale are possible in programming

It is the view of Glasgow *et al. (*1995:209) and Chapman (2005:19) that due to the large numbers of individuals residing in many worksites, it is possible to gain benefit from economies of scale in programming activities. The use of mass communication techniques, serial feedback, offering of classes for larger groups are all examples of the economies of scale, which can result from programming efforts in the workplace (Glasgow *et al.,* 1995:209; Chapman, 2005:19).

3.3.6 Potentially all parties can benefit

If a health promotion programme is well designed and effectively implemented, employer, employees, labour groups, communities and government can potentially benefit. Chapman (2005:19) provides a thorough list of these benefits below:

Employees:

- Increased knowledge about the relationship between lifestyle and health
- Increased opportunity to take control of their health and medical treatment
- Improved health and quality of life through reduction of risk factors
- Increased morale via management interest in their health and well-being
- Increased opportunity for support from co-workers and environment
- Reduced work absences
- Reduced presenteeism related productivity loss
- Reduced medical costs
- Reduced pain and suffering form illness and accidents

Employers:

- Increased worker morale
- Increased worker productivity
- Informed and health care cost-conscious workforce
- Positive public relations
- Recruitment tool
- Opportunity for cost savings

The community:

- Contributes to establishing good health as a norm
- Complements and reinforces national an local public health initiatives
- Provides a model for other local organizations
- Improves quality of life of citizenry
- Helps control and possibly reduce the economic and social burden on all taxpayers from premature mortality and morbidity

It is apparent from the above literature that these reasons are part of the rationale why health promotion at the worksite makes good sense and should be used in justifying the initiation of an employee health promotion programme.

3.4 PURPOSE AND EFFECT HEALTH PROMOTION PROGRAMMES – A SHORT REVIEW OF SOME PROGRAMMES

The basic purpose of most worksite health promotion programmes is to improve the health and productivity of a particular working population or work group and reduce their health-related costs, primarily by helping change the pattern of lifestyle and behavioural choices of individuals in the group (Riedel *et al.*, 2001:167; Chapman, 2005:1; Randolfi, 2006:3). In order to gain insight into the objectives of health promotion programmes of leading companies the Partnership for Prevention Leading by Example, CEO-to-CEO programmes purposes will be briefly summarized below.

- **Commonwealth of Virginia's *CommonHealth* programme** (Warner, 2005:1).

  - To make state and local employees in Virginia the healthiest in the nation
  - To integrate health into the work culture, build trustworthy partnerships and change individual behaviour

- **The Dow Chemical Company's *Good Health for Whole Self* programme** (Liveris, 2005:1).

  - To improve the health status of Dow people
  - To positively impact the health-related costs of Dow people
  - To be perceived as a valued service by Dow people

- **General Motors *UAW-GM Lifesteps* programme** (Wagoner, 2005:1).

  - To identify the individuals controllable health risks
  - To develop plans to reduce those health risks
  - To modify the individual's lifestyles

➢ **Aetna Inc. *Healthy Lifestyles* programme** (Rowe, 2005b:1).

- To help Aetna employees make informed decisions about their health care and health care dollars
- To reward employees for taking steps to achieve better health and be more productive in the workplace
- To integrate health and wellness programmes to help improve health status and lower health care costs

➢ **Johnson and Johnson's *Healthy People* programme** (Weldon, 2005:1).

- To have the healthiest and safest workforce in the most environmentally responsible corporation in the world
- To integrate and coordinate services (Disability management, Employee assistance, Occupational health, Wellness and fitness and Work life) to improve health and productivity and control health care costs
- To fulfil their Credo responsibility and help employees adapt to rapidly changing environment

➢ **Navistar International Corporation's *Vital Lives* programme** (Horne, 2005:1).

- To drive 100% participation in *Vital Lives* programme while demonstrating positive health outcomes
- To detect early-onset disease markers and reduce related health risks for improving quality of life of targeted employee population
- To influence behaviours for utilizing health benefits wisely and taking a proactive role in health management though improving self-care practices

➢ **Pfizer *Healthy Directions* programme** (McKinnell, 2005:23).

- To provide colleagues with knowledge and tools to help them manage their health
- To provide colleagues with direct services such as exercise facilities, health screenings, and preventative health measures such as flu shots to ensure they can act easily upon the knowledge they have built

➢ **The Home Depot *Building Better Health* programme** (Nardelli, 2005:1).

- To enhance workplace productivity and customer service
- To improve the health of their associates
- To provide a supportive wellness environment
- To position the Home Depot as an Employer of Choice

As evidenced from the literature above, it is apparent that many of these companies' objectives are overlapping. It coincides with the view of Riedel *et al.* (2001:167), Chapman (2005:1) and Randolfi (2006:3) namely to improve the health and productivity of the employees and reduce their health-related costs, primarily by helping change the pattern of lifestyle and behavioural choices of individuals in the group.

For the past two decades the emphasis of most health promotion programmes and evaluative research has been on physical risk factors, physical health status and health insurance costs (O'Donnell, 2002:1). Given the medical genesis of health promotion and the overwhelming research supporting the relationship between physical health, morbidity, and mortality, this focus on the physical dimension is not unexpected (O'Donnell, 2002:xx). It is known that a physical active lifestyle enhances general health, it reduces the risk for coronary heart diseases and ensures quality of life (Corbin *et al.,* 2000:6; Willmore, 2001:S622-S633; MHHE, 2005). A lack of physical activity can lead to a state of hypokineses, a reduction in health status and quality of life, as well as an increased risk for the developing of coronary heart diseases (Kaplan, 1997:14; Booth *et al.*, 2000:774-787; Corbin *et al.,*

2000:6; Strydom, 2000:25; Bolton *et al.*, 2004:56; American Heart Association, 2005).

Swanepoel (2001:33), Boshoff (2000:174) and Bolton (2002:76), used the method presented by Sharkey (1997:432) to determine the physical activity index of South African executives. Boshoff (2000:174) and Bolton (2002:76) indicated their physical activity index as 33.3. This physical activity index value of executives is reasonably lower than the average index value of 40 as published by Dreyer (1996:131). A physical activity index of 64 equals a kilocalorie expenditure of approximately 1500kcal.week^{-1} and an index of 16 and lower represents a kilocalorie expenditure of approximately 150kcal.week^{-1}. Research by Paffenbarger (1987:116) and Drygas *et al.* (2000:235) found that a kilocalorie expenditure of a 1000kcal.week^{-1} is effective enough to ensure a notable lower coronary mortality risk comparing to individuals not maintaining it. A study on South African executives indicated that 29.9% of the respondents were totally inactive with a physical activity index of less than 17, 49.5% were moderately active with a physical activity index of 17-63 and 20.6% were highly active with a physical activity index more than 64 (Dreyer,1996:116). It appears clearly from the above that the physical activity of only 20.6% of the executives was enough to ensure a kilocalorie expenditure of more than 1500kcal.week^{-1}. In a similar study on executives Bolton (2002:78) depicted a worse scenario and found that, a higher percentage of executives namely 39% were inactive, compared to the 31% that were highly active.

It seems that the physical activity index of South African executives portrays a grim picture if one takes into consideration that executives of any company are the most valuable group of the workforce (Shephard, 1986:8; Scott, 1999:1), and that a lack of physical activity can lead to a state of hypokineses, an increased risk for the developing of coronary heart diseases, a reduction in health status and quality of life (Kaplan, 1997:14; Booth *et al.*, 2000:774-787; Corbin *et al.*, 2000:6; Strydom, 2000:25; Bolton *et al.*, 2004:56; American Heart Association, 2005). If it is essential to ensure optimum work production and to protect the company's investment made in an executive, consequently the maintenance of their health and physical status is therefore imperative (Wyndham, 1981:411; Uys & Coetzee, 1989:5; Scott, 1999:1).

Furthermore, current health promotion programmes have expanded beyond focussing primarily on physical fitness by targeting particular "health risk factors" that are modifiable and associated with particular kinds of illnesses and/or injuries (O'Donnell, 2002:1; Chapman, 2005:1). By changing the behaviours associated with "modifiable" risk factors, the chance of illness and/or injury (e.g. "morbidity") is reduced for the individual, and as more individuals change their behaviour, the morbidity of the entire group is reduced (Chapman, 2005:1).

It seems as if the principal strategy of health promotion programmes is to motivate executives to learn to practice life-long positive health behaviour. Health promotion is pro active and refers to the salutogenic paradigm (Adams *et al.,* 1997:207; Viviers, 1998:27). Adams *et al.* (1997:209-210) and Viviers (1998:27) emphasise the philosophic foundation of health where the salutogenic paradigm as health promotion mechanism is an allegedly integral part. This development can occur on a health continuum that is either positive or negative as previously discussed on page 27 (Chapter 2) with Figure 2.5. (Travis & Ryan, 1988:27). Furthermore, the view of Travis & Ryan (2004:xix) that a simple model cannot always convey a complex concept, is discussed on page 28 (Chapter 2) with Figure 2.6. From the abovementioned literature it appears that medical care/ health care, wellness, illness prevention (pathogenic paradigm) and health promotion (salutogenic paradigm) should be treated as central concepts (Strydom, 2000:14) as portrayed in Figure 2.3. on page 25 (Chapter 2).

Health promotion programmes are also seen as a way to help keep employees (executives) healthy and thereby increase productivity by holding health insurance costs down (Erfurt *et al.,* 1991:962; Henritze *et al.,* 1992:129; Cooper & Cartwright, 1994:468; Shephard, 1999:48; McArdle *et al.*, 2001:957; O'Donnell, 2002:25-38; Chapman, 2005:1,18). It can produce a variety of effects including disease prevention, increases in health awareness, risk reduction and reduction in demand for marginal health services (O'Donnell, 2002:19; Chapman, 2005:1; Victorian health government, 2006). As maintained by O'Donnell (2002:xxii) worksite health promotion programmes have three levels of effect. They can enhance awareness,

help employees make lifestyle changes and create environments that support healthy lifestyles.

Level I: Awareness

An awareness programme increases an employee's level of awareness or interest in the programme topic. In very few cases, does the employee actually change health behaviour or improve health because of these programmes. Examples of awareness programmes include newsletters, posters, flyers, health fairs, educational classes, lunch and learn sessions, weekend retreats, health screenings without feedback, goal setting and interactive counselling (O'Donnell, 2002:xxii; Chapman, 2005:45-47).

The intended impact of many of these programmes is often health behaviour change or improved health but the outcome usually falls short. However, if the awareness programmes are offered in conjunction with other programmes, they can be very useful; in fact, they can be used as a direct feeder to the lifestyle change programmes (O'Donnell, 2002:xxiii).

Furthermore, awareness programmes can be of value to the employer apart from their impact on health goals. Awareness programmes can also be an inexpensive way to get started in health promotion and can stimulate management to develop programmes that are more extensive (O'Donnell, 2002:xxiii).

Level II: Lifestyle change programmes

It is the view of O'Donnell (2002:xxiii) that lifestyle change programmes go a step beyond awareness programmes by setting lifestyle-related behaviour change as the desired outcome. Changes might include to quite smoking, exercising on a regular basis, successfully manage stress, eating more nutritious foods, or combining exercise and nutritious eating to lose weight (Chapman, 2005:53).

As stated by O'Donnell (2002:xxiii) the most successful lifestyle change programmes use a combination of health education, behaviour modification, experiential practice and feedback opportunities. Successful programmes also allow sufficient time to elapse for behaviour changes to occur and take root.

In addition to improving employees' health, lifestyle change programmes are also of greater value to the employer than awareness programmes. First, behaviour changes can result in improved health status, which in turn can lead to reduced medical problems and thus reduced costs. Second, lifestyle change programmes have a greater chance of improving an employee's outlook and physical and emotional capacity to be more productive at work. Third, these programmes can provide a bigger morale boost and publicity angle, simply because they are more extensive. Finally, the extend nature of the programmes provides employees with additional opportunities to get to know one another, which can in turn help them learn to work together more effectively (O'Donnell, 2002:xxiii).

In conclusion, the problem with lifestyle change programmes is their failure to sustain long-term behaviour change. The best way to sustain long-term behaviour is through supportive environmental programmes that focus on assisting the participants with reduction of selected health risks and improved management of health conditions (O'Donnell, 2002:xxiii; Chapman, 2005:57). In order to ensure long-term behaviour change, the above highlights the importance of bringing a specific health-related risk factor under an individual's attention first (early detection) with education about the implications of personal health behaviour following thereafter. Behavioural intervention and care-seeking programmes will lead to increased awareness of the influence of risk factors on health status that should lead to changes in health behaviour. This in turn would lead to improvements in personal health status, reduction in health risk-based illness and, therefore, lower medical utilisation and subsequent reductions in medical care costs.

Level III: Supportive environments

According to O'Donnell (2002:xxiv) the goal of a supportive environment programme is to create an environment within the work setting that encourages a healthy lifestyle. This is the final phase in the process of detection, intervention and sustained long-term behaviour change. A supportive environment is critical in helping people maintain newly acquired healthy lifestyle habits (Randolfi, 2006:6). For example, regular exercise used to be popular primarily among young athletes, most of whom were male. Today regular exercise provides a recreational and social outlet for people regardless of age and gender. Finally, similar changes occurred in the food industry. It is far easier to buy foods low in fat, salt and sugar in grocery stores and restaurant than in the past.

It is the view of O'Donnell (2002:xxiv) that many of those changes have occurred independent of any intentional health promotion efforts, but intentional changes can be made in the workplace to make it more health inducing. Environments that support healthy lifestyles can be created by means of:

- Changing the physical setting, corporate policies and corporate culture
- Implementing ongoing programmes
- Enhancing employee ownership of programmes

Improvements in the physical environment that can encourage healthy lifestyles include construction of lockers, showers, workout areas, stocking vending machines and cafeterias with healthy foods and removing cigarette machines and ashtrays from common areas (O'Donnell, 2002:xxiv; Randolfi, 2006:6).

According to O'Donnell (2002:xxiii), corporate policies that foster healthy lifestyles include instructing managers to encourage employees to participate in programmes, allowing flexible work scheduling to permit employees to exercise during the day and instituting non-smoking policies. Furthermore, the funding of medical care coverage programmes so they reward good health practices instead of poor health and

restructuring absenteeism policies to reward coming to work instead of taking days off (Chapman, 2005:62).

As maintained by O'Donnell (2002:xxiv), the corporate culture can be adjusted to support positive health by applauding employees' involvement and success in the programme, featuring top management and other key employees as role models of health lifestyles and providing regular information reports on the health status and practices of each department.

Finally, ongoing structures such as a permanent formal health promotion programme with a programme manager, programme materials and a office, as well as ongoing activities such as fitness classes, health screenings, activity groups, special events and regular promotion can help make the programme a stable part of the organisation (O'Donnell, 2002:xxiv; Chapman, 2005:57; Randolfi, 2006:2-6).

3.5 HEALTH IMPACT, COMPONENTS AND BENEFITS OF HEALTH PROMOTION PROGRAMMES AT THE WORKSITE

Interventions that prevent diseases or improve treatment outcomes may reap significant returns for companies, but a crucial question in the chain linking lifestyle risks to health is whether health promotion intervention programme can change health risk or health behaviours? A further very fundamental question is whether the reduced health risks or behaviours lead to decreases in mortality, morbidity, costs and disability and according to O'Donnell (2002:14) sometimes referred to as the "total burden of illness". In order to address the above questions a series of analyses of the health impact of 400 health promotion programmes at the worksite according to The Centres for Disease Control and the American journal of health promotion (Wilson *et al.,* 1996:429-435) will be presented firstly. Secondly, the programme components and key findings of leading companies from the Partnership for Prevention Leading by Example, CEO-to-CEO programmes will be briefly discussed. Finally, the benefits to be reaped from the health promotion programmes discussed above will be summarized. Although the parameters, as well as the effect of interventions on the parameters used in this study are discussed in Chapter 2, a

brief overview of the literature on the health impact of health promotion programmes at the worksite according to The Centres for Disease Control and the American journal of health promotion (Wilson *et al.,* 1996:429-435) has been included to acknowledge the various health promotion programmes.

3.5.1 Health impact of health promotion programmes at the worksite

3.5.1.1 Health risk appraisal

A health risk appraisal typically serves as a core measurement and intervention tool when combined with appropriate follow-up and referral (Yen *et al.,* 2003:1050). Many may assume that simply assessing risk and giving feedback would lead to behaviour change. In fact, health risk appraisals are aimed at allowing specific interventions to change awareness and prepare people to change behaviours (Anderson *et al.*, 1996:499-508). As maintained by O'Donnell (2002:15) it is not surprising then that the available data suggests that health risk appraisal's (HRA) have their greatest impact as part of a comprehensive programme. There is limited research on the direct effects of HRA's but the logic connecting the HRA with a health outcome is sometimes tenuous (O'Donnell, 2002:15). Criticism against conventional HRA's is that it is standardised or "one size fits all" and they are not customised for individual risks. Offering targeted assessment of progress at follow-up, increases the impact of the instrument by initiating a dialog with the participant. Further, while all HRA's look at mortality risk, only a few assess the risk of morbidity of health service use. It is the view of O'Donnell (2002:15) that the latter will be of much more concern to employers and employees in the near future. The *Lifesteps* programme of General Motors is evidence that programmes has led, since 1996, to more than 1 million health risk appraisals and consequently to the reduction of more than 185 000 specific health risks. It is the view of the CEO of General Motors that a health risk appraisal system, integrated with other health and productivity-related measures, provides meaningful benchmarking data (Wagoner, 2005:19).

3.5.1.2 Fitness and exercise

Shephard (1996:436-440) has thoughtfully reviewed the evidence for the effectiveness of worksite fitness programmes. Among programme participants, regular participants reduced body mass by 1-2% with a reduction of body fat of 10-15%. Muscle strength and aerobic capacity increased by up to 20%. The impact on high-risk persons can be substantial when fitness programmes are combined with cholesterol and blood pressure reduction, weight control and other applicable heart disease prevention interventions. However, when the effects are averaged across the entire employee population, the impact is reduced. Shephard (1996:451-452) suggests that a better return on investment might be obtained by providing access to off-site fitness facilities.

Grace (2004:51) studied the impact of a worksite physical wellness programme on sick leave, absenteeism and health related fitness and found a saving of 4.9 days sick leave and absenteeism per employee. The intervention programme that enabled the saving in sick leave and absenteeism data entailed awareness, health promotion, assessments and a physical wellness programme. The application of abovementioned 4.9 days saved on sick leave and absenteeism at a company employing 450 employees with an average cost of R230.73 per employee per day adds up to an annual saving of R508 759.65 (Discovery Health, 2003).

Shephard (1999:48) calculates that a company can expect a saving of $500 - $700 per worker per year with a physical intervention programme, enough to cover the cost of a modest health promotion programme. Kennecott Copper Corporation saved $5.78 for each dollar spend on it's employee fitness programme; Equitable Life Insurance Company reported a benefit:cost ratio of $5.52 in the first year of its employee fitness programme and job performance strongly correlated with exercise adherence in a study of 3231 white-collar employees (McArdle *et al.*, 2001:960).

3.5.1.3 Weight control

Hennrikus *et al.* (1996:471) concluded that worksite weight control programmes could produce weight loss of 2-4 kilograms per week among participants. Some studies reported improvement in eating habits and employee satisfaction (Hennrikus *et al.*, 1996:471-498). Weight loss was less than reported for clinic-based programmes, but the participants were generally less obese initially and limits on loss rates were usually set. Most interventions focussed on individual counselling (Hennrikus *et al.*, 1996:471-498). In contrast to the study above, Graffagnino *et al.* (2006:280) studied the effect of a community-based weight management programme on weight loss and cardiovascular disease risk factors. Of the 47% individuals completing the 6-month structured community-based weight management programme participants averaged a weight loss of 7.3% in men and 4.7% in women. Finally, a 2-year work-site intervention programme in Minneapolis/St. Paul produced an average weight loss of 10.6 kilograms (Jeffrey *et al.*, 1993:98).

Research on the benefits and impact of health promotion programmes on weight control is recorded in studies by Jackicic *et al.* (2005:S226-S229), Stice *et al.* (2006:667-691), Popkin *et al.* (2006:271-293) and Skinner (2005:244).

3.5.1.4 Nutrition and cholesterol control

As stated by Glanz *et al.* (1996:453) the main strategies used for both nutrition and cholesterol management programmes were individual counselling, group education, mediated programmes and cafeteria-based programmes. Targeted behaviours were increases in dietary fibre intake, reduction in fat consumption and increases in fruit and vegetable intake. Cholesterol reductions in the 5-9% range were achieved and dietary habits changed to some extent (Glanz *et al.*, 1996:453). It appears that the more intensive strategies have greater effect on short-term results (Glanz *et al.*, 1996:453).

According to Henritze *et al.* (1989:25), an 8-week work-site voluntary programme at Coors Brewing Company improved multiple risk factors for cardiovascular disease with a decrease in total cholesterol and body weight and risks of ischemia. In participating employees over 8 years the annual cost was below $32 per participant per year and saved more than $1.4 million in health care costs over 6 years.

In addition, longitudinal studies of men with coronary artery disease have shown that endurance training, together with a cholesterol-lowering diet and interventions for other CVD risk factors, can help prevent the progression or reduce the severity of atherosclerosis in the coronary arteries (Surgeon general's report, 1996:110-111). The recommendation to restrict saturated fats in the diet in particular stems from several studies that have identified a clear and direct association between the levels of dietary saturated fat and total cholesterol (Ballantyne, 1998:3-9; Ehrman *et al.,* 2003:174; Skinner, 2005:243; ACSM, 2006:45-46).

3.5.1.5 Smoking cessation and smoking policies

Smoking cessation research has changed focus, probably along with the focus of cessation programmes themselves. Before 1985, smoking cessation was offered in clinics. In the late 1980's contests and incentives became a primary emphasis. In the 1990's worksite-wide efforts have become the norm (Eriksen *et al.,* 1998:83). Group programmes have reported success rates of 20-60% at 6 to 18 months. Minimal interventions, which attracted more participants, reported success rates ranging from one to 20% (Eriksen *et al.,* 1998:83). As maintained by Eriksen *et al.* (1998:83) twenty-five percent quit rates are viewed as realistic in the end, but few studies include long-term follow-up. Incentives and contests increase participation but may not increase quit rates (Eriksen *et al.,* 1998:83). Various studies report on worksite policies that restrict or ban smoking and present smoking cessation programmes to their employees (Paffenbarger *et al.,* 1994:858; Eriksen *et al.,* 1998:83; Hoeger *et al.,* 2002:374-375; Skinner, 2005:139). As stated by Eriksen *et al.* (1998:83) consumption at work dropped by an average of three cigarettes per day. Furthermore, a 2-year work-site intervention programme in Minneapolis/St. Paul produced a 43% increase in smoking cessation (Jeffrey *et al.,* 1993:98) that

can be ascribed to a combination of the implementing of smoking policies as well as the accessibility of these programmes at the worksite.

3.5.1.6 Hypertension control

As described in a review by O'Donnell *et al.* (1997:1) participation rates are high for hypertension control programmes with 79% of employees involved in on average. Between 60% and 85% of those with high blood pressure report blood pressure control to normal limits while programmes are in place (O'Donnell *et al.*, 1997:1). An 8-week work-site voluntary programme at Coors Brewing Company improved multiple risk factors for cardiovascular disease with a decrease in systolic blood pressure and risks of ischemia (Henritze *et al.*, 1989:25). A review of randomized controlled trials over 6 month duration analyzing the effect of reducing blood pressure found a decrease of 5.2/5.2mmHg and 2.8/2.3mmHg in hypertensive and normotensive participants, respectively (Ebrahim *et al.*, 1998:441–448).

Research on blood pressure and health promotion programmes is documented with several studies such as the Surgeon general's report (1996:126-127), Appel *et al.* (1997:1117-1124), Ehrman *et al.* (2003:2850), Skinner (2005:308) and ACSM (2006:214).

3.5.1.7 Stress management

The growing number of stress management programmes at work suggests that job stress is a recognised and probably growing issue. Murphy (1996:112) of the National Institute for Occupational Health and Safety (NIOSH) critically reviewed the literature evaluating the effects of worksite stress management programmes. He found it difficult to compare programmes since programmes used a variety of interventions ranging from muscle relaxation to cognitive techniques and combinations of interventions. The outcomes examined ranged from somatic complaints and physiologic measures to absenteeism and job satisfaction. These outcomes, however, focused only on absenteeism and job satisfaction and did not assess turnover, productivity, disease prevalence and health service use or health

care costs. The methodology varied greatly and the results were mostly positive but somewhat variable (Murphy, 1996:112-135).

As Murphy (1996:112-135) noted, individuals may be looking for calm, joy and productivity in all the wrong places. For more than twenty years the emphasise in literature, as well as the epidemiology, social science and management literature as a whole has been on changing organisational stressors and assessing organisational outcomes. Yet health promotion programmes still generally focus on training individuals to cope with stressors. While that is as worthy first step, according to Murphy (1996:112-135) it does not address the source of the problem or the most direct mechanism to improve organisational effectiveness.

3.5.1.8 Substance abuse

In a review of worksite alcohol programmes by Roman *et al.* (1996:136), they concluded that programmes are effective in changing supervisors' attitudes but that there is little evidence to conclude there was substantial change in alcohol use. The change in attitudes may have increased detection and referral. The primary preventative component of the programmes, if present, was not evaluated.

As stated by Roman *et al.* (1996:136-149) employee assistance programmes have also been used to treat or triage other types of substance abuse with varying success. They can also deal with work-place conflict and other issues. Furthermore, these programmes have been used as the base for primary programmes to prevent substance abuse. Finally, stress management programmes should also be used to reduce the drive to use drugs as a means of coping with stress (Roman *et al.,* 1996:136-149).

3.5.1.9 Seatbelts

As maintained by Wilson *et al.* (1996:429-435) there are only 14 studies on worksite seatbelt interventions. While the evidence is inadequate to derive a clear view of the impact of these programmes, its effectiveness is suggestive (Eddy *et al.*, 1996:281-

289). It should be noted that there is other evidence of interventions that were part of comprehensive programmes. In conclusion, it is the view of Wilson *et al.* (1996:429-435) that programmes which provided significant incentives and immediate reinforcement appeared to be the most effective.

3.5.1.10 Multi-component programmes

As noted by Wilson *et al.* (1996:429-435) these programmes are directed at multiple risk factors. They vary tremendously in scope, intensity and duration (Pelletier, 1991:311-315; Pelletier, 1993:43-49; Pelletier, 1996:380-388; Pelletier, 1999:66-78) All programmes examined in a recent review by Heaney *et al.* (1996:290-307) provided some form of health education to employees. In most cases, the programme provided opportunity to learn and practise new skills as well. Some, but by no means all, included changes in organisational policy or the work environment. Interestingly, according to one meta-analysis by Heaney *et al.* (1996:290-307), awareness programmes alone were more effective (e.g. had a higher success rate) than awareness programmes plus skill building interventions. Success rates for awareness programmes were measured as knowledge change, while success rates for skill building were measured as behaviour change. These two rates may not be combinable because they measure different outcomes; measuring behaviour change itself is complex since different behaviours are not necessary linearly combinable (Heaney *et al.*, 1996:290-307). It is the view of O'Donnell (2002:17) that the ideal measure would be health outcome. The offering of individual counselling for high-risk employees appears to be critical components of these programmes. According to O'Donnell (2002:17), programmes must also be of sufficient duration (typically a year) to achieve results. In addition, anecdotally and from the point of view of organisational and social theory, organisational leadership and support should be necessary to reinforce and to sustain more healthy behaviours in the long run (O'Donnell, 2002:17).

As stated by O'Donnell (2002:17) there are several advantages of multi-component programmes. Firstly, components may reinforce each other. For example, fitness, stress management and nutrition/weight control programmes are important to

mitigate the weight gain and anxiety that often follow smoking, alcohol or drug cessation. Secondly, the high-risk employees often have more than one health risk that they should address. Finally, the presence of a comprehensive programme reinforces management's commitment to a healthy workforce.

3.5.2 Components and key findings of health promotion programmes

In this section the programme components and key findings of leading companies from the Partnership for Prevention Leading by Example, CEO-to-CEO programmes will be briefly discussed. This call to action by CEO's recognize that not only the growth, but in some cases, the sustainability of their organizations is linked to employee health.

- **Commonwealth of Virginia's *CommonHealth* programme** (Warner, 2005:1).

The components of the *CommonHealth* programme campaigns focus on smoking cessation, weight management, diabetes, heart health, flu shots and premature birth prevention. It entails medical screenings and provides a personal health analysis report. Furthermore, the components involve programmes and challenges on fitness, mental health, nutrition and personal health and safety. The final components are fitness classes and discounts at fitness centres statewide.

The key findings of the *CommonHealth* programme are as follow:

- Almost 2000 individuals were identified as high risk for type 2 diabetes during the 2004 diabetes education programme
- 2672 state employees shed more than 16 000 pounds, or 4.92 pounds per person, through the weight management programme
- 26% of nearly 1400 participants in the smoking cessation programme have remained free from tobacco after 1 year

To conclude, the CEO of Commonwealth of Virginia maintains, "for 17 years the *CommonHealth* programme has helped the state workforce establish and/or

maintain a healthy lifestyle. These programmes benefited the Commonwealth's bottom line, saving taxpayer dollars through reduced health care expenses and less absenteeism due to illness. The most important outcome is that the peoples' lives have changed for the better."

- **The Dow Chemical Company's *Good Health for Whole Self* programme** (Liveris, 2005:1).

The components of the *Good Health for Whole Self* programme consist of group programmes, one-to-one counselling, web-based information, immunization, home-based and self-managed kit programmes. It has a relevant workplace health policy with preventative health coverage in the benefit plan.

The key findings of the *Good Health for Whole Self* programme are as follow:

- 42% of North American employees who are members of the fitness centres are regular users
- 35% of North American employees at a site with a fitness centre are members of the fitness centre
- About 43% of North American employees participate in health promotion activities other than in fitness centres
- Participants in Dow's *Positive Action* self-care and health care consumerism programme had statistically significant fewer claims for self-limited illnesses and emergency room visits than those who did not participate
- 83% of North American employees voluntarily participate in their scheduled health surveillance and screening examination

In conclusion, the CEO of Dow Chemical Company argues, "the analysis shows that prevention can improve both our direct and indirect health related costs. Furthermore, our profit potential is inextricably linked to the capability and performance of our employees."

- **General Motors *UAW (United Automobile Workers) – GM Lifesteps* programme** (Wagoner, 2005:1).

The components of the *UAW–GM Lifesteps* programme involve health fairs and screenings, quarterly publications, a web site and finally wellness support classes.

The key findings of the *UAW–GM Lifesteps* programme are as follow:

- To date, more than 1 million health risk appraisals have been processed, 370 000 people have participated, and 185 000 health risks have been reduced
- In the intensive onsite *UAW–GM Lifesteps* programme, the low-risk population (0-2 risks) has grown by 8.1% since the programme's inception in 1996 and more than 75% of active employees have participated
- The *UAW–GM Lifesteps* programme has published more articles than any other employer-sponsored wellness programme in America. There have been 18 peer-reviewed journal articles published that highlight the link between health care costs and modifiable health risks

To conclude, the CEO of General Motors states: "*Lifesteps* has improved productivity and employee morale. Of special importance given today's skyrocketing health care costs, *Lifesteps* has shown that everyone can improve the health care system by taking better care of themselves."

- **Highsmith Inc. *T.A.G.* programme** (Highsmith, 2005:16).

T.A.G. stands for : **T**otal commitment to developing human potential
Access to learning opportunities
Growth as an individual and as a company

The components of the *T.A.G.* programme consist of job/career development (the foundation for learning and development in a corporate environment) and work/life enrichment (finding balance in life that is vital for welfare, performance and happiness). It entails personal well-being (awareness of emotional health,

enhancing resilience to stress, competition and pressure) and self-care (providing sound information and resources enabling employees to take an active, educated and assertive role in managing their health). Furthermore, it consists of physical well-being (promoting positive lifestyle choices in the areas of physical activity and nutrition that have a profound effect on physical well-being) and incentives (a rich health insurance plan and monetary incentive approach to employee health insurance). A final component is benefits (a structure that supports this full initiative).

The key findings of the *T.A.G.* programme are as follow:

- Average increase of 4.9% in health insurance premiums 2002-2004
- Average tenure of 14 years; turnover in single digits
- 53% decrease in high-risk total cholesterol (≥240mg/dL)
- 52% decrease in high blood pressure (≥140/90mmHg)

In conclusion, the CEO of Highsmith Inc. maintains, "the developing of the full potential of the business means developing the potential of the people who make it all work, and changing the bottom line with health care costs means changing lives through education and opportunity."

➢ **Aetna Inc. *Healthy Lifestyles* programme** (Rowe, 2005b:1).

The components of the *Healthy Lifestyles* programme entails *Simple steps to a healthier life* (an interactive online programme that includes a health risk assessment and personalized action plan for making positive health changes and informed health choices); a *Healthy body, Healthy weight programme* (an innovative programme that helps participants control weight, reduce other risk factors and improve overall health). Another component is *Weight watchers at work and online* (group support or online assistance to help employees manage their weight). It also entails *Fitness centres* (access to fitness centres in several Aetna locations and access to membership discounts through a national fitness centre network) and an *Informed health line* (health questions answered 24/7 via telephonic support and

access to a registered nurse. A final component is incentives for designated preventative care services.

The key findings of the *Healthy Lifestyles* programme are as follow:

- People at higher risk levels not only have higher medical costs, they also miss more work days and are less productive while at work
- Employees who improved their health risk status experienced measurable improvements in work productivity

To conclude, the CEO of Aetna Inc. states: "*Healthy Lifestyles* yielded valuable benefits with individuals who improved just one risk factor improved their presenteeism by 9% and reduced absenteeism by 2%. It is clear that encouraging a healthy lifestyle makes good business sense."

➢ **Johnson and Johnson's *Healthy People* programme** (Weldon, 2005:1).

The components of the *Healthy People* programme involve an online health profile, lifestyle/disease management counselling and health risk intervention programmes. It also consists of environmental/cultural support and financial incentives for participation. The final component is an integration of a health promotion strategy with a health care benefit plan design.

The key findings of the *Healthy People* programme are as follow:

- Savings of about $9-10 million per year from reduced medical utilization and lower administrative expenses
- Health profile results for 44 000 employees (September 2001–December 2004) indicate that *Healthy People* goals are surpasses in three of the four target areas:

    - ✓ Smoking/tobacco use 6% – the target 9%
    - ✓ High blood pressure 9% – the target 10%

- ✓ High cholesterol 9% – the target 15%
- ✓ Physical activity 38% (of the population is inactive) – the target 20%

In conclusion, the CEO of Johnson and Johnson argues, "for more than 20 years Johnson and Johnson has helped employees recognize and change behaviours that threaten their health. Achieving our *Health People* targets can have many significant benefits, including increased productivity. Most importantly the employees will enjoy improved health, both on and off the job."

- **Navistar International Corporation's *Vital Lives* programme** (Horne, 2005:1).

The components of the *Vital Lives* programme consist of multifaceted health promotion offerings including corporate-wide exercise and nutrition challenges, telephonic health coaching, flu shots and extensive disease management programmes. Another component is onsite fitness centres and a health club subsidy reimbursement programme. It entails self-care initiative utilizing the Healthwise handbook and ongoing awareness and education programming as well as an onsite medical services including physical rehabilitation. A final component is a full range of services through employee assistance programme including clinical counselling, childcare, life management, pre-retirement counselling, childcare and eldercare consultations, legal assistance and financial services.

The key findings of the *Vital Lives* programme are as follow:

- Based on current participation levels, estimated annual savings of five highlighted programmes was more than $4.7 million
- With programme participation at 100%, projected annual savings in health cost is estimated to be $19 million plus

To conclude, the CEO of Navistar International Corporation maintains, "health promotion is not a programme – it's the way we live."

- **Pioneer Hi-Bred International, Inc *Preventative Health Services* programme** (Oestreich, 2005:1).

The components of the *Preventative Health Services* programme consist of EAP services including clinical counselling, legal and financial assistance, eldercare referral services and life management resources. It entails an onsite corporate fitness centre with professional staff to design individualized exercise programmes as well as comprehensive health assessment and onsite flu vaccinations. Another component is healthy food choices in the cafeteria, vending, and at business meetings. It consists of programmes, a newsletter, a library and a web site. A final component is a health plan designed to focus on prevention, disease management and the efficient use of the health care system as well as integrated health and safety programmes.

The key findings of the *Preventative Health Services* programme are as follow:

- Pioneer experienced an approximately $2000 per employee reduction in expected medical costs
- 96% of the members report the onsite fitness centre helps them to exercise regularly
- 93% of health screening participants report fewer than 5 sick days per year
- In 2004, Pioneer received *WELCOA's* Platinum *Well Workplace* award for excellence in worksite wellness programming

In conclusion, the CEO of Pioneer Hi-Bred International, Inc. states: "by promoting a healthy, engaged, and productive workforce, it is possible to maximize our business performance and drive sustainable growth. Pioneer maintains the belief that resources invested in the well-being of its employees are resources well spent."

As evidenced above it is apparent that the programmes utilized by these companies provide a variety of effects, including disease prevention, increases in health awareness and risk reductions. It affects morbidity and disability from common problems as well as a reduction in demand for medically insignificant or unnecessary

services. Probably the most valuable impact from a company's point of view is the reduction in health-related costs with an increase in the organization's return on its most important asset, namely its human capital.

3.5.3 Benefits of health promotion programmes

When considering the literature on worksite health promotion programmes above there are many reported benefits that will be summarized below. The benefits to be reaped from health promotion programmes are thoroughly described by Pfeiffer (2003:119) and Chapman (2005:19-20). If a health promotion programme is well designed and effectively implemented, employer, employees, labour groups, communities and government can potentially benefit as previously discussed on page 83.

It seems that as the field of worksite health promotion continues to evolve, so will the need to define and articulate the dimensions of a comprehensive model of worksite health promotion. Although the scope, design, intensity and duration of health promotion programmes vary tremendously as portrayed by the literature above, the questions to be investigated by the researcher, is: What is the constitution of a truly successful/perfect and comprehensive health promotion programme and does an ideal health promotion programme exist?

3.6 DESIGN AND CHARACTERISTICS OF HEALTH PROMOTION PROGRAMMES

The design of a successful health promotion programme as maintained by O'Donnell *et al.* (1997:1) is significantly influenced by the results of a benchmarking study on the best workplace health promotion programmes conducted by the American productivity and quality centre. The goal of that study was to identify the best workplace health promotion programme in the United States and determine what made them different from hundreds of other programmes in place. The eight elements unique to these programmes are shown in Table 3.2.

Table 3.2: Characteristics of the best programmes (O'Donnell, 2002:50)

	LOW IMPACT	MEDIUM IMPACT	HIGH IMPACT
HIGH CONTROL		Effective communication Communicate evaluation results	Link programmes to business goals
MEDIUM CONTROL		Evaluation component	Incentive programme
LOW CONTROL		Strong budget	Supportive culture Top management support

As seen from Table 3.2, these elements are organised in a matrix in terms of the impact of the element on programme outcome and the level of control a typical programme manager would have over building that element into their programme. For example, linking the goals of the programme to the business goals of the organisation has a major impact on the effectiveness of the programme and is also something the typical programme manager can control (O'Donnell, 2002:50). The manager can determine the goals of the organisation and align the programme goals to support these organisation goals. In agreement to this, Chapman (2005:22-23) is of the opinion that the following are critical "keys" that will largely determine the success of a health promotion programme regardless of the programme model being selected:

- Strong senior and middle level management support

It is the view of Chapman (2005:23) that the extent to which senior management and mid-level managers support the programme will probably be the single most important variable in determining whether the programme will ultimately succeed. That support is expressed in the provision of time for the execution of the programme during working hours by changing policies and procedures and providing funds for staffing, purchasing of equipment, vendor services, supplies and incentive rewards.

- Behaviourally sophisticated programming

The degree to which the health promotion programme uses state-of-the-art behaviour modification techniques and strategies is essential to the long-term impact of the programme. Each intervention component, as well as the overall programme needs to be designed using sophisticated behaviour change technology and methods. That sophistication also needs to embrace formal efforts to change the cultural norms that affect health in the worksite (Chapman, 2005:23).

- Positive and upbeat image

As noted by Chapman (2005:23) it is important for the health promotion programme to represent a positive and upbeat image to the employees and family members that are affected by it. The general perception, which employees hold toward the health promotion programme, is important in securing their participation and cooperation. Also, if employees see that management has not made a tangible investment in health promotion they tend to undervalue the programme and not take its activities or purposes seriously.

- Well-design and balanced programming

As maintained by Chapman (2005:23) the use of an appropriate programme model and set of programme interventions is essential to the effectiveness of the programme. This includes the choices expressing the right balance of communications, health and fitness testing, group activities, "virtual" interventions and the creation of a supportive environment tailored to the needs of the workforce involved and the desired effects of the programme. In conclusion, the emphasis of the programme intervention will differ depending on whether the focus is on long or short-term components.

- Well paced programming

In general, the best pace for a health promotion programme is one or two events a month with a highly promoted seasonal event during the spring and fall. Good programmes avoid an unusually heavy amount of "clustering" where several activities are conducted at the same time with long periods of limited activities in between (Chapman, 2005:24).

- Effective use of incentives

According to Chapman (2005:24), the use of well-designed incentives is an important part of any health promotion programme. Frequently the presence of an incentive will help increase participation, increase adherence to specific behaviours and increase follow-through by a factor of two to eight.

From the above it is seems that strong senior management support, behaviourally sophisticated programming/evaluation component and an incentive programme are the three areas overlapping. Although Chapman (2005:23) values the involvement of senior management as the single most important variable in determining whether the programme will ultimately succeed, O'Donnell (2002:49-50) regards it in the short term as unfortunate because the typical programme manager has little control over how much support they receive from top management. As maintained by O'Donnell (2002:50), a strong budget is important but it is not sufficient to make a programme successful. Programmes that create supportive environments will have the greatest chance of success in helping employees develop and maintain long-term healthy lifestyle practices (O'Donnell, 2002:xxii). The immediate impact should be seen on morbidity and disability from common problems such as respiratory and musculoskeletal conditions, as well as a reduction in demand for medically marginal of unnecessary services (O'Donnell, 2002:19). A striking finding in a study by Kaplan (1997:14) was that management-related factors were more important than programming factors in determining the success of the programme. The typical health promotion programme manager who is trained as a health expert tends to focus on the health dimensions of a programme and often neglects how the

programme ties into the organisation. As noted by Kaplan (1997:14-19) each of these eight qualities discussed above should be build into a new health promotion programme.

3.6.1 Health promotion programme models

As stated by Chapman (2005:38) in Figure 3.2 there are three major models for worksite health promotion programmes:

a) Quality of work life model (QWL);
b) Traditional or conventional model (ToC);
c) Health and productivity management model (HPM)

In conclusion, Randolfi's (2006:2-8) comprehensive model of worksite health promotion will be discussed and compared to these three models in the process of endeavouring an "ideal" worksite health promotion programme.

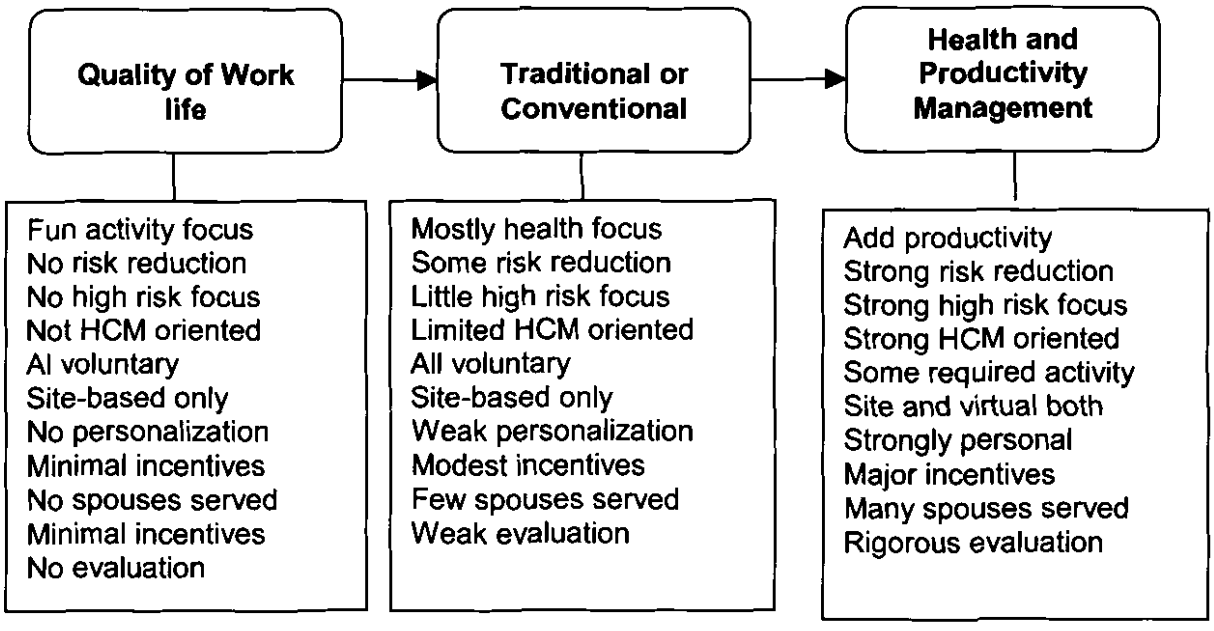


Figure 3.2: Programme model options (Chapman, 2005:38)

Herewith a short description of the three different health promotion programme models of Chapman (2005:41-67).

a) QUALITY OF WORK LIFE MODEL (QWL)

This model of worksite health promotion focuses primarily on improving the morale of employees. The intention of this programme is to add quality to work life and to improve camaraderie and relationships between employer and employees. This approach to worksite health promotion involves entirely voluntary activities that are generally selected for the positive effect they are likely to have on employees. Activities under this approach are passive and offer information and experiences that are generally desired by most employees. The key operative word here is "fun".

The type of programme interventions that characterise this particular model can be viewed in Table 3.3.

Table 3.3: Typical QWL health promotion activities (Chapman, 2005:45)

- ‡ Health fair
- ‡ Biometric testing
- ‡ Lunch and learn sessions
- ‡ Health promotion "event"
- ‡ Community sponsorship
- ‡ Chair massage option
- ‡ Free fruit
- ‡ Health promotion material in HR
- ‡ Health cartoons circulated
- ‡ Nutritious spot lucks
- ‡ Celebrity event

The realistic expectations or "likely results" to expect from this programme model is not any likely economic return. Furthermore, the random nature of programming combined with the fragmented approach leads to very limited levels of economic return. Also associated with this form of health promotion programme are very low expectations for long-term behaviour change. Since limited behaviour change takes place, there is typically limited economic return. Rarely a single intervention in this

form of programme will be available and will show a very high cost benefit ratio. In rare cases, the cost to benefit ratio for this type of programme model may be as high as 1:1.5 (Chapman, 2005:47-48).

Table 3.4 contains a brief summary of an example of a QWL health promotion programme (Chapman, 2005:79).

Table 3.4: Example of a QWL health promotion programme (Chapman, 2005:79)

Health promotion communication	‡ Distribute free pamphlets in the human resources ‡ Post the health promotion newsletter on bulletin boards ‡ Distribute a health tip memo periodically ‡ Put health promotion information in the employee newsletter
Health management process	‡ Provide a weight scale in the lunchroom ‡ Offer to take blood pressures periodically in the cafeteria ‡ Provide an annual personal health promotion inventory option ‡ Provide a chair massage time each week
Group activities	‡ Run a periodic weight loss contest, dividing the fee "pot" ‡ Organize an active walking club and lunch outings ‡ Provide a "Colours" program to help understand working and communication styles ‡ Provide a membership discount to a local fitness club ‡ Provide a naturopathic physician for brief consultation sessions at work
Supportive policies	‡ Adopt a smoke-free policy ‡ Put a microwave into the lunch room ‡ Provide healthier choices in vending machines ‡ Remove cigarette vending machines ‡ Purchase posters and cartoons and place them on bulletin boards

In conclusion, this level of programming brings increased awareness and information available to the population. Although there may be some benefit from the experiential health promotion, this level of programming will usually have a minor impact on individual health behaviour and the prevalence of risk factors among the population. As maintained by Chapman (2005:79-80), the cost of the QWL programme described above is approximately $0 to $45 per employee per year and does not generally require professional staffing. A part time health promotion coordinator would be necessary at the beginning to help initiate and guide the programme. Finally, it is the view of Chapman (2005:78-80) that this is a low cost programme approach.

b) TRADITIONAL OR CONVENTIONAL MODEL (ToC)

This model of worksite health promotion focuses primarily on the passive offering of a more extensive set of interventions than the QWL programme model described above. The intention of this programme is to offer a wide range of activities in a smorgasbord-style approach where about half the eligible employees will usually initiate the use of one or more programme activities. The intent is to offer on a voluntary basis many different worksite-based health promotion activities and to have "something ... for everybody." This approach to worksite health promotion usually involves only site-based activities that are voluntary without significant incentives. Activities under this approach can be characterised as passive and focused primarily on offering information and experiences that are generally valued by most employees. The programming is usually not driven by a concern for health cost management (HCM) effects and the key operative word here is "safe". As noted by Chapman (2005:49), this model is the one that is used in the majority of worksite health promotion programmes, particularly if economic return has not been a high priority in the programme. Incentives can be implemented but it is usually exceedingly difficult and consequently often shows weak effects.

The type of programme interventions that characterise this particular model can be viewed in Table 3.5.

Table 3.5: Typical ToC health promotion activities (Chapman, 2005:53)

‡ Health fair
‡ Lunch and learn sessions
‡ Health promotion "event"
‡ Community sponsorship
‡ Chair massage option
‡ Free fruit
‡ Health promotion material in HR
‡ Health cartoons circulated
‡ Nutritious spot lucks
‡ Celebrity event
‡ Health risk assessment
‡ Biometric testing option
‡ Fitness club membership/facility
‡ Weight management programme
‡ Web-based health information
‡ Healthy cafeteria/vending options
‡ Self-care book
‡ Preventative medical benefit coverage
‡ Wellness newsletter
‡ Short term incentive programme

The realistic expectations or "likely results" to expect from this programme model is likely a modest economic return. The more comprehensive nature of programming combined with a "use at will" approach usually leads to approximately half of eligible employees taking some level of personal initiative to use at least one per year of the many types of programme offerings that characterise this programme model. Also associated with this more traditional form of health promotion programme are moderate levels of expectations for long-term behaviour change. Moderate levels of behaviour change lead to moderate levels of economic return. As maintained by Chapman (2005:55), this programme is typically associated with a cost/benefit ratio of 1:3.00 producing three dollars of saving to each dollar of cost invested in the programme, safely within 12 to 14 months of the start of the programme.

Table 3.6 contains a brief summary of an example of a ToC health promotion programme (Chapman, 2005:80).

Table 3.6: Example of a ToC health promotion programme (Chapman, 2005:80)

Health promotion communication	‡ Distribute free pamphlets in the HR upon request ‡ Send a health promotion newsletter to employees at their home each month ‡ Post health promotion and motivational posters on bulletin boards and walls throughout the worksite ‡ Distribute health promotion PDA software to employees ‡ Provide a health advice phone line option for employees ‡ Mail a medical self-care book to every employee's home
Health management process	‡ Provide a voluntary HRA to employees ‡ Provide an opportunity for basic fitness testing on a voluntary basis ‡ Conduct an annual blood pressure sweep ‡ Offer periodic cholesterol testing opportunity each year
Group activities	‡ Run a periodic weight loss contest, dividing the fee "pot" among those who have kept weight off at six months after the contest ‡ Organize and promote a walking club ‡ Open a small fitness facility funded with member dues and with dedicated space ‡ Offer smoking cessation classes ‡ Conduct resilience education classes at periodic intervals ‡ Provide monthly "Lunch and Learn" sessions on health promotion topics
Supportive policies	‡ Adopt a smoke-free policy ‡ Put a microwave and healthier options into the lunch room ‡ Install some bike racks and fitness equipment ‡ Purchase and post motivational posters ‡ Install showers in the fitness facility ‡ Install 12-14 areas of worksite policies that are supportive of health promotion behaviour

To conclude, this example of health promotion programming provides a mix of information, motivation and behaviour change opportunities for employees. This level of programming usually requires professional level staff and a reasonable level of budgetary resources. The average cost of a ToC programme would probably be in the range of $46-$150 per employee per year. The larger the number of employees involved, the larger the budget must be for staffing. This level of programming usually includes some incentive features with primarily good material types of rewards (Chapman, 2005:82).

c) HEALTH AND PRODUCTIVITY MANAGEMENT MODEL (HPM)

This model of worksite health promotion focuses primarily on the proactive offering of a highly structured and substantial set of interventions than either the QWL programme model or the ToC programme model. It is Chapman's view (2005:57) that the intention of this programme is to provide an infrastructure of health management activities offered to a large portion of the workforce involved and their spouses. Usually more than 80% of eligible employees complete a health risk assessment (HRA) each year and at least half the spouses. Strong incentives are used to achieve this high-level participation. In addition, the HRA is used to provide survey-guided programming that uses the information provided in the HRA to proactively offer support and coaching to participants. The core intention of the HPM model is to offer an organised and intentional process of health improvement and health risk reduction for all participants (Chapman, 2005:57).

This approach to health promotion usually involves both site-based activities and "virtual" activities (those involving use of mail, computer and telephone in home settings) that are connected to significant incentives. Activities under this approach can be characterised as highly personalised, proactive in nature, and focused primarily on assisting the participant with reduction of selected health risks and improved management of health outcomes. The programming is usually driven by a concern for health cost management (HCM) effects and the key operative words here are "serious health promotion" (Chapman, 2005:57).

In conclusion, this model is the one that is used in the most progressive companies, particularly if economic return is a high priority for the health promotion programme. Incentives used are usually significant and may range from $300 to $1000 and programme budgets are usually significant. Rigorous programme evaluation is much more feasible and approximates much more of an epidemiologically sound approach (Chapman, 2005:57).

The type of programme interventions that characterise this particular model can be viewed in Table 3.7.

Table 3.7: Typical HPM health promotion activities (Chapman, 2005:62)

‡ Health fair
‡ Lunch and learn sessions
‡ Health promotion "event"
‡ Community sponsorship
‡ Chair massage option
‡ Free fruit
‡ Health promotion material in HR
‡ Health cartoons circulated
‡ Nutritious spot lucks
‡ Celebrity event
‡ Health risk assessment (incented and used for targeting)
‡ Biometric testing option
‡ Fitness club membership/facility
‡ Weight management programme
‡ Web-based health information
‡ Healthy cafeteria/vending options
‡ Self-care book
‡ Preventative medical benefit coverage
‡ Health promotion newsletter
‡ Short term incentive programme
‡ Risk stratification and interventions
‡ Telephonic coaching
‡ Medical self-care and consumer workshop
‡ Injury prevention
‡ Benefit linked incentive
‡ Health promotion achievement incentives
‡ Resiliency initiative for productivity
‡ Spouses also served
‡ Integrated programming
‡ Uses HPM framework

The realistic expectations or "likely results" to expect from this programme model is likely to produce a sizeable economic return. The more comprehensive nature of programming, combined with the use of proactive programming interventions, usually leads to more than 80% of the eligible employees taking some level of personal initiative to use at least one programme per year of the many offerings that characterise this programme model. Also associated with this more aggressive form of health promotion, are significant levels of long-term behaviour change. Significant levels of behaviour change lead to significant levels of economic return. As argued

by Chapman (2005:66), this programme model is typically associated with a cost/benefit ratio of 1:6.00 producing six dollars of savings to each dollar of cost invested in the programme, safely within 12 to 14 months of the start of the programme.

A significant amount of evaluation potential is associated with this particular programme model. The evaluation of individual programme components such as health fairs, lunch and learn sessions, voluntary completion of HRA's and participant satisfaction for various activities can be accomplished with a post programme evaluation survey and some additional questions can be asked about improvements in the programme and how important the programme was to specific behaviour changes. The high percent of the population completing a HRA each year allows a much more rigorous assessment of changes in the population. One of the basic strengths of this particular programme model is the valuation of the entire participant population and/or the entire workforce through the HRA. It is then possible to assess the impact of the programme on health risk prevalence, readiness to change, improved behaviour patterns and health care utilisation experience as well as sick leave experience, workers' compensation cost experience, disability management experience and presenteeism effects. The increased potential in evaluation capability combined with the relatively large populations of participants reached with this model makes Return-on-Investment (ROI) assessment possible on an annual basis (Chapman, 2005:67).

Finally, a significant "formative" evaluation that is intended to improve the effectiveness and efficiency of the programme is possible in this model, as well as the more substantive "comparative" evaluation that assesses the performance of the programme against a normative standard (Chapman, 2005:66).

Table 3.8 contains a brief summary of an example of a HPM health promotion programme (Chapman, 2005:81).

Table 3.8: Example of a HPM health promotion programme (Chapman, 2005:81)

Health promotion communication	‡ Distribute free pamphlets in the HR upon request periodically for each work group ‡ Send a health promotion newsletter to employees at their home each month ‡ Post health promotion and motivational posters on bulletin boards ‡ Distribute health promotion material periodically ‡ Provide a health promotion library with books and videos to check out and connect these to a core incentive programme
Health management process	‡ Require all employees to complete an HRA annually in order to maintain benefit coverage ‡ Conduct bi-annual blood pressure sweeps throughout the worksite ‡ Offer periodic lipid screens to help employees manage their nutrition patterns consistent with the new dietary guidelines ‡ Have health promotion coaches follow up personally ‡ Provide a health advice line with both inbound and outbound capability
Group activities	‡ Run periodic weight loss, fitness activity and cholesterol lottery groups, dividing the matched fee "pot" among those who have maintained good results at six months after the formal contest cycle ‡ Organize an active walking and recreational activities club ‡ Conduct periodic resilience workshops ‡ Offer smoking cessation and weight management classes ‡ Operate an on-site fitness facility with a strong linkage to the core incentive programme
Supportive policies	‡ Adopt a smoke-free policy ‡ Put a microwave and healthy menu options into the cafeteria ‡ Require periodic completion of the health survey to maintain health plan coverage and provide a $600 health plan discount for meeting 8 to 10 health promotion achievements linked to programme participation, health status attainments, behavioural compliance and meeting organizational indicators ‡ Establish a fitness facility at each worksite ‡ Install walking trails and showers in all major locations ‡ Implement 20-24 worksite employment and benefits policies that are supportive of health promotion behaviour and employee health management

In conclusion, this HPM style example of health promotion programming involves a serious and long-term commitment to creating a healthy workforce and a healthy work culture. The average annual cost per employee of this level of programming is probably in the range of $151-$450, not including the cost of professional staffing and the cost of financial incentives provided to employees. For this level of direct and vendor provided programming, there should be a full time, professional health promotion staff person for every 300 to 700 employees (Chapman, 2005:81-82).

Table 3.9 gives a summary of the three different health promotion programme models.

Table 3.9: Summary of three different programme models (Chapman, 2005:68)

	Programme feature	Quality of work life programme model (QWL)	Traditional or conventional programme model (ToC)	Health and productivity management programme model (HPM)
Operating principle	Voluntary versus mandatory activities	All voluntary	All voluntary	Some mandatory
	Clinic risk factor orientation	Weak	Moderate	Strong
	Type of prevention	1°	1° + 2°	1° + 2° + 3°
	Degree of programme orientation	None	Weak	Strong
	Systems orientation	None	Weak	Strong
	Participation of spouses	None	Weak	Strong
	Worksite based programme	All	All	Work and home
	Budget requirements for programming	Limited	Moderate	Major
	Expectations for economic return	None	Moderate	High
	Evaluation potential	None-existent	Weak	Strong
Organizing principle	Degree of pro-activity of programming	None	Weak	Strong
	Use of biometric testing	Very little	Heavy	Focused and linked
	Use of personal plan improvement	None	Moderate	Heavy
	Use of group interventions	Mostly group	Mostly group	Mostly individual
	Intervention with the high risk	None	Some	A lot
	Use of incentives	None	Weak	Strong
	Segmentation of programming	None	Light	Strong
	Medical self-care & consumer emphasis	None	Light	Heavy
	Onsite fitness facility emphasis	Weak	Strong	Weak
	Intentional cultural change orientation	Weak	Moderate	Strong

As evidenced from the programme models described above it, becomes clear that the type of programme model to be utilized by a company will be determined by what the company would like to achieve with the health promotion programme. Must the outcome be an economic return, a change in behaviour, motivational, informative, improving of the employee's morale, adding quality to work life and to improve camaraderie and relationships between employer and employee? Answers to these questions will enable a company to select and implement the correct health promotion programme. It is, however, the view of Randolfi (2006:2) that as the discipline of worksite health promotion continues to evolve, the need to define succinctly the components of this comprehensive approach increases. It is unlikely that any one component of a worksite health promotion programme will be responsible for the positive health outcomes of all employees. As noted by Randolfi (2006:1), a comprehensive approach to health promotion programming will maximize the impact of all interventions that requires the integration and overlapping of responsibilities by various departments and individuals outside the company. In the section to follow will Randolfi's (2006:2-8) representative model be discussed.

d) RANDOLFI'S HEALTH PROMOTION MODEL

This model includes the following components, which will be discussed below: health education programmes, employee health services and benefits, physical fitness and nutrition programmes, health promotion policies and procedures, counselling and employee assistance programmes, a safe and healthy work environment, and finally, the integration of company and community resources.

- **Health education**

Health education is easily integrated into all the areas of this model and it is unlikely that any of the areas could survive without an educational component. It is a key element of every primary, secondary, and tertiary prevention programme and a means of promoting wellness and optimal health. Health education efforts should emphasize skill development and the adoption of health enhancing behaviours while being accessible to all employees, their families and retirees. Methods of delivery

may include; one on one instruction, group presentations, seminars, workshops and finally, an educational media lending library and health literature distribution. Programme examples may include:

- Health risk appraisals
- Individualized health prescriptions and behaviour change assistance
- CPR and first aid training
- Nutrition education
- Stress management
- Smoking cessation
- Heart disease and cancer education
- Blood borne pathogens
- Sexual assault prevention
- Prenatal care
- Safety education
- Self care programmes
- Healthy back programmes
- Family centred programming
- Supplies of literature and educational media available for employee loan

➢ **Physical fitness and nutrition programmes**

Although many physical fitness and nutrition programmes are instructional in nature, they should go beyond educational programmes by providing enabling supports for the adoption of healthy behaviours. Quality health promotion programmes encourage and facilitate participation in daily physical activity for all employees and, when possible, family members and retired workers. As maintained by Randolfi (2006:4), this can be accomplished through access to fitness facilities (preferably on site) and properly supervised exercise classes. In addition, a comprehensive programme will provide opportunities for individualized exercise and nutrition prescriptions from certified professionals. Commitment to the model is demonstrated through occupational food services and sales consistent with healthy nutrition. The specific programmes to include are:

- Strength training
- Flexibility conditioning
- Healthy cooking classes
- Aerobic conditioning
- Diet analysis and planning assistance
- Physical rehabilitative programmes
- Weight/body fat control programmes
- Team and individual recreational sports programmes
- Physical fitness assessments

➢ **Employee health services and employee benefits**

As stated by Randolfi (2006:4) greater emphasis is put on primary prevention to keep employees healthy and secondary prevention to identify and treat health conditions before they can become serious. At some workplaces, employees are encouraged to take greater responsibility for their health related behaviours through risk rated incentive packages. Linking wellness to employee benefits of gain sharing and co-payment cost reductions will provide new opportunities requiring efforts of collaboration between the human resource managers and the health promotion specialists. It is Randolfi's (2006:4-5) view that these two sets of professionals may also work together for the ongoing evaluation of cost effective health promotion programming.

In conjunction with the above programmes, most large companies also have a nurse or physician on staff to dispense on-site medical and preventive care. Some programmes have also found it cost effective to provide their own physical therapy programming to assist injured and infirm workers in regaining optimal functioning. According to Randolfi (2006:4-5) a comprehensive selection of health related employee services and benefits would include the following:

- Free or low cost health screenings for serum cholesterol, blood pressure colorectal cancer screen, mammography, vision and hearing as well as diabetes are provided on site by company clinical personnel or through outside contractors

- Referral and follow-up procedures (e.g. hypertension, cholesterol, cancer)
- Provision of first aid and emergency care
- Disease control and prevention programmes
- Child and infirm adult care services
- Pre-retirement and financial planning
- Continued learning/educational opportunities
- Coordination of company picnics and outings
- Parent/child work visitation programmes
- Workman's compensation/rehabilitation

➢ **Counselling and employee assistance programmes**

It is the view of Randolfi (2006:5) that an employee's psychological health can never be neglected in a comprehensive model of worksite health promotion. Originating from a need for alcohol abuse interventions in the workplace, today's employee assistance programmes (EAP) encompass assessment and counselling for substance abuse and dependency, stress related disorders, family conflicts and other personal issues. Alcohol and substance abuse problems as well as issues of workplace violence and harassment are common areas of concern. For many the only viable treatment solution is the worksite's health promotion programme. Exemplary programming may include inter alia:

- Individualized assessment of employee concerns
- Assistance in treatment choice
- Emphasis on prevention as well as treatment
- Personal and family counselling
- Treatment for addictions such as drugs, alcohol and gambling
- Crisis intervention
- Stress management
- Ongoing support groups
- Management and employee training to identify individuals at risk
- After treatment care

➢ Safe and healthy work environment

The environmental conditions of the worksite can be divided into both physical and psychosocial domains, both of which influence the culture and climate of a worksite. The climate of a workplace is also more conducive to enhancing health and human performance when the environment is safe, clean, aesthetically pleasing and ergonomically engineered. While some occupations maybe inherently dangerous (e.g. fire fighter, military personnel) all comprehensive worksite health promotion programmes should control exposure to unhealthy conditions including: hazardous chemicals, noise, temperature, radiation and other risky conditions. According to Randolfi (2006:6), programme examples includes the following:

- Health promotion programming grounded in supportive cultural change strategies
- Environmental and safety compliance measures (lighting, ventilation, heating, control of toxic substances, noise and universal precautions)
- Ergonomically designed workstations
- Sanitary, clean, well maintained physical environment
- Recycling promoted
- Employee and management training in emergency procedures

➢ Health related company policies and procedures

As maintained by Randolfi (2006:6), worksite health promotion programmes have at times been instituted as public relations vehicles intended to enhance the corporate image with little concern for improvements in employee health. Companies, who are truly committed to enhancing employee health and wellness, are companies who have worked to include employee health promotion into the company's mission statement. With this commitment, policies and procedures can be written to address short and long-term goals of increased employee health, productivity, and morale. As stated by Randolfi (2006:6), these policies and procedures are critical to the establishment of supportive organizational cultures conducive to employee health and wellness namely:

- Active employee involvement in health promotion committees and company decision making
- Availability of flexitime work schedules
- No smoking policy
- Drug use policy and testing
- Motor vehicle seatbelt restraints and the use of other protective/safety equipment
- Sexual harassment policy
- Family leave
- Consistent and frequent awards and recognition of employee work efforts

➢ **Integration of Company and Community Resources**

Randolfi (2006:6-7) argues that worksites do not exist in a vacuum but are part and parcel of the community in which they are located. Successful corporate administrators are cognizant of the need for positive community relations and should do what is necessary to promote good will. What better way to bridge relationships than by utilizing existing community health promotion services and programmes whenever possible (e.g. voluntary, private and public health agencies) and providing health related services back to the community. Since the community is also the home of the employee, an effective mode of health promotion is through programming directed at the larger community. Sponsorship of community related health fairs is one example and more are listed below.

- Encourages employee/employer involvement in the community (blood drives, sponsorship of fund raising for community schools and social services, community recycling, youth league sports sponsorship, job training programmes)
- Media and public relations programmes advertising a healthy company image
- Company newsletters and press releases on health issues to local media
- Environmentally sound use of community resources and waste disposal

As confirmed by Randolfi's (2006:2-8) comprehensive programme model above, the focus of this programme model will be on employee wellness and optimal health and not just on the reducing of health care costs, prevention of disease as well as the maintaining of health. Furthermore, the impact of the interventions of this comprehensive approach to health promotion will be maximized only if there is an increased communication between administrators, employees, employee families, while adopting healthy worksite culture and climate.

Randolfi's (2006:2-8) programme model can be compared with components of Chapman's (2005:49-82) traditional or conventional model (ToC) and the health and productivity management model (HPM). It relates to Chapman's (2005:49-82) traditional or conventional model (ToC) because the traditional or conventional model provides a mix of information, motivation and behaviour change opportunities for employees. Furthermore, this programme offers a wide range of activities and this approach to worksite health promotion usually involves only site-based activities that are voluntary without significant incentives. Finally, this traditional or conventional model (ToC) can be compared to Randolfi's (2006:2-6) model because it offers information and experiences that are generally valued by most employees. It also compares well to components of Chapman's (2005:49-82) health and productivity management model (HPM) due to the provision of an infrastructure of health management activities offered to a large portion of the workforce involved and their spouses, and the completion of a health risk assessment (HRA). The core intention of the HPM model is to offer an organised and intentional process of health improvement and health risk reduction for all participants. A significant difference between Randolfi's (2006:2-8) model and Chapman's (2005:49-82) traditional or conventional model (ToC) and the health and productivity management model (HPM) is that Chapman's models are usually driven by a concern for health cost management (HCM) effects.

3.7 CONCLUSIONS

Literature on health promotion programmes in South African companies is scanty and, therefore, information had to be collected from international companies. If

companies want to invest and initiate health promotion programmes, it will not only affect health care costs through the tangible and intangible benefits to be gained, but also they can reason that from a more holistic view on employee health, it can act as a primary, secondary and tertiary prevention strategy. Unfortunately, if companies do not buy-in to relatively low-cost awareness campaigns and other health promotion intervention programmes, research indicates that many low-risk employees inevitably join the ranks of the higher-risk/higher cost employees. The implication of the above is so extensive that from 2 percent to 4 percent of an employee population is likely to migrate from low-risk status to higher risk within one year in the absence of preventative programmes to assist. Besides the reasons mentioned above for initiating and implementing health promotion programmes at the workplace, it is an ideal site for the establishment of a health promotion programme and is described as one of the most influential environments for adult health awareness programmes. Furthermore, if a health promotion programme is well designed and effectively implemented, employer, employees, labour groups, communities and government can potentially benefit. The most important purpose of health promotion programmes is to change the behaviours associated with "modifiable" risk factors because the chance of illness and/or injury (e.g. "morbidity") is reduced for the individual and, as more individuals change their behaviour, the morbidity of the entire group is reduced. The principal strategy of health promotion programmes is thus to motivate employees to learn to practice life-long positive health behaviour. In conclusion, it seems an impossible task to establish a "one-size fits all" type of health promotion programme because there are an immense number of worksite health promotion programmes and they vary in design, scope, intensity and duration. In the end, the type of health promotion programme model to be utilized by a company will be determined by just one question – What would the company like to achieve with the programme on the short, medium and long term?

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4

Quantitative Analysis of Some Selected Health Risk Profiles of Executives in the South African Colliery Industry

Kwantitatiewe Ontleding van Sekere Geselekteerde Gesonheid Risikoprofiele van Suid Afrikaanse Steenkoolmyn Uitvoerende Amptenare

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ABSTRACT

Studies that examined the physical, physiological and bio-chemical health indicators of South African executives are limited and outdated. Ongoing research indicates that the immense, yet measurable burden of poor health on indirect costs, particularly in lost productivity on and off the job is borne by all employers, even those who avoid direct costs by not funding health benefits (Clymer, 2005:i). Research has linked poor health status to higher direct health care costs, lower work output (e.g. presenteeism), higher rates of disability, higher workers' compensation and higher rates of injury (Wright et al., 2004:938). The purpose of this study is to determine the risk profile of South African colliery executives concerning some selected physical, physiological and bio-chemical health indicators. In this study a non-randomized, availability population of 143 white male executives from 5 Collieries, aged 26-58 years ($\bar{X}$ = 41.7, ± 7.98 years) participated. From the descriptive data, it is clear that regarding the bio-chemical parameter (cholesterol), respectively 46.8% and 53.2% fall in the desired (<5.20m.mol/L) and undesired (≥5.2mmol/L) health zone. Regarding the physiological parameter, namely blood pressure respectively 16.8% (systolic blood pressure) (≥140mmHg) and 21.7% (diastolic blood pressure) (≥90mmHg) fall in the undesired health zone. Finally, concerning the physical parameters it is apparent that flexibility (56.7%); sit-ups (39.7%); aerobic fitness (44.8%); fat percentage (31.4%); BMI (35.7%) and WHR (44.7%) fall in the age-adjusted undesired health zone. Therefore, it appears that health promotion intervention programmes are urgently needed to preserve and maintain good health and optimum productivity among executives as well as to protect the company's investment in the human capital.

Keywords: Executives, health promotion, health, physical, health care costs

Sleutelwoorde: Uitvoerende amptenare, gesondheidbevordering, gesondheid, fisieke, gesondheidsorgkoste

4.1 INTRODUCTION

Research suggests that technological advances over the past three decades are responsible for a 30%-40% reduction in humans' daily energy expenditure (Science Direct, 2002). Various researchers argue that employees, including executives, are forced into a sedentary type of lifestyle due to changes in their working environment brought upon by technological development and mechanisation (Erikssen, 2001:571). A sedentary lifestyle is becoming more apparent which leads to hypokinesis, with detrimental effects on an individual's health, quality of life and wellness (Wang *et al.*, 2004:428). Booth *et al.* (2000:774-787) are of the opinion that a lack of physical activity leads to a reduction in health status and life expectancy. Destructive lifestyle habits i.e. stress, smoking, obesity and alcohol abuse, in conjunction with a lack of exercise, are responsible for 59.5% of all deaths among South African males between the age 15 and 64 years (Heart Foundation of South Africa, 2002).

The corps of executives forms a most valuable group of employees (Scott, 1999:15) and it is very important to maintain good health among them to ensure optimal productivity and to protect the company's investment in the human capital (Scott, 1999:125). Literature indicated that the South African executive's fitness levels are poor and they have an increased risk for developing coronary heart diseases (CHD) inter alia due to their physically inactive status (Strydom *et al.*, 1998:123). Regular physical activity has long been regarded as an important component of a healthy lifestyle, which promotes good health and can reduce the executives' risk of heart disease (Willmore, 2001:S622-S633; Bolton *et al.*, 2004:56). The hypothesis of a contributing role of a sedentary lifestyle to the aetiology of CHD has been extensively scrutinized over the past 30 years by observational epidemiological, post-mortem and physiological studies (Willmore, 2001:S622-S633).

Research by Strydom *et al.* (1998:125) on South African executives from the mining, construction, steel, motor, and financial industries indicates a high prevalence of the four primary risk factors (elevated cholesterol, smoking, hypertension and physical inactivity) for CHD. Literature also revealed that respectively 38.7% and 58.2% of South African executives' systolic and diastolic blood pressures were higher than the acceptable values and 4.3% of their percentage body fat was high (Dreyer *et al.*, 1996:461). Researchers indicated that 69.5% of executives have high cholesterol with an average cholesterol level of 5.96 $m.mol.l^{-1}$ compared to the ACMS guidelines acceptable value of <5.2 $m.mol.l^{-1}$ (Dreyer *et al.*,

1996:462). No literature could be found in South Africa on executive's WHR (waist-hip-ratio), BMI (body mass index) and shoulder/arm- strength/endurance (push-ups).

It is clear that research data analysing the health risk profile of the executive was outdated and scanty especially regarding SA colliery executives. Since the publication of the abovementioned data, significant changes in the political, social, economical and other spheres have taken place in South Africa, which may change the reported profiles significantly. The purpose of this study, therefore, is to determine the risk profile of South African colliery executives regarding some selected physical, physiological and bio-chemical health indicators. This information will be useful in planning and implementing intervention programmes for the maintenance of health and productivity among high-level employees.

4.2 METHODS

Subjects

In this study a non-randomized, availability population of 143 white male executives from five colliery mines aged 26-58 ($\bar{x}$ 41.7, ± 7.98 years) were used. These collieries are spread over two South African provinces namely Mpumalanga and Gauteng. Subjects on medication that could affect their cholesterol, blood pressure and aerobic fitness values were excluded from the study.

Measurements

Due to the effect of aging, the physical health indicator results (flexibility, aerobic fitness, muscle endurance, body mass index, waist-hip-ratio and fat percentage) were categorised according to age adjusted criteria as good, average and poor as suggested by McArdle *et al.* (2001:882). The physiological and bio-chemical health indicators however were not categorised according to age adjusted criteria (ACSM, 2000:42).

The following instruments were used in this study:

Aerobic fitness:- The protocol, as prescribed by ACSM (2000:76), was used to determine the executive's aerobic fitness by means of a 3-minute submaximal step test on a Reebok step-up

bench. The recovering heart rate ($b.min^{-1}$) counted for 15 seconds after cessation of the test served as the fitness score.

Shoulder/arm- strength/endurance (push-ups):- The procedure, as explained by the ACSM (2000:84), was used to determine the executive's shoulder/arm- (push-ups) strength/endurance. The maximal number of push-ups performed in one minute consecutively without rest was noted as the score.

Abdominal strength/endurance (sit-ups):- The procedure, as explained by the ACSM (2000:84), was used to determine the executive's abdominal strength/endurance (sit-ups). Within a one-minute period, the executive performed as many sit-ups as possible (elbows touching knees).

Flexibility:- A sit-and-reach box was used primarily to determine the flexibility of the hamstring musculature and secondarily the flexibility of the lower back to the nearest centimetre according to the protocol as described by the ACSM (2000:87).

Fat percentage:- A John Bull skinfold calliper was used to determine the executive's % body fat. The 3 (three) skinfold sites to be measured were the chest/pectoral, abdominal, and thigh, as suggested by Corbin *et al.* (2000:289-290). A minimum of 2 (two) measurements were taken at each site.

Waist-and-hip circumference:- A measuring tape was used to determine the executive's waist and hip circumferences to the nearest 0.1cm according to the protocol as prescribed by ACSM (2000:63).

Body mass index:- The procedure, as suggested by the ACSM (2000:63), was used to determine the executives body mass index by dividing the body mass (kg) by the height in meters squared ($kg.m^{-2}$).

Blood pressure:- An ALPK2 aneroid sphygmomanometer was used to determine arterial blood pressure according to the protocol, as described by ACSM (2000:40). The first Korotkoff sound was used to determine systolic blood pressure, while the diastolic blood pressure was determined using the 4^{th} Korotkoff sound. As already mentioned earlier, due to the effect of aging the physical health indicator results were categorised according to age adjusted criteria as good, average and poor (McArdle *et al.,* 2001:882), whilst the physiological and bio-chemical health indicators however were not categorised according to age adjusted criteria. Thus, the blood pressure was categorised in the following three categories as suggested by the ACSM (2000:42): good (≤130-139 / ≤85-89 mmHg), average (140-159 / 90-99 mmHg) and poor (≥160 / ≥100 mmHg).

Cholesterol:- For the determination of total cholesterol concentration the Accutrend GC was used by taking an arterial blood specimen from a finger prick. The machine was calibrated by using the batch related calibration strip before the assessment. According to literature, a fasting period prior to the assessment of total cholesterol is not necessary for screening purposes (BioDoc, 2000:16-18). The cholesterol results were categorised as good (<5.20m.mol/L), average (5.2 - 6.21mmol/L) and poor (≥ 6.21m.mol/L) (Ehrman *et al.*, 2003:174).

Procedures

The assessment of the executive's physical, physiological and bio-chemical indicators commenced immediately after a general health and fitness introductory talk. The assessments were done either in the executive's boardroom or in the gymnasium on site. A specific sequence for the physical and clinical assessments was followed. This assessment commenced with the physiological parameter (blood pressure) followed by the bio-chemical parameter (cholesterol) with the physical parameters (flexibility, aerobic fitness, muscle endurance, body mass index, waist-hip-ratio and fat percentage), concluding the session.

Data processing and statistical analysis

Statistical analysis of the data comprised descriptive summary statistics (N, mean, minimum, maximum and standard deviations) by using the Statistica programme available on the intranet of the North-West University (StatSoft Inc., 2004).

4.3 RESULTS

Descriptive data of the executives that participated in the study is presented in Table 4.1 and Figure 4.1 (a-j).

Table 4.1: Descriptive data regarding some health indicators of South African colliery executives

Parameter	N	Mean	SD	Minimum	Maximum
Age (years)	143	41.7	7.98	24.00	60.00
Aerobic fitness ($b.min^{-1}$)	143	114	17.60	72.00	156.00
Abdominal strength/endurance (sit-ups/$.min^{-1}$)	136	27	9.26	5.00	55.00
Shoulder/arm- strength/endurance (push-ups/$.min^{-1}$)	136	28	10.40	7.00	60.00
Flexibility (cm)	143	32.9	9.12	7.00	54.00
Height (cm)	143	179.1	6.55	160.00	196.00
Weight (kg)	143	92.2	15.41	61.00	135.00
Body mass index ($kg.m^{-2}$)	143	28.7	4.27	20.50	43.00
Waist-hip-ratio	143	0.93	0.07	0.69	1.07
Fat %	143	20.7	4.83	6.80	33.90
Systolic blood pressure (mmHg)	143	121	15.08	90.00	160.00
Diastolic blood pressure (mmHg)	143	80	11.13	45.00	110.00
Cholesterol ($m.mol.l^{-1}$)	143	5.27	1.06	3.40	7.80

From Table 4.1, it appears that the aerobic fitness level of $114b.min^{-1}$ compares well to the study from Grace (2001:82) who established an aerobic fitness level for blue-collar employees of 131 $b.min^{-1}$. Research by Strydom *et al.* (1998:123) on 392 South African executives from the construction, steel, mining, motor and financial industries, indicate that 74% of the white male executive's PWC_{170} value fell in the undesired level or health risk zone when compared to the average PWC_{170} value of 2.5 $watt.kg^{-1}$. Figure 4.1-a points out that 37.1% of the executive's aerobic fitness levels are average and 44.8% are poor.

Table 4.1 indicates that the executives performed an average of 27 sit-ups per minute (abdominal muscle strength/endurance) and 28 push-ups per minute (shoulder/arm- muscle strength/endurance). The study by Dreyer and Strydom (1992:27) reported that the executives performed 27 sit-ups per minute. It compares well to the Indiana non-executive law enforcement academy's standard of 29 sit-ups $.min^{-1}$ (ILEA, 2004). The standard for the Hampton non-executive police department for the age group 30-39 years was established at 33 sit-ups $.min^{-1}$ and for the 40-49 year age group at 28 sit-ups $.min^{-1}$ (Hampton Police Department, 2004). The 27 sit-ups $.min^{-1}$ performed by the executives (Dreyer & Strydom, 1992:27) as well as the 29 sit-ups $.min^{-1}$ performed by the Indiana Law Enforcement Academy's employees falls respectively into the average and good category if compared to the standard for the general male population (ACSM, 2000:84). It appears from Figure 4.1-c that 23.5% of the executives fall into the average sit-ups category and 39.7% in the poor category

(ACSM, 2000:84). The 28 push-ups performed by the executives in this study compares well to the 25 push-ups per minute of the non-executive Indiana Law Enforcement employees (ILEA, 2004). This value falls into the good category when compared to the standard for the general male population (ACSM, 2000:85). Although no comparative data on executives' push-ups exists, it appears from Figure 4.1-b that 81.6% of the executives were in the good category.

The mean hamstring/lower back flexibility of the executives in this study (32.9cm) can be compared to the study from Dreyer and Strydom (1992:27) where the mean flexibility was 34 centimetres. From Figure 4.1-d respectively 33.5% and 56.7% of the executives hamstring/lower back flexibility was average and poor when compared to the ACSM's criteria (2000:87).

The executives mean systolic (121mmHg) and diastolic blood pressure (80mmHg) (Table 4.1) compares well to the study from Dreyer and Strydom (1992:27) where the executives' systolic and diastolic blood pressure values was 134mmHg and 89mmHg respectively. Furthermore, research by Strydom *et al.* (1998:125), on 392 South African executives from the construction, steel, mining, motor and financial industries, indicate that these executives found themselves in the high risk zones of four primary risk factors for CHD (high cholesterol, smoking, hypertension and physical inactivity). They indicated that 38.7% of the executives' systolic blood pressure was higher than the acceptable value of <140mmHg, and 58.2% of the executives' diastolic blood pressure was higher than the acceptable value of <90mmHg. In contrast to the findings above, Figure 4.1-h and Figure 4.1-i indicate only 16.8% and 21.7% respectively of systolic and diastolic blood pressure was in the high risk zone. The reason for this difference in the executives' blood pressure can possibly be ascribed to the fact that the participants in the study from Strydom *et al.* (1998:125) came from a broader spectrum in the corporate environment as the same cut-off points were used in both studies.

Table 4.1 indicates a higher fat percentage of 20.7% if compared to the study by Dreyer and Strydom (1992:27) where the executives' fat percentage was 13.9%. In addition to this, research by Strydom *et al.* (1998:123), on 392 South African executives from the construction, steel, mining, motor and financial industries, indicate that 5% of the white male executives fat percentages fell into the undesired level or health risk zone (>25%). In their study, Dreyer *et al.* (1996:461) indicate that 4.3% of the executives' fat percentage was very high compared to this study's 31.4% (Figure 4.1-e). Part of the difference in this finding may be due to the fact

that Dreyer *et al.* (1996:461) used a dissimilar set of criteria to categorize the percentage body fat but also the executives working environment has changed over the past decade. Figure 4.1-f further highlights the executives' poor body composition indicating that 44.8% of the executives are overweight and 35.7% is obese. WHR (waist-hip-ratio) provides an index of relative fat distribution in adults (Gettman, 1993:238). The executives WHR is 0.93 (Table 4.1) and the higher the ratio, the higher the proportion of abdominal fat. Although no comparative data exists, it appears from Figure 4.1-g that 41.3% of the executives WHR fall into the average and 44.7% in the poor category when compared to the ACSM's criteria (2000:63). Fat distributed in the abdominal area (upper-body, "apple-shaped", or android obesity) is associated with greater morbidity and mortality than fat distributed below the waist (lower-body, "pear-shaped", or gynoid obesity (Corbin *et al.*, 2000:278).

The executives' average cholesterol level of 5.27 m.mol.l^{-1} (Table 4.1) compares favourable to the study of Dreyer *et al.* (1996:462) who reported a mean value of 5.96 m.mol.l^{-1}. Figure 4.1-j indicates that 30.1% of the executives' cholesterol levels are borderline while 23.1% is high.

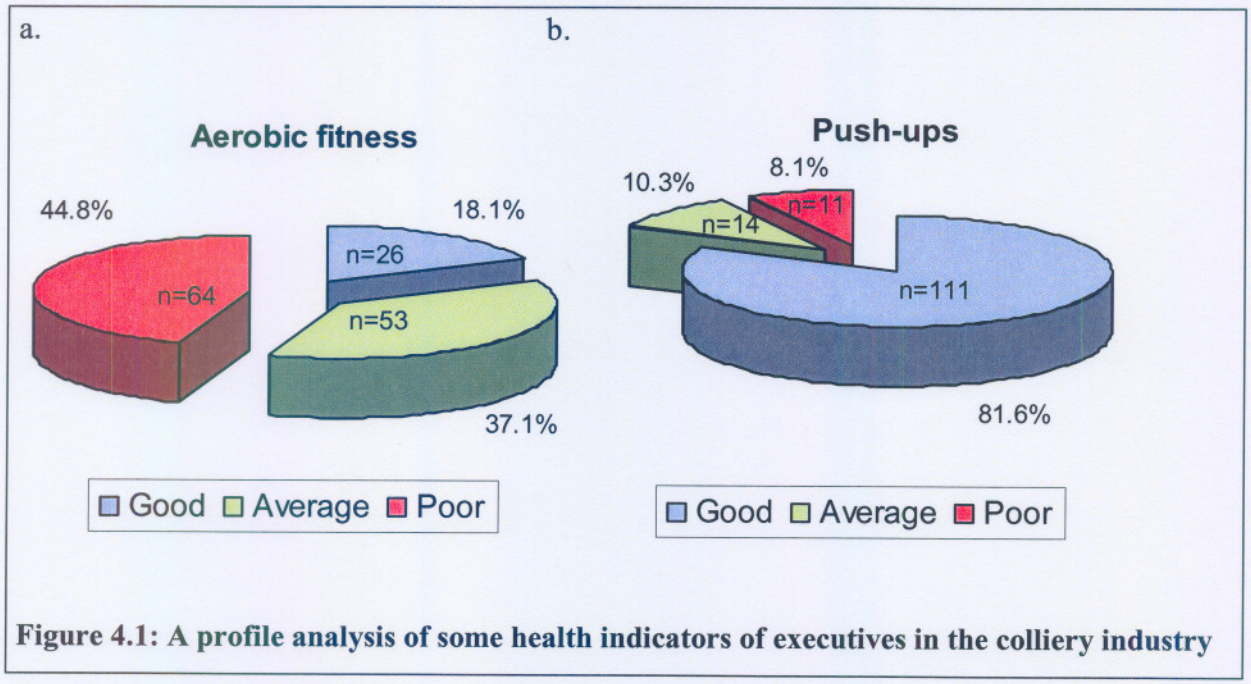
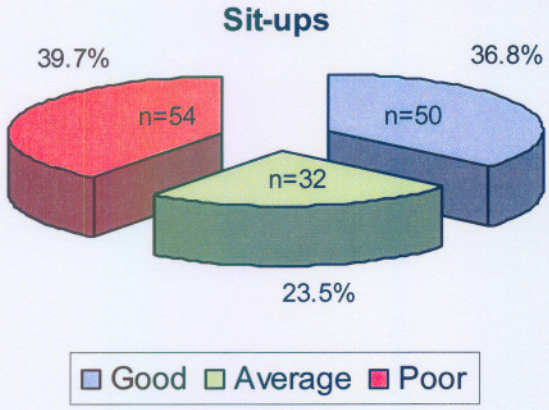
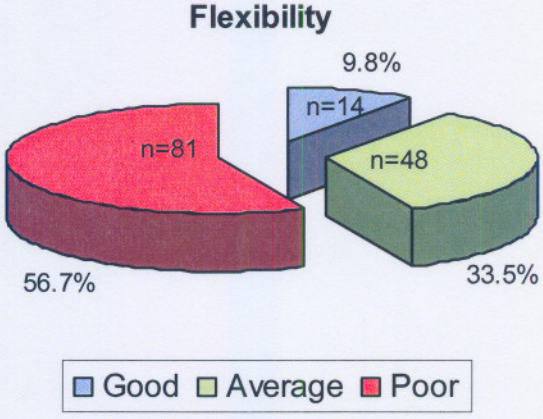


Figure 4.1: A profile analysis of some health indicators of executives in the colliery industry

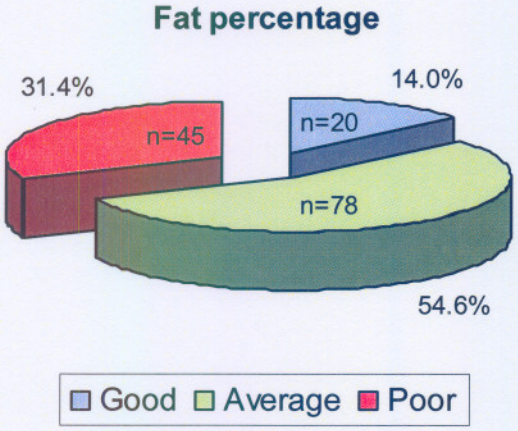
c.



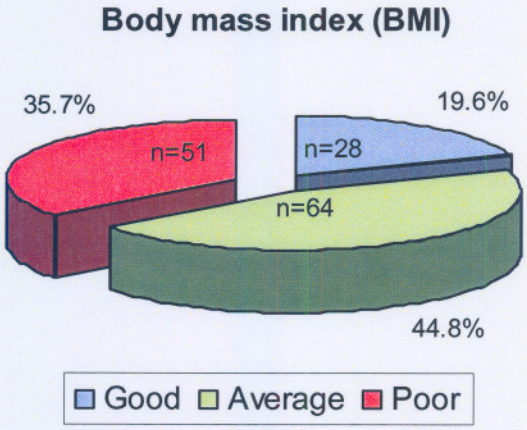
d.



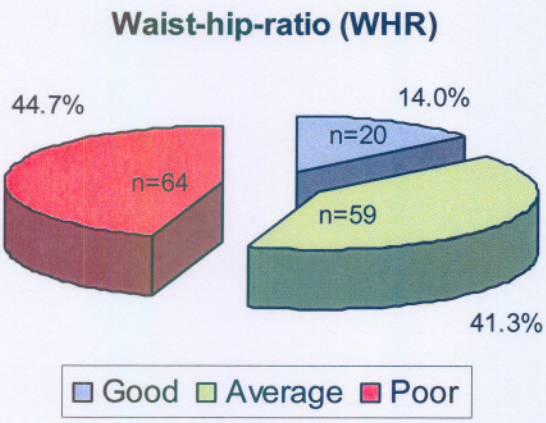
e.



f.



g.



h.

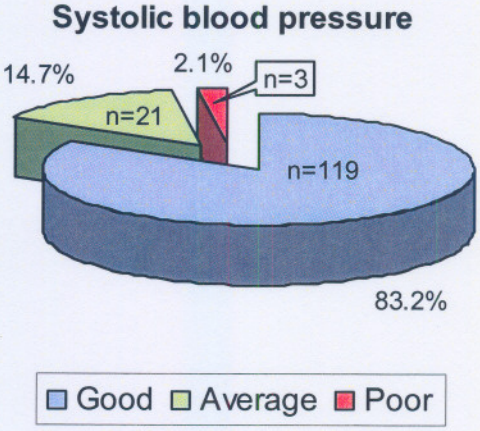


Figure 4.1: Continue

i. j.

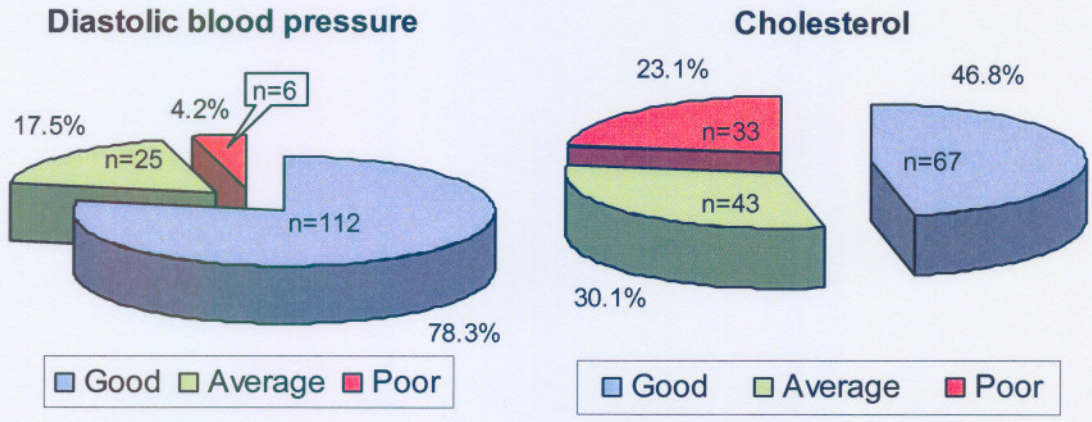


Figure 4.1 Continue

4.4 DISCUSSION

Currently there is a lack of research data on the aerobic fitness level of South African executives. From Figure 4.1-a it appears that 44.8% of the executive's aerobic fitness falls into the poor category. These poor fitness levels are alarming when considering that physical fitness contributes to good health and/or disease prevention (McArdle *et al.*, 2001:871). Furthermore, good health provides the ability to complete physical tasks successfully and maintain functional independence (McArdle *et al.*, 2001:913). This is disturbing and due to their poor fitness level, it can be assumed that the executives will have difficulty meeting the physical requirements of their job.

Data on the shoulder/arm- strength/endurance (push-ups) of executives could not be found in South African literature. From Figure 4.1-b, it seems that 81.6 % of the executives fall into the good category for push-ups. Unfortunately, the opposite is true regarding their abdominal muscle endurance where only 36.8% fall into the good category (Figure 4.1-c). Corbin *et al.* (2000:168) viewpoint on muscle endurance emphasize the importance of appropriate muscle endurance to executives: It increases work capacity, decreases the chance of injury, prevents lower back pain, poor posture and other hypokinetic conditions. Furthermore, their work output/capacity (e.g. presenteeism, absenteeism) can increase (Burton *et al.*, 2004:S38).

Information from Figure 4.1-d indicates that their hamstring/lower back flexibility is poor. Poor lower back and hip flexibility may, in conjunction with poor abdominal strength/endurance, contribute to lower back pain (ACSM, 2000:87). Bearing in mind the abovementioned literature, it is imperative for the executive to have good lower back flexibility because spinal disorders have an effect on the workforce and the health-care resources available, impacting negatively on their work output (Hee *et al.,* 2001:176; Burton *et al.,* 2004:S38).

Information from Figure 4.1-e indicates that 31.4% of the executive's fat percentages are in the poor category. Currently there is a lack of research data on executives' body mass index (BMI) and waist-hip-ratio (WHR) and no comparative literature could be found. It is apparent from Table 4.1, Figure 4.1-f and Figure 4.1-g that the executives body mass index and waist-hip-ratio are in the poor category. The implications to the executive for possessing a poor body composition is that obesity is regarded as an unmanaged health issue and it can damage the executives' productivity significantly (Goetzel *et al.,* 2003:2). Furthermore, obesity is a lifestyle-related risk factors and as their risk increase – even a single risk – health costs will increase (Burton *et al.,* 2004:S38) and these costs may double or triple if productivity measures are factored in (Burton *et al.,* 2004:S38).

Figure 4.1-h and Figure 4.1-i indicates that the executive's systolic (16.8%) and diastolic (21.7%) blood pressure is higher than the acceptable value of <140mmHg (systolic) and <90mmHg (diastolic). It is a source for concern and by implication it means that the more medical conditions an executive/person present, the higher their probability of absenteeism or presenteeism (Kessler *et al.,* 2001:1257). Furthermore, high blood pressure is regarded as an unmanaged health issue that can damage their productivity significantly (Goetzel *et al.,* 2003:2; Burton *et al.,* 2004:S38). Finally, if their blood pressure is high it increases their number of health risks with a consequent increase in work limitations where each additional risk factor was associated with an additional 2.4% excess of productivity loss (Burton *et al.,* 2005:769).

Table 4.1 points out that the executive's cholesterol level compares well to the ACSM (2000:47) guidelines acceptable value, but of concern is the findings from Figure 4.1-j revealing that 30.1% of the executive's cholesterol levels are borderline while 23.1% show high values which put them at risk for developing CHD. By implication it means that

preventative measures/programmes will have to be implemented, because the financial burden on companies to replace an executive will be immense when considering investment in high level employees.

4.5 CONCLUSIONS

From the discussion above, it is apparent that almost all the executive's physical health indicators fall into the undesired health zone that can influence their functional capacity negatively, and consequently, their productivity and presenteeism. It is further evident that if their results do not fall into the undesired health zone, most of their results fall into the average category. From the information above, it becomes apparent that companies will have to recognize the importance of worksite health promotion interventions, not only targeted interventions to reduce health care costs or to conserve and protect the company's investment in the executive, but also to create a strategy to prevent employees migrating into higher health risk categories.

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5

The Effect of a Physical and a Combined Health Promotion Intervention Programme on Some Selected Health Indicators of South African Colliery Executives

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The Effect of a Physical and a Combined Health Promotion Intervention Programme on Some Selected Health Indicators of South African Colliery Executives

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ABSTRACT

In many countries the focus of the employer's health policy has shifted from the emphasis of treating the disease to the preventative paradigm, which focused more on the promotion of employees' health. Various ramifications of wellness programmes, claiming positive results can be found in literature. The purpose of this study is to evaluate two different regimens; namely the conventional physical fitness programme as well as a combined programme of physical fitness enriched with health promotion activities. In this study 143 white male executives from 5 collieries, aged 26-58 years ($\bar{x}$ = 41.7, ± 7.98 years) participated as an availability, non-randomized sample. The subjects were randomly stratified into a control group (n=66) who were subjected to a conventional physical fitness intervention programme and an experimental group (n=77) who followed a physical fitness as well as a health promotion regimen. Assessments were done on the following time intervals, namely base line data (before starting), 16 weeks and 32 weeks (at termination of the programme). The following physical parameters were assessed: aerobic fitness, shoulder/arm- &, abdominal strength and endurance, flexibility, and BMI. The physiological and bio-chemical parameters assessed were the systolic and diastolic blood pressure at rest and total cholesterol concentration respectively. From the data, it is clear that both groups showed improvements in all health indicators for the first 16 weeks of the intervention period. However, for the last 16 weeks of the intervention period the control group showed deterioration in the aerobic fitness, flexibility, BMI and blood pressure parameters while the experimental group sustained improvement in almost all parameters. This was possibly due to some personal and programme factors which resulted in conflicting results.

Keywords: Executives, health promotion, health, physical, health care costs

Sleutelwoorde: Uitvoerende amptenare, gesondheidbevordering, gesondheid, fisieke, gesondheidsorgkoste

5.1 INTRODUCTION

In industrialized countries, modern technology has largely eliminated the need for physical exertion on the job, in the home and for transportation (Science Direct, 2002). Research by Jacobs (1991:64), Van Zyl (1995:iv, 31) and Dreyer (1996:131) also confirms this scenario in South Africa. They maintain that due to modernising, technological development and business demands, the South African executive finds him/herself in a stressful and often hypokinetic environment. As maintained by Dreyer and Strydom (1994:1) only 3% of South African executives are physically active at work while 20.6% were adequately physically active to ensure a salutogenic effect outside the working environment (Dreyer, 1996:133). Bolton (2002:78) reported 31% of the executives to be highly active during their leisure time. As far as the physical fitness status of some South African executives is concerned, Jacobs (1991:125) indicated a low 1.9 watt.kg^{-1} compared to the average PWC_{170} value of 2.5 watt.kg^{-1}, as established by Jones and Campbell (1982:250). According to Strydom *et al.* (1998:123) 74% of the white male executives from the construction, steel, mining, motor and financial industries indicated a low physical fitness score, while 5% of the respondents showed a body fat percentage of >25, placing them in a high health risk category. Furthermore, it also became clear from Swanepoel (2001:100) that 75.6% of the executives follow a moderate or unhealthy lifestyle with an inability to establish a balance between their work, family and relaxation (Dreyer & Strydom, 1994:11).

From the above, it is clear that the physical profile as well as the lifestyle of executives portray a fairly unhealthy scenario which can lead to a state of hypokinesis, an increased risk for the developing of coronary heart diseases, a reduction in health status and quality of life which may eventually result in premature death (Booth *et al.*, 2000:774-787; Bolton, Wilders & Strydom, 2004:56; American Heart Association, 2005).

The need for employers to conserve their investment in the employees (human capital) became evident over the last decade. Organizations therefore strive to identify the leading health cost drivers – both direct and indirect (e.g. medical, absenteeism, disability, presenteeism) because emerging research is documenting that indirect costs of poor health can be two to three times the direct medical costs (Burton *et al.*, 2004:S38). It is at this point that companies have to realise the importance of worksite health promotion intervention, not only targeted

interventions to reduce health care costs but also to provide a strategy to create a dynamic work environment (Pfeiffer, 2003:116) and to prevent employees from migrating into higher health risk categories (Musich *et al.*, 2003:393).

For the past two decades the emphasis of most health promotion programmes and evaluative research at the workplace has been on physical risk factors and physical health status (O'Donnell, 2002:1). Given the medical genesis of health promotion and the overwhelming research supporting the relationship between physical health, morbidity, and mortality, this focus on the physical dimension is not unexpected (O'Donnell, 2002:xx). It is well known that a physical active lifestyle enhances general health, reduces the risk for coronary heart diseases and ensures quality of life (Willmore, 2001:S622-S633). This focus on the physical dimension later became insufficient and health promotion programmes consequently expanded to a more holistic view on employee health, focussing on primary, secondary and tertiary prevention strategies for employees that resulted in better compliance and sustained improvement (Randolfi, 2006:1).

In South Africa no literature is available at present comparing a physical intervention programme to an enriched health promotion programme where other wellness dimensions were also incorporated. The motivation of this study was therefore to go beyond focussing on physical fitness only as an intervention regimen, but to enrich the intervention programme with other health promotion intervention activities.

5.2 METHODS

Subjects

In this study an availability, non-randomized sample of 143 white male executives from five collieries aged 26-58 ($\bar{x}$ 41.7, ± 7.98 years) were used. These collieries are spread over two South African provinces, namely Mpumalanga and Gauteng. Subjects on medication that could affect their cholesterol, blood pressure and aerobic fitness values were excluded from the study.

The subjects were randomly assigned to either a control group (n=66) or an experimental group (n=77). The experimental group was exposed to a physical and a health promotion intervention programme for eight months (32 weeks) while the control group was only exposed to a conventional physical fitness intervention programme. The subjects were assessed on three occasions, namely before they started the programme, 16 weeks after and a final assessment 32 weeks thereafter.

Measurements

The following parameters were used in this study:

Aerobic fitness:- The protocol, as prescribed by ACSM (2000:76), was used to determine the executives' aerobic fitness by means of a 3-minute submaximal step test on a Reebok step-up bench. The recovering heart rate ($b.min^{-1}$) counted for 15 seconds after cessation of the test served as the fitness score.

Shoulder/arm- strength/endurance (push-ups):- The procedure, as explained by the ACSM (2000:84), was used to determine the executives' shoulder/arm- (push-ups) strength/endurance. The maximal numbers of push-ups performed in one minute consecutively without rest was noted as the score.

Abdominal strength/endurance (sit-ups):- The procedure, as explained by the ACSM (2000:84), was used to determine the executives' abdominal strength/endurance (sit-ups). Within a one-minute period, the executive performed as many sit-ups as possible (elbows touching knees) which indicated the abdominal endurance.

Flexibility:- A sit-and-reach box was used primarily to determine the flexibility of the hamstring musculature and lower back. The measurement was taken to the nearest centimetre according to the protocol as described by the ACSM (2000:87).

Body mass index:- The procedure, as suggested by the ACSM (2000:63), was used to determine the executives' body mass index by dividing the body mass (kg) by the height in meters squared ($kg.m^{-2}$).

Blood pressure:- An ALPK2 aneroid sphygmomanometer was used to determine arterial blood pressure according to the protocol as described by ACSM (2000:40). The first Korotkoff sound was used to determine systolic blood pressure, while the diastolic blood pressure was determined using the 4^{th} Korotkoff sound.

Cholesterol:- For the determination of total cholesterol concentration the Accutrend GC was used by taking an arterial blood specimen from a finger prick. The machine was calibrated by using the batch related calibration strip before the assessment. According to literature, a fasting period prior to the assessment of total cholesterol is not necessary for screening purposes (BioDoc, 2000:16-18).

Procedure

The assessment of the executives' physical, physiological and bio-chemical health indicators commenced immediately after an explanation of the tests and procedures. The assessments were done either in the executive's boardroom or in the gymnasium on site. A specific sequence for the assessments was followed. The assessment commenced with the physiological test (blood pressure) followed by the bio-chemical test (cholesterol) with the physical tests (flexibility, aerobic fitness, muscle strength/endurance and body mass index), concluding the session.

Intervention programme

The programme was introduced to both groups by means of a general health and fitness programme orientation. The two intervention programmes were then explained to the subjects. The experimental group was exposed to a physical and a health promotion intervention programme for eight months while the control group followed only the physical part as an intervention programme. The assessment of the executives' physical, physiological and bio-chemical indicators commenced immediately after the general health and fitness programme orientation and personal feedback regarding the individual results were given.

Physical intervention programme

The ACMS's guidelines for improvement of fitness and general health, based on the FITT-principle, were used as the basis for their exercise-training programme (Durstine & Moore, 2003:96). The FITT-principle was applied, tailored to the executives' medical history, physical, physiological and bio-chemical results. Each executive's programme was subscribed on a programme card to be followed at a fully equipped gymnasium on site or at the nearest

available gymnasium in town. The two re-assessment dates on 16 and 32 weeks were stipulated on the training card as well as columns to tick whether an exercise session was completed, in order to monitor adherence to the exercise programme. For the duration of the study (32 weeks) the exercise programmes were adjusted every 2-4 weeks to ensure progress by increasing the exercise intensity as well as resistance. The exercise intensity was set at 65%-90% of their age adjusted maximal heart rate and training had to take place at least 3-5 times per week. The duration of their exercise programme was approximately 40 minutes. The participants had the option to choose from five easy accessible types of cardiovascular exercise namely cycling, walking, stepping, rowing and jogging. Resistance exercises were prescribed for the conditioning and strengthening of their lower and upper body muscle groups using free or fixed weights. Each exercise session included a warm-up and cool-down phase where basic stretching exercises were performed (quadriceps, hamstring, calf, triceps and shoulder). The first training session and every time when their programmes were adjusted, were performed under the supervision of the researcher. For the duration of the 32 weeks, they had to train on their own without supervision. They could however contact the researcher if anything was unclear.

Feedback on the results was given by the researcher immediately after completion of the physical re-assessments. Any complaints or adverse symptoms were addressed and continuous participation was encouraged. The exercises were done during executive's leisure time. The company offered no incentives for participation in the programme.

Health promotion intervention activities

The health promotion intervention activities presented to the executives entailed informative sessions on exercise and nutrition, physical stress management and lower back pain. The aim of these health promotion activities was to promote the health and/or reduce illness-producing lifestyle habits of the executives. Another aim was to foster awareness, influence attitudes to accept self responsibility for their health and wellness and identify alternatives that will enable them to make informed choices and change their habits in order to achieve an optimum level of physical and mental health and improve the physical and social environment. The duration of these sessions was 30-45 minutes presented every 8 weeks to the experimental group. Additionally, this group also followed the physical intervention programme as already described earlier.

Statistical analysis

Statistical analysis of the data was done on the Statistica programme available on the intranet of the North-West University by using ANOVA repetitive testing. Tukey post-hoc tests were used to determine whether certain groups differ statistically significant from each other (Tabachnick & Fidell, 2001:475-482; Statsoft Inc., 2004).

5.3 RESULTS

Descriptive data of the experimental and control group are presented in Table 5.1 and Figure 5.1 (a-h).

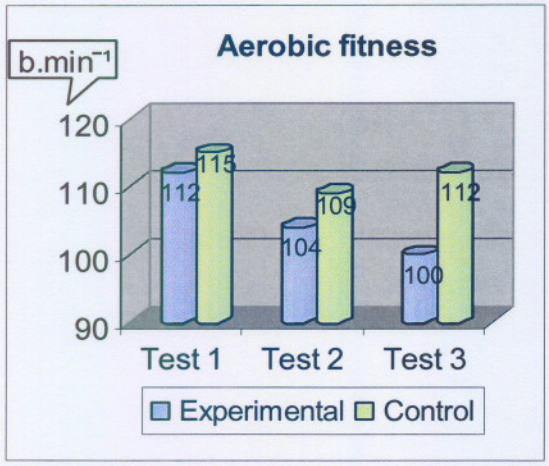
Table 5.1: Descriptive data of the executives (experimental & control) following different health promotion programmes

		TEST 1			TEST 2			TEST 3		
Parameters	**Group**	**N**	**$\bar{x}$**	**SD**	**N**	**$\bar{x}$**	**SD**	**N**	**$\bar{x}$**	**SD**
Aerobic fitness ($b.min^{-1}$)	Experimental	65	112 [2,3]	16	39	104 [1]	16.6	37	100 [1]	14.8
	Control	57	115	19.8	44	109	19.1	37	112	17.5
Abdominal strength/ endurance (sit-ups/$.min^{-1}$)	Experimental	71	27	9.8	48	29	8.3	45	29	8.6
	Control	65	27 [2,3]	8.7	54	29 [1]	8.0	50	30 [1]	9.1
Shoulder/arm-strength/endurance (push-ups/$.min^{-1}$)	Experimental	72	29 [3]	9.6	50	30	8.0	47	30 [1]	8.8
	Control	64	27 [2,3]	11.1	51	30 [1]	11.7	49	30 [1]	11.3
Flexibility (cm)	Experimental	77	32 [2,3]	9.3	51	34 [1]	9.4	50	34 [1]	9.4
	Control	66	34 [2,3]	8.9	54	35 [1]	9.3	51	34 [1]	9.5
Body mass index ($kg.m^{-2}$)	Experimental	77	28.2	3.8	55	28.0	3.8	52	27.9	3.3
	Control	66	29.1 [2,3]	4.6	54	28.9 [1]	4.0	52	28.9 [1]	4.1
Systolic blood pressure (mmHg)	Experimental	65	117	13.8	47	113	13.8	44	113	14.1
	Control	57	124 [2,3]	15.1	46	117 [1]	16.4	44	117 [1]	14.1
Diastolic blood pressure (mmHg)	Experimental	65	76 [3]	11.3	47	75	13.7	44	73 [1]	11.5
	Control	57	83 [2]	9.5	46	77 [1]	11.7	44	80	10.2
Cholesterol ($m.mol.l^{-1}$)	Experimental	65	5.1	1.02	46	5.1	0.86	43	5.1	0.75
	Control	57	5.3	0.93	46	5.4	0.76	44	5.2	0.71

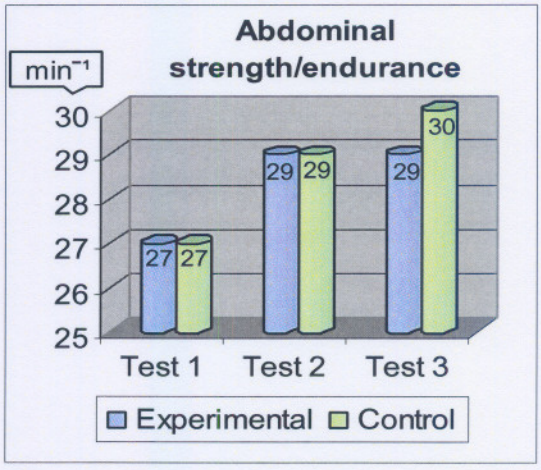
No statistical significance intergroup differences were evident in the three assessment intervals

Statistical intragroup differences are indicated by the small numbers 1, 2 or 3, next to the mean value indicative of test 1, 2 or 3. For example, the 2 & 3 next to the mean of test 1 in aerobic fitness indicates statistical significant difference between test 1 and test 2, as well as test 1 and test 3.

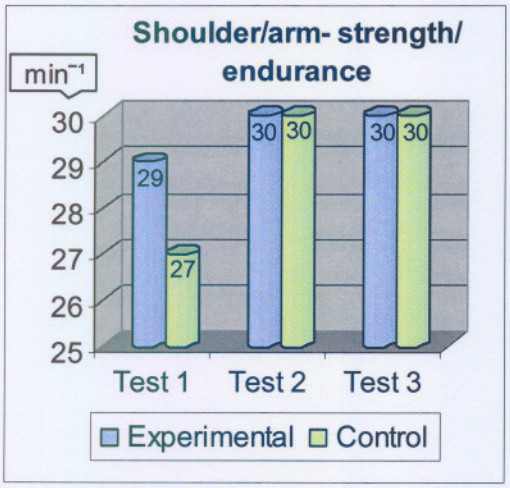
a.



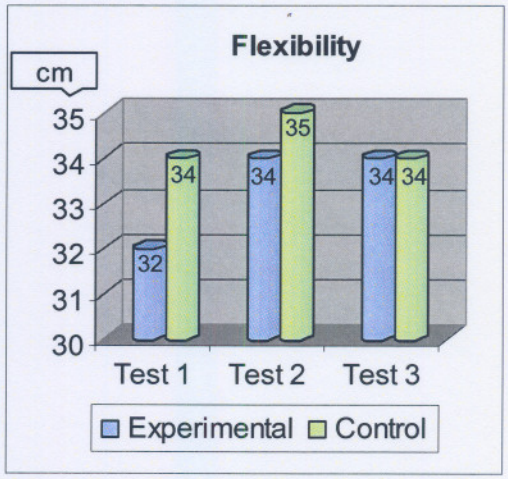
b.



c.



d.



e.

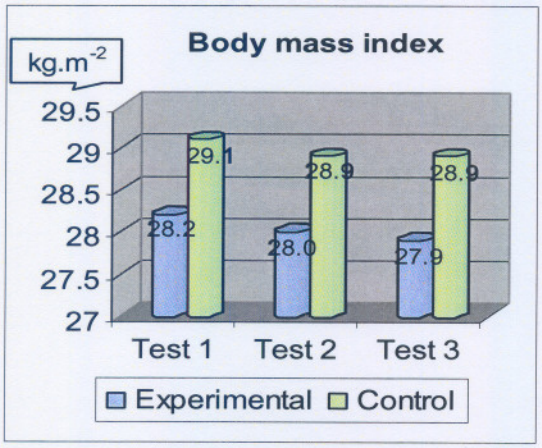
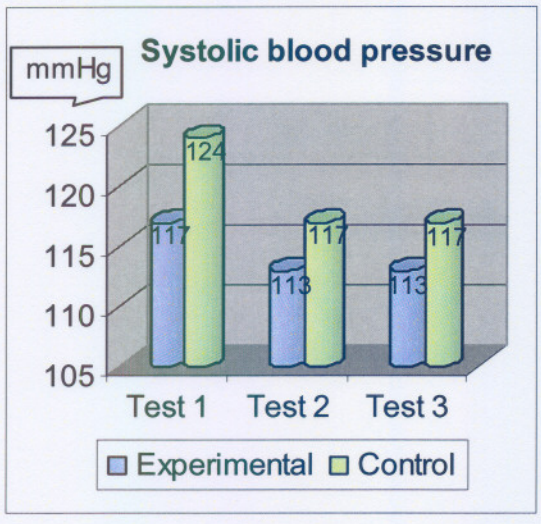
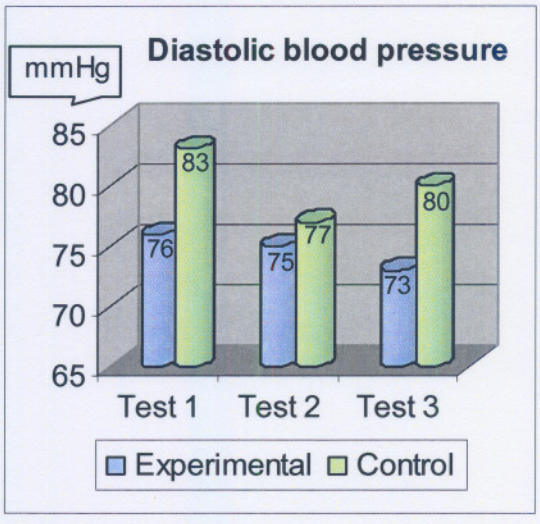


Figure 5.1: The effect of a physical and a combined physical and health promotion intervention programme on some selected physical parameters

g.



h.



i.

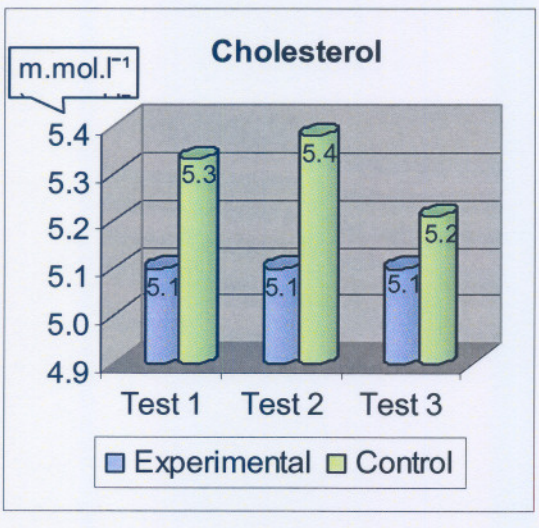


Figure 5.2: The effect of a physical and a combined physical and health promotion intervention programme on some selected physiological and bio-chemical parameters

It must be emphasized that both groups were exposed to a physical intervention programme, the only difference however was that the experimental groups' physical programme was enriched with health promotion programme activities. From Figure 5.1 a-e, it appears that the physical parameters, contained no uniform trends in both groups' results at the re-assessments. However, both groups improved in all physical parameters after the first 16 weeks of intervention (Test 2). From Table 5.1, it is clear that the improvement was statistical

significant within the following parameters: aerobic fitness (experimental group), abdominal strength/endurance, shoulder/arm- strength/endurance and BMI (control group) and flexibility (experimental & control group). Furthermore, the average baseline values of the shoulder/arm-strength/endurance were in the "good" category (Grace *et al.*, 2006:10) while the abdominal endurance, aerobic capacity, flexibility and BMI scores were categorized as "average" (Grace *et al.*, 2006:10).

However, with the final assessment after 32 weeks (Test 3), interesting trends are noted. The first trend is noted in Figure 5.1-c, where both groups showed an improvement in the shoulder/arm- strength/endurance after the first 16 weeks of intervention but then stayed the same after the next 16 weeks of intervention. Another interesting trend, is where the experimental group improved up to the final assessment, compared to the control group which improved after the first 16 weeks and then stayed the same or deteriorated – for example the aerobic fitness (Figure 5.1-a), flexibility (Figure 5.1-d) and BMI (Figure 5.1-e). A final trend is noted in Figure 5.1-b with the abdominal endurance, where the control group sustained the improvement compared to the experimental group, which stayed the same after the next 16 weeks of intervention. However, in both groups there were no statistical significances from Test 2 (16 weeks) to Test 3 (32 weeks).

The following trends are noted with Test 1-3: The experimental group showed statistical significant changes with aerobic fitness and diastolic blood pressure whilst both groups showed statistical significances with shoulder/arm- strength/endurance (push-ups) and flexibility. The control group showed statistical significances with abdominal strength/endurance (sit-ups), body mass index and systolic blood pressure.

Regarding the physiological parameter both groups improved in the systolic (Figure 5.2-g) and diastolic blood pressure (Figure 5.2-h) after 16 weeks (Test 2), but only the systolic and diastolic blood pressure of the control group showed a significant difference to Test 2. Both group's systolic blood pressure after 32 weeks (Test 3) were the same as in Test 2 but still better than the baseline values. The improvement in the systolic blood pressure of the control group (Test 1-3) however was statistical significant. It must be mentioned that both group's

baseline values were categorized as "good" (Grace *et al.*, 2006:11) and therefore a significant "improvement" was not anticipated. The diastolic blood pressure of the experimental group showed a non significant improvement from Test 2 to Test 3 while the diastolic blood pressure of the control group was higher at Test 3 (80mmHg) than in Test 2 (77mmHg). Again all blood pressure responses of both groups can be categorized as "good" (ACSM, 2004:40).

The bio-chemical parameter (cholesterol) of the experimental group stayed the same in all three assessments, namely 5.1m.mol.l^{-1}. The cholesterol concentration of the control group increased slightly after the first 16 weeks (Test 2) to 5.4m.mol.l^{-1} with a decrease after the next 16 weeks of intervention (Test 3) (5.2m.mol.l^{-1}). However, there were no statistical significances in both cases. The total cholesterol concentration of the experimental group, as well as the control group, fall in the "good" and "average" category respectively in all three assessments (Grace *et al.*, 2006:11).

5.4 DISCUSSION

It is clear from the results that no uniform trend was obvious within the 2 groups – especially in Test 3 which followed the last 16 weeks of intervention. The reason for this can probably be explained from two basic behaviour trends, as far as exercise participation is concerned, namely the compliance to the programme and the "quality" of programme execution, keeping in mind that this intervention programme was non-supervised.

According to Franklin (*In* Dishman, 1988:238) participants tend to loose interest in an exercise programme, resulting in a low adherence rate and eventually also an insignificant response to the intervention. This is especially true when a full time and enthusiastic programme leader is not available to form the centre pin of the programme, according to Gettman (*In* Dishman, 1988:354). Franklin (*In* Dishman, 1988:239) is of the opinion that programme and personal factors can influence programme compliance. The nature and comprehensiveness of corporate health promotion programmes in South Africa differs from company to company. Some of the larger companies can afford to appoint full time and appropriate qualified staff to conduct the various intervention programmes. Other smaller companies normally make use of health

consultants to initiate the programme with intermittent supervision. This type of programmes is typical where low adherence can erode the expected results. According to Pollock (*In* Dishman, 1988:262), the biggest drop out can occur after 12 weeks, with about 50% dropout after 24 weeks. Shephard (*In* Dishman, 1988:339) agreed that the highest drop out rate occurred some time around the first 12 weeks of training. In this study the first re-assessment took place after 16 weeks, thus a time when some of the participants might lose interest, especially the control group, who did not receive any health promotional activities such as discussions on relevant health issues. However, according to the participation reports, the average rate of compliance of both groups was approximately twice a week for the duration of the full intervention period (32 weeks).

As mentioned earlier, both groups showed an improvement in the physical and physiological parameters over the first 16 weeks. The last part (16 weeks) of the intervention was possibly influenced by a lower compliance rate. This probably could be higher in the control group because of the lack of motivational and other health promotion activities to the experimental group although they reported no difference in their average compliance rate.

As far as the cholesterol concentration is concerned, no clear trend was noticeable. The "normal" cholesterol concentration within the experimental group stayed constant at 5.1m.mol/L^{-1} throughout the 32 weeks of intervention, while very little fluctuations occurred in the cholesterol concentration of the control group. The reported low adherence of the participants could be a possible reason for the poor response on the training regimes.

The baseline values of the various parameters in both groups falling in the good and average categories may also be a contributing factor where the intervention programmes did not show significant responses. Another reason which goes hand in hand with compliance is the "quality" of programme compliance. In cases of aerobic fitness, flexibility and diastolic blood pressure, the control group showed a decrease during the last 16 weeks of intervention. It may be possible that the quality of compliance decreased because they received no supervision or any motivational or other health promotion activities, although they reported no difference in frequency of training, participants may have developed some preferences to various activities.

Shephard (*In* Dishman, 1988:339), in this regard, indicates that participants tend to adhere more to exercises for the developing of muscle strength such as weights and dumbells than to aerobic activities. It is, therefore, of interest to note that both groups showed a continuous improvement over the 32 weeks intervention in sit-ups and push-ups, while only the experimental group showed a continuous improvement in the aerobic fitness. The fact that the aerobic training takes more time than the strength training may in part also affect their preferences. From the results in Table 5.1, Figure 5.1 and Figure 5.2, no statistical significant intergroup differences were evident in the three assessment intervals. The outcomes of the two programmes thus showed no significant advantages of one programme over the other. Furthermore, from the results in Table 5.1, Figure 5.1 and Figure 5.2 it appears that regarding some parameters the experimental group showed statistical significant changes from Test 1-Test 3 whilst the control group showed no statistical significant changes. This is evident with aerobic fitness and diastolic blood pressure. With other parameters, the control group showed statistical significant changes with Test 1-Test 3 whilst the experimental group showed no statistical significant changes, for example with abdominal strength/endurance (sit-ups), BMI and systolic blood pressure. Regarding the shoulder/arm- strength/endurance (push-ups) and flexibility, both groups showed significant changes from Test 1-Test 3. The fact that the values of all the participants were in the "good" category with Test 1 regarding the following parameters, namely push-ups, systolic blood pressure, diastolic blood pressure and cholesterol concentration (experimental group) as well as the factors mentioned earlier on, might be responsible for the non-uniform trends. It appears thus that the two intervention programmes did not affect the final results of both groups significantly.

5.5 CONCLUSIONS

From the discussion above, it is obvious that all executive employees have experienced an improvement regarding physical and physiological parameters following intervention programmes over the first 16 weeks. For the next 16 weeks both groups showed conflicting results. The reason for this may vary from respondents already showing "normal" baseline values, probably due to their relative young age ($\bar{x}$=41 years) to programme preferences and programme adherence. The outcomes of the two programmes actually showed no significant

advantages of one programme being superior to the other. It must however be kept in mind that only physical, physiological and bio-chemical parameters were assessed. The health promotion activities focused more on knowledge empowerment of the participants. If these parameters were also included into the assessments the "enriched" programme might have provided some advantages which may lead to long term commitment and behavioural change.

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6

The Effect of Intervention on Coronary Prone Executives in the South African Colliery Industry

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ABSTRACT

More and more companies apprehend the importance of health promotion programmes not only due to the financial benefits to be reaped, but also because of the positive effect it has on the improvement of employees' health and quality of life.[2,9] An increase in high risk health indicators may also result into escalating health care costs.[30] It is, therefore, important that organizations realise that the risk status of their employees is not static. If continued commitment is not maintained to conserve human resources through awareness campaigns and other health promotion intervention programmes, research indicates that many of these low-risk employees inevitably join the ranks of the higher-risk/higher cost employees. Intervention strategies in order to reduce the employees with high health risks as well as to keep the low risk individuals in the optimal health zone, is thus of significant importance to companies. Therefore, a global trend became relevant to implement a variety of programmes focussing on employee wellness. According to literature, quite a number of South African colliery executives can be classified as having a high health risk profile.[18] If this echelon is left unattended, the prognosis of health catastrophes, threatening the individual, as well as the company, can be expected. In many cases these employees may be the more senior ones who filled pivotal positions and could cause major disruptions when they fall victim to poor health. It is, therefore, very important to implement intervention strategies in order to address the health risk indicators of employees in this high risk category.

Research targeting the high risk executive in South Africa is scanty. Therefore, the purpose of this study was to address the effect of two different regimes of intervention, namely a conventional physical fitness programme, as well as a physical fitness programme, enriched with other health promotion activities, on high risk executives in the colliery industry in South Africa. This study forms part of a comprehensive study on executives in some selected South African collieries where 143 executives participated as a non-randomized, availability sample. The average age of the group was 41.7 ± 7.98 years (26-58 years), randomly selected into an

experimental group (n=77) and a control group (n=66). The intervention period was 32 weeks and assessments were done before (Test 1) and after (Test 2) the programme. The subjects used in this study comprised employees categorized in the poor (high risk zone) category of the primary coronary heart disease risk factors, namely smoking, systolic and diastolic blood pressure (≥140mmHg and ≥90mmHg respectively), obesity (BMI ≥30 kg.m^{-2}), total cholesterol concentration (≥5.2 m.mol.l^{-1}), aerobic fitness (≥114 b.min^{-1}) and leisure-time physical activity participation (≤1-3 x per month).

A statistical significant improvement was noted within almost all the coronary risk factors after the completion of the intervention programmes, except for BMI. Regarding aerobic fitness and blood pressure, the average baseline values moved from the high risk category to the "normal" category, while the total cholesterol concentration in the post training values decreased with 12.5% and 14.8% in the experimental and control group respectively. Respectively 11.7% and 7.6% of the experimental and control group stopped smoking while 20.8% and 16.3% of the experimental and control group respectively reported a higher physical activity participation. It therefore seems that the intervention programmes also triggered healthier lifestyle behaviour.

Keywords: health promotion, migration, coronary, physical, intervention
Sleutelwoorde: gesondheidbevordering, migrasie, koronêr, fisieke, intervensie

6.1 INTRODUCTION

Various corporations are nowadays taking a closer look at the health and risk status of their workforce and are designing and implementing health promotion programmes to respond to their needs.[9,10] Approximately 90% of all companies in the USA with 50 or more employees and virtually all employers with over 750 employees offer some form of health promotion programme at their workplace.[22] This investment in lifestyle risk reduction and health promotion intervention plans stems from an emerging consensus that keeping employees healthy will save more money than waiting for the natural progression of the group to higher-risk (and cost) profiles and only then intervene to address the problem.[20] In other words, keeping those who are in lower-risk categories from slipping into higher risk categories can have financial benefits. On the other hand, the more high-risk parameters an individual presents, the higher the health care costs and the greater the probability of morbidity and mortality.[30] Therefore, appropriate intervention to remedy this situation is imperative to every company and intervention programmes put a high premium on reducing high risk parameters. In the corporate sector, CHD contributes to 40% of the health care costs.[4] Research on South African executives from the mining, construction, steel, motor and financial industries indicates a high prevalence of the four primary CHD risk factors (high cholesterol, smoking, hypertension and physical inactivity).[27] Furthermore, it is reported that 22% of South African executives are smoking[25] and only 3% of South African executives are physically active at work[11] while 20.6% participate in physical activity which can ensure a salutogenic effect outside the working environment.[12] Research on South African executives from the colliery industry, indicates that regarding the following health parameters, a significant number of respondents fall into the undesired health zone, namely aerobic fitness (44.8%), abdominal endurance (39.7%), flexibility (56.7%), fat percentage (31.4%), body mass index (35.7%), waist-hip-ratio (44.7%), systolic (16.8%) and diastolic (21.7%) blood pressure and cholesterol (53.2%).[18] This puts them at risk for an increased mortality regarding coronary heart disease.[13,29]

Furthermore, research has also linked poor health status with higher direct health care costs, lower work output (e.g. presenteeism), higher rates of disability, higher workers' compensation and higher rates of injury.[30,21]

Evidence is available in research literature which proofs the salutogenic effect of physical fitness on the primary coronary risk factors.[28,24] Furthermore, physical fitness intervention can reduce the mortality rate due to coronary heart disease, even when the total cholesterol, smoking and blood pressure remain in the high risk zone.[3] Therefore, it seems that physical training as an intervention regimen can not only reduce coronary risk factors, but can also reduce the mortality rate. Over the last couple of years an approach has been developed that corporate intervention should not only focus on improving the physical fitness of the employees, but it must also include other wellness and health promotion activities which will "enrich" the intervention regimen, such as information regarding motivation, stress management, self responsibility, healthy lifestyle etc, which may possibly contribute to a long term commitment to healthy lifestyles.

Research literature concerning intervention programmes, focussing on high risk employees with specific reference to coronary heart disease, is scanty in South Africa. The purpose of this research paper, therefore, was to study the effect of a physical and a combination of a physical programme enriched with other health promotion activities on high risk employees in 5 collieries in South Africa.

6.2 METHODS

Subjects

In this study only individuals falling in the high risk category (coronary prone) regarding some primary coronary risk factors (hypertension, obesity, hypercholesterolemia, smoking and physical unfitness and inactivity) were used.

They formed part of a comprehensive study using an availability, non-randomized sample of 143 white male executives from five collieries aged 26-58 ($\bar{x}$ 41.7, ± 7.98 years). These collieries are spread over two South African provinces namely Mpumalanga and Gauteng. Subjects on medication that could affect their cholesterol, blood pressure and aerobic fitness values were excluded from the study.

The subjects were randomly assigned to either a control group (n=66) or an experimental group (n=77). The experimental group was exposed to a physical and health promotion intervention programme for eight months, while the control group was only exposed to a conventional physical fitness intervention programme. The number of high risk participants in each group varies for obvious reasons and is indicted in Table 6.1 and 6.2.

Measurements

The following instruments were used in this study:

Blood pressure:- An ALPK2 aneroid sphygmomanometer was used to determine arterial blood pressure according to the ACSM's protocol.[1] The first Korotkoff sound was used to determine systolic blood pressure, while the diastolic blood pressure was determined using the 4th Korotkoff sound. The participants with a systolic blood pressure of ≥140 mmHg and a diastolic blood pressure of ≥90mmHg were categorized as high-risk.[1]

Total cholesterol:- For the determination of total cholesterol concentration the Accutrend GC was used by taking an arterial blood specimen from a finger prick. The machine was calibrated by using the batch-related calibration strip before the assessments. According to literature, a fasting period prior to the assessment of total cholesterol is not necessary for screening purposes.[5] The participants with a cholesterol concentration of ≥5.2mmol/L^{-1} were categorized as high-risk.[15]

Obesity:- This was determined by using the BMI procedure as prescribed by ACSM.[1] Participants with a BMI of ≥30 kg.m^{-2} were categorized as high risk.

Aerobic fitness:- The protocol, as prescribed by ASCM, was used to determine the executive's aerobic fitness by means of a 3-minute submaximal step test in $b.min^{-1}$ on a Reebok step-up bench.[1] Participants with a heart rate of ≥ 114 $b.min^{-1}$ were categorized as high risk.[17]

Smoking:- All participants who smoked were categorized as high risk according to the health risk assessment questionnaire provided by BioDoc.[5]

Physical activity:- Participants whose leisure-time physical activity participation was ≤1-3 x per month were categorized as high risk according to the health risk assessment questionnaire provided by BioDoc.[5]

Procedure

The assessment of the executives commenced immediately after an explanation of the tests and procedures. The assessments were done either in the executive's boardroom or in the gymnasium on site. A specific sequence for the assessments was followed. The assessment commenced with the blood pressure measurements followed by the determination of the total cholesterol with the physical parameters concluding the session.

Intervention programme

The intervention programme was introduced to both groups by means of a general health and fitness programme orientation. The two intervention programmes were then explained to the subjects. The experimental group was exposed to a physical and health promotion intervention programme for eight months, while the control group only followed a physical fitness intervention programme.

Physical fitness intervention programme

The ACMS's guidelines for improvement of fitness and general health, based on the FITT-principle, were used as the basis for their exercise programme.[14] The FITT-

principle was applied tailored to the executive's medical history, physical, physiological and bio-chemical results. Each programme was subscribed on a programme card to be followed at a fully equipped gymnasium on site or at the nearest available gymnasium in town. The re-assessment date after 32 weeks was stipulated on the training card, as well as columns to tick, whether an exercise session was completed in order to monitor the exercise adherence. For the duration of the study (32 weeks) the exercise programmes were adjusted every 2-4 weeks to ensure progress by increasing the exercise intensity as well as resistance. The exercise intensity was set at 65%-90% of their age adjusted maximal heart rate and training had to take place at least 3-5 times per week. The duration of the exercise programme was approximately 40 minutes. The participants had the option to choose from five easy accessible types of cardiovascular exercises namely, cycling, walking, stepping, rowing and jogging. Resistance exercises were prescribed for the conditioning and strengthening of the lower and upper body muscle groups using free or fixed weights. Each exercise session included a warm-up and cool-down phase where basic stretching exercises were performed (quadriceps, hamstring, calf, triceps and shoulder). The first training session and every time when their programmes were adjusted were performed under the supervision of the researcher. For the duration of the 32 weeks they had to train on their own without supervision. They could however contact the researcher if anything was unclear. The exercises were done in the executive's own time, outside their work schedule. The company offered no incentives for participation in the programme.

Health promotion intervention programme

The health promotion intervention activities presented to the executives entailed informative sessions on exercise and nutrition, physical stress management and lower back pain. The aim of these health promotion activities was to promote the health and/or reduce illness-producing lifestyle habits of the executives. Another aim was to foster awareness, influence their attitudes and identify alternatives that would enable them to make informed choices and change their habits in order to

achieve an optimum level of physical and mental health and improve the physical and social environment. The duration of these sessions was 30-45 minutes presented every 8 weeks to the experimental group. Additionally, this group also followed the physical intervention programme as already described earlier.

Statistical analysis

Statistical analysis of the data was done on the Statistica programme available on the intranet of the North-West University by using ANOVA. The Tukey post-hoc test was used to determine whether certain groups differ statistically significant from each other.[16,26]

6.3 RESULTS AND DISCUSSION

Descriptive data of the experimental and control group are presented in Table 6.1 and 6.2.

Table 6.1: The effect of intervention programmes on high risk individuals regarding the primary coronary risk factors in South African colliery executives

		TEST 1 (Pre)			TEST 2 (Post)			
Parameters	**Group**	**N**	**$\bar{x}$**	**SD**	**N**	**$\bar{x}$**	**SD**	**P-value**
Body mass index ($kg.m^{-2}$)	Experimental	23	32.7	2.2	13	32.1	2.1	0.421
	Control	28	33.2	3.5	20	32.4	3.0	0.356
Systolic blood pressure (mmHg)	Experimental	8	146*	7.6	5	128	11.9	0.007
	Control	14	144*	7.1	10	133	11.6	0.008
Diastolic blood pressure (mmHg)	Experimental	11	92*	3.9	7	83	12.4	0.044
	Control	20	96*	4.9	15	87	9.0	0.001
Cholesterol ($m.mol.l^{-1}$)	Experimental	34	6.2	0.8	28	5.4	0.8	0.001
	Control	36	6.1	0.8	30	5.2	0.8	0.001
Aerobic fitness $b.min^{-1}$	Experimental	34	128	10.1	15	112*	16.4	0.001
	Control	31	130	12.0	17	120*	13.4	0.013

* Refers to intergroup statistical significances P-value indicates intragroup statistical significances

Table 6.2: The effect of intervention programmes on high risk individuals regarding some selected lifestyle risks of South African colliery executives

		TEST 1 (Pre)		TEST 3 (Post)	
Parameters	**Group**	**N**	**%**	**N**	**%**
Smoking	Experimental	21	27.3	12	15.6
	Control	17	25.8	12	18.2
Physical inactivity	Experimental	23	53.5	17	32.7
	Control	20	46.5	16	30.2

From Table 6.1 a statistical significant improvement is apparent within almost all the coronary risk factors after the completion of the intervention programmes, except for BMI. These findings are in line with similar research results.[3] It is interesting to note that regarding the aerobic fitness, systolic and diastolic blood pressure, the average values after completion of a 32 week intervention programme, participants moved from the high risk to the "normal" risk classification. This implicates that not only has the risk of premature morbidity and mortality decreased but also the health care cost will be lowered. In this regard it is stated that the higher the risk an individual presents, the higher the health care cost may rise.[7] Research also indicated that the biggest cost savings can be achieved by reducing health risks.[21]

According to literature, individuals who improved just one risk factor can improve presenteeism by 9% and reduce absenteeism by 2%,[23] both indicators contributing to the indirect health care costs, which can be 2-3 times higher the cost of direct health care.[21] A decrease in health risks therefore not only implies a decrease in health care costs but it can also impact directly on productivity. In this regard it is stated that each additional risk factor was associated with an additional 2.4% excess productivity loss.[8]

In the case of the total cholesterol concentration, the initial value for the experimental and control group were 6.2 $m.mol.l^{-1}$ and 6.1 $m.mol.l^{-1}$ respectively. At the end of the intervention regimes the values were 5.4 $m.mol.l^{-1}$ and 5.2 $m.mol.l^{-1}$ respectively. Although it does not reach the "optimal" zone of <5.2 $m.mol.l^{-1}$ the post training values decreased with 12.5% and 14.8% in the experimental and control

group respectively. In this regard it is indicated that the mortality risk for coronary heart disease reduces with 2.5% for every 1% reduction in the concentration of total cholesterol.[19]

From Table 6.1, it appears that regarding the BMI, there was no significant changes at the end of the intervention programmes however the post training value was lower than the baseline value. It must be borne in mind that strengthening exercises formed part of both intervention programmes which might increase the muscle mass and thus no change occurred in the total body mass which resulted in no change in the BMI. From the reported adherence rate, it is evident that the compliance of the experimental group was slightly better compared to the control group. The average training compliance of both groups however was 1-2 times per week. It might be that the health promotion activities presented to the experimental group motivated them to train on a more regular basis. Although the optimum exercise frequency is laid down as 3-5 times per week, it is clear that even moderate to low exercise frequencies can affect individuals with high health risks, positively.[14] This corroborates with research that even moderate exercise participation can reduce mortality.[3,6]

From Table 6.1, it is also clear that both intervention regimes improved the status of these high risk individuals significantly. However, no significant change occurred between the effectiveness of the two programmes. It must however be kept in mind that measuring the primary risk factors primarily falls within the physical/physiological/bio-chemical scope, while the health promotion activities which were addressed in the experimental group to a greater extend entertained the psycho-emotional and lifestyle intervention. In this regard, it seems from Table 6.2 that the experimental group revealed a bigger change in smoking habits than the control group. Before the intervention programme started 27.3% and 25.8% of the experimental and control group respectively reported smoking. This figure decreased to 15.6% and 18.2% respectively implying that 11.7% and 7.6% of the experimental and control group respectively stopped smoking. The same trend

occurred in the leisure-time physical activity participation of the participants. Respectively 20.8% and 16.3% of the experimental and control group reported a higher leisure-time physical activity participation. It therefore seems that the intervention programmes also triggered healthier lifestyle behaviour.

6.4 CONCLUSIONS

From the study it is clear that a well structured and individualized intervention programme can improve the primary coronary risk factors in high risk employees significantly. This not only resulted in company benefits (increased productivity and lowered health care costs) but also improved the quality of life of the employees (decreased risk of morbidity and mortality).

Physical fitness intervention (control group) is equally effective in addressing the primary coronary risk factors compared to a programme enriched with health promotion activities (experimental group). However, it seems that the experimental group showed a better response as far as lifestyle change (smoking) and leisure-time physical activity participation were concerned. Assessment of other psycho-emotional parameters might indicate a different picture.

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7 Summary, Conclusions and Further Research

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7.1 SUMMARY

Business executives recognize, with reference to the heavy burden of health care costs, that not only the growth, but in some cases the sustainability of their organisations is linked to employee health and that changes in health costs follow changes in health risks (Edington, 2001:342; Musich *et al.,* 2003:393; Cowan *et al.,* 2004:131). Therefore, many multinational corporations are now taking a closer look at the health and risk status of their global workforce and are designing and implementing health promotion programmes to respond to their needs (Chapman, 2005:17-19; Clymer, 2005:i). Ascertaining the physiological component of health promotion intervention programmes, physical activity constitutes a very important aspect of the intervention approach (Clymer, 2005:i). Regular physical activity has long been regarded as an important component of a healthy lifestyle (Francis, 1996:463; Thune *et al.,* 1998:1633; Sesso *et al.,* 2000:975; Willmore, 2001:S622-S633). Not only has regular physical activity been regarded as an important component of a healthy lifestyle, but also a physically active lifestyle promotes good health and can reduce the executives risk towards heart disease (Francis, 1996:463; Thune *et al.,* 1998:1633; Sesso *et al.,* 2000:975; Willmore 2001:S622-633; Bolton *et al.,* 2004:56). Physical activity has been emphasised by employees in the business sector and put into practice as an integral part of the employer's health policy (Steinhardt *et al.,* 1991:445; Harvey *et al.,* 1993:296; McArdle, 2001:957; Chapman, 2005:55). The implementing of corporate health promotion intervention programmes resulted in a reduction of CHD and health care costs (Cooper & Cartwright, 1994:468; Bezuidenhout, 2001:71; Weldon, 2005:9).

The questions that this research endeavours to answer regarding South African colliery executives is to ascertain some physical, physiological and bio-chemical health profiles as well as to establish the effect of a physical and a combined physical and health promotion intervention programme on the abovementioned parameters. Furthermore, this study also investigated the effect of two intervention regimes on coronary prone South African colliery executives. Answers to these

questions should provide important information regarding physical and health promotion intervention programmes regarding the physical, physiological and bio-chemical health indicators of South African executives.

Due to the abovementioned research questions, the objectives of the study were the following:

- To establish some selected physical, physiological and bio-chemical health profiles of colliery executives in South Africa.
- To determine the effect of a physical and a combined physical and health promotion intervention programme on some selected physical and physiological and bio-chemical health parameters of South African colliery executives.
- To determine the effect of a physical and a combined physical and health promotion intervention programme on coronary prone South African colliery executives.

Chapter 2 addressed the various definitions of health as well as the factors influencing the executive's lifestyles. The health and risk status of South African executives with regard to some physical, physiological and bio-chemical health indicators were discussed thereafter.

Components of a physical and health promotion intervention programme and the benefits to some health parameters were discussed in **Chapter 3**.

Chapter 4, 5 and 6 were presented in the form of research articles. The literature reviews, method of research, research design, results, discussion and conclusion of each article was presented in the different chapters. The outlay of the different articles was as follow:

- **Chapter 4: Quantitative analysis of some selected health risk profiles of executives in the South Africa colliery industry.**

- **Chapter 5: The effect of a physical and a combined health promotion intervention programme on some selected health indicators of South African colliery executives.**

- **Chapter 6: The effect of intervention on coronary prone executives in the South African colliery industry.**

7.2 CONCLUSIONS

The conclusions of this research are handled according to the hypotheses of this study as presented in Chapter 1:

1. **Profiles on the physical, physiological and bio-chemical health indicators of colliery executives in South Africa can be compiled from this study.**

Statistical analysis of the data comprised descriptive summary statistics (mean, max, min and standard deviations). From the descriptive data, it is clear that flexibility (56.7%); sit-ups (39.7%); aerobic fitness (44.8%); fat percentage (31.4%); BMI (35.7%) and WHR (44.7%) fall into the undesired health zone. Regarding the physiological parameter, namely blood pressure respectively 16.8% (systolic blood pressure) and 21.7% (diastolic blood pressure) fall into the undesired health zone. Finally, concerning the bio-chemical parameter (cholesterol), 53.2% fall into the undesired health zone. Hypothesis 1 can, therefore, be accepted.

2. **Executives exposed to a combined physical and health promotion intervention programme will show statistical greater differences in their physical, physiological and bio-chemical health indicators compared to those only exposed to a physical intervention programme.**

Statistical analysis of the data comprised ANOVA repetitive testing as well as Tukey post-hoc tests were done to establish statistical significances between the different groups. It appears that regarding some parameters, the experimental group showed statistical significant changes from Test 1-Test 3 whilst the control group showed no statistical significant changes. This is evident with aerobic fitness, flexibility and diastolic blood pressure. With other parameters, the control group showed statistical significant changes with Test 2-Test 3 whilst the experimental group showed no statistical significant changes, for example with abdominal strength/endurance (sit-ups), BMI and systolic blood pressure. Regarding the shoulder/arm-strength/endurance (push-ups) and flexibility both groups showed significant changes from Test 1-Test 3. The fact that the values of the participants were in the "good" category with Test 1 regarding the following parameters, namely push-ups, systolic blood pressure, diastolic blood pressure and cholesterol concentration (experimental group) as well as other reasons, such as the participants programme preferences and programme adherence, might be responsible for the non-uniform trends. It appears thus that the two intervention programmes did not affect the final results of both groups significant differently. Hypothesis 2 can therefore be rejected.

3. **Coronary prone executives exposed to a combined physical and health promotion intervention programme will show significant greater improvement in their physical, physiological and bio-chemical health indicators compared to those only exposed to a physical intervention programme.**

Statistical significances ($p \leq 0.5$) are evident in almost all the coronary risk factors after the implementation of both the intervention programmes, except for BMI. The results indicate that participants with high values in the primary risk factors, benefited significantly from both intervention programmes and it also served as a trigger mechanism to establish healthy lifestyle habits. The value of such intervention programmes is thus important to keep employees in the optimum health category but also, not only to "normalise" employees with high risk health status, but

also to improve their risk status. No superiority of one programme over the other could be established. Hypothesis 3 can therefore be rejected.

7.3 FURTHER RESEARCH

From this study it appears that there is a specific need for further research on the following sectors to expand on the knowledge on the effect of a physical and combined health promotion intervention programme on some selected health indicators of South African colliery executives.

- More research is needed to ascertain the effect of multiple-focused health promotion intervention programmes, as several studies reported carryover effects on change in a specific behaviour from participation in programmes directed towards changing behaviour.
- Furthermore, research is needed to determine the effect of a physical and combined health promotion intervention programme compared to executives not exposed to any intervention programme.
- Further research is needed to determine the effect of a physical and combined health promotion intervention programme on intangibles, including such items as employee morale, company image and the inherent value of better employee health, for example the value to employees themselves and to society.
- A comprehensive assessment of workplace physical and health promotion intervention programme economics, considering all of the economic parameters involved in sick leave, presenteeism, absenteeism, including health care costs, life insurance, short and long-term disability, workers' compensation, turnover, productivity and pensions need to be researched.
- A longitudinal study needs to be done to assess the implications on short as well as long term, on the employee variables mentioned above.

- More research is needed to determine what needs to be done in order to help executives to make the necessary health expected lifestyle changes that coincides with their unique social and working environment.

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SESSO, H.D., PAFFENBARGER, R.S. & LEE, I.M. 2000. Physical activity and coronary heart disease in men: The Harvard alumni study. *Circulation,* 102(9):975–980, Aug.

STEINHARDT, M., GREENHOW, L. & STEWART, J. 1991. The relationship of physical activity and cardiovascular fitness to absenteeism and medical care claims among law enforcement officers. *American journal of health promotion,* 5(6):455–460.

THUNE, I., NJOLSTAD, I., LOCHEN, M. & FORDE, O.H. 1998. Physical activity improves the metabolic risk profiles in men and women. *Archives of internal medicine,* 158(15):1633–1640, Aug.

WELDON, W.C. 2005. Johnson & Johnson: Healthy people. (*In* Partnership for prevention., *ed.* Leading by example : Washington, DC. USA. 9 p.)

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Appendix A

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- *South African Journal for Research in Sport, Physical Education and Recreation*

South African Journal for Research in Sport, Physical Education and Recreation

GUIDELINES FOR SUBMITTING MANUSCRIPTS

INFORMATION FOR AUTHORS

The *South African Journal for Research in Sport, Physical Education and Recreation* is published by the Stellenbosch University. Contributions from the fields of Sport Science, Movement Education, Recreation/Leisure Studies, Exercise Science and Dance Studies will be considered for publication. The articles submitted will be administered by the appropriate Subject Review Editor and evaluated by two or more referees. The decision as to whether a particular article is to be published or not, rests with the Editorial Board.

SUBMISSION

Manuscripts should be typed with **one and a half spacing** in 12-point Times New Roman letter size and printed on A4-size white paper in laser quality. The original manuscript (clearly indicated) and three copies of the manuscript must be submitted. Length must not exceed 20 pages (tables, figures, references, etc. included). Original manuscripts may be submitted in English or Afrikaans and should be sent to:

The Editor
S.A. Journal for Research in Sport,
Physical Education and Recreation
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A signed declaration in respect of the originality must accompany each manuscript. On submission of the manuscript, the author shall present a written statement that the article has not been published or is not being presented for publication elsewhere. Should the article be taken from a Master's thesis or Doctoral dissertation, academic ethic requires that the student will be the first author. The author should also ensure that the LANGUAGE of the manuscript has been thoroughly edited at the time of submission. The name, address and telephone number of the person who has done the language editing must be provided. On receiving a written notification from the Managing Editor that the article has been accepted, a final hard copy of the manuscript and a diskette (virus checked) should be submitted using MS WORD, Office 97 or 2000 as a DOC-file (see Figures). It can also be send per e-mail as an attached file.

PREPARATION OF MANUSCRIPT

Title page

The first page of each manuscript should indicate the *title* in English and Afrikaans (will be translated for foreign authors), the *names* (title, first name and other initials, surname) of the author(s), the *telephone* numbers (work & home), *facsimile* number, *e-mail* address (if available) and the *field of study*. The mailing address of the first named author and the institution where the work was conducted should be provided in full. A short title of not more than 45 characters, including the spaces, should be provided for use as a running head.

Abstract

Each manuscript must be accompanied by an abstract of approximately 150-200 words in *English* and should be set on a *separate page* as a SINGLE paragraph (one and a half spacing). Articles in Afrikaans must include an *additional* extended summary (500-1000 words) in English. This summary must start on a new page (following the list of sources) providing the English title of the article at the beginning. A list of three to seven **key words** in *English* is required for indexing purposes and should be typed below the abstract.

Text

Start the text on a new page with the title of the article (centred and *without* the names of the authors). Follow the style of the most recent issue of the journal regarding the use of headings and subheadings.

Tables and figures

Tables and figures should be numbered in *Arabic* numerals (1, 2, etc.) and each be prepared on a SEPARATE page (also on the diskette). Tables require a heading at the *top* and figures a legend *below* and separate from the figure. For *figures*, kindly supply the values of the co-ordinates of line or bar graphs in a separate MS EXCEL file (.exl) or WORD file (.doc) while also including the actual figures in the same file. Only original and high resolution laser quality copies of figures and drawings and *original* photographs can be accepted (photocopies or negatives are unacceptable) for scanning. Indicate where the tables or figures must feature in the text. The names of the authors must be indicated clearly on the back of the copy of each table and figure. ***Note:*** Use the decimal POINT (not the decimal comma).

References

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List of references

Only the references cited in the text should be listed alphabetically according to surname (last name) of authors (capitals) after the body of text under the heading, **References** (Capitals) starting on a new page.

In the case of articles published in *JOURNALS,* references listed should include the surnames and initials (capitals) of all authors, the date of the publication in parentheses, the full title of the article, the full title of the journal (italics), the volume number, the serial number in parentheses (omitted only if the said journal does not use issue numbers), followed by a colon and the first and last page numbers separated by a hyphen.

Example:

VAN WYK, G.J. & AMOORE, J.N. (1995). A practical solution for calculating instantaneous values of tension in the extensor muscles of the knee joint during extension and flexion. *South African Journal for Research in Sport, Physical Education and Recreation,* 18(1): 77-97.

If the reference is a *BOOK,* the surname (last name) and initials of the author or editor (Ed.) must be given, followed by the date of publication in parentheses, the title of the book (italics) as given on the title page, the number of the edition (ed.) in parentheses, the city (and abbreviation for the state in the case of the USA) where published, followed by a colon and the name of the publisher.

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For a CHAPTER from a book, the page numbers of the chapter cited must be provided in parentheses (not italics) after the title of the book. For further details, authors should consult the most recent publication of this Journal for other examples.

Example:

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For *ELECTRONIC SOURCES* all references start with the same information that would be provided for a printed source (if available). The web page information follows the reference. It will usually contain the name of the author(s) (if known), year of publication or last revision, title of complete work in inverted commas, title of web page in italics, Uniform Resource Locater (URL) or access path in text brackets (do not end the path statement with a fullstop) and date of access. See *"How to cite information from the internet and the world wide web"* at http://www.apa.org/journals/webref.html for specific examples. When citing a web site in the text, merely give the address. Note that personal communications such as email are cited only in the text and are not included in the list of references.

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- *African Journal for Physical, Health Education, Recreation and Dance (AJPHERD)*

African Journal for Physical, Health Education, Recreation and Dance **(AJPHERD)**

GUIDELINES FOR SUBMITTING MANUSCRIPTS

The African Journal for Physical, Health Education, Recreation and Dance **(AJPHERD)** is a refereed journal established to:

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Abstract

Each manuscript must be accompanied by an abstract of approximately 150-200 words in *English* and should be set on a *separate page* as a SINGLE paragraph (one and a half spacing). A list of three to seven **key words** is required for indexing purposes and should be typed below the abstract.

Text

Start the text on a new page with the title of the article (centred and without the names of the authors). Make use of heading and subheadings. DO NOT justify the text and do NOT underline in the text, as the manuscript may be scanned. Submitted manuscripts must conform to the Publication Manual of the American Psychological Association (4^{th} ed.) and prepared in the following order: (1) title page (2) abstract (3) text including tables, figures etc., (4) references and (5) author notes (if any).

Tables and figures

Tables and figures should be numbered in *Arabic* numerals (1,2, etc.) and each be prepared on a SEPARATE page (also diskette). A table requires a heading at the top and figures a legend *below* and separate from the figure. For *figures,*

kindly supply the values of the co-ordinates of line or bar graphs in a separate MS EXCEL (.exl) or WORD file (.doc) while also including the actual figures in the same file. Only original and high-resolution laser quality copies of figures and drawings and *original* photographs can be accepted (photocopies or negatives are unacceptable) for scanning purposes. Indicate where the tables or figures must feature in the text. Tables must be *without* lines for scanning purposes. The names of the authors must be indicated clearly on the back of the copy of each table and figure. ***Note:*** Use the decimal POINT (not the decimal comma).

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For a CHAPTER from a book, the page numbers of the chapter cited must be provided in parentheses (not italics) after the title of the book.

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De Ridder, J.H. (1999). Kinanthropometry in exercise and sport. In L.O. Amusa, A.L. Toriola & I.U. Onyewadume (Eds.), *Physical Education and Sport in Africa* (pp. 235–263). Ibadan, Nigeria: LAP Publications.

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- *Occupational Health Southern Africa (OHSA)*

Occupational Health Southern Africa **(OHSA)**

GUIDELINES FOR SUBMITTING MANUSCRIPTS

Occupational Health Southern Africa is the official journal of the South African Society of Occupational Medicine (SASOM), the South African Society of Occupational Health Nursing Practitioners (SASOHN), the Southern African Institute of Occupational Hygiene (SAIOH) and the Mining Medical and Other Health Care Professionals Association (MMOA). Appropriate articles of academic merit are accepted for publication, subject to the following guidelines:

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These are short reports, with a length of less than 1000 words.

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Less than 400 words.

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- Abbreviations and acronyms should only be used if absolutely necessary and must be defined on first use.
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Examples

1. Zwarenstein, M., Barron, P., Tollman, S., et al. Primary Health Care Depends on the District Health System, S. Afr. Med. J. 1993; 83:558.

Book references

1. Thompson, L.A. History of South Africa. Newhaven and London: Yale University Press, 1990.

Proofs

Alterations to proofs must be limited to misprints or factual errors. Major alterations or new material cannot be accepted. Proofs not returned within the time limit specified will be regarded as approved.

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Linda Grainger
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Fax: 031 764 0386, **MUST BE MARKED Attention: Linda Grainger** or
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