Gordon Institute
of Business Science
University of Pretoria

Do routine executive medical examinations improve the health risk and work engagement of company senior executives?

Dr Elton Dorkin
Student number: 14458943

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Abstract

The provision of routine comprehensive medical examinations as part of the executive health management programme of company senior executives is controversial in academic and business literature. A difference between outcomes predicted in theory and those achieved in practice is evident. Programme design had a bearing on what outcomes could be achieved. This study was conducted to examine the change in health risks experienced by a group of company senior executives attending a commercially available executive health programme in Durban, South Africa. The study assessed the evidence base for screening tests offered as part of the programme, the health risk outcomes of participants on the programme and the perceptions of participants of the intervention and the employer.

The study showed that executives perceive employers who provide executive medical examinations very positively. A high prevalence of health risk factors was noted, indicating the need for such an intervention. Although perceived to be comprehensive, only 29 per cent of recommended preventative health screening tests were offered. Of the tests offered 49 per cent were not considered preventative in nature. No statistically significant changes were found for all health risks studied, over a two year period, although the improvement in blood pressure might be considered clinically significant.

Individuals displayed significant natural risk flow, some at low risk remained so, others became high risk; some at high risk became low, others remained high. These findings are similar to those of other studies where behaviour based interventions are not prominent. The findings suggest that an executive health programme based on medical examinations alone cannot reliably and consistently improve health risk of company senior executives. Evidence is provided that theory based and evidence-led interventions are required to address the real health concerns of executives.

Keywords

Executive medical examinations; individual health risk; health risk assessment; executive health; screening theory; behavioural theory.

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Elton Dorkin
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List of acronyms

AHRF	Assessment of Health Risks with Feedback
ECHC	Engaging Consumers in Health and Healthcare in Communities
HRAs	Health risk assessments/health risk appraisals
ICSI	Institute for Clinical Services Improvement

Chapter One: Introduction to the research problem

1.1 Background to the research problem

Many companies offer 'executive medical examinations' or 'executive physical examinations' as a perk to executive management believing that periodic (often annual) health examinations will help detect and treat risk factors and disease earlier than otherwise, and in so doing reduce disease and death (Krogsbøll, Jørgensen, Grønhøj Larsen, & Gøtzsche, 2012). This, in turn, would result in better work performance, reduced direct and indirect costs of to the organisation and improved company performance (Han, 1997; Burton, Chen, Daniel Schultz, & Edington, 2002). However, there are a diversity of views with regards to the effectiveness of executive medicals in terms of health outcomes and cost (Komaroff, 2009; Meyer, 2009, Rank, 2008).

It would seem intuitive that a health examination in people who are not otherwise ill makes sense (Krogsbøll et al., 2012). The converse of this would be for people not to be made aware of health risks, and to await symptoms of disease before doing something about it. Hence, these examinations aim to detect disease early, prevent further development thereof and provide reassurance to individuals on their health status. However, evidence presented to date (Krogsbøll, et al. 2012; Wilkinson, Bass, Diem, Gravley, Harvey, Maciosek, McKeon, Milteer, Owens, Rothe, Snellman, Solberg & Vincent, 2013; Holland, 2009; Muir Gray & Raffle, 2007) suggests that for a number of reasons, benefits of such examinations are less significant than anticipated.

Some experts felt that including tests of unproven benefit may be harmful, and are an expensive and an unnecessary use of resources in an already strained healthcare system, as well as being prone to various biases (Komaroff, 2009; Rank, 2008; McCartney, 2008). Others disagree; Shaack (2008) defended the practice, stating that current screening guidelines may not use the most recent evidence, and that executives, as a group, face gaps in care as a result of primary care systems not being responsive to their unique needs, most notably a lack of a preventative orientation and time sensitivity.

Han (1997) asserted that while the medical and scientific aspects are important, broader societal views are considered pertinent, suggesting a utility beyond just the health of the individual. Others asserted that correctly designed of executive medical programmes and other worksite health interventions result in them improving health,

reducing health costs and improving productivity (Soler, R. E., Leeks, K. D., Razi, S., Hopkins, D. P., Griffith, M., Aten, A., et al. (2010), Burton, et al., 2002).

Hence, it is not surprising to note that the debate about the scientific or other benefit of executive medicals is an ongoing one in the academic, lay and business press (Han, 1997; McCartney, 2008; Komaroff, 2009; Meyer, 2009; Armour, 1999; Rank, 2008). Ahmed (2013) reports that 32 per cent of Fortune 500 companies offer executive medical examinations as a perk, up from 22 per cent in 2008. Doctors and patients continue to perceive the concept of an annual physical examination to be of benefit (Chacko & Andreson, 2007).

Executive medical programmes are offered by many eminent health systems in the USA (Armour, 1999), Canada (Mendelson, 2010) and South Africa. As an example of their popularity, Worth Magazine, a lay periodical, publishes an annual 'Top Ten Executive Health Program' list, with executive medical centres competing for the prestige of being named in it. Regarding the executive annual medical, Wise, in Stock (2014) states: 'It's the only such benefit that shareholders haven't railed against in recent years. They think it's worth paying for.'

Furthermore, the health, illnesses and deaths of senior executives, have captured the business and public imagination. Think, for example, of Apple's Steve Jobs in the USA and SABMiller's Graham Mackay in South Africa. Debates in the US have sprung up about whether or not the health of senior executives is a 'material issue', whether any significant changes need to be reported to shareholders and quantifying the impact of the death of an executive on the share price (Larker & Tayan, 2011, Heineman, 2011; Larson,1999; Worrall & Davidson, 1987).

In South Africa, the debate has a long history. The South African Medical Journal, in 1978, published an opinion piece titled 'The Controversy Surrounding Executive Health Examinations' written by the then Head of Medical Services for Haggie-Rand Ltd. He defended the practice among their senior managers, against criticism from the wider medical fraternity (Baker & Johnson, 1978). Organised medicine, at the time, indicated its disapproval of the practice ("Periodical Health", 1978).

The controversy is aptly illustrated in press reports of the recent illness of Jamie Dimon, CEO of JP Morgan Chase. MacDonald (2014) implies, in an incorrect quote of Stock (2014), that early detection at an executive physical examination 'may have

saved Dimon's life'. Stock (2014) in a Bloomberg Business article entitled 'The C-suites savvy cancer-fighting strategy' actually states that while Dimon probably did attend an annual medical, the diagnosis was made when he saw a doctor for an unscheduled visit, as he was not feeling well.

1.2 Research purpose

Many corporations provide executive medical examinations to their senior staff, on the premise that they improve health and work performance. It is clear that there remains considerable controversy regarding this practice. The purpose of this paper is to define the executive medical examination and examine the history and theory of the practice in an effort to understand its effectiveness or otherwise, and its benefits and harms. It will also examine if the examination has other utility to individuals and the corporations which sponsor them, beyond their health.

Quick, Gavin, Cooper & Quick (2000, p.34) stated: "Executives are a key organisational constituency whose health should concern management scholars." The business rationale is that the health of executive management appears to be an important concern of corporations. The theoretical rationale is the need to understand by which mechanisms this intervention would work to improve the health of executives.

1.3 Structure of the research report

Chapter Two is a comprehensive literature review related to the research objective. Chapter Three provides the research questions to which are to be examined in this paper. Chapter Four defines the concept and components of a commercially available executive health examination and the research methodology that was employed to derive the results. Chapter Five presents an analysis of those results. Chapter Six consists of a discussion of the results in terms of how they relate to the theory and what this means in terms of answering the research questions. Chapter Seven provides conclusions and recommendations for different stakeholders. A number of appendices are included to provide more detail on various areas outlined in the main body.

Chapter Two: Literature review

2.1 Introduction and definitions

This review starts by defining the executive medical examination and its history. It then goes on to describe the components of the executive medical examination, and the key theories thought to influence these components, namely screening theory and health behaviour theory. It ends by describing some of the effects of executive medical examinations on the employee value proposition.

2.2 Definitions of executive medical examinations

The examination of the apparently healthy adult, not motivated by symptoms of disease, and performed at regular intervals, has a number of terms associated with it in various countries and circumstances (Krogsbøll et al., 2012; Han, 1997). These include, but are not limited to, 'general health checks', 'periodic health examinations', 'multiphasic screening' and 'preventative health checks'. The stated purpose is to find disease early and prevent it from developing further or providing reassurance of health (Krogsbøll et al. 2012). It should ultimately reduce death and illness (Krogsbøll et al. 2012). The tests are conducted at various intervals, and contain different screening tests.

From a conceptual perspective it was useful to determine the components of a typical executive medical examination. A typical executive medical examination includes a number of interventions, often including a questionnaire, a consultation and physical examination by a doctor, blood tests and procedures, which typically vary from provider to provider (Krogsbøll, et al. 2012; Han, 1997). In essence, these are all screening tests (Krogsbøll, et al. 2012), even though they may not all be perceived as such. Lifestyle interventions, which are not screening, but health education and behavioural interventions, were also frequently recommended during executive medicals (Krogsbøll, et al. 2012).

Thus the content of the executive medical examination was understood to consist of two clear components, and a clear location: a number of screening tests combined with an education and behaviour change interventions, which take place in the workplace setting (Krogsbøll et al., 2012). Hence, in order to understand the mechanics of how an executive medical examination works to improve or harm health, it would be necessary to study these two fields, namely screening theory, and the theory of health behaviour

change, also referred to as health promotion. Put otherwise, an assessment of these theories, in conjunction, should suggest how to explain the success or otherwise of executive medical examinations as a tool to improve the health of company senior executives.

2.3 The history of executive medical examinations

The history of medical examinations in healthy individuals is a long one, accounting for some of its appeal (Chacko & Andreson, 2007). It is not known when the regular (periodic) examination of the apparently healthy, rather than the sick began. It was recorded first in 1347, where it is advocated weekly for prostitutes (D' Souza, M.F., in Holland, 2009). Dobell in 1861, proposed it as a means of maintaining health to ward off tuberculosis (Roberts, 1958; Chacko & Andreson, 2007). Gould, in 1900 (Burton et al. 2002; Han, 1997), made the first recommendation to the American Medical Association for the provision of regular physical examinations to people who are not apparently sick. Little is known about the history of the practice outside of Europe and the United States of America (Han, 1997; Holland, 2009).

Han (1997) stated that the practice, initially aimed at the general population, became popular in the corporate industry from as early as the 1920's in the USA. EHE International, which claims to be the oldest and largest provider of physical examinations, dates its history back over 100 years to 1913 (CEO, n.d.). A number of economic factors drove the provision of medical examinations in the USA (Han 1997). With the introduction of workers' compensation legislation, companies adopted the practice to mitigate their risk in this regard (Han, 1997). Companies took a particular interest in the health of senior executives. Han (1997) argued that the rationale behind this was the perceived importance of the executive's health to the success of the company, hence linking the health of employees to the economic goals of the corporation. Another economic incentive was the introduction of pre-paid healthcare. Members of these plans began to use health services despite not being ill, as a way of trying to extract value (Han, 1997).

An industry developed around the provision of these medical examinations which made use of the latest available medical technologies. There is an abundance of published literature on the practice throughout the 20th century, but it was only in the 1970's that it was subjected to empirical scrutiny (Han, 1997). This involved a number of trials in the United Kingdom and the USA, and culminated in the Canadian and American

authorities discarding the concept of a standardised examination, for an individualised approach tailored to individual health risk (Han,1997; Holland, 2009).

2.4 Screening theory

As discussed previously, an important component of executive medical examinations is health screening. Muir Gray & Raffle (2007) described a screening activity as follows:

1) the individual being screened either does not have symptoms or signs, or is unaware of the symptoms and signs of the disease being screened for, and
2) the purpose of the activity is to reduce the risk of future ill-health, or if it cannot be reduced, to provide information to allow decision-making.

For a long time, it was accepted practice that screening healthy individuals was a good thing, although there was no empirical evidence of this (Han, 1997; Muir Gray & Raffle, 2007; Holland, 2009). After initial enthusiastic uptake of health screening, with time, it became apparent that this activity did not necessarily and reliably result in less disease and death in those screened, compared to those who had not been screened (Krogsbøll et al., 2012; Han, 1997; Muir Gray & Raffle, 2007). Counter intuitively, screening of healthy people can be harmful: since there is not necessarily certain benefit, one can draw the conclusion that any medical intervention can potentially lead to harm (Krogsbøll et al., 2012). Muir Gray & Raffle (2007, Preface) stated: “All screening programmes do harm. Some do good as well and, of these, some do more good than harm at a reasonable cost.”

According to Muir Gray & Raffle (2007), all formal definitions of health screening include the fact the activity deals with probabilities and not certainties, but only one requires that screening confer more benefit than harm. In order to understand how uncertainty and thus harm can come about it is necessary to understand some concepts around screening theory and its development.

One of the main assumptions of early screening theory was that disease progressed in a linear fashion from no risk factors, to risk factors and then to manifest disease (Muir Gray & Raffle, 2007). In fact, disease may regress spontaneously; the human body is capable of healing itself, or it may progress at varying rates (Welch, 2004; Muir Gray & Raffle, 2007). However, an engineering mind set towards the biological system persists, Gould in 1900 (Han, 1997) compares the human to machines, which need maintenance; in the UK, the annual physical examination is called the ‘DOT exam’ after

the annual motor car check of the Department of Transport. In Japan, it is referred to as the 'human dry dock'.

Another important tenet of screening theory concerned test performance. Test performance under real world conditions is not perfect. This results in false positives (sensitivity) and false negatives (specificity) (Krogsbøll et al., 2012). This uncertainty made it necessary to draw up a set of principles which guide screening (Wilson & Jungner, 1968 in Muir Gray & Raffle, 2007), endorsed by the World Health Organisation.

The same principles of sensitivity and specificity operate at a diagnostic test level. A person may thus be 'diagnosed' with a condition that they do not have, a condition referred to as overdiagnosis (Welch, 2004, in Muir Gray & Raffle, 2007). This can impact overall outcomes, from screening to treatment, and result in some people getting treated unnecessarily, for a condition, while positive on screening or even on a diagnostic test may not have resulted in their death (Muir Gray & Raffle, 2007). This, in turn, results in a condition referred to as overtreatment (Welch, 2004, in Muir Gray & Raffle, 2007). This can lead to unnecessary invasive diagnostic testing, pharmacological and surgical treatment with potential side-effects, complications and attendant costs (Salman, Whiteley & Warlow, 2007).

Overdiagnosis and overtreatment leads to the 'popularity paradox' of screening (Muir Gray & Raffle, 2007). Since people may not be aware that they may not have died of the disease with which they have been diagnosed, they ascribe the screening test as having saved their lives. To illustrate the problem of overdiagnosis and overtreatment, it is estimated that for every 2000 women screened for breast cancer over ten years, one will have her life prolonged, and ten will have unnecessary treatment for cancer for which they would not have died (Gøtzsche & Nielsen, 2006 in Muir Gray & Raffle, 2007). The ten women subjected to overtreatment, not knowing any better, would ascribe their being alive to health screening. Those of the group of ten, who develop complications, would not necessarily be unhappy, taking this as an acceptable risk, as they did not know that it could have been avoided.

Despite popular belief, there is no evidence to suggest that a physical examination by a doctor, certain blood tests (for instance, prostate cancer tests, blood sugar for diabetes) and procedures like electrocardiograms (ECG's) are of any benefit in people in the general population who have no symptoms (Wilkinson et al., 2013). Grønhøj

Larsen et al. (2012) found that 81% of tests offered by commercial providers of, amongst others, executive medicals in Denmark were of no proven benefit.

On the other hand, procedures like the measurement of blood pressure, cervical and breast cancer and obesity screening have been shown to be effective as health screening tests in the otherwise well (Wilkinson et al., 2013). In this regard, the Institute for Clinical Systems Improvement (ICSI) publishes an up to date, evidence based list of proven screening methodologies (Wilkinson et al., 2013).

Muir Gray & Raffle (2007) caution that programmes which only focus on screening for medical conditions, but are not designed as end-to-end programmes, including diagnosis and further care as part of a system, are unlikely to show success. There may also be short or long term psychological harm, arising from worry about having a health condition. 'False negatives', in turn, cause harm, by providing a false sense of security (Krogsbøll et al. 2012). This arises when, for example, a person, believing that they have recently been declared 'healthy', may not then present themselves to the health service timeously, when they develop symptoms.

Many of these principles may be illustrated in a large review of randomised studies of routine health examinations conducted by Krogsbøll et al. (2012). It was found that while the overall number of new diagnoses increased, no reduction in disease or death was found (including for cardiovascular disease and cancer). The harms which could arise were not quantified adequately in the studies under review. This led to the conclusion that general health examinations, irrespective of context, are not recommended, since the benefits of health checks are not evident and the harms are unknown.

Whilst most health checks studied by Krogsbøll et al. (2012) took place in community settings and in general practices, a few large studies took place in a workplace setting. Since this literature review only considered studies using randomised control methodologies, a large number of studies were excluded. This has significance since the largest causes of disease and death are associated with health behaviour (Sorenson, Landsbergis, Hammer, Amick, Linnan, Yancey, Welch, Geotzel, Flannery & Pratt, 2011; Painter et al., 2008; Soler et al. 2010) including the outcomes (cardiovascular and cancer) studied by Krogsbøll et al. (2012). One explanation may be that health checks could represent a necessary, but insufficient condition for reducing disease and death. This is discussed later in relation to the field of health

promotion; similar studies in workplace populations with specific designs do show improved outcomes (Soler et al., 2010).

Since participation in a health examination did not necessarily show benefit, it is suggested that other healthcare encounters in the primary setting, for example, during a visit for another acute or chronic problem, were sufficient to identify and treat patients (Krogsbøll et al., 2012). This may be context-specific; all these studies took place in developed countries, and assumed good health systems. It is not clear if countries with poorly developed health systems, in the developed world, may not show a different outcome.

There is also evidence to show that patients attending an annual scheduled examination are more likely to be provided with proven preventative services, than those attending for other acute or chronic encounters. Countries that have abandoned the annual medical, for example, Canada, as a vehicle for the delivery of preventative services, in favour of providing them at visits for acute or chronic care, have low penetration of preventative services (Chacko & Andreson, 2007). This contradiction requires further research, since it would appear that both within and without the realm of health checks, patients seem not to receive proven preventative benefits (Chacko & Andreson 2007, Krogsbøll et al., 2012).

2.5 Behavioural theory

The second aspect of executive medical examinations is the provision of a behavioural intervention. Behavioural interventions reside in the field of study referred to as health promotion. Health promotion is concerned with the prevention and managing of disease through reducing health risk behaviours (Evers, Castle, Prochaska & Prochaska, 2014). It is premised on the theory of behaviour change, in this case, health behaviour. Many of the leading causes of disease and death globally are related to health behaviours (Soler et al., 2010; Sorenson et al., 2011; Painter, Borba, Hynes, Mays & Glanz, 2008).

To be specific, tobacco and alcohol use, poor diet and physical inactivity are linked to 55% of all deaths in the United States of America and to five of the 20 most costly physical health conditions for United States employers. Theory on health behaviour change holds that multiple determinants of behaviour at an individual, interpersonal, group, organisational and/or community level have an influence on outcomes (Painter et al., 2008; Hampton, Brinberg & Peter, 2009; Mittler, Martslof, Telenko, & Scanlon,

2013). The workplace has become a venue of choice for delivery of health promotion programmes (Soler et al., 2011; Sorenson et al., 2011).

Regarding the impact of behavioural interventions, however, there is a divergence in evidence in the literature. While behavioural interventions are of varying value in the general population (Ebrahim, 2011 in Krogsbøll et al. 2012), this is not necessarily the case in workplace populations (Soler et al., 2010), where they have shown outcome improvements. This distinction is of importance, as the one distinguishing feature of an executive medical is its strong workplace association.

While academic studies in workplace health promotion abound, few look specifically at the executive and management subpopulation (for example, Donelly, 1996; Okojie, Isah, & Okoro, 2000; Burton, Chen, Daniel, Schultz, & Edington, 2002). In a recent review, the most common intervention in workplace health promotion in American workplaces is that of an 'assessment of health risk with feedback' (Soler et al., 2011), which is aligned with recent constructs of health behaviour theory (Mittler et al., 2013). This intervention meets the description of the behavioural intervention component of a typical executive medical examination.

Beyond their value to the health of individuals, workplace health promotion programmes are potentially associated with improved relations between employee and employer and improved employee attitudes (Sorenson et al., 2011; Soler et al., 2010, Nohammer, Schusterschitz & Stummer, 2013). There is anecdotal evidence that the provision of these perks may impact employment attractiveness to executives (Meyer, 2009).

2.6 Behavioural theory and worksite health promotion

There are a number of definitions of health promotion. From a research perspective it refers to the field dedicated to preventing or managing disease through reducing health risk behaviours (Tang, Ehsani & McQueen, 2003 in Evers, Castle, Prochaska & Prochaska 2014). Workplace health promotion, more specifically, is described as an approach to improving individual wellbeing, encouraging individual and organisational health-related learning and creating a health-sustaining work environment (Nohammer, E. et al. 2013). The worksite is seen as a convenient 'venue' or 'platform' for health promotion activities (Sorenson, et al., 2011). The workplace is where ever increasing numbers of the adult population spend their waking hours. Of all worksites in the USA

with 50 or more employees, 90% offered some form of health promotion for their employees (Soler et al., 2010).

The theoretical background to health promotion resides in the behaviour change arena (Hampton, Brinberg, Peter & Corus, 2009). The theory of reasoned action (Fishbein & Ajzen, 1975), the health belief model (Becker, 1974), social cognitive theory (Bandura, 1986), the theory of interpersonal behaviour (Traindis, 1977) and self-regulation theory (Kanfer, 1970) were developed into a unified theory to guide behavioural interventions, at the request of the United States National Institute of Health (Hampton et al., 2009). The working group which undertook this task agreed on a set of eight constructs that account for the majority of variance in volitional behaviour (Fishbein, et al. 2001). The eight constructs are: strong positive intention, environmental constraints, skills, attitude, social norms, self-image, emotional reactions and perceived self-efficacy. The first three are considered necessary and sufficient for producing any behaviour.

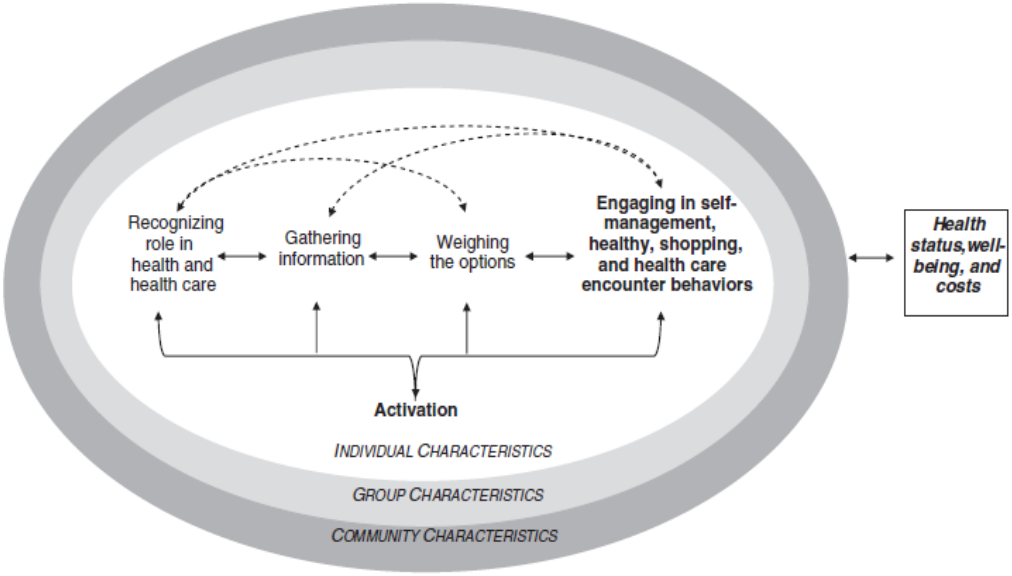
The trans-theoretical model by Prochaska & Di Clemente (1984) (in Hampton et al., 2009) proposed that behaviours are not dichotomous, but that individuals are at different levels of readiness to perform a behaviour, and that factors that might influence this behaviour are different for each stage of readiness. This implies that it is possible to integrate unified theory and the trans-theoretical model and these constructs may influence an individual to a greater or lesser degree depending on the stage of change (Hampton et al., 2009). The four stages of readiness to change proposed by Prochaska & Di Clemente (1984) are pre-contemplative, contemplative, action and maintenance.

More recently, Mittler, Martsolf, Telenko & Scanlon (2013) have proposed another approach, electing to describe health behaviour theory through the lens of health consumer engagement. After Painter et al. (2008), they identified the health behaviour theory most commonly cited in the literature. They then split these theories (and added to them) on the basis of those that focus on the *individual*, and those that focus on *interactions with people and the environment*. Those focusing on the *individual* include the health belief model, theory of planned behaviour/reasoned action, and the trans-theoretical model. They have added microeconomic consumer choice theory to this.

In terms of those focusing on *interactions between people and the environment*, social network theory and social support (Christakis & Flower, 2012, Heaney & Isreal, 2008, Uchino et al., 2012 in Mittler et al., 2013), and the social ecological model

(Bronfenbrenner, 1979 & Richard, Gauvin & Raine, 2011 in Mittler et al., 2013) have been added to social cognitive theory. This work led to the development of a model of health consumer engagement, the Engaging Consumers in Health and Healthcare in Communities (ECHC) framework (Figure 1). The model aims to more accurately assess health promotion programmes with consumer engagement as their intent, within existing theory frameworks. It succinctly describes the individual, group and community aspects thought to drive behaviour change.

Figure 1: The ECHC Framework



Other Key Characteristics by Level
(Plain text indicates fixed characteristics; italics indicate changeable characteristics.)

INDIVIDUAL			GROUP	COMMUNITY	
Gender	*Insurance status*	*Choice set*	Sociodemographics	Geography	*Economic infrastructure*
Race/ethnicity	*Health care experience*	*Knowledge*	*Social structure*	Sociodemographics	*Political infrastructure*
Age	*Preferences across goods*	*Skills*	*Social capital*	*Social infrastructure*	*Norms*
Personality	*Confidence/self-efficacy*	*Attitude*	*Norms*	*Social capital*	*Values*
Cognitive abilities	*Income*	*Beliefs*	*Values*	*Collective orientation*	*Beliefs*
Genetics	*Employment*	*Values*	*Beliefs*	*Interdependence of groups*	
Socioeconomic status	*Education*	*Emotions*	*Collective efficacy*	*Integration of groups*	
Health status	*Self-conception*		*Political resources*	*Physical infrastructure*	
			Economic resources	*Health systems infrastructure*	

Source: Mittler et al., 2013.

2.7 An executive medical examination as a health promotion methodology

Health risk assessments or health risk appraisals (HRAs, the terms are used interchangeably) are the most predominant approach to delivering worksite health promotion (Soler et al., 2010). Soler et al. (2010) states that most authors will agree that HRAs consist of three basic elements:

- The assessment of personal health behaviours and risk factors which may be supported by biometric measures of physiologic health;

- A quantitative or qualitative assessment of future risk of death or other adverse health outcomes, and;
- The provision of feedback in the form of educational messages and counselling that describe ways to change behavioural risk factors to alter the identified future risk of disease or death.

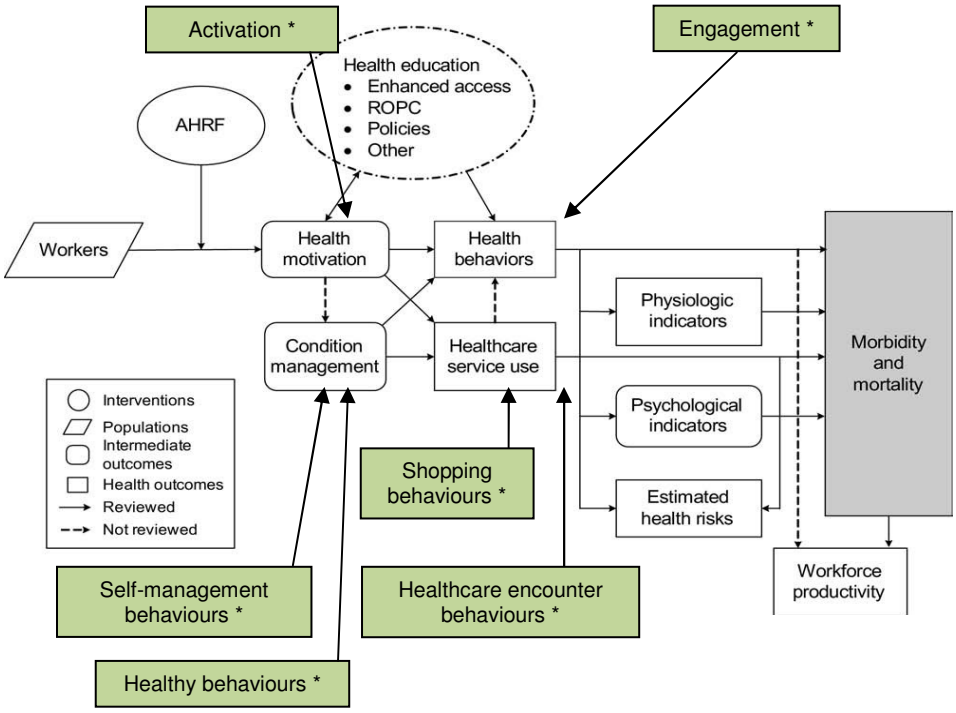
In line with the above, Soler et al. (2010) preferred 'Assessment of Health Risks with Feedback (AHRF)' as a more descriptive term. The AHRF is further described as either 'basic' or 'plus'. In essence, Soler et al. (2010) argue that the greater the behavioural intervention component in a workplace health programme, the more effective it is. The concept of the AHRF meets description of the health screening and 'lifestyle intervention' component within the executive medical examination as posited by Krogsbøll, et al. (2012). This proposition is supported by one of the referenced studies in Soler et al. (2010), namely Donelly (1996) which includes company senior executives in its cohort. This suggests it is a valid model to review the executive medical examination against.

An executive medical examination may even meet the criteria for an AHRF Plus, for example, due to 'enhanced access' (attending an offsite 'premium' facility) and 'incentivisation' (employer paying for cost). Soler et al. (2010) describes an analytical framework by which to assess how an AHRF could influence health outcome. There was empirical support for the effectiveness of such an intervention.

A review of the ECHC model (Figure 2) together with the AHRF analytical framework (It is thus possible to combine the two concepts as illustrated in Figure 2 below.

Figure 2) suggests the AHRF model may be mediated by increased health consumer activation and engagement, as described by Mittler et al., (2013). To reiterate, Soler et al. (2010) hypothesise that the 'assessment of health risk with feedback' methodology (AHRF, or AHRFPlus) has its effects on intermediate and clinical outcomes through behavioural interventions described in the unified theory of health behaviour (Fishbein et al., 2010). This concept aligns with the cognitive/ motivational 'activation' process and a behavioural 'health consumer engagement' process described by Mittler et al. (2013). It is thus possible to combine the two concepts as illustrated in Figure 2 below.

Figure 2: Analytical framework for AHRF combined with health consumer engagement



Source: Soler et al., 2010 and Mittler et al.,2013

2.8 Evidence for effectiveness of health promotion programmes

Given the theoretical complexity, evidence of improved health outcomes in health promotion programmes has always been a difficult area. This is illustrated aptly in the findings of Krogsbøll et al. (2012), discussed at length above, who adopt a positivist approach to the assessment of health examinations, including executive health examinations.

Tang et al. (2003) attempted to address this, and presented a typology for looking at the evidence for effectiveness of health programmes. They argued that the rational scientific method is inadequate as a sole measure of effectiveness of health promotion programmes. They posit that this is due to the multitude of individual, behavioural and environmental factors that interplay in influencing the outcomes of programmes (see also Soler et al. 2010 and the ECHC framework, Mittler et al., 2013). Krogsbøll et al. (2012), however, are notably direct on the requirement of clinically important outcomes (disease and death) rather than surrogate or intermediate outcomes (health behaviour change and change in physiologic indicators).

The need to look at outcomes other than morbidity and mortality is also emphasised by Han (1997) and Muir Gray & Raffle (2007). They argue that a rationalist perspective (looking at periodic medicals solely as screening) must be tempered with post-modern concerns. Han (1997) argues that periodical medical examination may have a legitimate role in fostering the doctor-patient relationship, improving patient and doctor satisfaction or the quality and efficiency of care.

O'Donnell (2013) and Goetzel & Pronk (2010) argue that well designed, methodologically sound workplace health promotion programmes are effective, while cautioning that between 90-95% of programmes lack the necessary components and are hence too superficial to make an impact. Against this background, it is not surprising that health outcomes reported for worksite health promotion programmes have been mixed (Wilson et al., 1996; Soler et al., 2010 ; RAND 2013 in O'Donnell, 2013).

Soler et al., (2010) shows that these differences in methodology may indicate the success of some programmes over others. This is aptly illustrated in Figure 2, which combines the ideas of Mittler et al. (2013) on health consumer engagement (with a basis in health behaviour) and Soler et al. (2010) on the mechanisms through which the so-called 'assessment of health risk with feedback' methodology has its effect. The programmes were compared on the basis of the degree of behavioural interventions. They compare programmes did not include skill-building with those that do.

These findings suggest that health promotion approaches that address the theoretical constructs of behaviour change are more successful than those that do not. This is also suggested by Painter et al. (2008). However, classical unified theory of health behaviour change (Fishbein et al., 2001), maintains that skill-building is a necessary, but insufficient requirement for behaviour change (no environmental constraints and strong positive intention are the other two requirements).

Burton et al. (2002) and Donelly (1996) looked specifically at medical programmes directed at senior executives and found evidence of improvement in health in terms of the reduction of health costs, absenteeism and health risk. Gemson (1995) in Burton et al. (2002), in turn, found that the inclusion of a health risk appraisal with a periodic worksite health examination resulted in improved outcomes. The criticism remains that these are intermediate or surrogate outcomes, and not clinically important outcomes (Fleming & DeMets, 1996). For instance, Fleming & DeMets (1996) outlined that due to

a number of factors the use of intermediates or surrogate markers (like cholesterol or blood pressure) may be problematic, and not adequately predict the true clinical outcome (for example an end point like actual disease or death).

2.9 Management as a hazardous occupation

A model on executive health was put forward by Quick, Gavin, Cooper & Quick (2000) suggesting that executive health is an interplay between organisational and individual factors. The model is a useful start, but in its current form is anecdotal and lacks sufficient appreciation of the current theoretical underpinnings.

When looking at the possible health risks of the employed population, population health data is often used as a starting point (Soler et al. 2010). This assumes that the health of the working population is the same as the general population. This may be true in the aggregate, but may not necessarily be true for subpopulations of employees. Two questions arise out of this: Are the health risks of executive and senior management the same as that of the general population and the rest of the working population? Secondly: Is management, and particularly executive management, hazardous to health? This claim is often implied anecdotally in lay accounts of executive programmes, often as part of the sales process. The marketing behaviour of private companies is an important determinant of health behaviours and hence outcomes (Ehsani, McQueen & Tang, 2003; Han, 1997).

The profession of executive and senior management is often associated with stress or it is implied that executives are so busy that they do not have time to care for their own health (for instance in Meyer, 2009). This is also implied in academic studies, for example, in Burton et al. (2002), but without any substantiation. If this was true then stress and its complications amongst senior management could be handled as an occupational disease. Sorensen et al.(2011) state that worksite conditions may contribute to chronic diseases through hazardous job exposures, high job demands and inflexible work schedules. This is perhaps more applicable to lower levels of employees and not managers or executives, although the last two conditions may be of relevance.

On the other hand, there is some evidence to link the wealth effect to better health (Mittler et al., 2013), and that wealthy individuals may experience better health for a wide variety of issues (personal, organisational and environmental) that allow them to better understand and intervene in their personal health and circumstances. There is

some evidence in Swedish (Hallquist et al, 1998, in Sorenson et al, 2011) and American (Landsbergis et al., 2003 in Sorenson et al., 2011) men of differential impacts of job level on physical health. In these cases, cardiovascular disease, among blue collar workers had a higher prevalence than among white collar workers. Hence, the evidence is inconclusive as to whether executive management has a net negative effect on health.

2.10 An executive medical examination as a part of the employee value proposition

There is evidence to suggest that correctly designed and implemented executive medical programmes may have a positive influence on the employer-employee relationship (Sorenson, Himmelstein, Hunt et al., 1995 in Sorensen et al. 2011; Sorenson, Barbeau, Hunt & Emmons, 2004 in Sorenson et al., 2011; Institute of Medicine, 2010 in Sorenson et al., 2011).

Nohammer et al. (2013), drawing on motivation theory (Kanfer, 1990 in Nohammer et al., 2013), assumes a relationship between expected personal benefit and programme participation. In white collar employees, participating in a workplace health programme, almost 60% reported feeling appreciated, and it was indirectly inferred that this may contribute to motivation and job satisfaction. Holzbach, Piserchia, McFadden, Hatwell, Herman & Fielding (1990) show that a comprehensive health promotion programme has the effect of improving employee attitudes.

2.11 Summary

There are clear theoretical pathways (Soler et al., 2010, Mittler et al, 2013) in health screening and behaviour by which interventions such as executive medical examinations have been demonstrated to have an effect on health improvement (Soler et al., 2010). In addition, they may be associated with a number of non-health benefits, including an improvement of employee attitudes and job satisfaction when they are provided as part of a workplace health promotion programme (Nohammer et al., 2014; Holzbach et al., 1990).

In practice, however, this is not evident (Krogsbøll et al., 2012). A number of reasons are offered to explain this (Goetzel & Pronk, 2010; Tang et al., 2003, Han, 1997). These may include the failure to select and implement appropriate health screening (Muir Gray & Raffle, 2007; Wilkinson et al., 2013) and thus leading to harm which cancels out any benefit. Secondly, these may include a failure to recognise the

behavioural basis of common health risks, and failing to design programmes which address these (Soler et al, 2010, Mittler et al, 2013, and Goetzel & Pronk, 2010).

Chapter Three: Research propositions

Drawing on the literature, an executive health programme comprising of executive medical examinations as its basis may be effective by:

1. Offering health screening tests which have an evidence base to support their use
2. The intervention has sufficient behavioural change components to improve health behaviours
3. The intervention is well received by management and accrues a positive reaction to the employer

Proposition 1:

An executive medical examination is a composite of a number of screening tests which have been shown to be effective.

Proposition 2:

An executive medical examination has components which address health behaviour change as evidenced by an improvement in health risk indicators and health consumer behaviour.

Proposition 3:

The executive medical examination as a workplace health promotion activity has the effect of showing an improvement in the employee value proposition by improving employee perceptions.

Chapter Four: Research methodology

4.1 Choice of methodology

Research methods are 'techniques for gathering data' (Harding, 1986 in Westmarland, 2001) and broadly categorised as either quantitative or qualitative (Westmarland, 2001). Both methods are appropriate, depending on the nature of the study. Research philosophy may be slanted along the same divide, with quantitative research more associated with the positivist approach, and the phenomenological approach associated with qualitative research (Hussey & Hussey, 1997).

The research approach envisaged for this topic is seen as having both quantitative components (the measurement of health risks expressed in numbers) and qualitative components (behaviour change, employee attitudes). In health behaviour research, Tang et al. (2001) has suggested that a positivist approach on its own may not be well suited, and suggests a typology of evidence which more accurately captures the nuances. Hence, a mixed method has been adopted. The two arms are of the study are complementary, the one tests the quantitative outcomes of defined behaviours and biometrics and the other, qualitative, as it measures the perceptions of participants towards the intervention, and towards the employer as a provider of the intervention.

The study approach is a deductive one, it seeks to examine existing theory and derives propositions from this body of theory (Saunders & Lewis, 2012). These propositions will be tested by observing the results and determining if they fit into the general theoretical framework or whether a modification is necessary. The study type is explanatory. It seeks to compare the pre- and post-result of an intervention (Saunders & Lewis, 2012). This method has been chosen for this study as there is ongoing controversy in the literature regarding the value of the intervention, and the existing theory base has not been applied to the intervention specifically. The intervention is to be studied in the light of the theory base, and outcomes will be tested, against those expected.

Secondary data is utilised, the results of an intervention previously undertaken and not for the purpose of this research are analysed (Saunders & Lewis, 2012). There are advantages and disadvantages to this (Saunders & Lewis, 2012). The advantage is that data is readily available for analyses. The disadvantage is that the data is not necessarily in the best form for the study. For instance, one of the study limitations is

that validated questionnaires have not been used, because the original data was not collected using such an instrument.

4.2 Study population, sampling method and sample size

The study population is the executive and general management of an agro-processing company based in Durban, South Africa, consisting of 43 individuals. They have been selected from the group of executive and general managers who met the following criteria: (1) in employ between 2013 and 2015; (2) attended at least two executive medical examinations, which took place in 2013 and 2015. The company is a sugar-cane grower, and sugar and downstream products producer in six countries in Africa. It is listed on the Johannesburg Stock Exchange. The group represents the most senior employees of the company. The researcher is responsible for the programme and is a member of the group. He is a medical doctor by profession, in the full-time employ of the company, and is designated as a general manager himself.

Most of the group is located at the head office in Durban, but a small part of the group work at various company owned entities (agricultural estates, sugar mills and an alcohol production plant) located in South Africa, Swaziland, Mozambique, Zambia, Malawi and Tanzania. Demographic information was collected from the employment records received from the company, and included age and gender. Age was calculated as age in 2015, the second year of participation in the programme.

4.3 Description of the intervention

A medical examination is offered to general managers every two years and to executive directors every year. It is a part of company-wide medical services provided to all employees of the company. The objective of the programme is to improve the health of the senior management team. The programme commenced in 2013 in its current form. Prior to this, medicals were offered by the incumbent company doctor (predecessor to the current one). The commercial provider selected, is one of a few available nationally and locally, and was formally selected and contracted in a non-competitive process. The provider has a number of other corporate clients in the city, and is well regarded for the services provided.

Each individual is contacted by the medical department to arrange an appointment with the service provider. Close to the time of the appointment, the medical department arranges to collect a number of samples for blood and stool testing. These samples are analysed at a large, accredited pathology group and the report sent to the service

provider. Each individual receives a *standardised* questionnaire from the service provider, which has been designed by the service provider, by email.

The questionnaire includes a consent form, personal details, general medical history, family history, travel history and current symptoms. It also includes a lifestyle risk questionnaire which includes sleep, tobacco use, alcohol use, physical activity and nutrition. It has a perceptual and psychological battery consisting of a stress, emotional and psychological wellbeing, quality of life (perceived health, life satisfaction and job satisfaction), willingness to change and goal setting. The psychological wellbeing questionnaire is based on Kessler & Mroczek (1994). The rest of the questionnaires were designed by the service provider and have not been validated.

Each individual then attends the facility at the appointed time, and has a standardised set of tests: a resting and effort electrocardiogram, height, body mass, waist circumference, percentage body fat, urinalysis, exercise and fitness test and a lung function test performed by a registered biokineticist. The tests are conducted on standard equipment as found in a typical medical centre. The equipment is calibrated according to each manufacturer's recommendations. The individual sees a doctor for a full physical examination, and a discussion of the results. Of the 86 (43 per year) examinations done in two years, all but 11 were done by the same doctor (87 per cent). The doctor has extensive experience, and is qualified in sports medicine.

If necessary the individual may be referred to his own doctor or specialist for any condition identified on examination. All participants are members of a comprehensive medical aid for which the company subsidises between 50 and 60 per cent, depending on employee benefit status. The visit is followed by an individualised report which is emailed to the individual concerned, and a copy sent to the medical services department for filing. Certain responses to questions in the medical history, scores of self-report and blood and urine test results are captured on a spread sheet in Microsoft Excel by staff of the service provider.

Table 1: Description of the executive health programme

	Year 1 & 3
Location	Arranged by worksite, but performed offsite
Type of assessment	Questionnaire including demographics, medical history and self-reported perceptual, psychological, work and life satisfaction, nutrition, smoking status, alcohol intake and exercise Physical examination by a doctor Various blood tests Fitness assessment and biokineticist consultation Resting and effort ECG
Method of feedback	One-on-one feedback followed by emailed written report

4.4 Unit of analysis

The unit of analysis is the individual. For the purposes of this report we were interested in responses to health risk, psychological/perceptual scores and physiologic parameters. The individual responses to the health risk questionnaires and psychological/perceptual battery are collected and scored according to scales explained Table 5.

4.5 Measurement Instrument

In order to test the first proposition, a similar approach to that used by Grønhøj Larsen et al. (2012) was selected, as a similar question was being asked, namely, what evidence base is there for health screening tests included in a typical executive medical examination? This study differed from that done by Grønhøj Larsen et al. (2012), who studied websites to obtain information on tests offered. The Institute for Clinical Systems Improvement (ICSI): Preventative Services in Adults (Wilkinson et al., 2013) uses peer-reviewed and quality controlled assessment procedure to assess the effectiveness of preventative interventions. The ICSI publishes an up-to-date set of recommendations which are designed to be used by health services to determine what preventative services to use. Recommendations vary from services which must be offered to those for whom there is evidence to not recommend them.

Previous versions of the ICSI list were also used in the research environment by Grønhøj Larsen, et al., (2012), who assessed commercial providers in Denmark regarding the level of evidence of tests offered and whether balanced disclosure was provided regarding benefits and harms of screening. Services not included in the list are not considered to be preventative in nature, and services are classified from Level I to IV, as indicated in Table 2.

Table 2: ICSI Preventative Services for Adults Guide levels of evidence

Level of evidence	Definition
Level I Services	Preventative services that clinicians and care services *must* assess the need for and recommend to each patient. These have the highest priority value
Level II Services	Preventative services that clinicians and care services *should* assess the need for and recommend to each patient. These have value but less than those in Level I.
Level III Services	Preventative services for which the evidence is currently incomplete and/or high burden of disease and low cost of delivering care. Providing these services is left to the judgement of individual medical groups, clinicians and their patients.
Level IV Services	Preventative services that are not supported by evidence and *not* recommended

A pre-specified list was developed (Grønhøj Larsen et al. 2012) with a list of evidence-based tests based on the ICSI Preventative Services in Adults (Wilkinson et al., 2013), and advice given (Grønhøj Larsen et al., 2012; Wilkinson et al., 2013). This is detailed in Table 3.

Table 3: Pre-specified list to assess health screening tests and disclosure

Regarding tests offered by the provider?	**Does the provider offer advice on? (Grønhøj Larsen et al., 2012; Wilkinson et al., 2013)**
Do the tests appear on the Level I to IV evidence of the ICSI Preventative Services for Adults Guideline? (Wilkinson, et al. 2013), Annotation Table 1?	What disease is being screened for?
	The possibility of false negatives and false positives?
	The accuracy of the test to diagnose health or illness?
	The number of people being overdiagnosed?
	The number of people being overtreated?

Regarding proposition 2, worksite health promotion programmes are evaluated based on the ability of the programme to reduce the number of individuals at high risk while

maintaining that of individuals at low risk (Edington et al., 1997; Ozminkowski et al., 2000 and Yen et al., 2001 in Musich, McDonald, Hirschland & Edington, 2003). However, individuals participating in corporate health programmes experience a number complex changes in their risk (Musich et al., 2003; Burton et al., 2006). Firstly, individuals at low risk may remain at low risk or become high risk, and vice versa for high risk individuals. Secondly, individuals gain or lose an overall number of risks. This is illustrated in Table 4 (Musich et al., 2003; Burton et al., 2006).

Table 4: Modelling of risk outcomes

Baseline 2013	2015	
Low	Percentage still low risk (low-low)	Total equals 100%
	Percentage now high risk (low-high)	
High	Percentage now low risk (high-low)	
	Percentage still high risk (high-high)	

The questionnaire format is useful as allows an investigator to obtain an indirect measure of the variables under investigation (Katzenellenbogen, Joubert & Abdool Karim, 1991). The study seeks to obtain opinions from participants regarding their perceptions about the practice in question, namely, executive medical examinations. A Likert-type questionnaire was developed to determine perceptions of personal behaviour change, the elements of health consumer engagement (Mittler et al., 2013) and attitude to the company. In the design of the questionnaire attention is paid to content and construct validity (Saunders & Lewis, 2012). No standardised questionnaire was available for use in this context, and questions were developed from applicable literature (Mittler et al., 2013; Nohammer et al., 2013) to test the constructs. Four scales were used, from 1 (disagree) to 4 (agree completely) without a neutral category (Nohammer et al., 2013).

Data analysis of the questionnaire took the form of frequency analyses, namely, what proportion in percentages answered within each scale. The questionnaire was tested with two participants, and adapted after their input was received. For instance, questions that were repeated between the psychological/perceptual assessments of the executive medical examination (work satisfaction, perceived health) were removed from the questionnaire.

4.6 Data gathering process

The service provider was requested to provide an Excel spread sheet containing the full list of participants who met the inclusion criteria. The data was reviewed for any missing or outlier fields. Any discrepancies were checked against the source data in the medical file and corrected. Each individual score was transformed into a low or high risk indicators outlined in Table 5. A random number generator was used to identify a sample of participant feedback reports, representing just over 50 per cent of the feedback reports (22 reports). The questionnaire was developed into an online format using the Survey Methods software programme and emailed to all participants. A report was obtained which indicated the proportion of replies made to each question.

4.7 Analysis approach

A copy of the standardised questionnaire, pathology request form and participant feedback report was obtained. All tests offered in these reports were noted. All the tests offered by the provider were compared to the list made available by the ICSI: Preventative Services for Adults guide (Wilkinson, et al., 2013). The feedback reports were studied for what advice or disclosure was made to participants as outlined in Table 3 regarding the benefits and harms of screening.

Each risk parameter was populated with a figure from 2013 and 2015 for each eligible participant. The high risk criteria for a number of parameters are known (smoking, alcohol intake, physical activity, cholesterol). The provider, however, also used a number of self-designed tests, for which there is no validation or scoring scheme available. It was thus necessary to determine what would equate to low or high scores on these tests using statistical methods. The approach adopted by Musich et al., (2003) was used. The high risk scores were developed from percentiles of the set of all individual scores as follows: (1) for stress index, approximately the upper 10th percentile, which equated to scores of more than 3; (2) for diet, life and job satisfaction and perceived health, a score less than the lower 10th percentile. High risks equated to a score of less than five for diet, less than seven for life and job satisfaction and less than six for perceived health.

The same approach was adopted for calculating the overall risks, which is the sum of individual risks. The overall risk score was the 50th percentile for low risk (a score of zero to three), 90th percentile for medium (a score of four to five) and greater than the

90th percentile for high risk (a score of six to seven). The prevalence of high risk status was calculated at baseline and at follow-up (two years).

Table 5: Criteria for high risk

Parameter	Unit of Measurement	High Risk Status
Health behaviour risk		
Smoking	Current smoker, non-smoker and ex-smoker status	Current smoker
Alcohol	Units consumed per week	More than 14 units of alcohol per week
Physical Activity	Minutes per week of physical activity	Less than 150 minutes per week
Nutrition	Answer Yes or No for 10 healthy eating behaviours, score zero to 10	Score less than 5
Psychological and Perceptual Risks		
Stress	Self-rate: 0-5, where 0 is no stress and 5 is constant stress	Score greater than 3
Life Satisfaction	Self-rate, (0-10, 0=poor and 10=Excellent) to three questions regarding health, life satisfaction and job satisfaction	Score less than 5
Job Satisfaction	Self-rate, (0-10, 0=poor and 10=Excellent) to three questions regarding health, life satisfaction and job satisfaction	
Perceived Health	Self-rate, (0-10, 0=poor and 10=Excellent) to three questions regarding health, life satisfaction and job satisfaction	
Physiologic risk		
Total cholesterol (Fasting)	mmol/l	Greater than 4.9
Blood pressure	mmHg	Greater than 139/89
Body mass index	kg/m^2	Greater than 29
Other Risks (combination of behavioural and physiologic)		
Relative Cardiovascular Risk	ratio	Greater than 1
Overall Risks		
Low risk		0-3
Medium risk		4-5
High risk		6 or more risks

The SPSS software package was used for statistical analysis. A statistical comparison is made of the difference in proportion at high risk between baseline and follow up. The statistical test used was McNemar's chi-square test, as used in similar studies (Musich, et al., 2003; Burton, et al., 2006). McNemar (1947) outlined assumptions for which the test is appropriate: (1) one categorical dependent variable with two categories and one categorical independent variable with two related groups; (2) the groups of the dependent variable must be mutually exclusive. The third assumption is that these are random samples, but in practice this is not necessarily necessary. McNemar's test for statistical significance was conducted on the significance of the change in the high risk proportion for each individual risk as well as the overall risk. Tests were conducted at the 95 per cent level of significance. Two by two tables were constructed to reflect the baseline and results at two years.

Table 6: Two by two table

		Results at Year 2	
		Low risk	High risk
Results at baseline	Low risk	a	b
	High risk	c	d
	Total	a+c	b+d

McNemar's chi-test statistic is represented by the formula:

$$\chi^2 = \frac{(b-c)^2}{b+c}.$$

McNemar's test calculates the statistical significance of the ability of an intervention (in this case, an executive medical examination) to maintain the low risk status of individuals (keep them low), while improving the high risk status (moving to low risk). This must be distinguished from the clinical results of the programme; there may be a net improvement in health risks in the population under study, accounted for by an improvement in those at risk and a deterioration of those at low risk (Musich, et al., 2003).

4.8 Limitations

A number of limitations are evident in the process. The sample is small and for conditions with a low prevalence this will result in difficulties in interpretation (Katzenellenbogen et al., 1991). The statistical method selected may be overly conservative, and differences which have no statistical significance may have clinical

significance and vice versa (Katzenellenbogen et al., 1991). This effect was not controlled for in this study, as programme level outcomes were assessed.

The sample is homogeneous in terms of demographics (white, 79 per cent; male, 86 per cent; 70 per cent white and male). There is no comparison population which means that it is not possible to control for the effects of time, that is, the effects of aging, or other external influences, for instance, all participants are on a medical aid with its own health promotion component (Soler et al., 2010).

The group belongs to one company, limiting the generalisations of the findings to other settings. Only one service provider is assessed, limiting the conclusions which can be drawn regarding other providers. Behaviour changes are self-reported which could result in favourable reports in the post-test depending on demand characteristics (Soler et al., 2010). Validated assessment tools were not used so questions of validity, reliability and repeatability of the instrument may be raised (Soler et al., 2010). In addition, surrogate endpoints (change in health behaviours and physiologic markers) are used, and the study duration is too short to look at clinical endpoints (disease, death) which may be under- or overestimate true effects (Fleming & DeMets, 1996).

Chapter Five: Results

5.1 Description of the sample

The average age of participants was 51 years (range 31-64). The participants comprised 14 per cent (six) females and 86 per cent (37) males. The ethnic makeup of the group was 79 per cent (34) White, 14 per cent (six) Indian, five per cent (two) African and two per cent (one) Coloured.

Table 7: Sample description

Demographics	
Average Age (range)	51(31-64)
Gender	
Male	86%
Female	14%
Race	
White	79%
Indian	14%
African	5%
Coloured	2%

5.2 Analysis of the results

5.2.1 Analysis of health screening tests offered to participants

At least 21 discrete screening tests were provided. Of these, ten, or 47 per cent were found to either not be preventative or not recommended as preventative tests. Tests that are not recommended comprise 19 per cent of tests. If tests on which evidence is incomplete or are weakly recommended are included (Wilkinson et al., 2013) this number rises to 62 per cent. Of the tests which *must* or *should* be provided, 29 per cent are provided. The questionnaire includes a standard consent form, and disclaimer, but no specific advice regarding the benefits and harms of health screening is provided.

Table 8: Evidence levels for health screening tests

Level of Evidence for Preventative Testing	Available Tests	Tests offered during the executive medical examination
Services provided but not considered preventative, or not included in ICSI guide due to a lack of evidence	Not applicable	Physical examination Counselling: Nutrition, physical activity Fitness rating Percentage body fat Urine dipstick
Level I Services (*must* assess need for, and recommend to every patient, highest priority value)	11	Alcohol abuse screen and brief counselling Colorectal cancer screening Hypertension screening Lipid screening Tobacco use screening and brief intervention
Level II Services (*should* assess the need for and recommend to each patient; has value, but less than Level I)	17	Depression screening HIV screening Obesity screening
Level III Services (evidence currently incomplete)	15	Prostate cancer screening Skin cancer screening and counselling Thyroid dysfunction screening
Level IV Services (not recommended)	6	Coronary heart disease routine screening Diabetes routine screening Other routine lab testing Screening for COPD with spirometry

5.2.2 Risk outcomes of the executive medical programme

The prevalence of tobacco use was low in the group of participants at five per cent. One of the two individuals who used tobacco at baseline stopped use by the next assessments. None of the low risk participants at baseline started to use tobacco by the next assessment. The result was not statistically significant.

Table 9: Tobacco use risk result

			Tobacco use Year 2		
			Low	High	Total
Tobacco use Baseline	Low	Count	41	0	41
		% within Tobacco use Baseline	100.0%	0.0%	100.0%
		% within Tobacco use Year 2	97.6%	0.0%	95.3%
		% of Total	95.3%	0.0%	95.3%
	High	Count	1	1	2
		% within Tobacco use Baseline	50.0%	50.0%	100.0%
		% within Tobacco use Year 2	2.4%	100.0%	4.7%
		% of Total	2.3%	2.3%	4.7%
Total		Count	42	1	43
		% within Tobacco use Baseline	97.7%	2.3%	100.0%
		% within Tobacco use Year 2	100.0%	100.0%	100.0%
		% of Total	97.7%	2.3%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		1.000[a]	.500[a]	.500[a]
N of Valid Cases	43			

a. Binomial distribution used.

The prevalence of high risk dietary habits reported is 12 per cent at programme inception and improves to five per cent by the next assessment. This result is due to an improvement to low risk of 12 per cent in the high risk group, which represents all the at risk members. A five per cent deterioration of the low risk group is noted. The result is not statistically significant.

Table 10: Dietary risk result

			Diet Year 2		
			Low	High	Total
Diet Baseline	Low	Count	36	2	38
		% within Diet Baseline	94.7%	5.3%	100.0%
		% within Diet Year 2	87.8%	100.0%	88.4%
		% of Total	83.7%	4.7%	88.4%
	High	Count	5	0	5
		% within Diet Baseline	100.0%	0.0%	100.0%
		% within Diet Year 2	12.2%	0.0%	11.6%
		% of Total	11.6%	0.0%	11.6%
Total		Count	41	2	43
		% within Diet Baseline	95.3%	4.7%	100.0%
		% within Diet Year 2	100.0%	100.0%	100.0%
		% of Total	95.3%	4.7%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		.453[a]	.227[a]	.164[a]
N of Valid Cases	43			

a. Binomial distribution used.

The prevalence of high risk alcohol intake is seven per cent (3 individuals) at programme inception. This prevalence increases to nine per cent at two years (4 individuals). This increase is represented by a decrease of 33 per cent in the high risk group, and a five per cent increase in the low risk group, which is represented by two individuals. The result is not statistically significant.

Table 11: Alcohol intake risk result

			Alcohol Intake Year 2		
			Low	High	Total
Alcohol Intake Baseline	Low	Count	38	2	40
		% within Alcohol Intake Baseline	95.0%	5.0%	100.0%
		% within Alcohol Intake Year 2	97.4%	50.0%	93.0%
		% of Total	88.4%	4.7%	93.0%
	High	Count	1	2	3
		% within Alcohol Intake Baseline	33.3%	66.7%	100.0%
		% within Alcohol Intake Year 2	2.6%	50.0%	7.0%
		% of Total	2.3%	4.7%	7.0%
Total		Count	39	4	43
		% within Alcohol Intake Baseline	90.7%	9.3%	100.0%
		% within Alcohol Intake Year 2	100.0%	100.0%	100.0%
		% of Total	90.7%	9.3%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		1.000[a]	.500[a]	.375[a]
N of Valid Cases	43			

a. Binomial distribution used.

The prevalence of high risk exercise behaviours is 44 per cent. These behaviours improve to 40 per cent at the follow up point. This is also a combination of improvements in those at high risk (53 per cent) and deterioration (29 per cent) of those at low risk. The result is not statistically significant.

Table 12: Exercise

			Exercise Year 2		
			Low	High	Total
Exercise Baseline	Low	Count	17	7	24
		% within Exercise Baseline	70.8%	29.2%	100.0%
		% within Exercise Year 2	65.4%	41.2%	55.8%
		% of Total	39.5%	16.3%	55.8%
	High	Count	9	10	19
		% within Exercise Baseline	47.4%	52.6%	100.0%
		% within Exercise Year 2	34.6%	58.8%	44.2%
		% of Total	20.9%	23.3%	44.2%
Total		Count	26	17	43
		% within Exercise Baseline	60.5%	39.5%	100.0%
		% within Exercise Year 2	100.0%	100.0%	100.0%
		% of Total	60.5%	39.5%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		.804[a]	.402[a]	.175[a]
N of Valid Cases	43			

a. Binomial distribution used.

The prevalence of high risk blood pressure is 47 per cent. This improves to 37 per cent in two years for the population. This overall improvement is the result of a 35 per cent improvement in the high risk group and 13 per cent deterioration in the low risk group. The result is not statistically significant.

Table 13: Blood pressure

			Blood Pressure Year 2		
			Low	High	Total
Blood Pressure Baseline	Low	Count	20	3	23
		% within Blood Pressure Baseline	87.0%	13.0%	100.0%
		% within Blood Pressure Year 2	74.1%	18.8%	53.5%
		% of Total	46.5%	7.0%	53.5%
	High	Count	7	13	20
		% within Blood Pressure Baseline	35.0%	65.0%	100.0%
		% within Blood Pressure Year 2	25.9%	81.3%	46.5%
		% of Total	16.3%	30.2%	46.5%
Total		Count	27	16	43
		% within Blood Pressure Baseline	62.8%	37.2%	100.0%
		% within Blood Pressure Year 2	100.0%	100.0%	100.0%
		% of Total	62.8%	37.2%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		.344[a]	.172[a]	.117[a]
N of Valid Cases	43			

a. Binomial distribution used.

The prevalence of high risk cholesterol is at 61 per cent at programme commencement. The net prevalence increases to 65 per cent at follow up. The increase is the result of as 41 per cent deterioration in those formerly at low risk accompanied by a 19 per cent improvement in the high risk group. The result is not statistically significant.

Table 14: Cholesterol

			Cholesterol Year 2		
			Low	High	Total
Cholesterol Baseline	Low	Count	10	7	17
		% within Cholesterol Baseline	58.8%	41.2%	100.0%
		% within Cholesterol Year 2	66.7%	25.0%	39.5%
		% of Total	23.3%	16.3%	39.5%
	High	Count	5	21	26
		% within Cholesterol Baseline	19.2%	80.8%	100.0%
		% within Cholesterol Year 2	33.3%	75.0%	60.5%
		% of Total	11.6%	48.8%	60.5%
Total		Count	15	28	43
		% within Cholesterol Baseline	34.9%	65.1%	100.0%
		% within Cholesterol Year 2	100.0%	100.0%	100.0%
		% of Total	34.9%	65.1%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		.774[a]	.387[a]	.193[a]
N of Valid Cases	43			

a. Binomial distribution used

The prevalence of at-risk body mass index is 28 per cent at programme inception. This improves to a net 26 per cent. This is the result of a 17 per cent improvement in the high risk group and three per cent deterioration in the low risk group. The result is not statistically significant.

Table 15: Body mass index

			BMI Year 2		
			Low	High	Total
BMI Baseline	Low	Count	30	1	31
		% within BMI Baseline	96.8%	3.2%	100.0%
		% within BMI Year 2	93.8%	9.1%	72.1%
		% of Total	69.8%	2.3%	72.1%
	High	Count	2	10	12
		% within BMI Baseline	16.7%	83.3%	100.0%
		% within BMI Year 2	6.3%	90.9%	27.9%
		% of Total	4.7%	23.3%	27.9%
Total		Count	32	11	43
		% within BMI Baseline	74.4%	25.6%	100.0%
		% within BMI Year 2	100.0%	100.0%	100.0%
		% of Total	74.4%	25.6%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		1.000[a]	.500[a]	.375[a]
N of Valid Cases	43			

a. Binomial distribution used.

The prevalence of high risk perceived health scores 30 per cent at programme commencement. This improves to 26 per cent. This is the result of a 39 per cent increase in the high risk group and ten per cent deterioration in the low risk group. The result is not statistically significant.

Table 16: Perceived health

			Perceived Health Year 2		
			Low	High	Total
Perceived Health Baseline	Low	Count	27	3	30
		% within Perceived Health Baseline	90.0%	10.0%	100.0%
		% within Perceived Health Year 2	84.4%	27.3%	69.8%
		% of Total	62.8%	7.0%	69.8%
	High	Count	5	8	13
		% within Perceived Health Baseline	38.5%	61.5%	100.0%
		% within Perceived Health Year 2	15.6%	72.7%	30.2%
		% of Total	11.6%	18.6%	30.2%
Total		Count	32	11	43
		% within Perceived Health Baseline	74.4%	25.6%	100.0%
		% within Perceived Health Year 2	100.0%	100.0%	100.0%
		% of Total	74.4%	25.6%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		.727[a]	.363[a]	.219[a]
N of Valid Cases	43			

a. Binomial distribution used.

The percentage of those at high risk for life satisfaction is 21 per cent at programme commencement. This improves to 19 per cent at the follow up date. This improvement is a result of a 67 per cent improvement in the high risk group, while the low risk group deteriorates by 15 per cent. The result is not statistically significant.

Table 17: Life satisfaction

			Life Satisfaction Year 2		
			Low	High	Total
Life Satisfaction Baseline	Low	Count	29	5	34
		% within Life Satisfaction Baseline	85.3%	14.7%	100.0%
		% within Life Satisfaction Year 2	82.9%	62.5%	79.1%
		% of Total	67.4%	11.6%	79.1%
	High	Count	6	3	9
		% within Life Satisfaction Baseline	66.7%	33.3%	100.0%
		% within Life Satisfaction Year 2	17.1%	37.5%	20.9%
		% of Total	14.0%	7.0%	20.9%
Total		Count	35	8	43
		% within Life Satisfaction Baseline	81.4%	18.6%	100.0%
		% within Life Satisfaction Year 2	100.0%	100.0%	100.0%
		% of Total	81.4%	18.6%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		1.000[a]	.500[a]	.226[a]
N of Valid Cases	43			

a. Binomial distribution used.

The percentage of participants who report a high risk job satisfaction is 14 per cent at programme inception. This increases to 30 per cent within two years. This finding is a combination of a 24 per cent deterioration in those at low risk and of a 33 per cent of those at high risk. The result is not statistically significant.

Table 18: Job satisfaction

			Job Satisfaction Year 2		
			Low	High	Total
Job Satisfaction Baseline	Low	Count	28	9	37
		% within Job Satisfaction Baseline	75.7%	24.3%	100.0%
		% within Job Satisfaction Year 2	93.3%	69.2%	86.0%
		% of Total	65.1%	20.9%	86.0%
	High	Count	2	4	6
		% within Job Satisfaction Baseline	33.3%	66.7%	100.0%
		% within Job Satisfaction Year 2	6.7%	30.8%	14.0%
		% of Total	4.7%	9.3%	14.0%
Total		Count	30	13	43
		% within Job Satisfaction Baseline	69.8%	30.2%	100.0%
		% within Job Satisfaction Year 2	100.0%	100.0%	100.0%
		% of Total	69.8%	30.2%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		.065[a]	.033[a]	.027[a]
N of Valid Cases	43			

a. Binomial distribution used.

The prevalence of high risk stress reported by the group is 33 per cent at programme commencement, and reduces to 30 per cent at follow up. This reduction is represented by an improvement of 14 per cent in those at high risk, and a corresponding decrease of 36 per cent in those originally at low risk. The result is not statistically significant.

Table 19: Stress index

			Stress Index Year 2		
			Low	High	Total
Stress Index Baseline	Low	Count	25	4	29
		% within Stress Index Baseline	86.2%	13.8%	100.0%
		% within Stress Index Year 2	83.3%	30.8%	67.4%
		% of Total	58.1%	9.3%	67.4%
	High	Count	5	9	14
		% within Stress Index Baseline	35.7%	64.3%	100.0%
		% within Stress Index Year 2	16.7%	69.2%	32.6%
		% of Total	11.6%	20.9%	32.6%
Total		Count	30	13	43
		% within Stress Index Baseline	69.8%	30.2%	100.0%
		% within Stress Index Year 2	100.0%	100.0%	100.0%
		% of Total	69.8%	30.2%	100.0%

	Value	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
McNemar Test		1.000[a]	.500[a]	.246[a]
N of Valid Cases	43			

a. Binomial distribution used.

The total number of health risks per individual is the sum of individual risks. It is reported as the proportion of the group with zero to three risks (low), four to five risks (medium) and six and more risks (high). At programme onset 63 per cent of the group is low, 28 per cent is medium and nine per cent is high. After two years, the proportion at low risk remains at 63 per cent, the proportion at medium risk increases to 35 per cent and that at high risk reduces to two per cent. All groups show movements to other groups. Those at low risk at inception deteriorate by 30 per cent, and enter the medium group. None of this group become high risk, that is, 70 per cent remain low risk. The medium group improves by 58 per cent to low risk, and deteriorates by eight per cent to high risk. The high risk group (4 individuals) improves by 75 per cent to medium and 25 per cent to low, and no individuals remain at high risk.

Table 20: Overall risk

			Overall Risk Year 2			
			Low	Medium	High	Total
Overall Risk Baseline	Low	Count	19	8	0	27
		% within Overall Risk Baseline	70.4%	29.6%	0.0%	100.0%
		% within Overall Risk Year 2	70.4%	53.3%	0.0%	62.8%
		% of Total	44.2%	18.6%	0.0%	62.8%
	Medium	Count	7	4	1	12
		% within Overall Risk Baseline	58.3%	33.3%	8.3%	100.0%
		% within Overall Risk Year 2	25.9%	26.7%	100.0%	27.9%
		% of Total	16.3%	9.3%	2.3%	27.9%
	High	Count	1	3	0	4
		% within Overall Risk Baseline	25.0%	75.0%	0.0%	100.0%
		% within Overall Risk Year 2	3.7%	20.0%	0.0%	9.3%
		% of Total	2.3%	7.0%	0.0%	9.3%
Total		Count	27	15	1	43
		% within Overall Risk Baseline	62.8%	34.9%	2.3%	100.0%
		% within Overall Risk Year 2	100.0%	100.0%	100.0%	100.0%
		% of Total	62.8%	34.9%	2.3%	100.0%

	Value	df	Asymptotic Significance (2-sided)
McNemar-Bowker Test	2.067	3	.559
N of Valid Cases	43		

5.2.3 Questionnaire Responses

The response rate for the emailed questionnaire was 53 per cent (23/43). The frequency count of responses by questions asked is illustrated below.

Table 21: Results by percentage frequency response

Partly Agree/ Agree	Percentage of responses	Disagree/ Partly Disagree
• Since my medical I am more interested in managing my chronic disease better • I consider myself to be a health conscious person. • I feel that I am better informed about my own health	100	
• I feel I am preventing future health problems from developing • I feel more empowered to manage my own health • Having a work place medical provides me with valuable time to focus on my health which I would not otherwise do. • The fact that Illovo conducts and pays for work place medicals makes me feel that they care about my personal well-being. • I would be upset/ disappointed if Illovo withdrew the work place medical/HRA benefit. Why?	90-99	I would prefer to have my medical conducted by my private doctor than in the work place
• I feel that my future health will be better • I feel an improvement in my current health • I feel that I am better able to participate in decisions about my healthcare	80-89	
• I feel that I can engage better with my own doctor regarding my health (ask more, and better questions) • I feel that I can better communicate my health goals to my own doctor • I am now able to better seek out and use information to help select different treatment options	70-79	If my company did not pay for a work place medical I would still have one and pay for it myself
• My existing health problems are better	60-69	
• I feel in a better position to select healthcare providers (doctors or hospitals or medical aid) based on a better understanding of my health needs I feel in a better position to select healthcare providers based on a better understanding of the quality of care I can get for myself or my family	50-59	I went for a private medical last year

Table 22: Questionnaire responses

	Question	Disagree/ Partly Disagree (percentage)	Partly Agree/ Agree (percentage)
1	Since my medical I am more interested in managing my chronic disease better	0	100
2	I feel an improvement in my current health	13	87
3	I feel that my future health will be better	13	87
4	My existing health problems are better	9*	65
5	I feel I am preventing future health problems from developing	9	91
6	I feel that I am better informed about my own health	0	100
7	I feel more empowered to manage my own health	9	91
8	I feel that I can engage better with my own doctor regarding my health (ask more, and better questions)	22	78
9	I feel that I can better communicate my health goals to my own doctor	26	74
10	I feel that I am better able to participate in decisions about my healthcare	9*	87
11	I feel in a better position to select healthcare providers (doctors or hospitals or medical aid) based on a better understanding of my health needs	30*	56
12	I feel in a better position to select healthcare providers based on a better understanding of the quality of care I can get for myself or my family	39*	52
13	I am now able to better seek out and use information to help select different treatment options	22*	70
14	I consider myself to be a health conscious person.	0	100
15	I went for a private medical last year.	52*	39
16	If my company did not pay for a work place medical I would still have one and pay for it myself?	22	78
17	Having a work place medical provides me with valuable time to focus on my health which I would not otherwise do.	9	91
18	I would prefer to have my medical conducted by my private doctor than in the work place.	96	4
19	The fact that Illovo conducts and pays for work place medicals makes me feel that they care about my personal well-being.	9	91
20	I would be upset / disappointed if Illovo withdrew the work place medical/HRA benefit. Why?	9	91

*The difference is the number who replied 'not applicable'

Chapter Six: Discussion of results

6.1 Introduction

This section is a discussion of the findings covered in the previous chapter. It commences with a discussion of the findings of the quality and quantity of tests and interventions offered by the provider. Secondly, the outcomes of the measured risks are discussed. Lastly, the findings regarding employee satisfaction with the intervention and the company providing it are discussed.

6.2 Quantity and quality of health screening tests and interventions offered to participants

Of 21 discrete health screening tests provided and analysed, 47 per cent are either not considered preventative or are not recommended as screening tests. Tests that are specifically not recommended (Wilkinson et al., 2013) comprise 19 per cent of tests. If tests on which evidence is incomplete and are weakly recommended (Wilkinson et al., 2013) are included, this number rises to 62 per cent. Of the tests which must or should be provided, only 29 per cent are provided. No evidence is found regarding a discussion of both the risks and the benefits of screening. This is similar to findings of Grønhøj Larsen et al. (2012) in an assessment of commercially available health screening services in Denmark.

One of the hallmarks of the executive medical examination is the physical examination. Conducting a physical examination in a person who has no symptoms is discussed at length by Wilkinson et al., (2013). A physical examination is not considered to be part of preventative care. It fails on most grounds as a health screening test. It is, and remains, a valuable *diagnostic* tool in the patient who has symptoms. Certain elements are seen as preventative though, and are included as separate tests (height, body mass and blood pressure). There is no evidence to promote the *routine* use of a physical examination in the setting of an executive medical examination. Wilkinson et al., (2013) and Han (1997) acknowledge that there may be real and intangible benefits to this examination, and that it may be a patient expectation, but this should not be the assumption in all cases.

A situation may arise, however, where a participant describes a symptom incidental to the examination, which may justify its use. This is, however, not the main purpose of the examination, and is better served more timeously by a consultation in the primary

health service. It is possible that harm may arise out of this practice: a normal physical examination cannot reliably be depended on to exclude diseases of importance, and may delay presentation in an individual who has been falsely reassured by a normal finding (Muir Gray & Raffle, 2007). Thus it may be offered to patients on the proviso that they are advised of the high rate of false positive or negative findings associated with it.

With regard to counselling for nutrition habits and physical activity (and unsafe sex, accidents and safety) there is little evidence that screening and counselling, or advice by a doctor will result in behaviour change. Since this as a result of a lack of good quality trials, rather than no, or mixed effects (Wilkinson et al., 2013) doctors may still choose to provide such counselling. The issue is a lack of evidence, rather than any effect of benefit or harm. Regarding tobacco use, there is evidence to say that counselling and advice by a doctor is associated with a reduction in use (Wilkinson et al., 2013), and this is a recommended intervention. The prevalence of this risk factor is low in the study group, and the absolute number is low, so a conclusion cannot be drawn on its effect on tobacco use. The result was statistically insignificant.

Soler et al. (2001) in the assessment of dietary behaviours in programmes which have significant behaviour change component (as well as those without) showed mixed and small effect estimates, with no effect for fruit and vegetable intake, and a small effect on reduction in fat intake. Similarly this study, shows no statistically significant improvements in dietary and exercise behaviours. Further examination of the data shows that the group who experienced the most improvement was the high risk group (100 per cent improvement). All members improved their dietary behaviours. This effect is netted off by the low risk group, which contributed all cases at follow up. The outcome of the intervention is not uniform and the small improvement in clinical outcomes, is thus not significant. The actual numbers are low, between two and five individuals, and hence the prevalence is low. This effect should be studied further.

In the assessment of the effect of a health risk assessment on physical activity, Soler et al. (2001) found that programmes not employing a significant behaviour change intervention show no improvement. Those that do, show an effect in increasing physical activity. The results of this study are more in keeping with the former group. The assessment of this study showed a net improvement in the proportion at high risk over the term. This is made up of an improvement of those at high risk, accompanied by a deterioration of those at high risk. The effect of the intervention was inconsistent,

some low-risk individuals became high risk, and some high risk members remained in the category. The clinical effect is positive, but has no statistical significance.

6.3 Risk Outcomes

As discussed in earlier chapters the success of the programme is measured on two effects: (1) the movements of individuals from low to high risk within an individual risk and (2) the change in the total number of risks per individual (Musich et al., 2003). The outcome for each individual risk is discussed first, and then the overall risk reduction is addressed.

6.3.1 Physiologic Risks

The high prevalence of high risk conditions in this cohort was a dramatic finding. All have access to good healthcare services and subsidised healthcare funding from the company. The occurrence of new diagnoses and uncontrolled conditions in programmes of this nature is not an unusual finding (Krogsbøll et al. 2012). The average age of this group (51 years) may be a contributing factor. This is often hailed as a success of an executive health programme. However, it should probably bring into question the overall accessibility and effectiveness of health services in general, and their available to executives. One argument often made in the literature is that executives do not have the time, and that normal primary care services are not responsive to the needs of executives. For instance, long waiting times in a general practice setting (Shaack, 2008) may mean they are reluctant to visit.

Despite these finding in studies, the fact that they have been diagnosed does not imply that they will be controlled or that disease and death is avoided in this group. Krogsbøll, et al. (2012) in their meta-analysis found no reduction in cancer or cardiovascular disease in groups subjected to medical examinations compared to those who were not, in randomised trials. In addition, the use of surrogate or proxy indicators have a number of theoretical limitations, both in the diagnosis and treatment of conditions (Fleming & DeMets, 1996), suggesting, for example, that the finding and treatment of a condition like high blood pressure does not, a priori, lead to a reduction in cardiovascular disease or death.

Depending on screening practices, people may be subjected to the harms of overdiagnosis and overtreatment (Muir Gray & Raffle, 2007; Krogsbøll, et al., 2012). These effects are often not researched, so little is known about them (Krogsbøll et al., 2012). This study adds no further to this. The screening of blood pressure, blood lipids

and body mass have been shown to be of benefit, with minimal harm and have strong recommendations to perform them on applicable groups (Wilkinson et al., 2013). The ICSI outlines the intervals (not necessarily annual) and age from which screening needs to be commenced. Since these measures have relevance in clinical outcomes it is important to assess the impact of the intervention on them.

There was high prevalence of at-risk individuals at programme inception, 47 per cent have an at-risk blood pressure. The net reduction is ten per cent, to 37 per cent, which is a significant clinical finding. The effect is not statistically significant though, and is the result of 13 per cent deterioration in the low risk group and a 35 per cent improvement in the high risk group. These findings are in keeping with those of Soler et al. (2011), who found that a reductions in blood pressures are not a finding of interventions based on risk assessment without behaviour change, rather than those which did.

The study finds that the proportion of individual with elevated cholesterol levels were increased over the study period from 61 per cent to 65 per cent. Once again, this is as a result of both increases and decreases of those at no risk, and at-risk respectively. This finding could be impacted by recent changes in dietary advice. In contrast, Soler et al., (2010) found that improvements in cholesterol are a feature of all workplace programmes studied in his review, whether incorporating behaviour change interventions or not. This change is not, however, statistically significant.

The change in the proportion of individuals at risk for body mass index is two per cent, from 28 to 26 per cent. This small movement is associated with similar changes of individual shift between high and low risk proportions and vice versa. This change is not statistically significant. Soler et al. (2010) showed that programme design has little effect on this particular health risk.

6.3.2 Perceptual and Psychological Risks

Perceptual and psychological risks are thought to predispose people to illness (Burton, et al., 2006). Four parameters were assessed in this battery: a stress index, perceived health and life and job satisfaction. The dramatic finding in this group was that almost one third reported high risk for stress. This improved marginally to 30 per cent. This change was the result of four individuals deteriorating, and five improving, a net improvement of one. The result was not clinically or statistically significant. This has been a finding in other studies in white-collar workers (Nohammer et al., 2013), although organisation-specific conditions at the time could explain that. In contrast,

Musich et al. (2003) report a significant improvement, in the context of a more comprehensive workplace programme, but aimed at a broader segment of the workforce and not just executives.

Regarding self-reported health, Krogsbøll et al. (2012) in their meta-analysis report that two out of four studies found small beneficial effects, but this may have been due to bias. This study finds a prevalence of 30 per cent for high risk perceived health status. A non-significant improvement to 26 per cent is found, made up of 10 per cent deterioration, and 39 per cent improvement in the low and high risk groups respectively. This is similar to Musich et al. (2003) who also report a statistically insignificant improvement, despite having a much more comprehensive programme. This study is not strictly comparable as it is conducted across a broader workplace population than just executives.

Life satisfaction and job satisfaction high risk proportions are 21 per cent and 14 per cent respectively. Life satisfaction experiences a non-significant improvement to 19 per cent, while job satisfaction reduces to 30 per cent, a 16 per cent worsening. This finding is relatively large but does not reach statistical significance. The underlying shift is the 24 per cent deterioration in those at low risk, and the improvement of 33 per cent in those with high risk. This may be related to the programme or to factors outside of it. Musich, et al. (2003) have been mentioned previously, this study reports an improvement in life satisfaction, while job satisfaction was not measured.

6.3.3 Health Behaviours

Exercise and dietary behaviours have been discussed earlier in this chapter. The prevalence of high risk alcohol use is seven per cent at baseline and increases to nine per cent at review. One individual in the high risk group improves, and two deteriorate in the low risk group. This finding is not statistically significant. The overall percentages are low and it is difficult to draw real conclusions from this. Soler et al. (2010) reported small decreases in consumption in similar studies irrespective of study design.

There was a low prevalence of tobacco use in the group, at two individuals (5 per cent), one of whom stopped by the next review. Ex-users at inception were 19 per cent of the participants. It is difficult to draw conclusions from these non-significant findings. Soler et al. (2010) reports reductions in workplace programmes which have a behavioural intervention and none in those without one.

The questionnaire elicited replies regarding perceptions which test health consumer engagement behaviours. The concept of health consumer engagement, as proposed by Mittler et al. (2013), is a new iteration of the classical unified theory of health behaviour change (Fishbein et al., 2001). Consumer health engagement is seen as a set of behaviours. It thus proposes that the effectiveness of health programmes can be determined by how they address these behaviours, namely self-management, healthy behaviours, healthcare encounter behaviours and shopping behaviours.

Executive medical examinations are seen to influence 'self-management' and 'healthy behaviours' strongly, questions in this domain achieve between 70 to 100 per cent agreement. The intervention influences 'healthcare encounter behaviours somewhat less, in the 70-80 per cent agreement ranges. It has the least influence on 'shopping behaviours' which are in the 50 per cent agreement range. This suggests that the intervention has the impact of improving disease management and the adoption of healthy behaviours, and less on the ability to interact with more confidence with healthcare providers at the point of service. It has the least impact on the ability to select healthcare providers in purchasing decisions.

6.3.4 Overall Risks

The second measure of programme effectiveness on health outcomes is a reduction on the overall number of high risks an individual the programme achieves. The prevalence of participants at high risk is nine per cent (four individuals) at commencement. This group improves to medium risk (75 per cent) and low risk (25 per cent). One individual from the medium risk group becomes high risk. The small number in this risk group makes drawing conclusions difficult.

Twenty eight per cent of the group are in the medium risk group at inception. This group increases 35 per cent as members who improve to low risk are replaced almost one-for-one by members of the low risk group, and former high risk members join it. The low risk group maintains its prevalence at 63 per cent as members churn in and out of the group. The findings are not statistically significant, suggesting the intervention is not reliably impacting overall health risks.

6.4 Employee perceptions of the programme

With regard to the 'employee perceived effects cluster' (Nohammer et al., 2013), the themes of the employer providing 'value' (time to focus on health) and 'care' elicit an agreement in the 90 per cent range. In addition, the preference of employees for the

workplace programme, compared to alternatives, is in the 90 per cent range. The reverse question: asking if employees would be disappointed if the benefit was withdrawn, suggest that employees find it valuable.

Chapter Seven: Conclusion

7.1 Principal findings

7.1.1 Health screening in executive medical examinations

A number of health screening tests are offered as part of the executive medical examination studied. Between 19 and 47 per cent where either not recommended or were not considered effective screening tests, when compared to evidence-based standards (Wilkinson et al., 2013). On the contrary, of those tests that *were* recommended, only 26 per cent were actually offered. This is similar to findings as noted in the literature in other countries (Grønhøj Larsen et al., 2012).

This is in notable contrast to the perception of participants, who felt that the examinations were comprehensive and detailed. They preferred the commercial provider, rather than their own general practitioner to provide services, on this basis. This is an on-going debate in the literature, Komaroff (2009) suggests that these services should and could be delivered at a primary care level. Shaack (2009), counters that the primary care system does not cater adequately for the needs of company senior executives, while Han (1997) suggests that there are other valid benefits associated with this kind of examination. The perception of those participating is in keeping with the latter two views.

7.1.2 Health risk, physiologic and psychologic/perceptual outcomes of executive medical examinations

The findings showed a high prevalence of health and physiologic risk factors, in an apparently healthy population, with a high socioeconomic status and with good access to healthcare. This highlights the importance of providing a good executive health service. The prevalence of high risk exercise behaviours, body mass index, blood pressure and cholesterol was notable, between 28 and 61 per cent of the population exhibited them. None of the indicators displayed any statistically significant changes in either direction.

High risk dietary, tobacco use and alcohol intake was less prevalent at between five and 12 per cent. The small sizes of the prevalence of some of the indicators (tobacco use and alcohol intake) make it difficult to draw conclusions from the data. The prevalence of the population with four or more concurrent risk factors was 37 per cent. Most indicators, except cholesterol and blood pressure experienced modest

improvements. Blood pressure improved by ten per cent, and cholesterol deteriorated by four per cent.

The changes in blood pressure, and to a lesser degree, the other indicators, may suggest clinical improvement at a population level, but the high degree of risk churn (Burton et al., 2006; Musich, et al., 2003) negate these changes at a statistical level. Individuals in the study either remained low risk, or move to high risk and vice versa within risks. The same process took place for the sum of each individual's individual risks, between low, medium and high risk. This suggests that the intervention is not equally efficient at maintaining individuals at low risk, while reducing risk in those at high risk.

This high burden of disease is supported by the high prevalence of high risk perceived health and stress. Life and job satisfaction scores were less impacted. Of note is the deterioration in job satisfaction noted in the study period. This is probably related to factors external to programme and warrants further investigation. The finding was not statistically significant.

Participants report that the high stress environment they experienced at work is one of the reasons they feel that the company should provide executive medical examinations. Stress is an important contributor to chronic disease, but employees are affected differentially, for instance, older workers and blue collar workers are more susceptible (Sorenson et al. 2011; Hallqvist et al., 1998 and Landbergis et al., 2003 in Sorenson et al., 2011). The high average age of the group may be a consideration, but may be mitigated by the high socio-economic level. Of note is that there was no statistically significant improvement in stress levels demonstrated in this study.

The findings suggest that it is not a straightforward assumption that there will be an improvement in at-risk health behaviours, physiological indicators and psychological and perceptual risks, and that improvements between the different behaviours varied widely. This is not an uncommon finding in studies of this type (Burton et al., 2006; Musich et al., 2003). In an assessment of the complexity involved in behaviour and behaviour change (Fishbein et al., 2001, Mittler et al., 2013; Soler et al., 2010), it is easier to understand these differential impacts on different behaviour, suggesting that ultimately certain behaviours may be 'stickier' than others, and that interventions may have different impacts on different behaviours.

Health consumer engagement, as proposed by Mittler et al. (2013), is a new iteration of the classical unified theory of health behaviour change (Fishbein et al., 2001). Consumer health engagement is seen as a set of behaviours. It thus proposes that the effectiveness of health programmes can be determined by how they address these behaviours, namely self-management, healthy behaviours, healthcare encounter behaviours and shopping behaviours, which together are posited to explain health consumer behaviour. These constructs were tested in the participants and an association was found with the behaviours of better self-management of disease, and the adoption of healthy behaviours. The association was less so with behaviours related to interacting with healthcare providers at point of care, and the purchasing of healthcare.

7.1.3 The employee value proposition in executive medical examinations

The findings suggest that employees find value in corporations providing executive health examinations. This has previously been reported in other workplace health promotion programmes (Nohammer et al., 2013 and Holzbach et al., 1990). With regard to the 'employee perceived effects cluster' (Nohammer et al., 2013), the themes of the employer providing 'value' (time to focus on health) and 'care' elicit an agreement in the 90 per cent range. In addition, the preference of employees for the workplace programme, compared to alternatives is in the 90 per cent range. The reverse question, asking if employees would be disappointed if the benefit was withdrawn, suggests that employees find it valuable.

7.2 Stakeholder recommendations

7.2.1 Recommendations for commercial providers of executive medical examinations and primary care providers

Commercial providers of executive medical examinations need to ensure that the tests offered are based on a solid evidence base (Grønhøj Larsen et al., 2012). If questionnaires are used in collecting information, these should be validated, and context specific, as it is difficult to reliably depend on the information provided otherwise. In addition, they need to give individual and balanced information regarding both the potential benefits and harms of health screening programmes.

Providers need to be realistic with what is promised to clients regarding the outcomes of the programme. This study shows minimal clinical improvement in most health risks, none of which were statistically significant. It is a time consuming, complex and

resource intensive activity to provide a service that improves outcomes at an acceptable cost, with minimum harm (Muir Gray & Raffle, 2007; Soler et al., 2010; Geotzel & Pronk, 2010; Mittler et al., 2013). This is often not considered by the client or the provider. Commercial interest, particularly, supplier-driven demand has been a key driver of the growth in executive medical examinations (Han, 1997; Rank, 2009; Grønhøj Larsen et al., 2012) associated with a loss of its scientific reliability to improve outcomes.

Most, if not all, of the recommended testing is as useful for the general population as it is for executives (Wilkinson et al., 2013). The interventions are also easily delivered in a team setting and at a primary care level (Wilkinson et al., 2013; Komaroff, 2009). One conclusion to draw from the findings is that executives are in general dissatisfied with the provision of primary healthcare. In addition, patients do not necessarily receive proven preventative benefits within primary health systems (Chacko & Andreson 2007). This is supported by the opinions of practitioners (Shaack, 2009), despite this being the natural home for most of these interventions (Komaroff, 2009).

It would be useful for primary care practitioners to orientate their practices to the diverse needs of the populations that they serve (Komaroff, 2009), and rely on evidence-based practices (Wilkinson et al., 2013) in the implementation thereof. The opportunity exists for them to recognise and adapt to the realistic concerns and expectations of the company senior executive (Han, 1997; Muir Gray & Raffle, 2007).

7.2.2 Recommendations for employers and executive management teams

The findings of this study suggest that the intervention is an important component of the employee value proposition. In keeping with Nohammer et al. (2013), and Holzbach et al., (1990), the provision of executive medical examinations are associated with improved employee attitudes to the organisation, and a perception that the employer values the employee. In the complex environment that employers and managers find themselves, it is easy to look to seemingly simple solutions to the health issues that employees face, particularly when the perceived benefit is so strong.

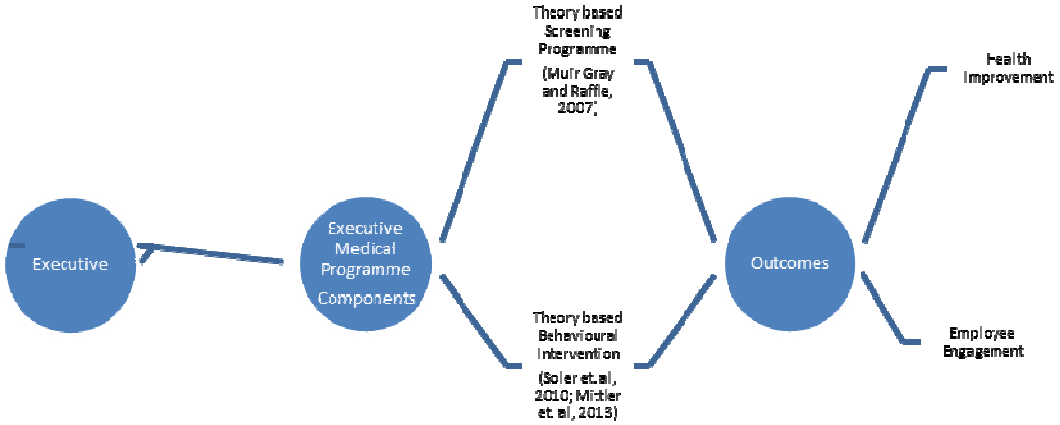
Research shows that the promises of reduced cost and improved productivity are not realised easily (Goetzel & Pronk, 2010; Mittler et al., 2013; Soler et al., 2010). This is due to the multiple real-world limitations illustrated in theories of health screening (Muir & Raffle, 2007), health behaviour change (Fishbein et al., 2001) and the organisations and societies that people find themselves in (Mittler et al., 2013). It is an appealing

prospect for corporations and executives to assume that attendance at an executive medical examination will improve health and productivity (Han, 1997). The findings of this research show that health improvements are at best minimal, and the possibility of harm has not been excluded.

In case-control trials clinical outcomes of reduced disease and death are not evident from interventions like executive medical examinations (Krogsbøll et al., 2012). This does not mean that the intervention does not work in all situations and at all times (Tang, 1996). The evidence suggests that these outcomes *are* achievable, but only in programme designs which are grounded in theory, with a strong evidence base (Goetzel & Pronk, 2010; Soler et al., 2010). Of necessity these programmes will be complex and time consuming, and require adequate resources for their implementation (Goetzel & Pronk, 2010). As a result, as many as 90 to 95 per cent of workplace health programmes and show no improvement in outcomes (O'Donnell, 2013).

This combination of theory and practice evidence has not yet, to the best of this researchers knowledge been specifically applied to the field of executive medical examinations, particularly in the South African context. Based on these premises, it is possible to propose a model, as illustrated, in Figure 3. An executive medical programme which is grounded on theory, and uses evidence-based design, demonstrates an improvement in both health and employee engagement. The model shows that a health screening programme must meet a number of criteria before it affords more benefit than harm (outlined by Muir Gray & Raffle, 2007 and Wilkinson et al., 2013). In addition, since most significant drivers of health have a behavioural basis the programme must include interventions that address this. This is demonstrated by Soler et al., 2010 and more recent work by Mittler et al., 2013.

Figure 3: A model for executive health programmes



7.2.3 Recommendations for academics

Regarding workplace health promotion, Goetzel & Pronk (2010, pp.S223-S225) state triumphantly: “Employers have arrived at a wondrous intersection of science and practice.” Workplace health represents the interface between health and business. The workplace is a key venue where better health can be delivered to arguably the most productive members of society, those in employment (Sorenson et al., 2011). Other imperatives of the commercial enterprise may, however, crowd out the scientific basis of the profession, and the need to show real outcomes and no harm, as well as cost-effectiveness.

This tension will be evident in all commercial enterprises that engage in workplace health (Goetzel & Pronk, 2010) and the commercial healthcare enterprises that provide these services (Han, 1997). The need for robust academic enquiry in the business school environment thus becomes self-evident, particularly in South Africa. Most literature was of American or European origin. One possible avenue would be a greater interaction at under- and postgraduate levels between schools of business and medicine (Welch, 2015). Another would be to attract more medical professionals into business schools.

7.3 Limitations of the research and suggestions for future research

This study was limited to one company and one commercial provider. The conclusions drawn are not necessarily indicative of the entire industry, or of commercial providers in general, although evidence in other countries suggest that this is a common finding (Grønhøj Larsen et al., 2012). It would be useful to conduct a similar study spanning a few industries and involving a number of other providers of executive medical examinations. In addition, the study only looked at one methodology of delivering executive medical examinations. Future studies should look at different types, for instance, online delivery or more intense (for example, annually) or less intense (for example five yearly) programme delivery.

The study took place over a very short time horizon. It is possible that the long term benefits and long term harms may be evident when studied over a longer period, particularly disease and death (Krogsbøll et al., 2012). These tie into a second limitation, the use of surrogate or proxy indicators are theoretically problematic (Fleming & DeMets, 1996), it may not be possible to determine whether improving health risks and biologic indicators eventually leads to reduced death and disease. This can be addressed by longer term studies. Another limitation of the study was the use of non-validated questionnaire screening tools. This presents reliability and validity concerns regarding responses to questionnaires. Future studies should be conducted over a longer time period, and use validated tools.

The study was limited to assessing the components of the screening tests and health, physiologic and psychological/perceptual risks. It did not study if new diseases occurred, or if treatments were prescribed and at what cost these downstream effects came at. In addition, it did not look specifically at what harms occurred in the population (Muir Gray & Raffle, 2007; Krogsbøll et al., 2012). The small number of participants made it difficult to draw conclusions for low prevalence conditions.

7.4 Conclusion

If the objective of an executive health programme based on executive medicals is to reduce health risk, this was not achieved. This study illustrates that due to a number of methodological and behaviour-based factors, an executive medical examination on its own does not lead to an improvement in the health risks of company senior executives. The practice, however, engenders positive perceptions in the executives who

participate. The theory base and evidence available suggests that it is possible to achieve both these objectives if the programme design is consistent with leading practices.

References

Ahmed, M. (2013). Executive Compensation. http://www.towerswatson.com/en/Services/our-solutions/executive-compensation.

Armour, L. A. (1999). Executive physicals. *Your Company,* 9(3), 54.

Burton, W. N., Chen, C. C., Daniel J., Schultz, A. B., & Edington, D. W. (2002). The value of the periodic executive health examination: Experience at bank one and summary of the literature. *Journal of Occupational & Environmental Medicine, 44*(8), 737-744.

Baker, M.D. & Johnson, R.J. (1978, November 11). The controversy surrounding executive health examinations. *South African Medical Journal*, 805

Baicker, K., Cutler, D., & Song, Z. (2010). Workplace wellness programs can generate savings. *Health Affairs*, *29*(2), 304-311.

Burton, W.N., Chen, C., Conti, D.J., Schultz, A.B. & Edington (2006). The association between health risk change and presenteeism change. Journal of Occupational and Environmental Medicine. 48(3), 252-263.

CEO. (n.d.). Retrieved from http://www.eheintl.com/

Chacko, K.M. & Anderson, R.J. (2007).The annual physical examination: important or time to abandon? *American Journal of Medicine* 120(7), 581-583.

Tang, K. C., Ehsani, J. P., & McQueen, D. V. (2003). Evidence based health promotion: recollections, reflections, and reconsiderations. Journal of Epidemiology and Community Health, 57(11), 841-843.

Evers, K. E., Castle, P. H., Prochaska, J. O., & Prochaska, J. M. (2014). Examining relationships between multiple health risk behaviors, well-being, and productivity. *Psychological Reports, 114*(3), 843-853.

Fishbein, M., Triandis, H. C., Kanfer, F. H., Becker, M., & Middlestadt, S. E. (2001). Factors influencing behavior and behavior change. In Baum, A.S., Revenson, T.A. and Singer, J.E. (Eds.), Handbook of health psychology. New Jersey, Lawrence Erlbaum.

Fleming, T. R., & DeMets, D. L. (1996). Surrogate end points in clinical trials: are we being misled?. Annals of internal medicine, 125(7), 605-613.

Goetzel, R.Z., & Pronk N.P. (2010). How much do we really know about what works? *American Journal of Preventative Medicine*, 38 (2S) S223-S225.

Grønhøj Larsen C., Jørgensen,K.J., & Gøtzsche P.C. (2012). Regular health checks: cross -sectional survey. *PloS ONE.* 7 (3)

Hampton, B., Brinberg, D., Peter, P. & Corus, C. (2009). Integrating unified theory and stages of change to create targeted health messages. *Journal of Applied Social Psychology,* 39 (2) 449-471.

Han, P.K.J. (1997). Historical changes in the objectives of the periodical health examination. *Annals of Internal Medicine,*127 (10) 910-917.

Heineman, B.W. (2011). Retrieved from http://www.law.harvard.edu/programs/corp_gov/articles/Heineman_Atlantic_01-21-11.pdf. Accessed 1 May 2015

Holland, W. (2009). Public health perspectives-Periodic Health Examination—A brief history and critical assessment. *Eurohealth*, 15(4), 16-20.

Huskamp, H. A., & Rosenthal, M. B. (2009). Health Risk Appraisals: How Much Do They Influence Employees' Health Behavior?. *Health Affairs*, *28*(5), 1532-1540.

Johnson, S. S., Cummins, C. O., Evers, K. E., Prochaska, J. M., & Prochaska, J. O. (2009). Proactive health consumerism: An important new tool for worksite health promotion. *American Journal of Health Promotion*, *23*(6), TAHP-1.

Kessler R. & D Mroczek. Final Versions of our Non-Specific Psychological Distress Scale [Written communication -memo dated 10/3/94]. Ann Arbor (MI), Survey Research Center of the Institute for Social Research, University of Michigan, 1994.

Komaroff, A. L. (2009). Executive physicals: What's the ROI? *Harvard Business Review, 87*(9), 28-30.

Krogsbøll, L.T., Jørgensen,K.J., Grønhøj Larsen C., & Gøtzsche P.C., (2012). General health checks in adults for reducing morbidity and mortality from disease. *Cochrane Database of Systemic Reviews, Issue 10,* 2012

Larcker, D.F & Tayan B. (2011). Retrieved from http://web.stanford.edu/group/knowledgebase/cgi-bin/2011/01/25/ceo-health-disclosure-at-apple-a-public-or-private-matter/. Accessed 1 May 2015

Larson, J. A. (1999). Stock price reactions of small public firms to the loss of the CEO. *Journal of Small Business Management, 37*(3), 15-24.

McCartney, M. (2008). Executive health checks raise questions. http://intl/cms/s/0/a8f65560-c263-11dd-a350-000077b07658.html. Accessed 1 May 2015.

Mendelson, R. (2010). Best medicine money can buy. *Canadian Business, 83*(20), 74-75.

Meyer, H (2009). http://www.hreonline.com/HRE/print.jhtml?id=270033519 accessed 1 May 2015

Mittler, J. N., Martslof, G. R., Telenko, S. J., & Scanlon, D. P. (2013). Making sense of 'consumer engagement' initiatives to improve health and health care: A conceptual framework to guide policy and practice. *Milbank Quarterly, 91*(1), 37-77.

Monachino, M.S., Moreira, P. (2014 Corporate social responsibility and the health promotion debate: An international review on the potential role of corporations. *International Journal of Healthcare Management, 7*(1), 53-59.

Musich, S., McDonald, T., Hirschland, D. & Edington, D.W. (2003). Examination of risk status transitions among active employees in a comprehensive worksite health promotion program. *Journal of Occupational & Environmental Medicine,* 45(4), 393-399.

MacDonald, I. (2014, July 7). Executive physicals: CEO illness buster and lucrative business line. Fierce Healthcare. Retrieve from http://www.fiercehealthcare.com/node/99606/print

McCartney, M. (2008, December 13). Executive health checks raise questions. Financial Times. Retrieved from http://www.ft.com/intl/cms/s/0/a8f65560-c263-11dd-a350-000077b07658.html

McNemar, Q. (1947). Note on the sampling error of the difference between correlated proportions or percentages. Psychometrika. 12 (2), 153–157.

Meyer, H. (2009, October 16).Body of evidence. Retrieved from http://www.hreonline.com/HRE/browse/Search%20Results.jhtml?ss=harvey+meyer&s=18

Nöhammer, E., Schusterschitz, C., & Stummer, H. (2013). Employee perceived effects of workplace health promotion. *International Journal of Workplace Health Management, 6*(1), 38-53.

O'Donnell, M.P. (2013). Does Workplace Health Promotion Work or Not? Are You Sure Really Want to Know the Truth? *American Journal of Health Promotion,* 28 (1), iv-v.

Painter, J.E., Borba, C.P.C., Hynes, M., Mays, D.,Glanz, K. (2008). The Use of Theory in Health Behaviour Research from 2000-2005: A Systematic Review. *Annals of Behavioural Medicine,* 35: 358-262

Periodical Health Examination. (1978, July 22). *South African Medical Journal*. [Response from editor] 134.

Okojie, O., Isah, E., & Okoro, E. (2000). Assessment of health of senior executives in a developing country. *Public Health, 114*(4), 273-275.

Quick, J.C., Gavin, J.H., Cooper, C.L., Quick, J.D. (2000). Executive health: Building strength, managing risks. *Academy of Management Executive,* 14(8), 34-44.

Raffle, A. E., & Gray, J. A. M. (2007). Screening: evidence and practice. Oxford University Press.

Rank, B. (2008). Executive Physicals-Bad Medicine on Three Counts. *New England Journal of Medicine.* 359 (14), 1424-1425.

Salman,R.A, Whiteley, W.N., Warlow, C. (2007). *Screening using whole-body magnetic resonance imaging scanning: who wants an incidentaloma? Journal of Medical Screening.* 14, 2-4

Shaack, T. (2009, December). Letter to the editor. In Harvard Business Review, 122-123.

Soler, R. E., Leeks, K. D., Razi, S., Hopkins, D. P., Griffith, M., Aten, A., et al. (2010). A systematic review of selected interventions for worksite health promotion: The assessment of health risks with feedback. *American Journal of Preventive Medicine, 38*(2, Supplement), S237-S262.

Sorenson, G., Landsbergis, P., Hammer, L., Amick B.C., Linnan,L., Yancey, A., Welch, L.S., Geotzel, R.Z., Flannery K.M. & Pratt, C. (2011). Preventing Chronic Disease in the Workplace: A Workshop Report and Recommendations. *American Journal of Public Health,* 101 (2, S 1), S196-S207.

Stock, K. (2014, July 3). The C-Suite's Savvy Cancer-Fighting Strategy. *Bloomberg Business.* Retrieved from http://www.bloomberg.com/bw/articles/2014-07-03/the-c-suites-savvy-cancer-fighting-strategy

Welch, H. G. (2015). Less Medicine, More Health: 7 Assumptions that Drive Too Much Medical Care. Beacon Press.

Wilkinson J, Bass C, Diem S, Gravley A, Harvey L, Maciosek M, McKeon K, Milteer L, Owens J, Rothe P, Snellman L, Solberg L, Vincent P. (2013) Preventive Services for Adults. *Institute for Clinical Systems Improvement.*

Wilson, M. G., Holman, P. B., & Hammock, A. (1996). A comprehensive review of the effects of worksite health promotion on health-related outcomes. *American Journal of Health Promotion,* 10(6), 429-435.

Worrell, D. L., & Davidson III, W. N. (1987). The effect of CEO succession on stockholder wealth in large firms following the death of the predecessor. *Journal of Management,* 13(3), 509.

Appendix 1: Ethical approval

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.
- FWA 00002567, Approved dd 22 May 2002 and Expires 20 Oct 2016.
- IRB 0000 2235 IORG0001762 Approved dd 22/04/2014 and Expires 22/04/2017.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences Research Ethics Committee

27/08/2015

Endorsement Notice

Ethics Reference No.: Temp2015-01034

Title: Executive Medical Examination Programmes: Theoretical Underpinnings, Health and Other outcomes

Dear Elton Dorkin

The **New Application** as supported by documents specified in your cover letter for your research received on the 18/08/2015, was approved, by the Faculty of Health Sciences Research Ethics Committee on the 26/08/2015.

Please note the following about your ethics approval:
- Please remember to use your protocol number (**Temp2015-01034**) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, or monitor the conduct of your research.

Ethics approval is subject to the following:
- The ethics approval is conditional on the receipt of 6 monthly written Progress Reports, and
- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

Dr R Sommers; MBChB; MMed (Int); MPharMed.
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

☎ 012 354 1677 🖷 0866516047 ✉ deepeka.behari@up.ac.za 🖱 http://www.healthethics-up.co.za
✉ Private Bag X323, Arcadia, 0007 - 31 Bophelo Road, HW Snyman South Building, Level 2, Room 2.33, Gezina, Pretoria

Appendix 2: Consent letter

I am a student at the University of Pretoria. As part of my studies, I am conducting research about executive medical examinations. I am trying to find out how they help to improve health. I will need access to your medical file to collect information about your health behaviours and test results. Your personal identity will not be revealed and all results will be reported as a group, and not individuals. I will also request you to complete a questionnaire about your views about the medical examination which should take a maximum of 15 minutes to complete. Your participation is voluntary and you can withdraw at any time without penalty. All data will be kept confidential. If you have any concerns, please contact my supervisor or me.

Our details are provided below.

Signature of participant: _____

Date: _____

Elton Dorkin
Researcher
Email: 458372@mygibs.co.za
Phone: 083 825 2819

Andee Deverell
Research Supervisor
Phone: +27 11 631 3930
E-mail: andee.deverell@gmail.com

Appendix 3: Questionnaire

Table 23: Questionnaire

	Disagree	Partly Disagree	Partly Agree	Agree
Since my medical I am more interested in managing my chronic disease better	Health Consumer Engagement Cluster (Mittler, et al.,2013) 'self-management' 'healthy behaviours' 'healthcare encounter behaviours' 'shopping behaviours'			
I feel an improvement in my current health				
I feel that my future health will be better				
My existing health problems are better				
I feel I am preventing future health problems from developing				
I feel that I am better informed about my own health				
I feel more empowered to manage my own health				
I feel that I can engage better with my own doctor regarding my health (ask more, and better questions)				
I feel that I can better communicate my health goals to my own doctor				
I feel that I am better able to participate in decisions about my healthcare				
I feel in a better position to select healthcare providers (doctors or hospitals or medical aid) based on a better understanding of my health needs				
I feel in a better position to select healthcare providers based on a better understanding of the quality of care I can get for myself or my family				
I am now able to better seek out and use information to help select different treatment options				
I consider myself to be a health conscious person.				
I went for a private medical last year.				
If my company did not pay for a work place medical I would still have one and pay for it myself?	Employee Perceived Effects Cluster (Nohammer et al., 2013)			
Having a work place medical provides me with valuable time to focus on my health which I would not otherwise do.				
I would prefer to have my medical conducted by my private doctor than in the work place.				
The fact that Illovo conducts and pays for work place medicals makes me feel that they care about my personal well-being.				
I would be upset / disappointed if Illovo withdrew the work place medical benefit. Why?				