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Abstract

Linking health and productivity to organisational advantages, this study explores the benefits that health screening may provide organisations in South Africa. Health was evaluated in this research as the amount of lifestyle factors (physical inactivity, cigarette smoking, alcohol consumption and BMI) and biometric factors (high blood pressure, high cholesterol and high glucose) employees were at risk for. The study aimed to investigate whether increased health leads to the experience of negative health consequences, which may negatively impact on productivity in the workplace. Productivity was assessed firstly by a person's ability to be at work, and secondly by their ability to significantly contribute to their organisation while they were at work. As such, workplace productivity loss was evaluated in terms of the direct, and indirect, organisational costs that ill-health results in. Workplace productivity loss was measured using the Work Productivity and Activity Impairment Questionnaire: General Health V2.0 (WPAI-GH). Participants were 409 employees from an organisation in the financial service sector (M_{age} = 41.86, SD = 9.3). Multiple regression analysis found one lifestyle factor (physical inactivity) and one biometric factor (cholesterol) to significantly predicted work productivity. Cigarette smoking, alcohol consumption, BMI and blood pressure did not significantly predict workplace productivity loss. Significant relationships were found between physical inactivity and BMI, blood pressure and cholesterol. Alcohol consumption was significantly related to cigarette smoking and blood pressure, while BMI and blood pressure had a significant relationship. The findings contribute to knowledge on how workplace productivity can be promoted through healthy lifestyle behaviours and biometric risk factors. Theoretical and practical implications were discussed in terms of how organisations can design, implement and evaluate appropriate workplace programmes that are related to the specific health needs of their employees. This was positioned as an essential

business practice that positively relates to organisational effectiveness by increasing workplace productivity.

Keywords: workplace productivity loss, lifestyle risk factors, biometric risk factors, organisational advantage, South Africa

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Declaration

I, Nadine dos Santos, declare that this research report is my own, unaided work. It is submitted for the degree of Master of Arts in Social and Psychological Research by Coursework and Research Report at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at this or any other university.

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Chapter One: Literature Review

Background and rationale

How productive a person is, is indicated by their ability to be at work, and their ability to work at full capacity. The more productive a person is, the more he/she is able to contribute to their workplace objectives. A key driver of productivity is a person's health status, which can be determined by their lifestyle and biometric factors. Research has found that the main lifestyle factors that influence productivity are physical inactivity, cigarette smoking, excessive alcohol consumption and unhealthy BMI scores, while the main biometric risk factors are high blood pressure, high glucose and high cholesterol (Steyn et al., 2006; WHO, 2003). These health risk factors are a serious concern for the South African population as they lead to non-communicable diseases (NCDs). In South Africa, NCDs, such as cardiovascular disease and diabetes, are the main causes of deaths (Bradshaw, South African Medical Research Council, & Burden of Disease Research Unit, 2003). The more lifestyle and biometric risk factors a person has, the more their health will suffer, and the less productive they will be. By eliminating risks of unhealthy lifestyle behaviours, up to 80% of cardiovascular disease and diabetes can be prevented (Shisana et al., 2014), thereby improving overall productivity.

If lifestyle and biometric risk factors are not addressed with urgency, NCDs will continue to contribute to ill health problems in South Africa. An increase in the prevalence of NCD risk factors leads to increased sick days, which not only places strain on the affected person, but it also costs the organisation and the society in terms of how much they are able to contribute to the economy (Li, Suto & Yamaguchi, 2014). As a result, South African workplaces are experiencing increased workplace productivity loss, and are having to deal with the associated costs of such loss (Bradshaw et al., 2003). This study is concerned with how much ill health amongst South African citizens contributes toward total workplace

productivity loss. The answer to this question is important both for implementing policies aimed at improving health in South African organisations, and more generally, for understanding how South African companies can engage with their employees to generate greater productivity within the workplace. In other words, this study positions the health of employees as an edge to organisational competitiveness.

A healthy workforce is essential for business success as it leads to increased employee productivity. In South Africa, access to information relating to the health status of the country's workforce is incomplete and demonstrates a lack of coherence and consistency (Bradshaw et al., 2003). This study aims to determine if the current lifestyle behaviours and biometric factors in the South African workforce are leading to work productivity loss. This appears to be necessary as there are limited prior studies that have directly assessed workplace productivity loss in terms of employee health in the South African workforce. Hence, this study will provide a much needed perspective on how lifestyle risk behaviours and biometric risk factors are impacting on work productivity loss in South African organisations.

Establishing the link between Health and Productivity

Health can be considered as one of the most fundamental and vital possessions a person has. This is because health directly impacts on the way an individual is able to carry out daily activities and tasks (Schultz & Edington, 2007), i.e. how productive they are. In order to contextualise the concept of health and productivity in the workplace, it is necessary to understand the trends that have emerged in research when examining these concepts. Current conceptualisations positioned health in terms of physical, mental and social wellbeing, in addition to the absence of sickness or diseases (Noblet & Rodwell, 2010). According to this conceptualisation, health can be viewed as an individually orientated approach, and is seen as the product of an individual's behaviour and responsibility (Shain,

2004). From an individual perspective, literature extended research on health to include wellness and prevention. This approach to health is generally viewed in terms of a more holistic setting-based approach (Danna & Griffin, 1999; Schultz & Edington, 2007), as it states that health is not limited to the individual, but rather to groups, organisations or even populations (Noblet & Rodwell, 2010). In other words, modern conceptualisations of health considers the possibility that health may be influenced by external forces outside of an individual's control (Shain, 2004). Occupational characteristics (such as job demands, working hours and remuneration packages), and workplace characteristics (such as culture, location and networking groups), have been found to influence a person's health (Das, 2011).

Health has therefore been researched from two perspectives, the individual and the holistic settings-based perspective. The first approach to health acknowledges the role of employees in health. Each employee will bring into an organisation his or her own personal resources, health practices, beliefs, attitudes and values that directly influences how they perform their job (Conrad, 1987; Kirsten, 2010). The latter approach acknowledges that how the workplace is designed and structured will directly influence the health of its employees (Shain, 2004). As approaches to health have broadened, the costs associated with health risks remains the primary issue of concern. For instance, Danna and Griffin (1999) and Kirsten (2010), found that poor health impacts on the amount of days that employees take off from work, and that absence from work matters in terms of lost productivity. Lost productivity can therefore be assessed as the associated costs of absenteeism, i.e. the amount of time an employee is away from work, typically as a result of poor health (Schultz & Edington, 2007; Baicker, Cutler, & Song, 2010). Thus, health can be viewed as possessing substantial benefit for organisations as healthier workers, who do not miss as many days from work as their unhealthy colleagues, are proven to be more productive. Absenteeism can be measured using the formal absenteeism records of an organisation. Higher absenteeism ratings indicate

greater loss of productivity (Braakman-Jansen, Taal & van de Laar et al., 2012). Medical advancement and technology makes it possible for employees with ill health to manage health complications associated with risky lifestyle and biometric factors, and still be able to live somewhat active lifestyles (Escorpizo, Bombardier, Boonen, Hazes, Lacaille, Strand & Beaton, 2007). Therefore, measuring absenteeism alone is not sufficiently conclusive to evaluate the effects of health on productivity.

A second feature that influences the productivity of an organisation is known as presenteeism. Presenteeism is lost productivity during work hours, errors or mistakes made on the job, or failure to produce a standard of work that is required from an employee (Mattke, Balakrishnan, Bergamo, & Newberry, 2007). Due to the difficulties present when generating objective data of an individual's productivity levels while at work, determining presenteeism is a somewhat complicated task for organisations (Goetzel, Carls, Wang, Kelly, Mauceri, Columbus, & Cavuoti, 2009). An instrument used to measure presenteeism is the Work Productivity and Activity Impairment Questionnaire: General Health V2.0 (WPAI-GH). The WPAI-GP is a self-reported quantitative assessment that determines the relationship between health and productivity (Braakman-Jansen et al., 2012) by calculating an absenteeism percentage, a presenteeism percentage and an overall workplace productivity loss percentage (Hafner, van Stolk, Saunders, Krapels & Baruch, 2015). Typically, an organisation is considered productive if there are low rates of absenteeism and presenteeism. For the purpose of this study, workplace productivity will be determined using the WPAI-GI, which encompass absenteeism and presenteeism.

Therefore, the current trend in literature is to argue that the healthier workers are, the more productive they will be (Shain, 2004; Weil, 2005; Kirsten, 2010). Although true, this statement does not illustrate how value can be added to organisations through means of healthy employees that, as a result of their health, contribute to the organisation's competitive

edge. Furthermore, although there is a substantial amount of literature on health and productivity, Kirsten (2010) and Baicker et al., (2010) found that the number of organisations that take a proactive approach to promoting health, in terms of its lifestyle and biometric risk factors, in relation to increased productivity remains small. The interest of this study has been placed not only on increasing productivity in the workforce, but rather on the fact that healthy and well people are important for organisations and societies as a whole. Based on this argument, it is important to understand the relationship between lifestyle risk factors and biometric factors on work productivity. To initiate this understanding, context on how the health risk factors are gathered by organisations to determine the health status of employees will be provided.

Assessment of Health in Organisations

Health status in the screening events is assessed by a general health questionnaire, and may be followed by a biometric screening. The health questionnaire measures behavioural health risks such as smoking, physical activity, alcohol consumption, and body weight. It may also include questions on the participant's current medical conditions (for instance allergies or stress) and family medical history (such as cancer or diabetes). Biometric screenings include body measurement, systolic and diastolic blood pressure, heart rate, total cholesterol, triglycerides and glucose (Goetzel et al., 2009). Once all information is gathered, participants are told their health status on a continuum ranging from optimum health to a variety of symptoms, health problems or diseases that will negatively impact how a person is able to carry out daily activities and tasks. It is hoped that the information received by the participants will either motivate them to improve or maintain their current lifestyle behaviours (Schultz & Edington, 2007). Additionally, information gathered from the health risk appraisals may be used to establish a variety of interventions appropriate for workplaces, so as to foster a culture of health and productivity (Mattke et al., 2007). Examples of

workplace interventions that promote health include those that address fitness, stress, smoking, and weight management (Shain, 2004).

A reason why health screening events are important is because they are able to provide information on the types of lifestyles experienced by their employees (Conrad, 1987; Shain, 2004; Baicker et al., 2010). Studies have found that employees are becoming increasingly unhealthy in their eating, drinking and exercising behaviours (Steyn et al., 2006; Beaglehole & Bonita, 2009). These behaviours influence employee's health, which impact the amount of effort they put towards being productive during the work day.

The results generated from health screening events provide organisations with statistical information that can be used to argue for, and create, healthier and more productive workers (Schultz & Edington, 2007; Goetzel et al., 2009; Baicker et al., 2010). In other words, comprehensive and precise information on the health of employees is therefore recognised as a critical resource for organisations to achieve and maintain high levels of productivity. In particular, information on lifestyle risk factors (physical inactivity, cigarette smoking, alcohol consumption and BMI), and biometric factors (high blood pressure, high cholesterol and high glucose) can be used to determine whether an organisation consists of healthy employees that are significantly contributing to the productivity levels needed to remain business competitive.

Research Done on Establishing the Link Between Lifestyle Factors, Biometric Factors and Productivity

Previous literature has defined employee health in relation to the effects it has on productivity. For instance, when examining the relationship between lifestyle risks and productivity costs in an employed population, Goetzel et al., (2009) found a significant relationship between cigarette smoking and alcohol consumption, which contributed to increased absenteeism and presenteeism in the company. Schultz and Edington (2007), found

that physical inactivity and excess body weight are significantly associated with increased presenteeism. Baicker et al., (2010) conducted a meta-analysis on the associated financial implications of health screening events, and found that employee health cost decreased as a result of workplace health promotions. Shain (2004) found employees who have three or more unhealthy lifestyle factors are likely to be absence for double the amount of time that healthy employees are. Although these findings will vary depending on the type of organisation, the argument that health impacts on productivity is strengthened. Furthermore, Kirsten (2010) found that the effects of biometric factors (such as increased blood pressure, high cholesterol and high glucose levels) are contributing to unhealthy workforces, meaning that employees are becoming sicker and less productive. Therefore, research has been conducted on the effects that unhealthy lifestyle and biometric factors have on productivity, however, how research on health can be used be used to enhance organisational productivity is limited.

Importance of Lifestyle Risk Factors on Workplace Productivity

Lifestyle risk factors are the types of behaviours that people choose to live by (Boström, 2006). Physical inactivity, cigarette smoking, excessive alcohol consumption, and being underweight or overweight, are examples of lifestyle factors that dramatically increase a person's risk for health disorders, diseases or incapacities (Barnekow-Bergkvist, Hedberg, Janlert & Jansso, 2001; World Health Organisation, 2015). In South Africa, 37% of all deaths are due to the NCDs caused as the result of the unhealthy lifestyle practices (Bradshaw et al., 2003). Furthermore, unhealthy lifestyle factors significantly contribute to high absenteeism rates in organisations, and are associated with increased health care costs (Shain, 2004). The higher the lifestyle risk is, the greater the health cost will be on the affected person, their company and their society. South Africa is not the only country experiencing the consequences of sick employees. Kristen (2010), found a global rise in the number of risk

factors experienced by individuals, thereby resulting in an increased number of employees around the world experiencing ill-health complications and decreased productivity due to lifestyle behaviours and biometric risks

Importantly, individuals do have some control in the experience of either healthy or unhealthy lifestyle factors. For instance, a person that is experiencing the health problems associated with high BMI scores can take active measures (e.g. increase their physical activity and decrease their food consumption) to reduce their scores to healthier BMI levels. Advice on how to improve current lifestyle behaviours may be provided by organisations at health screening events. This also allows organisations to take more active roles to improving the health status of their employees. Therefore, health screening events are opportunities, provided by organisations, and given to employees, to improve awareness of the kinds of lifestyle factors that may be negatively impacting on their health. Information will then be provided to employees with how to improve their current health status, which will then improve their overall productivity levels.

Physical inactivity, cigarette smoking, excessive alcohol consumption and unhealthy weight, have been identified as the leading four lifestyle risks that impact on employee health (World Health Organisation, 2015). Through an examination of previous studies and surveys, I will show how significant lifestyle behaviours are contributing to increased NCDs amongst South Africans. Each of the lifestyle risk factors will be discussed in relation to their effects on health and productivity.

Physical Inactivity

Physical activity is any type of bodily movement that requires an expenditure of energy with either a conscious, or unconscious, intention to improve physical health (World Health Organisationa, 2015). The definition of physical activity also includes all types of muscular activity, such as house and garden work, carrying physical loads at work or during

leisure time, and other leisure activities or hobbies such as gyming and recreational sport (Boström, 2015). The World Health Organisationa (2015) recommends that adults should aim to do at least 2 hours and 30 minutes of moderate-intensity physical activity throughout the week, or 75 minutes of vigorous-intensity physical activity throughout the week. It is not always possible to gather a true reflection of how active a person is. How physically active, or inactive, a person is, is generally determined through interviews, questionnaires and surveys. Results are sometimes exaggerated, or understated, in order to come across in a particular way. For instance, someone may exaggerate how often they exercise so that appear to be physically fit, when in reality, they do not exercise as much as they stated.

The current lifestyle trend present in South Africa does not promote active behaviours, rather, people are living more sedentary lifestyles in the 21st century than what has previously been recorded (Boström, 2015). The reason behind this is mainly because of increased availability of technology and transport, i.e. more people are watching TV and are on the computer during the day rather than getting active outside, and due to modernisation, more people take cars or buses to work rather than walking or using their bicycles as a mode of transport. This trend is supported by Steyn et al., (2006) who found that urbanisation and other migration patterns are directly impacting on the health, nutrition and physically active statuses of many South Africans. The authors also found that women (47%) were more inactive than men (32%), and that this difference in physical activity further increases with age. This is a significant finding that can be used by organisations to improve their productivity levels. By knowing that women are more at risk for physical inactivity, organisations can establish rewards and incentives that encourage females to be more active. By doing so, companies are able to assist vulnerable groups at risk of particular lifestyle behaviours to make sure that productivity levels remain at a competitive high (South Africa, Department of Health, & South African Medical Research Council, 2007).

South African organisations are functioning in a world that is culturally diverse. Not only is there diversity in language and colour, but there is also diversity in cultures and religion. This provides workplaces with interesting and dynamic profiles. Acquiring an appreciation and understanding of how this diversity influences health can greatly assist in the promotion of health, and the subsequent experience of workplace productivity. Reddy et al., 2003, illustrated the percentages of physical inactivity contributed by each racial group- 33% Indian, 29% White, 46% Coloured and 38% Black people do little to no exercise daily. These unattractive statistics suggested that South Africa is heading towards a dangerous road to increased risk of NCDs. As mentioned previously, the experience of NCDs has numerous impacts on numerous parties. The lifestyle risk of physical inactivity requires additional attention given to the groups that are more likely to be impacted. By doing so, organisations will be able to sustain their high workplace productivity levels.

Literature has closely liked physical inactivity with greater food ingestion, excess alcohol consumption and increased BMI scores (Steyn et al., 2006; Kallings et al., 2009; Witter et al., 2015). Combined, the closely linked variables predict cardiovascular diseases, diabetes and even mortality (Dishman, Oldenburg, O'Neal, & Shephard, 1998). The risk of being overweight or obese may be fatal as risk symptoms are not visible or apparent, especially in early stages of cardiovascular diseases. When the symptoms do become noticed, the health implications are exaggerated and medical treatment is often need (World Health Organisationa, 2015), resulting in increased absenteeism and decreased productivity (Steyn et al., 2006). Conducting a meta-analysis on workplace physical activity interventions, authors such as Conn, Hafdahl, Cooper, Brown, and Lusk (2009) and Marshall (2004), found that physical activity interventions can improve health among employees, which then reduces the company's absenteeism rate and assists in the company achieving important outcomes. Marshall (2004) further found that programmes that promote incidental physical activity,

such as promoting the use of stairs rather than escalators, appear to be the most successful in improving health among employees.

Cigarette Smoking

Cigarette smoking is the inhalation and exhalation of burning tobacco. Cigarette smoking poses extensive risk to individual health. It is well documented that smokers, and even occasional smokers, are more likely to suffer from lung cancer, coronary heart disease, and depression and anxiety disorders (Kristein, 1983; Halpern, Shikiar, Rentz, & Khan, 2001; Brownson, Hopkins, & Wakefield, 2002; Boström, 2006). Further, Bassuk & Manson (2005) found that smoking significantly increases the risk for type 2 diabetes, and that by quitting smoking, people significantly reduced the risk of diabetes for up to five years for women and 10 years for men. As a result of the health implications of smoking, smokers are absent from work more than their non-smoking colleagues, which results in considerable work productivity loss costs imposed on organisations (Kristein, 1983; Brownson et al., 2002; Parrott, Godfrey, & Raw, 2000; Tsai, 2005). Even at work, productivity is further reduced as smokers are constantly taking time away from their work to take smoke breaks (Tsai, 2005).

Individual costs of smoking are evident in the increased insurance premiums rate of smokers compared to non-smokers (Brownson et al., 2002; Baicker et al., 2010). The effects of smoking are not limited to the individual smoker or to their organisation, but also to the employees that do not smoke but are subjected to passive smoking (Adams, Morar, Kolbe-Alexander, & Jeebhay, n.d; Parrot et al., 2000). Shisana et al., (2014) found that 17.7% of South African workers are exposed to environmental tobacco smoke. Men were significantly more exposed to passive smoking than women, and individuals over the age of 65 years were least exposed. Passive smokers are involuntarily exposed to second-hand cigarette smoke as they inhale and exhale the cigarette smoke of a smoker nearby (World Health Organisationb, 2015), which may then cause acute and chronic diseases in otherwise healthy non-smokers

(Brownson et al., 2002). According to Mackay and Eriksen (2002), passive smokers are becoming increasingly at risk for lung cancer and heart disease by being around cigarette smoke on a daily basis. Therefore, even though they have not chosen to be at risk for this lifestyle risk behaviour, non-smokers are experiencing negative health implications of smoking. Organisations now have to address the impact of smoking on employees who smoke, as well as consider how the productivity levels of non-smoking employees are being affected.

It may be argued that organisations no longer need to concern themselves with the relationship between smoking and productivity because smoking is becoming increasingly less unpopular (Boström, 2015). Shisana et al., (2014) found 20.8% of the South African population engage in cigarette smoking, while 79.2% of the population have never smoked cigarettes. Implemented control policy, and increased control legislation, are two explanations as to why smoking decreased in popularity from 1990 onwards (Steyn et al., 2006). Although these findings communicate that smoking is becoming a less popular lifestyle risk, the associated risks and health implications of cigarette smoking remains apparent in many societies, especially low-income ones (Baicker et al., 2010). For instance, cigarette smoking is still contributing to morbidity and mortality amongst the South African population (Steyn et al., 2006). Therefore, if organisations want to remain competitive, they cannot become complacent in thinking that the decreased smoking trend will not impact on their productivity levels. Instead, organisations can view smoking as a lifestyle factor that calls for prevention methods. Attempts can be made to communicate the health implications of smoking, and passive smoking, around the organisation. Furthermore, organisations can make sure that smoking areas are away from non-smokers to decrease the occurrences of passive smoking.

Alcohol Consumption

Alcohol consumption is the physical ingestion of beverages that contain an alcohol rating. Excessive/unhealthy consumption of alcohol is considered as binge drinking (ingestion of four alcoholic drinks per occasion for women, and five alcoholic drinks per occasion for men), heavy drinking (one alcoholic drink per day on average for women, and two alcoholic drinks per day on average for men), any alcohol consumption by the population under the legal age of alcohol consumption, and any alcohol consumption by pregnant women (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011). Alcohol is seen as a leading risk factor for ill-health and premature death amongst people aged between 25 and 59 (Das, 2011). This is of particular concern because the age group affected is the core working age group for businesses. If employees engage in unsafe alcohol habits, then organisations run the risk of losing their working backbone, which will result in workplace productivity loss. Occupations that are regarded as stressful work environments are at higher risk for workplace productivity loss due to the implications of excessive drinking habits (Das, 2011).

A second risk factor of alcohol is that when people drink excessive amounts, they tend to engage in behaviours that are not characteristic of their personality types (Gmel & Rehm, 2003). This is because alcohol consumption lowers people's inhabitations resulting in risky behaviours such as sexual promiscuity, drinking and driving, and violent and aggressive outburst (Das, 2011). The implications of these behaviours may be worse than just a hangover the next day, instead they may lead to motor vehicle crashes, HIV infections and sexually transmitted infections, alcohol-related crime, foetal alcohol syndrome, liver cirrhosis, stroke, unintentional injuries, and alcohol dependence (Anderson, Chisholm, & Fuhr, 2009; Bouchery, Harwood, Sacks, Simon & Brewer, 2011; Esser, Kanny, Brewer, & Naimi, 2012; Boström, 2015). Furthermore, the implication costs associated with the above mentioned behaviours are often long-term and pricey to the person, their relatives, their

organisation, private health insurers, employers, and safety and protection forces (Bouchery, et al., 2011). Therefore, people who engage in unhealthy amounts of drinking may need time to recover away from work. Time away from work results in the organisation not being able to utilise all their resources and strengths, thereby affecting what the company is able to produce and deliver.

It has been found that moderate alcohol consumption is good for productivity as it has health benefits for middle-older age groups (Beaglehole & Bonita, 2009; Gmel & Rehm, 2003). The authors position a glass of red wine in the evenings to significantly reduce the risks of cardiovascular diseases, and to help people feel more relaxed for work the next day. Although this may be the case, there is less risk involved in promoting abstinence from alcohol than there is promoting the moderate consumption of alcohol (Anderson et al., 2012). Promoting alcohol abstinence is particularly relevant to South Africa because the harmful consequences of excessive alcohol consumption are exacerbated in third world countries (Beaglehole & Bonita, 2009). Furthermore, alcohol has been found to significantly predict workplace absenteeism and presenteeism (Das, 2011). Thus, excessive alcohol drinking leads to health problems, which impacts on absenteeism and presenteeism, and causes workplace productivity loss, thereby costing both organisations and societies.

Recognising the need to eliminate the harmful effects of alcohol, a number of policies and programmes have been made available to the public, especially to areas that are at most risk of alcohol abuse. Alcohol policies and programmes are defined as sets of measures aimed at addressing the effects of negative health implications of excessive alcohol consumption (Anderson et al., 2012). Policies that have seen significant results in reducing harmful effects of alcohol include those that aim to make alcohol more expensive, less available, and less acceptable. Other measures that reduce harmful effects include: educational and informational campaigns, advertising and promoting responsible drinking,

increasing measures that reduce driving while under the influence, and establishing individual based interventions for at-risk groups (Beaglehole & Bonita, 2009; Anderson et al., 2012). Organisations can examine the significant results generated from these programmes and implement what they feel is appropriate to their own workplace. Companies may assist this by portraying a supportive image that promotes healthy lifestyle behaviours. Raising awareness of the harmful consequences to alcohol may prevent employees to excessively drink. Therefore, applied alcohol awareness programmes can ensure workplace productivity is not lost due to unhealthy lifestyle habits.

Although research has found that alcohol awareness has improved, due to aggressive marketing techniques of the alcohol industry, as well as the accessibility of alcohol, people are unlikely to make substantial changes of alcohol consumption behaviour (Anderson et al., 2012). Society is seeing more sophisticated alcohol promotion methods as alcohol is reaching a wider audience and advertising campaigns are being linked to brands, sports, cultural activities, sponsorships, product placements and celebrities (Anderson, et al., 2009). As such, consumption of excess alcohol may not stop, but instead continue to contribute to South Africa's mobility and mortality statistics. An alternative explanation of why excessive alcohol consumption may continue is because of certain workplace environments. Environments that are at risk for employee drinking are stressful, time and task pressured, offer low remuneration and rewards, and are where the culture of the company promotes the use of alcohol (Das, 2011). Therefore, organisations still run the risk of becoming less productive as a result of unhealthy levels of alcohol consumption.

Being Underweight, Overweight or Obese (BMI)

Overweight and obesity are defined by the World Health Organisation as "abnormal or excessive fat accumulation that may impair health" (World Health Organisationc; 2015). Conversely, underweight would be defined as below fat accumulation in the body that may

impair health. Body mass index (BMI) is an index of weight-for-height metric, and is commonly used by researchers to identify people who are within and without the healthy weight measurements. Interpretation of the BMI scores are as follows: less than 18.5 is underweight, between 18.5 and 24.9 is normal, between 25 and 30 is overweight and greater than 30 is obese (Dodge, Templeton, & Zalkin, 1961). Being underweight, overweight or obese has health and productivity loss implications. Being underweight increases a person's risk of infectious diseases (Caulfield, Richard, Rivera, Musgrove & Black, 2006), while research has found that being overweight or obese directly increases the appearance of health problems, such as high blood pressure, diabetes and other NCDs (O'Neil et al., 2012; Witter et al., 2015). Although useful in that BMI scorers can be applied to males and females, and is appropriate for all ages of adults, it should be considered as a rough guide to assessing possible risk of being under or overweight (World Health Organisationc; 2015).

The South Africa Demographic and Health Survey conducted in2003 found 55% of women, and 30% of men, above the age of 15 to be overweight or obese (South Africa et al., 2007). This figure is highlighted because both men and women see an increase in their weight until they reach the age of 55. Increased weight findings in adults were supported by Barret (2005), who reported a global spread of adult obesity. The rise in obesity impairs people's quality of life in South Africa as it contributes to the risk of NCDs and diabetes, as well as the associated costs of these risks (WHO/FAO, 2003). This all means that the majority of working South Africans are experiencing the associated health risks of being overweight, which includes decreased energy and productivity levels. If organisations want to be competitive in the business market, it is imperative that emphasis is placed on the effects that being underweight, overweight or obese has on employee's ability to be able to be at work and produce while at work.

Being overweight or obese may also be an indicator of life stressors, such as newly found independent living, economic stress, and newly found parenthood (O'Neil, 2012). It is common for young adults to skip breakfast, smoke cigarettes, consume large portions of fast foods and not make time for physical activity. These are the types of habits and lifestyle behaviours that will contribute to the development of overweight and obesity. Therefore, the appearance of one risky lifestyle habit (overweight or obese) is influenced by the appearance of three main lifestyle risk factors (cigarette smoking, alcohol consumption and physical inactivity). Being overweight or obese may therefore result in decreased employee productivity, however, there are measures that organisations can employ to hinder the mentioned health effects. For instance, organisations can provide their employees with the AHA Dietary Guidelines, which provides a health framework and recommended dietary and exercise requirements (Krauss et al., 2000). To improve success rates, it is advised that individual ownership of wanting to improve BMI scores.

Krauss et al., (2000) recommend that to maintain an already established healthy body weight, individuals should match their total intake of energy (i.e. calories consumed) to overall energy needs, limit consumption of high calorie foods or foods with low nutritional values (i.e. foods with high salt, sugar and fat content), and partake in moderate levels of physical activity. To lose weight, it is recommended that the individual be working towards an energy expenditure that exceeds their overall energy intake- i.e. burning off more calories than the amount of calories consumed (Krauss et al., 2000). These are all recommendations that organisations can assist in. For instance, organisations can make sure that the types of food available are healthy low calorie foods, or they can subsidise gym members and offer incentives and rewards program for increased physical activity. By assisting employees to meet their health goals, employees are more likely to assist organisations to meet their productivity goals.

Importance of Biometric Risk Factors on Workplace Productivity

Biometric risk factors are biologically inherent to individuals, and provide numerical information on their health status. The three main biometric factors assessed for health are blood pressure, glucose and cholesterol. Each factor is attributed a value that can either be interpreted as healthy or unhealthy. The values are assessed through means of comparison- i.e. comparing an individual's score to typical and atypical benchmarks scores. The result is that the individual will receive an indication of their health status, and be told which risks factors are of particular concern (Smith, 2006).

The specific biometric factors that will be looked at for this study are blood pressure, cholesterol and glucose. All three factors are taken by qualified healthcare practitioners. High levels of any of the mentioned biometric factors can increase an individual's risk of cardiovascular diseases. As the number one cause of global death, cardiovascular diseases impair the heart and blood vessel leading to increased vulnerability for the experience of heart attacks and strokes (World Health Organisationd; 2015). Providing a thorough report on the severity of poor health, Bradshaw et al., (2003), finds that 37% of all deaths in South Africa are due to NCDs, which includes cardiovascular diseases. Stroke is estimated to be the most fatal NCD among South African women while ischaemic heart disease is estimated to be the most fatal for South African men. Heart disease, diabetes, and chronic lung disease were among the leading causes of deadly NCDs in the year of 2000. The Bradshaw et al., (2003) figures mirror global trends of increased deaths due to NCD's (Beaglehole et al., 2011). If organisations do not step in and assist employees in improving their biometric factors, then there will be serious repercussions to workplace productivity, as well as to the social and economic state of the country (Schultz & Edington, 2007).

Research commonly links biometric factors to lifestyle factors. For example, The Department of Health recognises that NCD's caused by biometric factors are largely

prevented through the reduction of four major lifestyle factors- physical inactivity, cigarette smoking, being overweight or obese and excessive alcohol consumption (South Africa et al., 2007). As previously illustrated, unhealthy lifestyles are associated with dramatic decreases in employee productivity. The same link is applied to biometric risk factors i.e. increased biometric factors lead to decreases in employee productivity (Kotseva, et al., 2009). The link between workplace productivity and each of the identified biometric risk factor, beginning with blood pressure, will be discussed in the remainder of this chapter.

Blood pressure

Simply defined, blood pressure is the force of blood in the circulatory system which is needed to keep blood flowing through the body (Appel et al., 2006). High blood pressure, also known as hypertension, occurs when the walls of the larger arteries lose their natural elasticity and become rigid, and the smaller blood vessels become narrower (Heart and Stroke Foundation South Africa, 2015). Blood pressure is measured in millimetres of mercury (mmHg) and is recorded and interpreted as systolic pressure over diastolic pressure (Health & others, 2006). According to Goetzel et al., (2009), values that are greater than, or equal to, 120/80 mm Hg predict high blood pressure complications. High blood pressure causes the force of increased blood flow to damage the heart, kidneys, brain, and eyes (Heart and Stroke Foundation South Africa, 2015).

A third of South African adults suffer from high blood pressure (Heart Foundation, 2015) and are thus at risk for stroke, heart and kidney disease, cardiac failure, dementia, and blindness. Shisana et al., (2014) found that at a national level, many South Africans were suffering from, or at risk for, prehypertension and hypertension. The authors also found that the risk of high blood pressure increases with age, particularly when participants reach the age of 45. High blood pressure imposes severe financial and service burdens on health systems as people are required to take time off of work to seek treatment (Molla, 2015). It is

clear that increased efforts are needed to control blood pressure rates. Organisations that understand the need to protect their employees' health are more likely to see an increase in the organisational commitment (Schultz & Edington, 2007). An increased employee commitment to the organisation significantly contributes to increased workplace productivity, and the meeting of organisational goals and targets. Therefore, by providing services and information on how to control high blood pressure levels, organisations are ensuring that they remain competitive.

Examples of how organisations can get involved is through the provision of knowledge on the effects of high blood pressure, as well as ways to deal with, to hinder, and to eventually eliminate, such effects. For instance, posters can be strategically placed around the organisation with information on how blood pressure can be controlled through a healthy diet that limits the intake of salt to less than six grams per day, and increases the intake of fruit, vegetables, and low-fat dairy products (Krauss et al., 2000; Iwase, Tanaka, Kobayashi, Wada, Kuwahata, Kido, Hamaguchi, Asano, Yamazaki1, Hasegawa, Nakamura & Fukui, 2015). Further suggestions include limiting alcohol consumption to one drink per day for women, and two drinks per day for men, and increasing effects to be moderately physically active at least three days of the seven-day week (Heart and Stroke Foundation South Africa, 2015). Losing weight, even small amounts of weight, is found to reduce risks of developing high blood pressure. A way to increase the buy in of these suggestions is to provide statistics and figures around how people were able to reduce their blood pressure, as well as the significant health benefits they experienced as a result of improved blood pressure readings. For example, by following a healthy eating plan, and engaging in regular moderate exercise, the Heart and Stroke Foundation South Africa, (2015) found that people are able to reduce their blood pressure readings in two weeks. Significant changes to the participant's health and productivity levels were also seen and felt within these two weeks. Lastly, ways to stay

motivated to decreasing blood pressure levels can be given by organisations- i.e. set recordable health goals, include family and friends in health journeys, be creative in to get active and reward any noticeable accomplishments.

Glucose

The second biometric factor in this study is glucose. Glucose is a type of sugar (i.e. a simple sugar), that the body makes from the types of food a person consumes. It is largely made from carbohydrates, but can also be made from fats and protein. Once made, glucose is absorbed directly into the body's bloodstream to provide the body and brain with its main source of energy (Colberg, Albright, Blissmer, Braun, Chasan-Taber, Fernhall, Regensteiner, Rubin & Sigal, 2010). Glucose is stored in the liver and is released whenever necessary, even if the person has not recently eaten. Insulin, a natural hormone found in the body, assist this process by controlling the amount of glucose released into the bloodstream (Colberg et al., 2010). A blood glucose test measures the amount of glucose in an individual's blood. High blood glucose values are greater than, or equal to, 100 mg/dL (if the person fasted), or greater than, or equal to, 140 mg/dL (if the person did not fast) (Goetzel et al., 2009). High blood glucose levels are associated with lifestyle factors such as cigarette smoking, physical inactivity, poor diet and being overweight or obese (Ford, Williamson & Liu, 1997; Molla, 2015), and is a strong predictor of cardiovascular disease risk (Goetzel et al., 2009).

High glucose levels indicate diabetes, as well as precursory conditions of diabetes (WebMD, 2015). Diabetes is a health condition caused by high levels of glucose in the blood (Colberg, et al., 2010). Diagnostic and preventative technologies are often regarded as too costly by the general public (Li et al., 2011). This prevents people from checking their glucose status, thereby increasing their associated risks of high glucose. However, checking for diabetes is crucial because it is regarded as a chronic condition that can lead to various health complications over time (Iwase et al., 2015). There are three types of diabetes: Type I

is when the body is unable to produce insulin, Type II is when the body is unable to produce enough insulin or is unable to properly respond to insulin (otherwise known as insulin resistance), and gestational diabetes is when pregnant women produce levels of glucose in their blood but their bodies are unable to produce enough insulin needed to transport the glucose in the bloodstream (World Health Organization, 2011). Interesting, Bassuk and Manson (2008) found that Type II diabetes is a condition that is more prevalent in women than men, and that this prevalence is increasingly becoming more apparent. The authors further found a relationship between a person's weight and risk of insulin resistance- that is, increased weight significantly leads to insulin resistance, which then leads to the development of Type II diabetes.

Type II diabetes is a serious condition that accelerates the development of cardiovascular diseases, kidney failure, vision loss, limb amputation, and diabetic ketoacidosis (Miller et al., 2011). Diabetic ketoacidosis occurs when the body does not have enough insulin to use glucose as its source of energy, and instead breaks down body tissue to use as its alternative energy source (American Diabetes Association, 2015). Along with the speedy detection of diabetes, determining the appropriate treatment for the individual will reduce the mortality risk associated with this condition (Barrett, 2005). Treatment protocols vary. Diabetes is strongly associated with lifestyle factors such as being overweight, smoking, lack of exercise and an unhealthy diet and can, in some cases, be reversed if diagnosed and managed early (Bradshaw et al., 2003). Other ways to manage diabetes is through the use of insulin and prescribe oral medications. If left untreated, all of these medical complications are life threatening conditions that can lead to excess morbidity and mortality in individuals with diabetes (Barret, 2005). Therefore, high glucose levels hold serious concerns for organisations as it is likely to negatively impact on how employees are able to perform. If employees are not able to perform on their jobs, then they are not

contributing towards the functioning of the organisation, and are instead greatly impacting on the way the organisation is able to remain competitive in business.

If the prevalence of diabetes continues to increase in South Africa, and if the implications of the condition cannot be reversed, our society will be facing major social and economic challenges (Barrett, 2005). The burden of diabetes, and its many complications, will affect more than just the affected individual. Families, organisations and societies will suffer the costs as diabetes consumes an enormous amount of social and economic resources (Fagot-Campagna & Narayan, 2001; Barrett, 2005; Miller el al., 2011). It has been made clear that greater awareness surrounding the harmful health impact of diabetes is desperately needed in South Africa. The Association for Dietetics in South Africa (ADSA), organise and host health events with specific aims to share knowledge on health risk issues. Following the events, ADSA publish a newsletter which summarises the key learning points at each health event, as well as other health promoting articles. Organisations can subscribe their employees to the ADSA health events and newsletters as a way to manage high level of glucose, and its effects on workplace productivity.

The review of the literature on lifestyle and biometric factors has so far shown a link between physical inactivity, smoking, alcohol consumptions, and obesity on high blood pressure and glucose levels. Therefore, workplace programs that promote physical activity are becoming increasing important because they are a reference point to reducing the effects of unhealthy lifestyle choices and biometric risk factors (Anderson et al., 2009). There are many factors to consider that influence a person's health status, for instance, a genetic pre-distribution to biometric risk factors such as increased glucose levels. Unfortunately, whether a result of genetic predisposition or poor lifestyle choices, unhealthy employees are associated with increased cost to their companies. In particular, unhealthy employees contribute to costs associated with absenteeism, sick leave, disabilities and injuries (Conn et

al., 2009). If organisations are unable to reduce this cost, they will not be able to remain competitive in the business world as money is being spent on health costs rather than on improving ways of doing business and increasing productivity.

Cholesterol

The final biometric factor that will be discussed in this study is cholesterol. Cholesterol is a waxy substance that is produced and circulated by an individual's liver, and is affected by the types of food that an individual consumes (Appel et al., 2006). High cholesterol is therefore defined as a condition where there is excess cholesterol in the blood. It is recommended that people above the age of 20 test their cholesterol once every five years. This is because cholesterol generally does not show in symptoms, and thus people do not know if they have the condition unless they go for a blood test. According to Witter et al., 2015, the most accurate way to determine high cholesterol readings is through fasting blood samples. Fasting blood tests require the individual taking the test to not eat or drink anything, except water, for up to eight hours before taking the test (Miller et al., 2011). It is also recommended that chewing gum and smoking be avoided in this time period as well. This is because food and drinks affect the blood results and you will not get an accurate reading of your true cholesterol scores.

Cholesterol score, also known as a lipoprotein profile, will consist of a total cholesterol score, a low-density lipoprotein (LDL) score, a high-density lipoprotein cholesterol (HDL) score, and a triglycerides score (i.e. score that expresses the amount of excess fats carried and stored in the blood). Cholesterol risk occurs with LDL cholesterol values are greater than 100 mg/dL. (Molla, 2015). A second way to measure cholesterol scores is to determine if values are below 5mmol/L (in healthy range), of above 5mmol/L (out of healthy range) (Goetzel et al., 2009). The higher your blood cholesterol level, the greater the risk for NCDs are.

Blood cholesterol is a powerful predictor of cardiovascular disease risk. It is common practice for people with high LDL scores to take some form of medication (also known as a statin), in addition to making improved lifestyle choices. According to Dr Dirk Blom, medication is also available for people who have low HDL scores (association for dietetics in south africa, 2015). These drugs are known in the medical community as being "cardio-protective" as they reverse cholesterol transport, are anti-inflammatory, anti-oxidant and anti-thrombotic, and have a favourable effect on nitric oxide induction. Cholesterol levels (and associated cardiovascular risk factors) can be greatly reduced by a healthy balanced diet (i.e. low-fat, high-fibre foods). Organisations can make available to employees the mechanisms involved in lowering high cholesterol scores. For instance, companies can provide their workers with AHA guides, which recommend limiting foods with high saturated fats and cholesterol (found in processed meats, lard, cream, and so on), and replacing them with foods that have low unsaturated fats (such as vegetables, fish, legumes, and nuts) (Krauss et al., 2000).

As the majority of the adult population in South Africa spend the bulk of the day at work, the worksite becomes an important setting to promote healthy lifestyle behaviours and communicate the effects of poor health practices (Savolainen, 2014). Worksites also provide a social support element that has been found to significantly promote change of poor lifestyle behaviours to their healthier counterparts (Hyatt Neville, Merrill & Kumpfer, 2011). Therefore, organisations hold potential to be an influential setting that promotes health and productivity through open channels of communication and support. Examining the effect of worksites wellness programs, Hyatt Neville et al., (2011) found that organisations that invest in incentivized worksite wellness program see the benefits of long-term health outcomes in their employees. The chief aim of the wellness programs is to lower body weight, high

cholesterol and high blood pressure through regular physical exercise and medical treatment, for those who require it (Bradshaw et al., 2003; Goetzel et al., 2009).

Closing Remarks

This chapter has extensively considered the relationship between lifestyle risk factors and biometric factors on workplace productivity. It did this by first establishing the link between health and productivity, by providing an assessment of health in organisations and then positioning the importance of lifestyle factors and biometric factors on workplace productivity. Previous research conducted on the effects of health on productivity was examined to illustrate the kinds of impact and costs associated with ill-health on productivity. In particular, lifestyle risk factors and biometric factors negatively impact on a person's health, which then decreases productivity in the workforce. The studies examined in this literature review suggest that lifestyle and biometric risk factors contribute towards severe health conditions, such as cardiovascular disease and diabetes. By engaging in regular physical activity, limiting or ceasing smoking cigarettes, avoiding alcohol consumption, and making the necessary changes to improve BMI levels, a person's blood pressure, cholesterol and glucose levels may improve, and as such, their risk for NCDs decreases and their health improves. Healthier people are better workers because they are able to harder for longer periods, and are also able to think clearer than their unhealthier work colleagues (Weil, 2005). Approaches to health focus on the costs (on the affected individuals, organisations and societies) associated with ill health. In particular, costs of lost productivity are associated with missed days from work and increased health care as a result of lifestyle risk factors (Conrad, 1987; Weil, 2005; Schultz & Edington, 2007). Health risk factors are not only related to absenteeism, as they may also impact on lost productivity during work hours, errors or mistakes made on the job, or failure to produce a standard of work that is required from an employee (Mattke et al., 2007; Goetzel et al., 2004). Therefore, health issues of employees

are extended to include decreases in productivity due to absenteeism as well as decreased productivity during working hours (Schultz & Edington, 2007).

By testing the relationship between lifestyle risk factors, biometric factors and productivity in a South African organisation, it is hoped that insight into how employees manage their health will be shared. Further, it is hope that the findings of this study will support a business case to improve the health of employees in South African.

Chapter Two: Methods

Research Questions

The main aim of this study is to determine which lifestyle and biometric risk factors impact on the health of employees, and whether this impact influences workplace productivity loss. In doing so, I will be asking two questions:

1. What is the relationship between health risk factors and productivity in a South African workforce?
2. What is the relationship between biometric factors and productivity in a South African workforce?

Methodology

Sampling and sample

The data has been collected by a South African organisation that hosts, organises, and runs health day screening events. An external business employed the serves of this organisation to collect data on: work productivity and activity impairment, lifestyle risk factors, and biometric factors. The data was collected just over the time span of a year, from February 2014 to April 2015. The data collected consisted of 4402 participants in the database, with the majority of the participants being female. Participants were excluded from the study if they were missing more than two of the seven independent variables (i.e. physical inactivity, cigarette smoking, alcohol consumption, BMI, cholesterol, glucose and blood pressure), and if they did not complete the work productivity and activity impairment questionnaire. There were 3994 employees who did not conform to the inclusion criteria requirements, and were removed from the sample as a result. Therefore, the final sample for this study consisted of 409 employees. The participants in the sample are all from the same Johannesburg organisation, South Africa, and were all acquired through their interest in utilising the health screening service.

Research design

The research will be quantitative in nature. Quantitative research is a data based approach which provides numerical values on the independent and dependent variables of a study (Strangor, 2007). There are seven variables in the study: four lifestyle risk factors (cigarette smoking, physical inactivity, BMI, and alcohol consumption) and three biometric factors (blood pressure, cholesterol and glucose). These variables have not been manipulated in any way by the researcher. There was no random assignment of participants as there was no control or experimental group. Therefore, this reserach follows a cross-sectional, non-experimental, expost facto design (Huck, 2008). The design of the research is suitable as I am concerned with examining how the four lifestyle risk factors, and three biomentric risk factors, affect workplace producitivity.

Instruments

Data was collected on the day of all health screening events between February 2014 and April 2015. Employees were asked to fill out the Work Productivity and Activity Impairment Questionnaire: General Health V2:0 (WPAI: GH). The questionnaire refers specifically to how an individual's health status impacts on his/her productivity in the workplace. Health is viewed as any physical or emotional problem or symptom (Braakman-Jansen et al., 2012). The WPAI:GH was originally created as a self-reported quantitative assessment that aimed to determine workplace productivity loss through the effect that general health has on absenteeism, presenteeism and daily-activity impairment (Tang, Beaton, Boonen & Bombardier, 2011). There are six questions asked in the instrument. Each question asks the participants to base their answer within the time frame of the past seven days. These questions are: (Q1.) Are you currently employed (working for pay); (Q2.) How many hours did you miss from work because of your health problems; (Q3.) How many hours did you miss from work because of any other reason, such as vacation, holidays, time off to

participate in this study; (Q4.) How many hours did you actually work; (Q5.) How much did your health problems affect your productivity while you were working; (Q6.) How much did your health problems affect your ability to do your regular daily activities, other than work at a job? Scores were indicated on a rating scale ranging from 0 – 10, where 0 indicated no effect of health problems on work and 10 indicate full prevention of work due to ill-health (See Appendix A). Out of the six listed question, data was gathered on questions two, three, four and five.

This study was interested in obtaining information on workplace productivity loss. In order to get this information, the outcomes of each question had to first be calculated as percentages. Absenteeism, which was defined as the percentage of time absent from work due to ill health, was calculated from the formula: (Q2/(Q2+Q4)) *100. Higher absenteeism scores were indicated by higher percentages. Presenteeism was assessed as affected work productivity, and was calculated from the formula: Q5/10 *100. The percentage calculated was then assessed as the degree to which health problems affected work productivity. The higher percentages indicated greater impairment and less productivity at work. Work productivity loss was defined as the overall work impairment experienced by a person due to the effect of health on absenteeism and presenteeism. The values were calculated using the formula: [(absenteeism) + [(1-absenteesim) *(presenteeism)], *100. Higher percentage scores indicated greater work impairment and less productivity.

Caution is raised around the validity of the scale as there have only been a few studies that have established validity for diseases such as allergies, chronic hand dermatitis, IBS and Crohn's disease (Prasad, Wahlqvist, Shikiar, & Shih, 2004; Braakman-Jansen et al., 2012). Furthermore, there are concerns around the accurateness of the specificity surrounding the measurement of the WPAI, especially for the self-administrated version of the instrument (Hafner et al., 2015). For instance, this instrument does not attempt to examine the level of

cognitive or physical demands of work experienced by the person concerned. However, this concern is raised specifically for study's that intends to examine the impact on productivity for different tasks at work (Prasad *et al.* 2004), and as such is not a limitation to be concerned with for this study. Furthermore, Bays, Fox & Grandy (2014), stated that the WPAI:GH questionnaire has good validity and reliability scores, making this scale a useful and adequate measure of absenteeism and presenteeism. Therefore, the WPAI scale is appropriate for the use of this study.

The second questionnaire used in the health screening event required the participants to complete information regarding their biographic details. In this questionnaire, the participants were asked date of birth, gender, marital status, how the participant would describe their overall health status, whether the participant is a parent or primary caregiver to one or more children, and general interest and concerns (See Appendix B). The participants were then required to complete a questionnaire on their lifestyle habits, such smoking, alcohol consumption, movement and activity, nutrition and diet (See Appendix C). Biometric screening, which was taken by medically trained practitioners was conducted, in order to obtain systolic blood pressure, diastolic blood pressure, heart rate, total cholesterol, triglycerides, HDL, LDL, and blood sugar levels. Lastly, the participants' essential measurements were taken by medically trained practitioners. Measurements include height, weight, waist (cm), and hip (cm).

Procedure

Procedure will be explained in terms of the steps that I, as the researcher, followed when conducting this research. Firstly, I applied for ethical clearance with the human research ethics non-medical committee. Once ethical clearance was obtained, I contacted the organisation that hosted the health screening events and requested access to the data obtained from the external company. The data was obtained from a health screening day, and as a

result, it served as a baseline for understanding the current health risks that the employees at the external organisation were experiencing. Further investigation was required into the specific barriers that were faced when promoting health and productivity in the workplace. The hosting company extracted the data of relevance for this study from their dataset, and provided me with an anonymised data sub-set. Therefore, all identifying information in the data set was removed. There was no possible way that either myself, or my supervisor, would be able to identify who the participants were. In this way the information received by the participants will remain confidential, and the participants themselves will remain entirely anonymous throughout the research process.

Data analysis

As this research aimed to investigate whether or not there is a relationship between health risks factors and biometric factors on employee work productiving, the data was analysed using multiple regression. Multiple regressions were performed on the data using a statistical analysis software called SPSS version 23. Multiple regression allowed for the relationships between variables to be explored in detail (Strangor, 2005). Before conducting the statistical test, the data was cleaned through statistical screening measures. The statistical screening measures were to make sure that there were no errors in the data set, and that participants with too many missing variables were deleted from the sample. Once completed, the sample was tested for a list of assumptions required to perform multiple regression analysis. This included testing for adequate sample size, multicollinearity and singularity, normally distributed residuals, independent variables (independent variables) have a variance of zero, homoscedasticity, independence of errors/autocorrection, linearity, and outliers and influential cases. All assumptions were met, meaning that the data was suitable for a multiple regression analysis. The multiple regression model was then evaluated. The significance of

the actual model was determined, followed by an assessment into which independent variables significantly predicted workplace productivity loss.

Ethical considerations

According to the guidelines of the University of the Witwatersrand, to any laws and/or legal frameworks that may apply, and to norms and expectations of my discipline, I recognised that it is my responsibility to conduct research in an ethical manner. Firstly, I submitted an ethics application form to the Human Research Ethics Non-Medical Committee (HREC Non-Medical). Then, I received an extract from a data, which was cleared from all identifying information. Therefore, the participants remained completely anonymous to me and my supervisor, and their details remained confidential throughout the entire process. Ethical procedures were followed in the collection of the data by the organisation that initially collected the data. While completing the health questionnaires, participants were told that they had the right to not answer any question that they may have felt uncomfortable answering and that by refusing to answer, they would have experience no harm in any way. Further, contact details were provided by company providing the health screening services to the participants should the participants have had queries or concerns.

Chapter Three: Results

Introduction

The results in the current study were based on a sample of 409 (M_{age} = 41.86, *SD* = 9.3) employees from an organisation in the financial service sector. The participants in the sample were all from the same organisation based in Johannesburg, South Africa, and were all acquired through their interest in utilising health screening service offered to them. On the days that participants attended health screening events, data was collected on their lifestyle factors (alcohol consumption, physical inactivity, smoking, and BMI), biometric factors (blood pressure, cholesterol and glucose levels), and work productivity and activity impairment. A standard multiple regression analysis was conducted on the data to determine the factors that predicted lifestyle risk and biometric risk on workplace productivity loss. This chapter describes the results of this analysis.

Screening and Cleaning the Data

The sample consisted of 409 employees. The data was collected over a 14-month period, from February 2014 to April 2015. The initial number of participants in the sample was 4403 employees. Before any form of statistical analysis was conducted, the data was cleaned through statistical screening measures. The statistical screening measures were to make sure that there were no errors in the data set, and that participants with too many missing variables were deleted from the sample. Participants were excluded from the study if they were missing information on more than two of the seven independent variables, and if they did not complete the work productivity and activity impairment questionnaire. There were 3994 employees who did not conform to the requirements of the inclusion criteria, and as such, were removed from the sample. Therefore, the final sample for this study consisted of 409 employees.

Demographic Information for Sample

Demographic information obtained from the sample is presented in Table 1 and Table 2. The age of the respondents ranged from 17 to 65 years of age (M_{age} = 41.86, *SD* = 9.3). In terms of gender, the majority of the population was female, (*n* = 286; 69.93%). There were (*n* = 123; 30.75%) men in the study. In terms of marital status, 272 participants were married (*n* = 272; 66, 5%), 22 participants were divorced (*n* = 22; 5,38%), four recorded a defacto status (*n* = 4*;* 0.98%), which is when couples live together but are not married, 102 participants were single (*n* = 102; 24.94%), and nine participants were widowed (*n* = 9; 2.2%). Two-hundred-and-ninety-one participants recorded having children (*n* = 291; 71.32%), while 117 participants had no children (*n* = 117; 28.68%). No demographic information was gathered on participant's race, or on their home languages spoken.

Table 1
Age descriptives of the sample

Variable	M	SD	Range
Age	41.86	9.437	17-65

Table 2
Demographic information for sample

Variable	Frequency (n)	Percentage (%)
Gender		
Female	286	69.93
Male	123	30.07
Marital Status		
Married	272	66.50
Divorced	22	5.38
Defacto	4	0.98
Single	102	24.94
Widowed	9	2.2
Children		
Yes	291	71.15
No	117	28.61

The number of observations for each independent variable selected for the regression model is presented in Table 3. Not all predictive variables were answered by all participants. As result, some variables had more responses than others. Out of the total sample of 409 participants, smoking had the most amount of responses (n = 409; 100%), followed by blood pressure (n = 408; 99.76%), BMI (n = 404; 98.78%), physical inactivity (n = 386; 94.38%), cholesterol (n = 374; 91.44%), alcohol consumption (n = 239; 58.44%), and the variable that saw the least observations was glucose (n = 223; 54.5%).

Table 3
Number of responses given to each IV

	Physical Inactivity	Cigarette Smoking	Alcohol Consumption	BMI	Blood Pressure	Cholesterol	Glucose
Valid	386	409	239	404	408	374	223
Valid %	94.4	100	58.4	98.8	99.8	91.4	54.5
Missing	23	0	170	5	1	35	186
Missing %	5.6	0	41.6	1.2	0.2	8.6	45.5

Note. BMI = Body mass index.

The data that was collected for each of the independent variables was coded as either in healthy range or out of healthy range. Physical inactivity scores were regarded as healthy if participants reported weekly moderated and active exercise habits, and out of healthy range if they reported weekly sedentary and occasional exercise habits (The World Health Organisationa, 2015). Participants who smoked between zero and two cigarettes per day were regarded within the healthy range, while participants who smoked more than two cigarettes per day were regarded as out of the unhealthy range (Bradshaw et al., 2003). The consumption of more than four standard alcoholic drinks per occasion of drinking, and more than two standard alcoholic drinks per day were considered out of healthy range, while less than four standard alcoholic drinks per occasion of drinking, and less than two standard alcoholic drinks per day were considered within the healthy range. (Bouchery et al., 2011).

Participants who scored BMI values less than 18.5, and more than 25 were considered out of healthy range, while those who were within healthy range scored a BMI between 18.5 and 25 (Bassuk & Manson, 2008). Low blood pressure scores (90/60 mmHg) and high blood pressure scores (140+/90+ mmHg) were considered out of healthy range, while normal blood pressure scores (120-140/80-90 mmHg) were considered within healthy (Goetzel et al., 2009). Cholesterol scores below 5mmol/L were coded as within healthy range, while scores above 5mmol/L were coded as out of healthy range (Goetzel et al., 2009). Lastly, glucose scores below 11 were considered within healthy range while scores above 11 were considered out of the healthy range (Molla, 2015).

Alcohol consumption was the lifestyle factor that the participants were the most aware of as (n = 222; 92.9%) reported to be within the healthy range. Cigarette smoking was the second healthiest lifestyle factor as (n = 350; 85.6%) reported to be within the healthy range. The two lifestyle factors at least risk were then followed by physical inactivity (n = 154; 39.9%) and BMI (n = 122; 30.2%). The majority of the participants had healthy glucose levels (99.1%), healthy blood pressure readings (n = 337; 82.6%), as well as healthy cholesterol levels (n = 23; 63.1%; Table 4). The significance of each result will be discussed in greater detail in the Discussion chapter.

Table 4
Healthy vs. unhealthy levels of the independent variables

	Physical Inactivity	Cigarette Smoking	Alcohol Consumption	BMI	Blood Pressure	Cholesterol	Glucose
Healthy	154	350	222	122	337	236	221
Healthy %	39.9	85.6	92.9	30.2	82.6	63.1	99.1
Unhealthy	232	59	17	282	71	138	2
Unhealthy %	60.1	14.4	7.1	69.8	17.4	36.9	.9

Note. BMI = Body mass index.

Of the 223 participants who had their glucose levels tested on the health screening day, only two participants reported having unhealthy levels of glucose. The small comparison between healthy versus unhealthy glucose levels meant that there was not enough data to determine whether unhealthy glucose levels predicted workplace productivity loss. As such, glucose was not included in the final statistical model.

Three hundred and eight six participants were asked to rate their current physical activity as either sedentary (<1hour/week), occasional (1-2hrs/week), moderately active (2-5hrs/week), and very active (5+ hrs/week). As mentioned, participants who rated their physical activity as either sedentary or occasional were classified as out of the healthy range for physical activity, while participants who rated their physical activity as either moderately active or very active were classified within the healthy range of physical activity (The World Health Organisationa, 2015). In total, (n = 232; 60%) participants rated their physical activity as out of healthy range, while the remainder (n = 154; 40%) participants classified their physical activity as healthy (Figure 1). Therefore, the majority of participants reported low physically active levels.

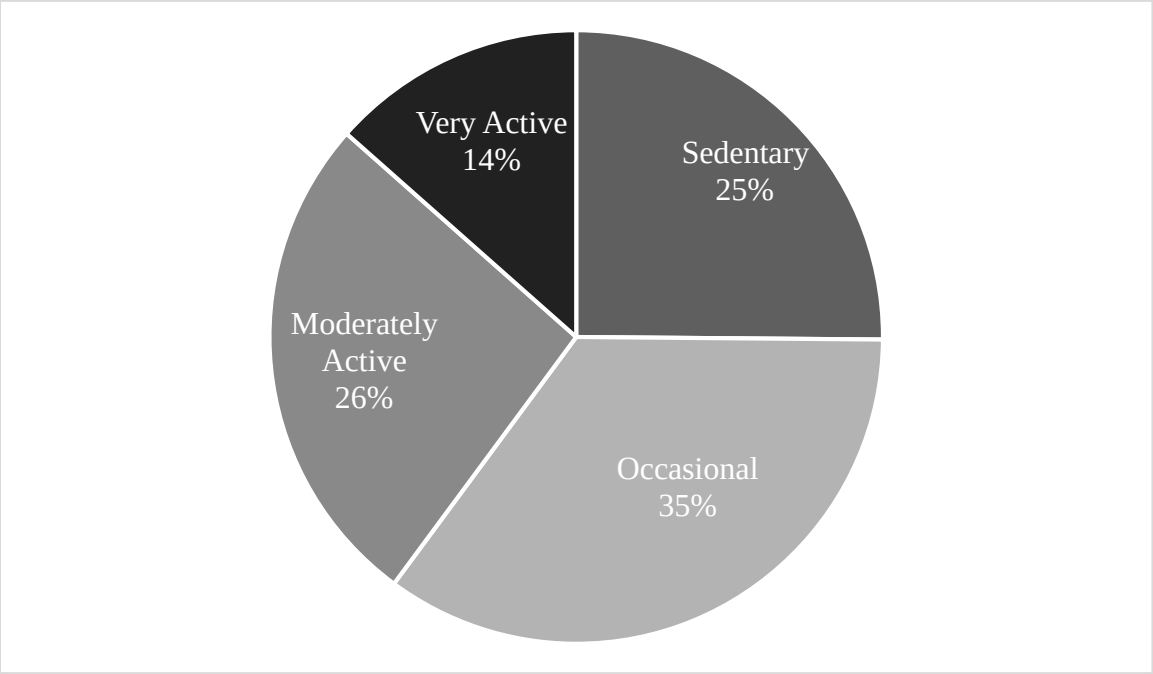

Figure 1. Current physical activity levels reported by participants

Figure 2 provides a visual illustration of the smoking trends reported by the participants. All 409 participants in the sample reported on their cigarette smoking habits. The majority of participants (*n* = 365; 89.3%) reported within the healthy range of cigarette smoking. Participants that were non-smokers (*n* = 315; 77%), previous smokers (*n* = 35; 8.6%), and smoked less than two cigarettes per day (*n* = 15; 3.7%) were included in the healthy range of cigarette smoking. The remainder (*n* = 44; 10.7%) of participants reported out of healthy range levels of smoking. These participants recorded cigarette smoking habits between two and 10 cigarettes per day (*n* = 30; 7.3%), 10 and 20 cigarettes per day (*n* = 10; 2.4%), and 20 and 30 cigarettes per day (*n* = 4; 1%). There were no participants that recorded smoking more than 20 cigarettes per day.

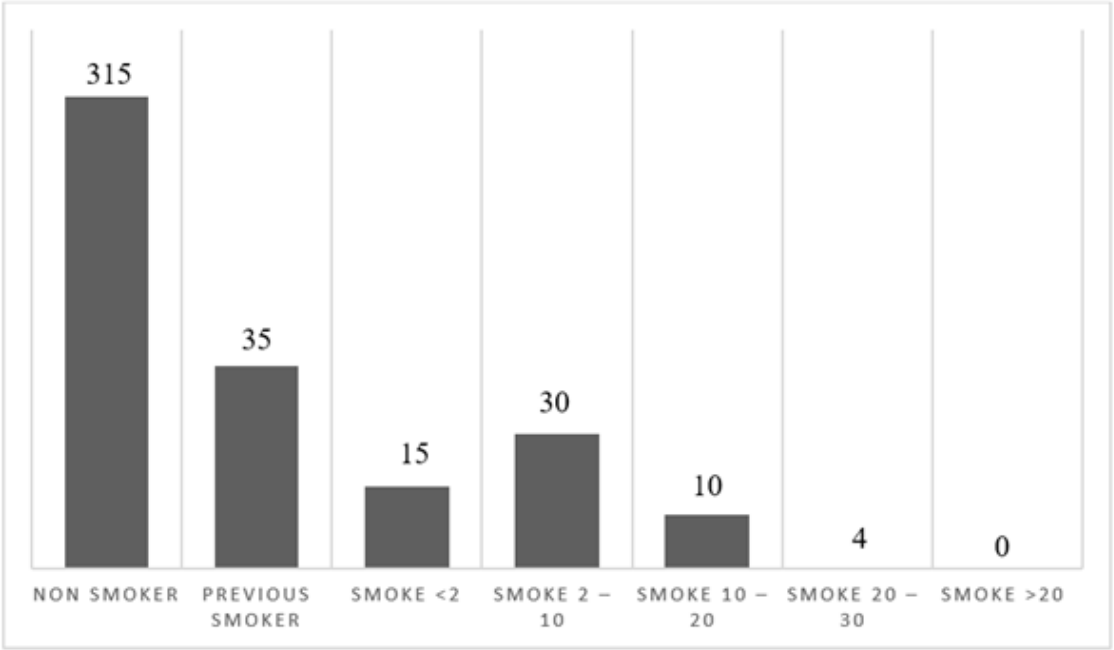

Figure 2: Cigarette smoking habits reported by participants.

Participants were asked two questions regarding their alcohol consumption. The first question was on the amount of days that participants consume alcohol in an average week. The majority of participants reported that they did not consume any amounts of alcohol in the week (n = 135; 56.5%). Out of the participants who did consume alcohol in the week, the majority reported they drank alcohol one day out of the week (n = 59; 24.7%), while the least amount of participants drank alcohol five days out of the (n= 3; 3.3%) (Figure 3). Therefore, the sample reported in healthy range amounts of alcohol consumption habits as there were no recordings of alcohol consumed every day of the week, and the majority of the participants drank alcohol two days out of the week.

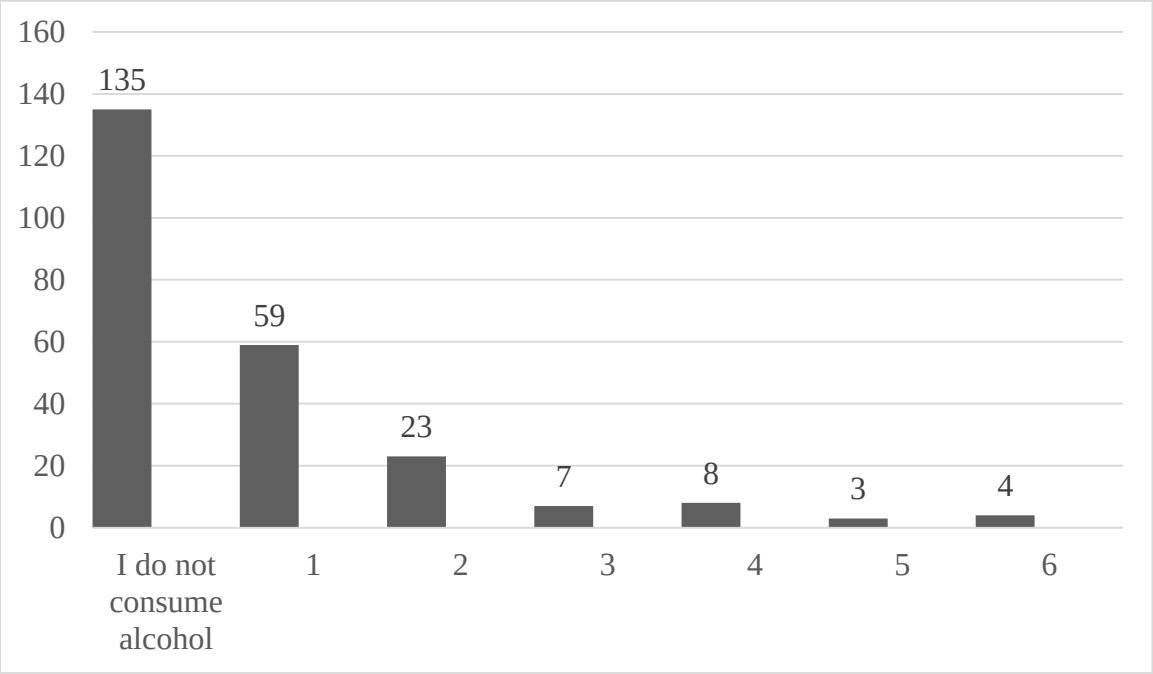

Figure 3: Reported amount of days' participants consume alcohol in an average week.

The second question participants were asked to report on was the average amount of standard alcoholic beverages consumed during drinking occasions. The average alcohol consumption was two standard alcoholic beverages (n = 72; 72%), followed by three standard alcoholic beverages (n = 50; 20.9%). These two findings were considered in the range of healthy alcoholic consumption (Bouchery et al., 2011). Participants that recorded consuming four (n = 9; 3.8%), and five (n = 8; 3.3%) standard alcoholic beverages were considered out of the healthy range for alcoholic consumption.

Preliminary Analysis

A preliminary analysis of the data was conducted to explore the nature of the variables within this study. It was necessary to determine the appropriateness of the multiple regression as a statistical technique used for this study as it is a parametric technique and requires the data to be normally distributed. There are eight assumptions requirements of data for a regression to be run. These assumptions are: sample size, multicollinearity and

singularity, normally distributed residuals, independent variables with a variance of zero, homoscedasticity, independence of errors/autocorrection, linearity, and outliers and influential cases (Pallant, 2010). If the eight assumptions are not met then the results generated from the multiple regression analysis may not be completely valid, and as such will hold less scientific value. Each of these assumptions will be elaborated on in relation to the distribution of the present study:

Sample size.

Multiple regression is a statistical procedure that is highly sensitive to small sample sizes, particularly when the distribution of scores is skewed (Pallant, 2010). The smaller the sample size, the less value in the interpretation of the results of the model. There are numerous ways to determine if the sample size of the study is appropriate for multiple regression. For instance, the sample size is adequate if the total number exceeds the sum of fifteen participants per independent variable (Stevens, 1996). In this study, there were seven independent variables, meaning the recommended sample size is 105 participants. The sample consisted of 409 participants, and as such, it was large enough for a multiple regression to be conducted.

Multicollinearity and singularity

Multicollinearity and singularity refer to the relationship among the independent variables. It is not possible to run a multiple regression when the independent variables are highly correlated (Pallant, 2010). Singularity occurs when one independent variable is a combination of other independent variables (Field, 2009). The appearance of multicollinearity and singularity in a dataset will significantly decrease the value of the regression model.

Correlations are performed to measure the strength and relationship between the independent variables in this study. Although the data was proven to meet the requirements

of normality, Spearman's correlation coefficients were calculated, instead of a Pearsons correlation, due to the presence of dummy variables. Dummy variables were created to represent a feature of more than one distinct level, i.e. in healthy range versus out of healthy range (Fields, 2009). Before conducting a Spearman's correlation, there are two assumptions that need to be met. The first assumption is that the variables need to be ordinal, interval or ratio scale. The variables in the study are at least ordinal, meaning the first assumption is met. The second assumption is that variables need to have a monotonic relationship, i.e. both variables either increase or decrease together, or as one variable increases the other variable decreases (Field, 2009).

The results generated from a Spearman's correlation are presented as numbers between negative one (-1.0) and positive one (+1.0). The closer the values are to either -1.0 or +1.0, the stronger the relationship is (Stangor, 2011). If values are negative (-), it means that as one variable increases, the other variables decreases (and vice versa). Values that are positive (+) mean that as one variable increases, the other increases. A correlation coefficient value of 0 designates no relationship between the two variables of interest (Pallant, 2010).

There were significant relationships between physical inactivity and BMI ($r = .195$, $p \leq .01$), physical inactivity and blood pressure ($r = .126$, $p \leq .05$) and physical inactivity and cholesterol ($r = .146$, $p \leq .01$). Therefore, physical inactivity significant influences BMI, blood pressure and cholesterol. The relationship between cigarette smoking and alcohol consumption ($r = .258$, $p \leq .01$) were significant, as well as the relationship between blood pressure and alcohol consumption ($r = .241$, $p \leq .01$) and blood pressure and BMI ($r = .188$, $p \leq .01$; Table 5). The relationships between the significant variables were all weak, which indicates that the risk of multicollinearity in the data is low. As such, the data supports a regression analysis. The significance of each of these relationship findings will be explored in the Discussion session.

Table 5
Correlations between all six independent variables in the current study

	1	2	3	4	5
1. Physical Inactivity	-				
2. Cigarette Smoking	.041	-			
3. Alcohol Consumption	.001	.258**	-		
4. BMI	.195**	.039	.007	-	
5. Blood Pressure	.126*	.032	.241**	.188**	-
6. Cholesterol	.146**	.028	.062	.085	-.045

Note. * = $p \leq .05$, ** = $p \leq .01$. BMI = Body mass index.

A second measure for testing possible multicollinearity in the data is an assessment of tolerance and variance inflation factors (VIF) values. Tolerance values are used to indicate the amount of variance that a specific variable has which is not explained by the other independent variables. Small tolerance values (less than .10), indicate high correlation with other variables, and suggests possible multicollinearity. VIF values are the inverse of tolerance values. As such, high VIF vales (above 10), indicate warmings for multicollinearity (Pallant, 2010). Refer to Table 6 for the tolerance and VIF values for each independent variable in this study. The tolerance values for all the independent variables are below .10, and the VIF values of all variables are below the cut-off point of 10. Therefore, there is enough evidence to suggest the independent variables of this study are not highly correlated. The assumption of multicollinearity and singularity is therefore confirmed, and there is further reason to assert that multiple regression is a suitable technique to use for the analysis of the data.

Table 6
Collinearity statistics of Tolerance values and variation inflation factors by independent variables

	Tolerance	VIF
Physical Inactivity	.952	1.051

Cigarette Smoking	.945	1.058
Alcohol Consumption	.861	1.162
BMI	.938	1.066
Blood Pressure	.873	1.145
Cholesterol	.971	1.030

Note. BMI = body mass index. VIF = variance inflation factor.

Normally Distributed Residuals

The assumption of normality deals with aspects of the distribution of scores, and the nature of the underlying relationship between the variables. Residuals are the difference between the observed/obtained values and the dependent/predicted variable. In a linear regression analysis, it is assumed that the distribution of residuals is normal at every level of the DV, and is constant in variance across levels of the DV (Pallant, 2010). It is generally the case that if the data is normally distributed, then the residuals are normally distributed around each predicted DV score. Normally distributed scores are not important in regression, however, normally distributed residuals are important. Studentised residuals were inspected when assessing normality as they are documented by research to be more precise than standardised residuals (Field, 2009; see Figure 1).

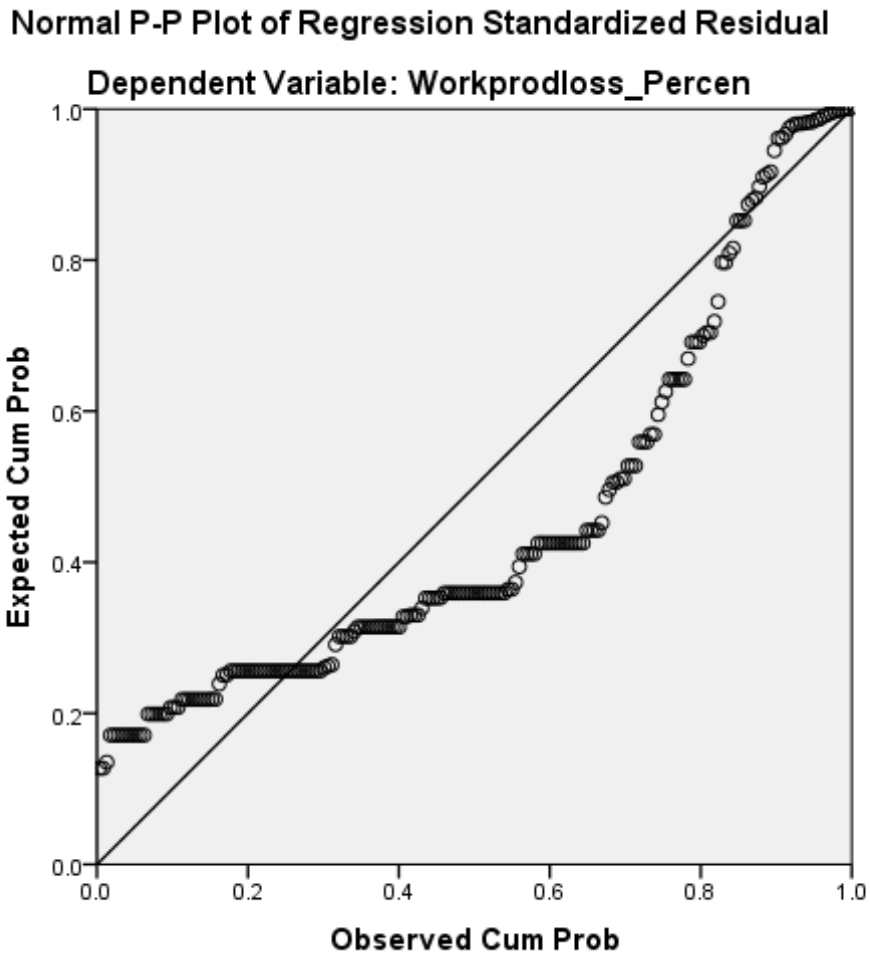

Figure 4. P-P Plot on workplace productivity loss, lifestyle risk factors and biometric risk factors.

The P-P plot shows the residuals are not completely normally distributed because not all the data points are on the straight line. For the reason that the P-P plot did not illustrate normally distributed residuals, it is necessary to further inspect the standardised residual values. If 5% of the sample has an absolute standardised residual with an absolute value greater than or equal to 2 (≥ 2), then the assumption of normally distributed residuals is met (Fields, 2009). The total sample size is 409, and therefore 5% of 409 is 20.45. There are 17 variables with absolute residuals ≥ 2. Therefore, the assumption of normally distributed residuals is met.

Independent Variables Have a Variance of Zero

in order for this assumption to be met, the variance for each independent variable must not be zero. Table 7 indicates the variance for each independent variable. None of the independent variables have a variance of zero: physical inactivity (.240), cigarette smoking (.124), alcohol consumption (.066), BMI (.211), blood pressure (.144), and cholesterol (.233). Therefore, the assumption is met.

Table 7
Descriptive Statistics: Variance of IVs

	Variance
Physical Inactivity	.240
Cigarette Smoking	.124
Alcohol Consumption	.066
BMI	.211
Blood Pressure	.144
Cholesterol	.233

Note. BMI = body mass index.

Homoscedasticity

The next assumption of concern is homoscedasticity, which states that the variance of the residual term should be constant at each level of the dependent variable. In other words, when assessing for homoscedasticity, there needs to be the same variance across the independent variables. Refer to Figure 2 which shows the scatter plot for the studentised residuals and standardised predicted value (workplace productivity loss).

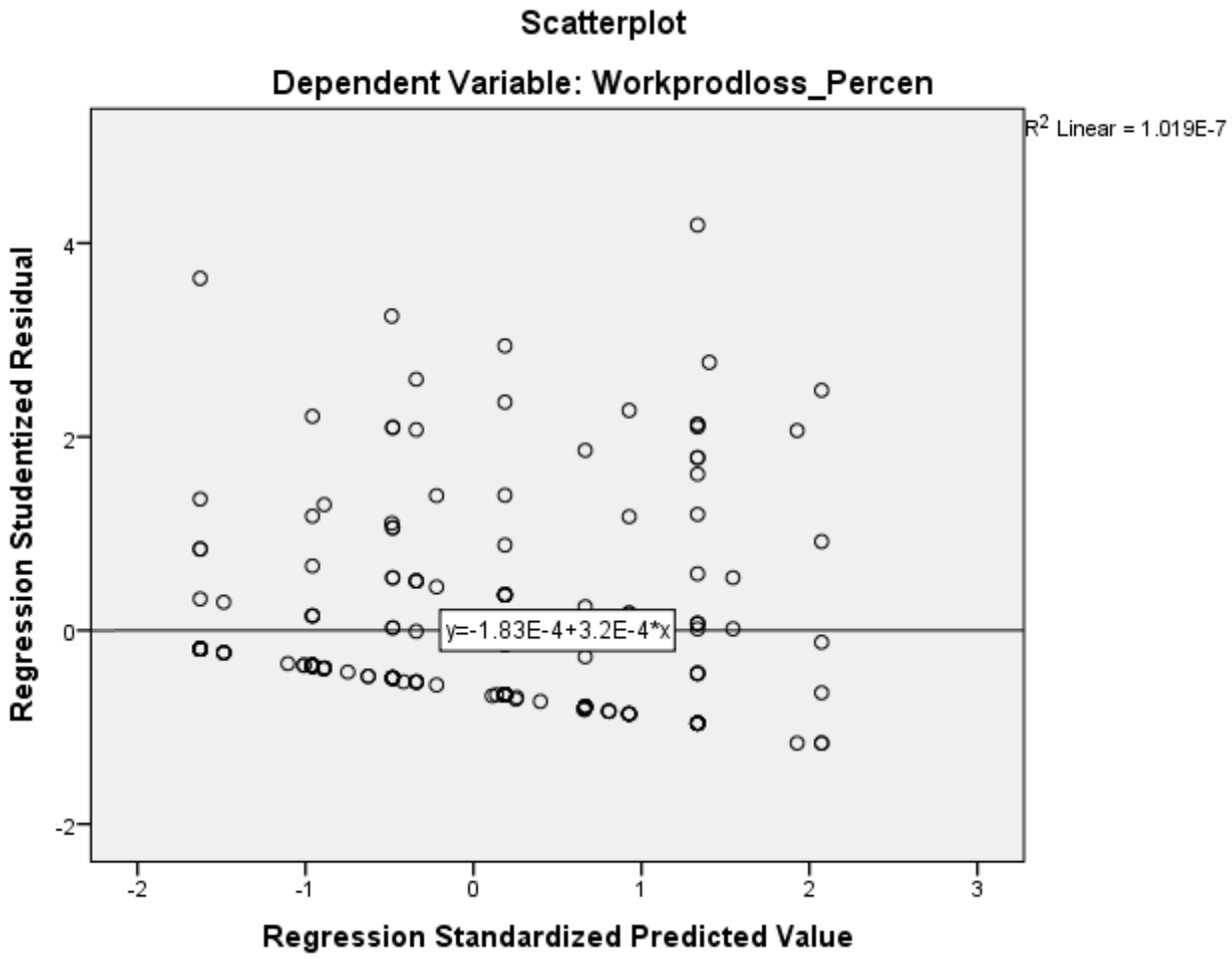

Figure 5. Scatterplot of regression standardised predicted value and regression studentized residuals.

Homoscedasticity is determined by the shape that the data points create in the scatterplot. The shape on the scatterplot illustrates a rough rectangular shape, indicating that the assumption of homoscedasticity is met. Shapes that are instead curvilinear or funnel type are indicators of heteroscedasticity (Pallant, 2010).

Independence of errors/autocorrection

This assumption states that for any two observations the residual terms should be uncorrelated. This is also sometimes referred to as autocorrelation. This assumption is tested with the Durbin- Watson test (Sangi, Win, Shirvani, Namazi-Rad & Shukla, 2015). This test

produces output ranging from zero to four, with a value of two indicating uncorrelated residuals, values greater than two have a negative correlation and values less than two a positive correlation. The values should be between one and three. The Durbin-Watson value for this study is 1.833. This means that the residuals are mostly uncorrelated, and as such, the assumption of independence of errors has been met.

Linearity

In order to run a multiple regression analysis on a dataset, the relationship between the dependent variable and the independent variables must be linear. To test linearity is to determine if the residuals have a straight line relationship with the dependent variable scores. Field, (2009) notes that if the relationship between the dependent variable and each independent variable is not linear, the results from the multiple regression will become spurious. To test linearity, visual interpretation of partial regression plots is appropriate (see Figures 3 to 8).

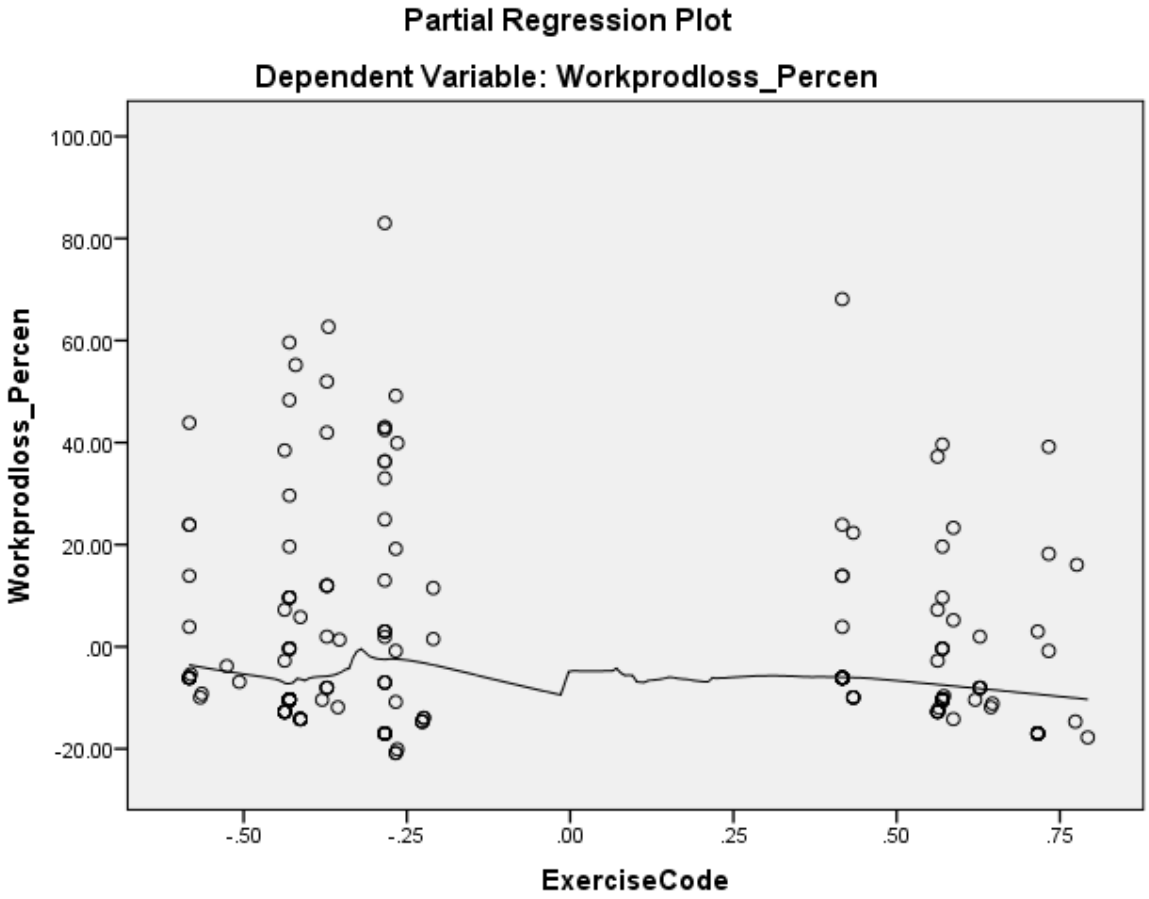

Figure 6. Partial regression plot on workplace productivity loss and physical inactivity.

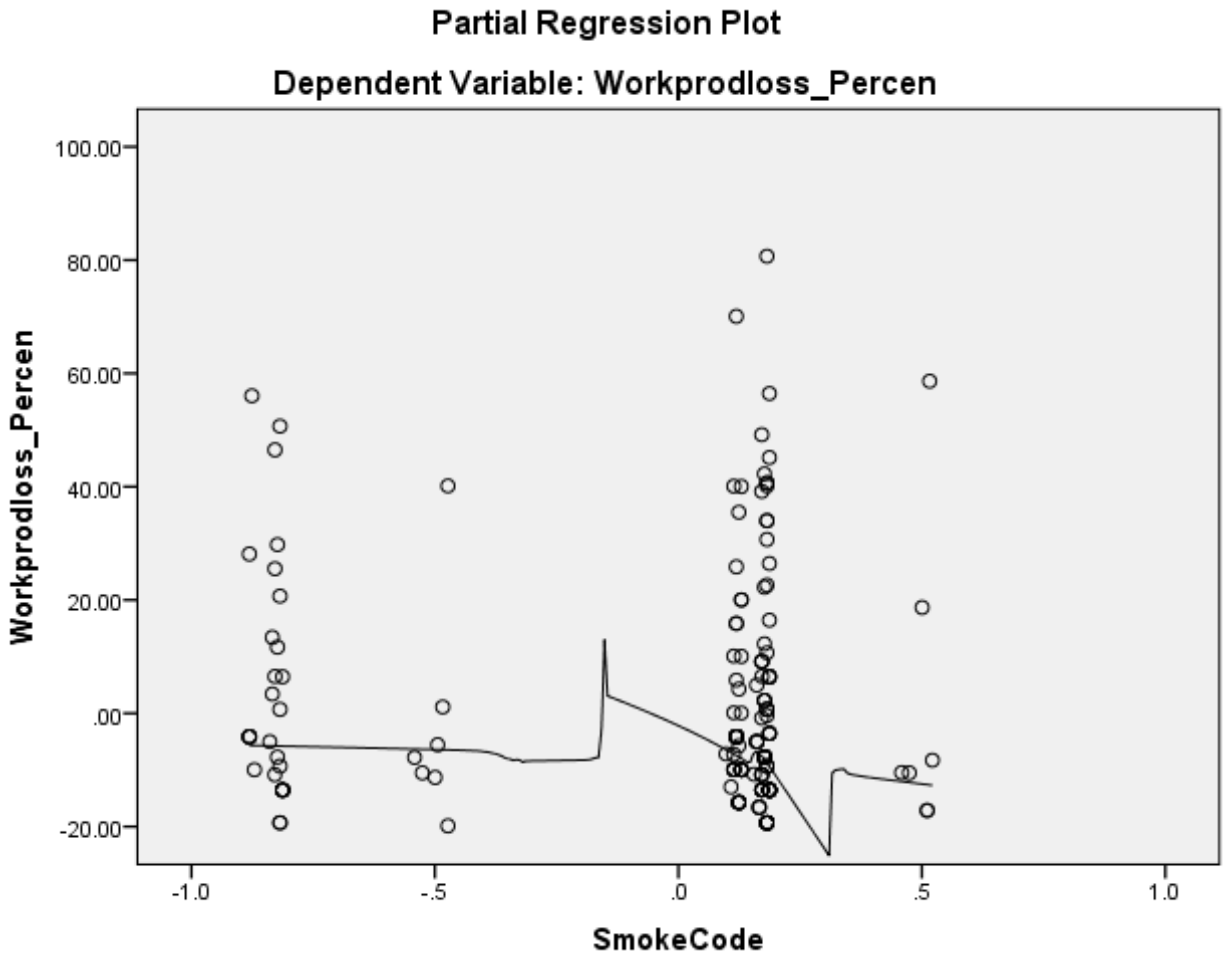

Figure 7. Partial regression plot on workplace productivity loss and cigarette smoking.

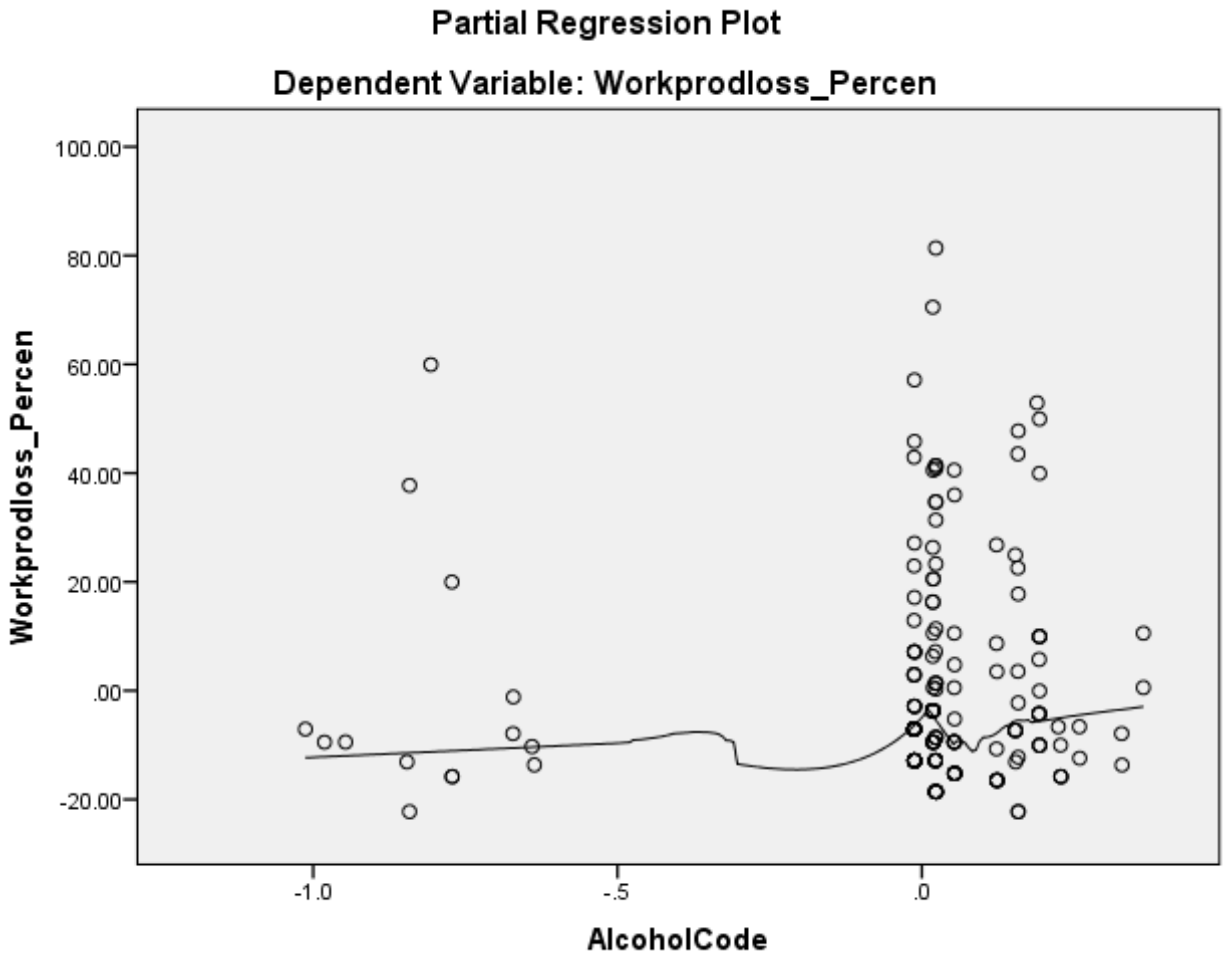

Figure 8. Partial regression plot on workplace productivity loss and alcohol consumption.

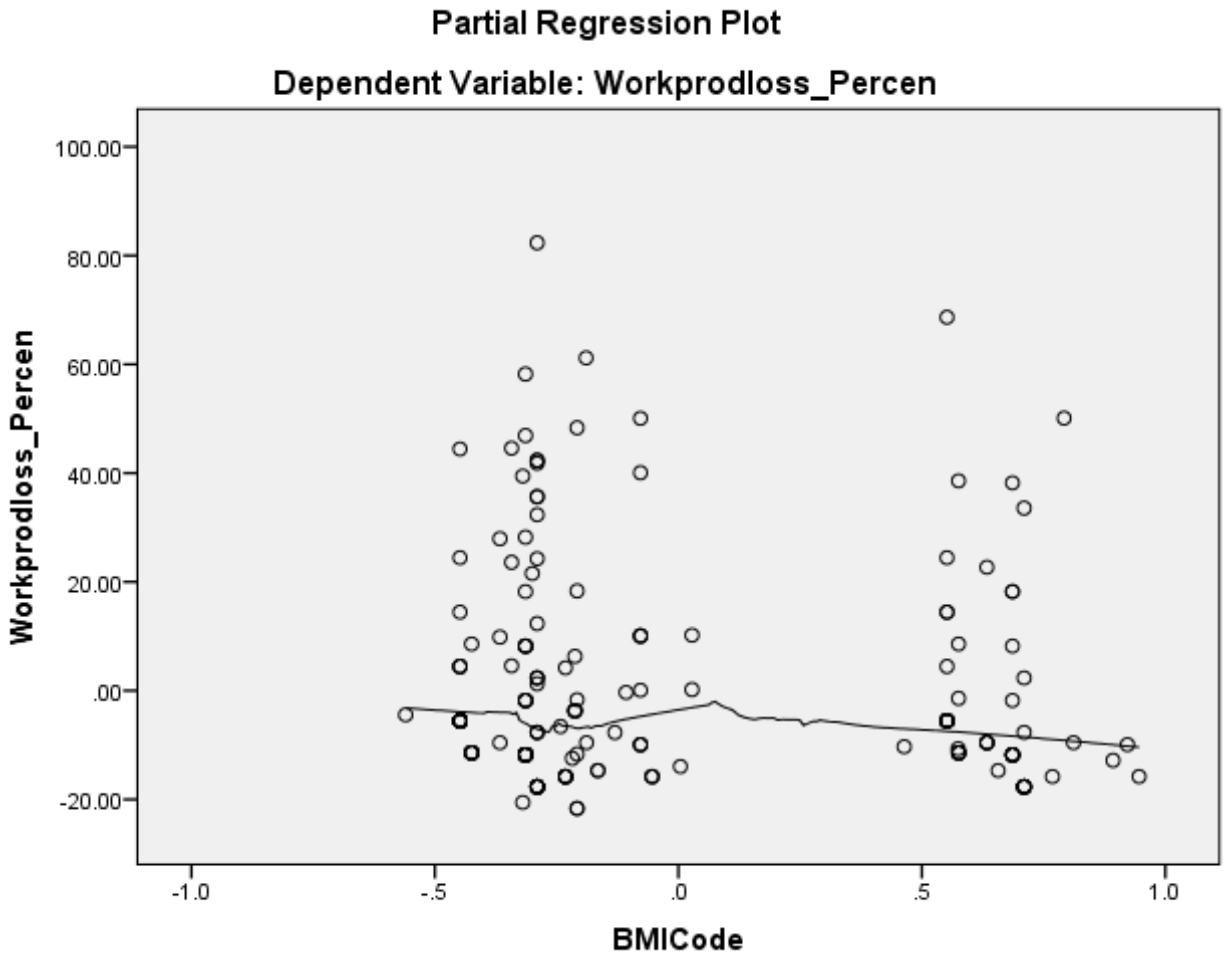

Figure 9. Partial regression plot –workplace productivity loss and BMI.

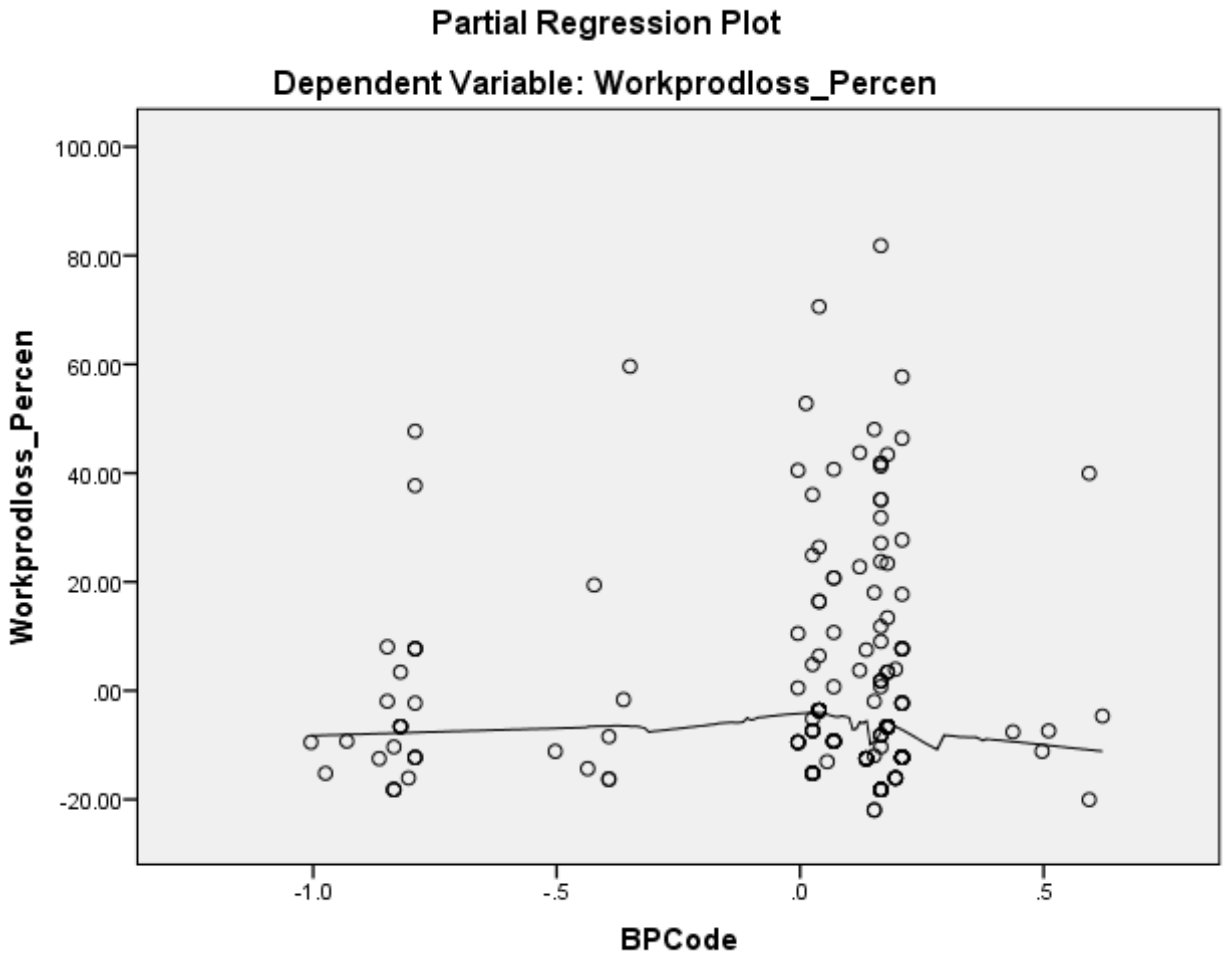

Figure 10. Partial regression plot – workplace productivity loss and blood pressure.

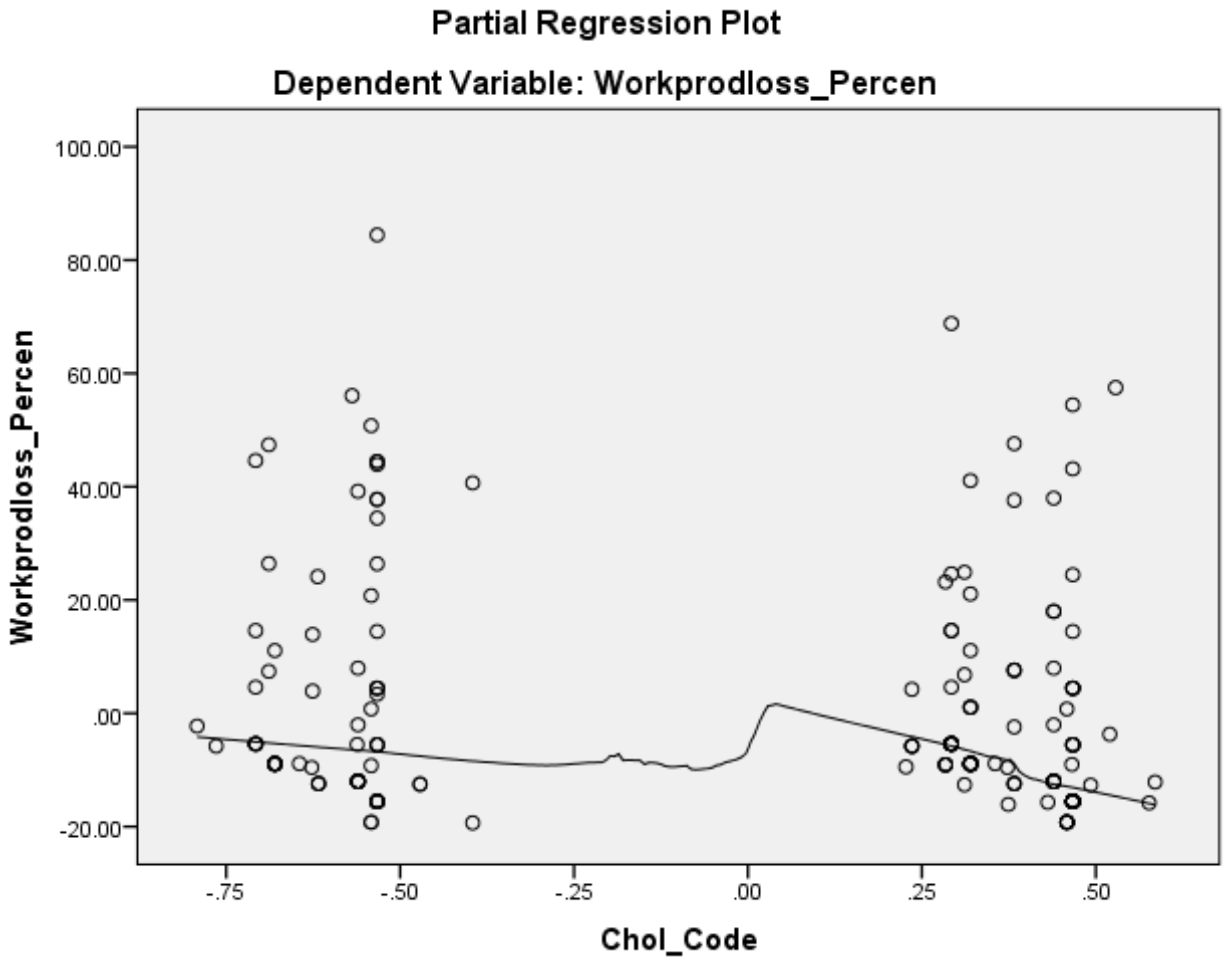

Figure 11. Partial regression plot – workplace productivity loss and cholesterol.

A perfectly linear relationship between variables is indicated by a perfectly straight locally weighted smoothing (loess) line. Loess is a powerful but simple strategy for fitting smooth curves to empirical data (Jacoby, 2000). This allows for visual interpretation of trends in the data. The concern for this assumption is a curvilinear relationship, which is indicated through quadratic lines. For the most part, all six relationships between each of the independent variables and the DV can be treated as linear because there is no presence of quadratic lines. Thus, it can be concluded that the relationships between each of the independent variables and the dependent variable are mostly linear, therefore meeting the assumption of linearity. The last two assumptions that will be assessed before conducting the multiple regression is the assumption of outliers and influential cases.

Outliers and influential cases

Outliers are defined as specific data points that greatly differ from the overall pattern of data (Field, 2009). For example, scores that are very high, or very low, compared to the rest of the data, are outliers. Multiple regression techniques are very sensitive to outliers, both in the independent and dependent variables, because they affect the values of the estimated regression coefficients. Checking for outliers is usually done through graphical representation of the data, and is usually conducted as part of the initial screening and cleaning phase.

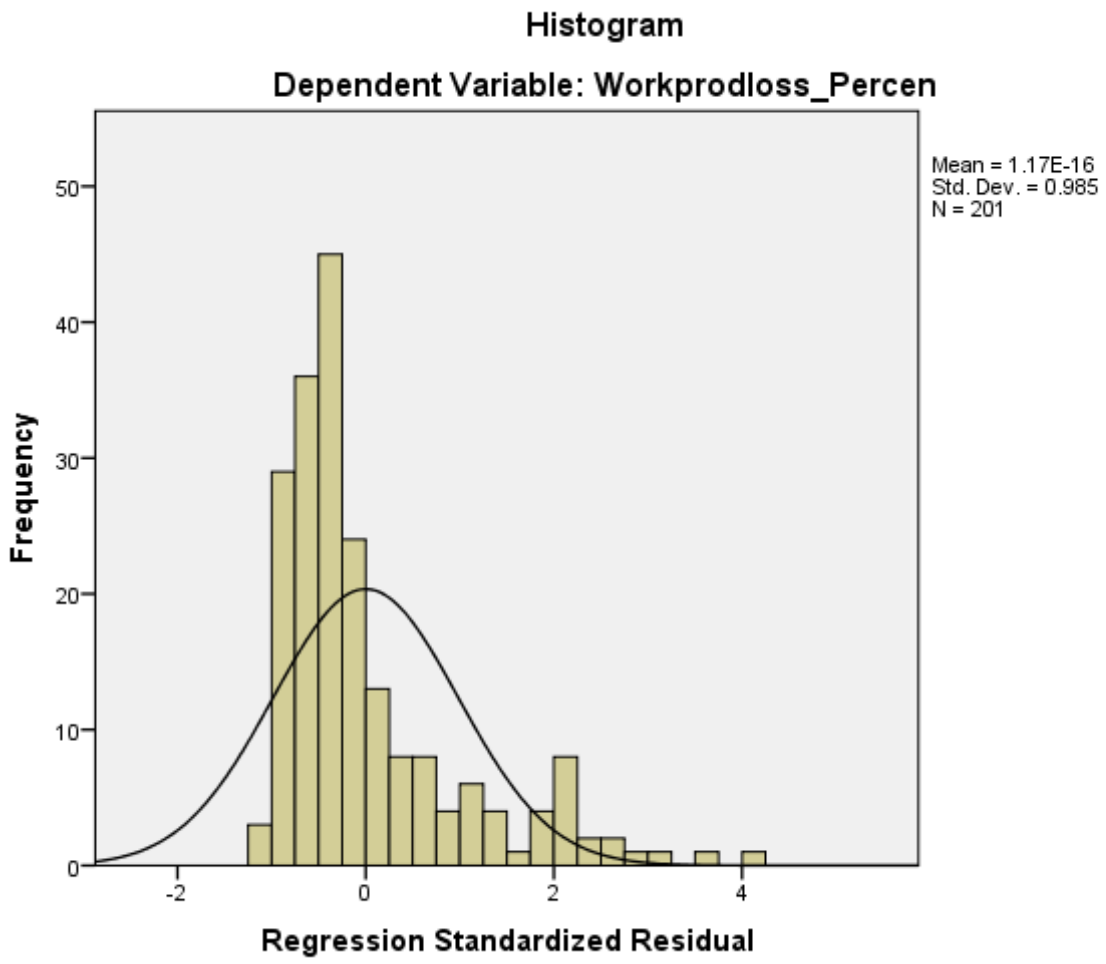

Figure 12. . Histogram – workplace productivity loss, lifestyle risk factors and biometric risk factors.

Assessing the histogram and the standardised residual plot of the data can be used to determine the threat of any potential outliers in the dataset. Potential outliers will appear as data points sitting away from the majority of the data. The histogram can be considered normal if the scores move away from one another in a reasonably even slope. The histogram shows two data points sitting to the right of the majority of the data (Figure 12). The outliers do not appear to be a problem as they are not extreme points and the scores move away from the majority in a reasonably even slope. As such, the histogram of residuals generated by the dataset demonstrates relatively normally distributed data, with very little concern for outliers.

The last assumption to be investigated is that of influential cases. Influential cases are classified as more than one type of unusual points in the dataset (Fields, 2009) that have the potential to negatively affect the regression model used to predict the value of the dependent variable based on the independent variables. Not only will influential cases change the output values, they also have the potential to reduce the predicted accuracy and significance of the model's results (Pallant, 2010). Cook' distance (Cooks D) values are used to determine influential cases in the data. Cooks D considers the influence of a single variable on the model as a whole. Any value that is greater than 1 (>1), is considered problematic. The smallest Cooks D value in the dataset was 0, while the largest value was .16. Therefore, there are no problematic Cooks D values in the dataset.

The results of the all the assumptions made were promising. Assumption requirements were met for sample size, multicollinearity and singularity, normally distributed residuals, independent variables with a variance of zero, homoscedasticity, independence of errors/autocorrection, linearity, and outliers and influential cases. Therefore, multiple regression is an appropriate statistical procedure for the given dataset.

Evaluating the Multiple Regression Model

Given that all multiple regression assumptions were met; the statistical procedure was conducted on the data using IBM SPSS version 23. As mentioned, multiple regression analysis explores the relationship between one dependent variable, and a number of independent variables. Although multiple regression is based on correlation, which describes the strength and direction of the linear relationship between two variables, it generates more results on the interrelationships among variables (Pallant, 2010). The advantages of this is that the technique is more appropriate for research that is not laboratory based. For this study, multiple regression was used to develop a model for predicting workplace productivity loss from lifestyle and biometric risk factors. Table 8 shows the results from the multiple regression for the overall regression model. The *F* ratio assesses whether the overall regression model is a good fit for the data. The model suggests that at least one independent variable statistically significantly predicts workplace productivity loss (F (6, 194) = 2.203, $p \leq .005$).

Table 8.
ANOVA

	Sum of Squares	df	Mean Squares	*F*	*p*
Regression	5088.077	6	848.013	2.203	0.044
Residual	74675.126	194	384.923		
Total	79763.203	200			

The basic model summary statistics are shown in Table 9. R squared (R^2), statistically measures how close the data falls in relation to the fitted regression line (Field, 2009). The value of R^2 will be between 0 and 100%, where 0% indicates that the model explains none of the variability of the response data around its mean, and 100% indicates that the model explains all the variability of the response data around its mean. It is generally assumed that

higher values of R^2 predict better fits between the model and the overall data. For this regression model, the R^2 value is .064. This indicates that the linear combination of the six independent variables can be explained by 6.4% of work productivity loss. Alternatively, it can be said that the percentage of variance explained is 6.4% by the model as opposed to error. Although this value does appear to be low, for the purpose of this research it is regarded as acceptable, and implications of which will be discussed in the following chapter.

The second value of concern is the Durbin-Watson. This value detects the presence of autocorrelation in the residuals from a regression analysis. The implications of both were discussed when examining the assumptions of a multiple regression. The Durbin-Watson values ranges from zero to four. Values closer to zero indicate positive autocorrelation, values closer to two indicate non-autocorrelation, and values closer towards four indicate negative autocorrelation (Field, 2009). The Durbin-Watson value for this study is 1.718, meaning that the data is appropriate for regression.

Table 9
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.253	.064	.035	19.62	1.833

From Table 10, it is clear that there are two significant predictors of work productivity loss in this study. These two predictors are physical inactivity (p = .047), and cholesterol (p = .046). Therefore, one lifestyle risk factor and one biometric risk factor are significant predictors of workplace productivity loss. The significance of this finding will be elaborated in more detail in the discussion section. Smoking (p = .312), alcohol consumptions (p = .900), BMI (p = .275) and blood pressure (p = .506), were not significant predictors of workplace productivity loss.

Table 10
Coefficients

	t	*p*	Part correlations
Physical Inactivity	-2.003	.047	-.139
Cigarette Smoking	-1.015	.312	-.070
Alcohol Consumption	.126	.900	.009
BMI	-1.095	.275	-.076
Blood Pressure	.666	.506	.046
Cholesterol	-2.011	.046	-.140

Note. BMI = Body mass index.

It is necessary to establish the amount of unique variance contributed to the DV (work productivity loss) by each significant predictor variable (physical inactivity and cholesterol). Physical inactivity contributed 1.90% [(-.139*-.139) *100= 0.0190] of unique variance to the overall model, while cholesterol contributed 1.96% [(-.140*-.140) *100= 0.0196] of unique variance to the overall model. Therefore, the two significant predictors, physical inactivity and cholesterol, contribute 3.86% of unique variance to the overall statistical model, i.e. the overall R^2 value.

Overview of the results

A standard multiple regression analysis was conducted in this study. Each independent variable was evaluated in terms of its predictive power in the established model. The predictor variables were cigarette smoking, alcohol consumption, exercise, cholesterol, BMI and blood pressure. Preliminary analysis determined the appropriateness of the use of multiple regression as the statistical analysis used for the study. Included in this assessment was sample size, multicollinearity and singularity, normally distributed residuals, independent variables have a variance of zero, homoscedasticity, independence of errors/autocorrection, linearity, and outliers and influential cases. The results indicated that multiple regression was an appropriate statistical choice for this data. This study found that physical inactivity and cholesterol significantly predicted work productivity, while cigarette

smoking, alcohol consumption, BMI and blood pressure did not significantly predict workplace productivity loss. It was found that the total amount of unique variance contributed by these predictors to the overall statistical model was 3.86%. From these results, the ensuing chapter will explore the significance between each of the independent variables on workplace productivity loss, the significant relationships found between independents, implications of this study, strengths and limitations of this study, and suggested directions for future research.

Chapter 4: Discussion

Introduction

This study aimed to assess whether lifestyle and biometric risk factors influence workplace productivity loss in the South African workforce. A standard multiple regression analysis was conducted on the data to assess the predictors of lifestyle risk factors and biometric risk factors on workplace productivity loss in the South African workforce. Each independent variable was assessed in order to evaluate its predictability with workplace productivity loss. The results gained will be reviewed separately in this chapter, with specific attention given to how the results fit into what has already been found in the existing literature, as well as to how they may contribute to greater knowledge on workplace health and productivity in South African organisations. Lastly, the chapter will consider the study's theoretical and practical implications, strengths and limitations, and suggestions for future research. To begin the chapter, a review of the study's descriptive statistics will be conducted.

Descriptive information

The sample consisted of 409 participants, 286 of whom were female, and 123 of whom were male. The lifestyle factor that was saw the least health risk was alcohol consumption as (n = 222; 92.9%) of participants reported in healthy range values. Cigarette smoking was the second lowest lifestyle risk factor as a total of (n = 350; 85.6%) reported in healthy range values. Physical inactivity was the third lowest risk factor where (n = 154; 39.9%) of participants reported in healthy range values. The lifestyle factor participants were at most risk for was BMI, as *(*n = 282; 69.8%2%) of participants reported out of healthy range variables. Biometric factors are less of a concern for health than lifestyle factors. The majority of the population (n = 221; 99.1%) reported in healthy range glucose levels (n = 221; 99.1%), blood pressure levels (n = 337; 82.6%), as well as cholesterol levels (n = 236;

63.1%). The significance of each result will be discussed in greater detail in the sections to come, which specific relevance given to how the results impact on workplace productivity loss.

Physical Inactivity and Workplace Productivity Loss

One of the two significant results that emerged from the data was that physical inactivity predicts workplace productivity loss. In particular, participants that engaged in less than 2hrs/week of physical activity were less productive at work than participants who exercised for more than 2hrs/week. This finding is supported by previous research on the influence of physical exercise and productivity. For instance, Reddy et al., (2003) and Conn et al., (2009) found that physical activity improved productivity by enhancing energy and concentration. Other ways that physical activity has contributed to increased productivity is through lowering stress levels and improving symptoms and side effects of depression (Marshall, 2004).

Physical inactivity was the lifestyle factor at most risk for out of healthy range values. Reddy et al., (2003) reports an increased global trend of sedentary lifestyles due to the increased availability of technology and fast food restaurants (Reddy et al., 2003). This study found evidence to support the increased sedentary lifestyle trend. In addition to recording the amount of hours' participants were physically active in a day, participants were asked to estimate the amount of hours they were sitting down throughout the working day. The majority of participants (n = 215; 56%) spend between 5-8 hours sitting down throughout the day, followed by 3-5 hours (n = 95; 24.8%), more than 8 hours (n = 57; 14.8%), and lastly less than three hours (n = 17; 4.4%). Therefore, the majority of the participants were sitting down for approximately 25 – 45 hours per working week. By finding ways to reduce the amount of hours that employees sit throughout the day, organisations will assist their employees to become more active and thus more productive. For instance, organisations can

encourage employees to take regular breaks from their office desks, to walk around the office site, or even to stretch at their desks. Other suggestions aimed at assisting employees to be more active in the workplace include: standing desks, the use of fitness balls instead of chairs, fitness membership discounts or gyms at the office premises, provision and support of more active modes of transports (e.g. bicycles), and encouraged participation in office team activities (Steyn et al., 2006).

This study found a significant positive correlation between physical inactivity and BMI ($r = .195$, $p \leq .01$). This relationship is supported in the literature which links physical inactivity overweight and obese (Reddy et al., 2003; Marshall, 2004; Witter et al., 2015). Other significant correlations found for physical inactivity were for two biometric factors, i.e. blood pressure ($r = .126$, $p \leq .05$) and cholesterol ($r = .146$, $p \leq .01$). Two biometric factors are therefore impacted by the lifestyle factor of physical inactivity. These relationship findings have significant implications for the workforce as it suggests that by improving the lifestyle factor of physical inactivity, biometric factors will be positively impacted, which may reduce workplace productivity loss. The link between lifestyle behaviours and biometric factors is therefore an important consideration that will assist organisations to become, or remain, competitive in the business world. By encouraging employees to stay active, employees will experience other health benefits that will aid to their productivity levels.

Cigarette Smoking and Workplace Productivity Loss

This research found no significant relationship between cigarette smoking and workplace productivity loss. This result differs from previous research that has found people who smoke to be more likely to take time off from work, thereby decreasing their contribution to their organisation productivity indicators (Kristein, 1983; Brownson et al., 2002; Tsai, 2005). Conducting a meta-analysis on the effects of smoking on productivity, Heishman, Kleykamp & Singleton (2010), found significant results that suggest that people

who smoke have better motor abilities, attention, and memory improvement, than people who do not smoke. Furthermore, smokers were found to not only be more productive, but to also produce work that was of a higher standard than those who did not smoke.

The results generated by Heishman et al., (2010), can be used to explain why this study did not find a significant relationship between cigarette smoking and workplace productivity loss. Furthermore, the contradictory findings of this study, compared to what is being promoted by health policies and campaigns, may be explained by the social element found in cigarette smoking. Studies support taking a number of breaks during the work day to increase productivity (Adams et al., n.d; Steyn et al., 2006). Employees who smoke generally take their smoke breaks together, thereby increasing communication between a particular group of people. Because the smokers have moved away from their desks to smoke, their new environment may feel more relaxed, which supports more creative and innovative ways of thinking. During these smoke breaks, it may be the case that smokers receive, or overhear, information that assist in the execution of work tasks and objectives. Non-smokers will then be disadvantaged as they do not receive, or overhear, such information.

The majority of participants reported they did not smoke cigarettes (n = 315; 77%). This finding suggests that smoking is becoming less of a lifestyle concern for people and organisations than what has previously been documented (Cooper et al., 2009). The study provides evidence that South Africa's current public health policies and campaigns against smoking are successful in raising awareness of health risks and costs associated with smoking. Decreased numbers in smoking could also be attributed to the laws and regulations in South Africa that limit where people are allowed to smoke, increase taxes on cigarettes, and ban tobacco advertising and restricting sales (Bouchery et al., 2011).

This research found a significant relationship between alcohol consumption and cigarette smoking. One lifestyle factor (smoking) is likely to lead to another lifestyle factor

(alcohol consumption). As already noted, cigarette smoking has a social element attached to it, which may also be influencing the consumption of alcohol. People are more likely to engage with these two lifestyle habits when they are feeling stressed (Das, 2011). However, due to the addictive nature of these lifestyle habits, once people start relaxing as a result of having smoked a cigarette, having drank an alcoholic beverage, or both, they are more likely to continue their behaviour. Therefore, it may be the case that people feel more relaxed when smoking, and are around other employees sharing and generating knowledge that contributes to workplace productivity.

Alcohol Consumption and Workplace Productivity Loss

Most research on alcohol is conducted on the negative effects that it has on a person's health, and thus on their ability to lead productive lives (Steyn et al., 2006; Beaglehol & Bonita, 2009; Anderson et al., 2011; Esser et al., 2012). Das (2011) states that alcohol negatively impacts on organisational competitiveness because it reduces employee's mental performance, it contributes to absenteeism rates, and it's the leading cause of death amongst the most productive working age work (early to late adulthood). Given what has been found in research, the non-significant relationship found between alcohol and productivity was surprising. Reasons as to why alcohol does not predict workplace productivity loss may be explained by the social element attached to alcohol drinking. Socialising with colleagues and team members in more relaxed environments may increase creativity and innovation, and contribute to a sense of belonging and fulfilment within the organisation. This is proven to have a positive effective on individual efficiency and productivity (Boström), which leads to the organisation experiencing long-term financial benefits.

According to South Africa et al., (2007), South Africa has a high prevalence of alcohol consumption, which includes out of healthy range alcohol consumption during the week, as well as high levels of binge drinking. To measure binge drinking behaviours,

participants were asked how often they have four or more alcoholic drinks in one day. The majority responded never (*n* = 137; 33.5%), followed by less than monthly (*n* = 108; 26.4%), monthly (*n* = 82; 20%), weekly (*n* = 33; 8.1%) and lastly daily or almost daily (*n* = 26; 6.3%). Therefore, participants in this study do not drink unhealthy/excessive amounts of alcohol, and they do not engage in binge drinking behaviours. There are two additional explanations as to why no significant relationship between alcohol and productivity was found. The first explanation may be because participants did not accurately report their drinking habits, and instead reported socially acceptable amounts of drinking habits. The second possible explanation is that participants were at their place of work when they were giving information on their alcoholic drinking habits. As such, participants may have altered their answers in fear of judgement from colleagues and superiors, or in order to appear in a specific manner to other.

BMI and Workplace Productivity Loss

High BMI values have been closely linked to workplace productivity loss as people who are overweight or obese are more likely to contribute towards their organisations absenteeism and presenteeism rates (WHO/FAO, 2003). Low BMI scores were included in the out of healthy range values because of the impact that being underweight has on a person's ability to be productive at work. For instance, people with low BMI scores run the risk of being malnourished, which may lead to weaker immune systems. The weaker the immune system, the more susceptible a person is to falling ill and the longer it takes for that person to recover from illness (The Department of health et al., 2007). Therefore, the three participants with low BMI scores were grouped with the 272 participants who had high BMI values above 25, and were regarded out of the healthy variable range. In total, there were 275 participants that were out of the healthy range for BMI values. The remainder 122 participants reported in healthy range BMI value. The mean BMI score was 29.4, meaning

that the average participant was overweight, and thus, according to research, at risk for health problems that will contribute to the organisations workplace productivity loss (O'Neil et al., 2012). However, this study found no significant prediction between BMI and workplace productivity loss. Furthermore, it may also be the case that the financial service industry does not require employees to have in healthy range BMI scores in order to be productive at work.

The non-significant finding between BMI and workplace productivity loss provides this research with alternative reasons as to why employees out of the healthy range for BMI values are still productive. Work environments, work demands and tasks, salaries, incentives and rewards, work relationships, and working hours' may be moderating the relationship between unhealthy BMI scores and workplace productivity loss.

As previously discussed, BMI and physical inactivity were significantly correlated. A second significant relationship was found between BMI and blood pressure ($r = .188$, $p \leq .01$). Therefore, there is more evidence to suggest that lifestyle and biometric factors are not exclusive. Instead, they all contribute towards how healthy a person is, and thus how productive they are able to be at work. For instance, although BMI does not significantly predict workplace productivity loss, it does have a relationship with physical inactivity, which is a significant predictor of workplace productivity loss. Furthermore, measures taken to improve BMI improve blood pressure levels, which may impact on a person's ability to be at work and significantly contribute towards organisational advantages.

Blood Pressure and Workplace Productivity Loss

This study found that blood pressure did not significantly predict workplace productivity loss, however a significant relationship was found between blood pressure and alcohol consumption ($r = .241$, $p \leq .01$). This significant relationship is supported in the literature, which states that blood pressure rises when excessive amounts of alcohol is consumed (Anderson et al., 2009; Esser et al., 2012). However, no predictive relationship

was found between blood pressure or alcohol consumption on workplace productivity loss, therefore meaning that this relationship is unlikely to impact on workplace productivity loss either.

The unpredicted relationship between blood pressure and work productivity loss raises two points of discussion. The first is an inconsistency that comes from what is available in the research. Molla (2015) found that blood pressure considerably increases a person's risk of stroke, heart failure and kidney disease, and that the experience of all three health complications drastically impacts an organisations ability to perform in the business market. The second point of discussion is a concern that the amount of in-healthy range variables recorded by participants did not coincide with the current blood pressure statistics in South Africa. The majority of participants (n = 337; 82.4%) recorded healthy blood pressure readings, however, the Heart Foundation (2015) report that a third of South Africans suffer from high blood pressure, and its associated health implications. This could be because the nature of the sample is biased, or because the sample itself is biased, and therefore not representative of the South African population. This study will therefore be considered as a reference point that future studies can use to further investigate the relationship between health and productivity, and specifically between high blood pressure and workplace productivity loss, in South Africa.

Cholesterol and Workplace Productivity Los

Cholesterol was the only predictive biometric variable that predicted workplace productivity loss. The average cholesterol reading of participants was 5.1, supporting the finding that the majority of participants had healthy levels of cholesterol (n = 236; 63.1%). Research states that high cholesterol levels are powerful predictors of cardiovascular diseases (Goetzel, 2009; Molla, 2015). An employee's ability to be at work, and to significantly contribute to work, will be compromised if he/she reports high cholesterol levels or the health

complications associated with high cholesterol levels. Therefore, because a significant relationship was found between cholesterol and workplace productivity loss, organisations can use this information to increase measures to assist employees in keeping their cholesterol levels within the healthy range, so that they are able to remain healthy and positively contribute to their workplace's productivity. Organisations that choose to make health screening and health promotion an inherent part of their culture are more likely to see successful long-term results of health and productivity (Schultz & Edington, 2007). Furthermore, the information gathered at each screening and health promotion event can be used as the organisation's benchmark to base their policies and initiatives on, thereby ensuring that they remain relevant and updated for the organisations employees.

Glucose and Workplace Productivity Loss

The average glucose score was 4.9, which indicates that the majority of participants had healthy levels of glucose. Due to the low number of in healthy range versus out of healthy range comparison levels of glucose scores, this biometric factor was excluded from the multiple regression. It is recommended that further research be conducted on the predictive relationship between high glucose readings and workplace productivity loss in a South African work context.

Implications

This present study has furthered research on the relationship between lifestyle risk factors and biometric risk factors on workplace productivity loss. The findings indicate that physical inactivity (as the only lifestyle factor), and cholesterol (as the only biometric factor), significantly predicted workplace productivity loss.

This research provides insight into how organisations can promote, and assist, the health of their employees to gain a competitive advantage in the business world. For instance, knowing the health status of South African employees can assist organisations to support

plan, monitor and evaluate the implementation of programmes and other workplace initiatives that are aimed at improving health measures around physical inactivity and high cholesterol. By taking active steps to promote health in organisations, not only will companies be improving absenteeism and presenteeism rates, they will also appear more committed to their employees, which provides employees with a sense of belonging and security, and may further increase productivity rates (Schultz & Edington, 2007).

This study provides results that are of significant interest within the South African population as the country is seeing a rise in unemployment (Statistics South Africa, 2011). The employment rate is negatively impact by health because ill-health, if not seen to, can result in an individual either being dismissed from work, due to decreased productivity levels, or it can result in an individual feeling forced to resign due to health complications. Understanding where employees are at most risks, in terms of their health, will help the country to develop and implement workplace initiatives that result in greater workplace productivity due to improved health. Furthermore, a greater societal awareness of the impacts of ill health can result in many organisations coming together to determine the best preventative measures, and to utilise the strengths and resources of different companies to see the best results. By assisting one another to improve employee health, employees are able to generate a higher morale within their organisation, which further contributes to the development of workplace productivity (Bradshaw, 2003).

Regular health screening for employees requires ongoing support from organisations. Using screening and health events can assist organisations to implement health interventions that will directly improve their workplace productivity. An organisations culture can assist the improvement of employee health, and thus productivity. Incentives and rewards for healthy lifestyles helps to maintain employee’s efforts to becoming healthier and more productive. Other methods to improving awareness of the impacts of health on productivity is

through education seminar, brochures, videos, and newsletters. Regular assessment of employee's lifestyle behaviours and attitudes are needed to be able to identify the leading factors hindering organisational advantages.

This study has provided insight into how organisations are able to utilise the health of their employees to further advance themselves in the business world. In particular, health screening events are effective in that they are able to determine a health baseline consisting of a workforce's health status. The baseline is invaluable to design, implement and evaluate the implications of employee health on workplace productivity. Health baselines may also provide information to evaluate an organisations return on investment for offering workplace health promotions. Information gathered from these assessments can determine the direction of an organisations investments.

Strengths and Limitations

The sample size that was used to perform the statistical analysis for this study was 409 participants. The number of participants included in this study provided a sophisticated means of comparison, where all the assumptions to perform the statistical procedure were met. The amount of recorded observations for each independent variable varied, however, this did not appear to influence the statistical results of the study. There was one independent variable (i.e. glucose) that did not have enough comparisons between the in and out of healthy range observations, and as such was excluded from the analysis. This may provide insight into the glucose trends of South Africa, i.e. that the majority of South African employees have healthy glucose levels. As such, organisations can offered to decrease measures aimed at reducing glucose readings. Rather than spending money on a biometric factor that does not appear to be a health problem, organisations can increase efforts on establishing effective interventions on physical inactivity and high cholesterol levels on workplace productivity loss.

The first limitation of this study regards itself with the sample. The majority of the participants were female (n = 286; 69.93%), and the minority were male (n = 123; 30.07%). In terms of gender, this is a slightly skewed sample and caution is raised on the study's external validity. Secondly, although the sample size was large enough to do a multiple regression, it was not representative of the South African population. Therefore, the findings cannot be generalised within the South African context, however, it may be used as a reference point for future research done on the relationship between lifestyle and biometric risk factors and productivity in South Africa.

A major concern of this study is that participants recorded their answers to three out of the four lifestyle risk factors (physical inactivity, cigarette smoking and alcohol consumption). There may be instances were recordings were either exaggerated or limited, especially as the health screening event was onsite at the organisations premises. The possibility of inaccurate lifestyle reflection could be the result of wanting to appear in live a certain lifestyle, and/or fear from judgement from colleagues and supervisors.

Three thousand nine hundred and nighty four participants were removed from the analysis due to errors or too many missing values. Although this was needed to meet the statistical assumptions required to perform the analysis, it raises concerns on how the information was gathered. In particular, the accurateness and quality performed at health screening events are of concern. An evaluation into how lifestyle and biometric factors are being inspected and recorded is recommended. This way, cautions raised on the execution of screening events will become apparent, and the necessary measures to correct potential issues may be taken.

Lastly, this study recognises that there may be other explanations that predict workplace productivity loss that are not attributed to an employee's lifestyle behaviours or biometric factors. For instance, job demands, working hours, types of relationships with

colleagues, remuneration packages, networking groups, ergonomic conditions of the workplace, and so on, may all lead to employees being less productive at work.

Future Directions of Research

Future studies can expand on how sedentary the South African workplace is by gathering information on how long it takes participants to get to work and home, as well as estimates on how long participants generally sit at home. These two additional data points, along with the data on the amount of hours' people are completely inactive at work, can communicate trends on how sedentary the South African population is, and the implications that this has on individual health, workplace productivity, and economic growth in the country. Information gathered from the relationship between sedentary lifestyles and workplace productivity loss will directly impact on an organisation's ability to promote healthy and productive workers, which can then be used to generate a competitive advantage in the business market.

There are various approaches to promoting health, and subsequently workplace productivity, that exist in the business world. The approaches vary in what they aim to promote and/or discourage, and each approach contains their own merits and disadvantages. By knowing where to focus efforts that are needed for improved employee health (i.e. which specific lifestyle and biometric factor to promote), a holistic workplace policy can be devised to address specific areas of concern. Future research can be conducted on establishing more health relevant workplace interventions that are appropriate for South African organisations. This will not only save organisations in terms of costs, as unnecessary costs are not being spent on health concerns that do not exist within the business, but it will also help workplace interventions to become more reliable and consistent, and improve the effectiveness of their outcomes.

Conclusion

This study researched whether healthy employees contribute to organisational competitiveness and advantages by increasing workplace productivity. One lifestyle risk factor (i.e. physical inactivity), and one biometric risk factor (i.e. cholesterol levels) were identified as factors of concern for organisations as both significantly predicted workplace productivity loss. Healthy employees increase an organisation's edge to competitively contribute to the business world through greater physical and mental health, improved communication, increased team moral and greater networks. The findings are of particular interest for South African organisations due to the current decrease of the economic growth in the country (Statistics South Africa, 2011).

The workplace is an ideal access point for employees to explore information on their health status, as well as an information point where health and productivity may be seen as drivers to individual and organisational success (Das, 2011). Therefore, organisations are fundamental when it comes to reducing the negative effects of lifestyle and biometric risk factors by putting in place comprehensive measures that include clear policies around health in the workplace, as well as screening, education, and interventions aimed at generating a healthy, and thus productive, workplace culture.

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Appendix A: Work Productivity and Activity Impairment Questionnaire:General Health V2.0 (WPAI:GH)

There are a number of variants of the WPAI:

- WPAI:GH
- WPAI:SHP
- WPAI:GH/SHP

We will be using the ***WPAI:GH*** as this instrument refers specifically to productivity issues in the workplace related to **Health Problems**…this being a major focus for HealthLogix / HealthInSite.

The following questions ***ask about the effect of your health problems on your ability to work and perform regular activities***. By health problems we mean any physical or emotional problem or symptom. *Please fill in the blanks or circle a number, as indicated.*

1. Are you currently employed (working for pay)? ____ NO ____ YES

   If NO, check "NO" and skip to question 6.

The next questions are about the **past seven days**, not including today.

2. During the past seven days, how many hours did you miss from work because of your health problems? *Include hours you missed on sick days, times you went in late, left early, etc., because of your health problems. Do not include time you missed to participate in this study.*

   _____HOURS

3. During the past seven days, how many hours did you miss from work because of any other reason, such as vacation, holidays, time off to participate in this study?

_____HOURS

4. During the past seven days, how many hours did you actually work?

_____HOURS *(If "0", skip to question 6.)*

5. During the past seven days, how much did your health problems affect your productivity <u>while you were working</u>?

Think about days you were limited in the amount or kind of work you could do, days you accomplished less than you would like, or days you could not do your work as carefully as usual. If health problems affected your work only a little, choose a low number. Choose a high number if health problems affected your work a great deal.

Consider only how much <u>health problems</u> affected productivity <u>while you were working</u>.

Health problems had no effect on my work	0 1 2 3 4 5 6 7 8 9 10	Health problems completely prevented me from working

CIRCLE A NUMBER

6. During the past seven days, how much did your health problems affect your ability to do your regular daily activities, other than work at a job?

By regular activities, we mean the usual activities you do, such as work around the house, shopping, childcare, exercising, studying, etc. Think about times you were limited in the amount or kind of activities you could do and times you accomplished less than you would like. If health problems affected your activities only a little, choose a low number. Choose a high number if health problems affected your activities a great deal.

Consider only how much health problems affected your ability to do your regular daily activities, other than work at a job.

Health problems had no effect on my daily activities	0 1 2 3 4 5 6 7 8 9 10	Health problems completely prevented me from doing my daily activities

CIRCLE A NUMBER

Appendix B: Descriptive information

About You

Date of birth

Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Gender

- ☐ Male
- ☐ Female

Marital status

- ☐ Defacto (Living together)
- ☐ Divorced
- ☐ Married
- ☐ Single

- ☐ Widowed

Generally speaking, how would you describe your overall health status?

- ☐ Very healthy
- ☐ Fairly healthy
- ☐ Not very healthy
- ☐ Very unhealthy

Are you a parent or primary caregiver of one or more children?

- ☐ Yes
- ☐ No

INTERESTS AND CONCERNS

- ☐ Alternative medicine
- ☐ Food & nutrition
- ☐ Men's health
- ☐ Mental health
- ☐ Parenting & children's health
- ☐ Fertility & pregnancy
- ☐ Sport & fitness
- ☐ Stress management
- ☐ Substance abuse / Addiction
- ☐ Caring for others
- ☐ Travel medicine
- ☐ Weight control

- ☐ Women's health
- ☐ Work-life balance
- ☐ Positive relationships
- ☐ Happiness
- ☐ Energy levels
- ☐ Resilience
- ☐ Time management
- ☐ Performance at work
- ☐ Managing change
- ☐ Dealing with conflict
- ☐ Leadership and coaching

Appendix C: Lifestyle Risk Factors

Habits

SMOKING

What is your current smoking status?

- ☐ Nil / non smoker
- ☐ Previous smoker
- ☐ Smoke <2 per day
- ☐ Smoke 2 - 10 per day
- ☐ Smoke 10 - 20 per day
- ☐ Smoke 20 - 30 per day

Have you recently quit smoking?

- ☐ Yes, I have stopped smoking for 6 months or more
- ☐ Yes, I have stopped smoking for 1 months or more
- ☐ I am in the process of quitting right now

If you are a current smoker, how long have you been smoking?

- ☐ Nil
- ☐ < 5 years
- ☐ 5 - 10 years
- ☐ 10 - 15 years

- ☐ 15 - 20 years
- ☐ 20 - 30 years
- ☐ > 30 years

How likely are you to quit smoking?

- ☐ Not considering a change within the next 6 months
- ☐ Intend to make changes within next 6 months
- ☐ Intend to make changes within 1 month

Do you live or often spend time with people who regularly smoke around you?

- ☐ No
- ☐ Yes, I often spend time with people who regularly smoke around me.

ALCOHOL CONSUMPTION

In an average week, on how many days do you consume alcohol?

- ☐ I do not consume alcohol
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

- ☐ 6
- ☐ 7

On these occasions, please indicate your average alcohol consumption (standard drinks):

- ☐ Nil / non drinker
- ☐ 1 - 2 drinks per day
- ☐ 3 - 4 drinks per day
- ☐ 5 - 6 drinks per day
- ☐ > 6 drinks per day

How often do you have 4 or more drinks in one day?

- ☐ Never
- ☐ Less than monthly
- ☐ Monthly
- ☐ Weekly
- ☐ Daily or almost daily

How likely are you to limit your alcohol consumption to 2 standard drinks per day; not to drink more than 4 standard drinks in one day and to include 1-2 alcohol-free days per week?

- ☐ Not considering a change within the next 6 months

- ☐ Intend to make changes within next 6 months
- ☐ Intend to make changes within 1 month
- ☐ I've made changes in the past 6 months
- ☐ I've been achieving my goals for over 6 months

MOVEMENT AND ACTIVITY

In an average day, what is the total time you would spend sitting down?

[Includes in a chair, at a desk, in the car, on the couch...]

- ☐ <3 hours
- ☐ 3-5 hours
- ☐ 5-8 hours
- ☐ 8+ hours

How would you rate your current physical activity habits?

[e.g. playing a team sport, swimming laps, jogging, brisk walking, cycling etc.]

- ☐ Sedentary (< 1 hr / week)
- ☐ Occasional (1 - 2 hrs / week)
- ☐ Moderately active (2.5 - 4 hrs / week)
- ☐ Very active (5+ hrs / week)

How likely are you to change your total physical activity, to get 30 minutes or more of general (incidental) or planned activity throughout the course of the day, most days of the week?

- ☐ Not considering a change within the next 6 months
- ☐ Intend to make changes within next 6 months
- ☐ Intend to make changes within 1 month
- ☐ I've made changes in the past 6 months

- ☐ I've been achieving my goals for over 6 months

NUTRITION AND DIET

How many serves of vegetables do you consume per day?

- ☐ 0-2 serves
- ☐ 3-4 serves
- ☐ 5 or more serves

How many serves of fruit do you consume per day?

- ☐ 0 serves
- ☐ 1 serve
- ☐ 2 or more serves

How often do you eat breakfast?

- ☐ Every day
- ☐ 4 - 6 times per week
- ☐ 1 - 3 times per week
- ☐ Fortnightly or less

How often do you eat restaurant or takeaway meals?

[Includes all meals and snacks]

- ☐ Everyday
- ☐ 3 - 6 times per week
- ☐ 1 - 4 times per fortnight
- ☐ Monthly or less

On average how often do your food choices or ingredients in cooking include one or more of the following?

Food	**None - a few times per month**	**A few times per week**	**Daily or almost daily**	**2 – 5 times per day**	**6 or more times per day**
Processed meat*					
Fatty meat**					
Full-fat dairy products***					
High-sugar foods^					
High-salt foods#					
High-fat foods^^					

**Sausages, hot dogs, ham, bacon, salami, deli meats etc.*

***Meat untrimmed with fat still on, chicken with skin on etc.*

****Butter, ice-cream, full-cream milk, cream cheese, cream etc.*

^Lollies, pastries, cakes, biscuits, confectionary bars etc.

#Soy-sauce, fish sauce, salt added at the table or in cooking, sauces and spreads etc.

^^Anything deep or shallow fried, potato chips and snacking crisps, full-fat peanut butter/spreads, snack bars etc.

How many glasses of water do you drink each day?

- ☐ Less than 2/day
- ☐ 2 - 4/day
- ☐ 4 - 6/day
- ☐ 6 - 8/day
- ☐ More than 8/day

How likely are you to change your diet to widen the variety of fish, fruit, vegetable, cereal and grain products you consume and to limit foods that are highly processed, high in fat, salt or sugar?

- ☐ Not considering a change within the next 6 months
- ☐ Intend to make changes within next 6 months
- ☐ Intend to make changes within 1 month
- ☐ I've made changes in the past 6 months
- ☐ I've been achieving my goals for over 6 months