

# **Happiness and Health: Associations with Cardiovascular Disease Risk Factors**

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## List of Abbreviations

AHI	Authentic Happiness Inventory
ANOVA	One way analysis of variance
BMI	Body mass index
CHD	Coronary heart disease
CVD	Cardiovascular disease
DALY	Disability adjusted life years
ESS	European Social Survey
HDL	High density lipoprotein
ICC	Intraclass correlation coefficient
LDL	Low density lipoprotein
MOH	Ministry of Health
PANAS	Positive and Negative Affect Scale
SHI	Steen Happiness Index
SHS	Subjective Happiness Scale
SWLS	Satisfaction with Life Scale
WHO	World Health Organisation
YLL	Years of lost life

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## **Attestation of Authorship**

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Chapters 2 and 3 have been submitted for consideration as separate papers for publication in international peer-reviewed journals. Each of these papers was conceived by the candidate, who was also the main contributor and author. All co-authors have approved the inclusion of the papers they were involved in as chapters for this thesis.

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30 June 2011



## List of Publications and Presentations from Thesis

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Janine Shepherd (80%: lead author, main contributor), Grant Schofield (10%),  
Melody Oliver (10%)

Shepherd, J., Schofield, G., & Oliver, M. (2011). *Validity and reliability of the Authentic Happiness Inventory*. (Submitted 25 May 2011 to Journal of Happiness Studies).

Janine Shepherd (80%: lead author, main contributor), Grant Schofield (10%),  
Melody Oliver (10%)

We hereby confirm the academic contributions and specific role of the student for the co-authored works are as above:

\_\_\_\_\_ Professor Grant Schofield

\_\_\_\_\_ Dr Melody Oliver

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The Northern X Regional Ethics Committee granted ethical approval for this research on 15<sup>th</sup> April 2010 (NTX/10/03/014). The Auckland University of Technology Ethics Committee granted ethical approval for this research on 7<sup>th</sup> December 2010 (10/275).

## **Abstract**

Chronic disease is the biggest health issue of our time and cardiovascular disease (CVD) is predicted to be the leading cause of death worldwide by 2030 (World Health Organisation; WHO, 2008). Positive psychology is a relatively new discipline that is interested in positive emotions and provides researchers with the option to study character strengths, virtues, optimism, happiness, and well-being. The aim of this thesis was to examine the relationships that may exist between CVD risk factors and between health behaviours and happiness.

A cross-disciplinary approach of psychology and public health could allow us to move beyond the current deficit model that exists in medicine and public health. This deficit model, to borrow a metaphor from Gable and Haidt (2005), attempts to bring people up from negative eight to zero, whereas a positive health model could help people rise from zero to positive eight. In real terms, traditional CVD and chronic disease prevention and management is focused on lowering risk factors and minimising harmful health behaviours which, to date, has not succeeded in bringing about sustainable behaviour population change. By adopting well-being as a goal of positive health, we may be able to change the negative health behaviours that contribute to CVD and chronic disease, into positive health behaviours that decrease chronic disease while promoting positive health.

To begin the exploration into how positive psychology principles can start to be integrated into mainstream public health, this thesis examines relationships between happiness and the individual health behaviours that contribute to the risk of CVD in Study 1. In this study a sample of participants (n=195) underwent a CVD risk

assessment and answered three questionnaires: the Authentic Happiness Inventory (AHI), a physical activity and nutrition patterns questionnaire, and a demographic survey. Pearson's correlations were conducted to examine associations between the AHI sum results and each demographic and health variable. Only trivial or no significant associations were found. Analysis of variance revealed small differences in happiness scores by ethnicity (Asian Indians were the happiest ethnic group), total cholesterol and low density lipoproteins (LDL) cholesterol (the lower the total cholesterol and LDL cholesterol the higher the happiness score). Bivariable and multivariable logistic regression were used to further examine relationships between variables and AHI classification (lowest versus highest tertile of AHI). After elimination of non-significant factors, only smoking status remained associated with AHI classification ( $p = 0.016$ ). This indicated that non-smokers are happier than smokers in this sample and this is consistent with other research. Overall there was little evidence of associations between happiness and health variables. Whether this was because of homogeneity in happiness scores or a real lack of association is unclear. Happiness can be difficult to examine and find effects due to the fact that many people report being at least moderately to very happy regardless of how they may actually be feeling.

Study 2 was conducted to test the convergent validity and test-retest reliability of the measure of happiness (the AHI) with a convenience sample of working adults ( $n=30$ ). Participants completed the AHI on two consecutive days. On the second day, participants also completed the Satisfaction with Life Scale (SWLS) and the Positive and Negative Affect Scale (PANAS). Exploratory factor analysis was conducted on AHI scores with an additional convenience sample of working adults ( $n = 222$ ). For the overall AHI sum, the test-retest reliability was strong ( $ICC = 0.92$ ,  $p < 0.001$ ). There was a strong positive association between AHI and SWLS ( $r = 0.76$ ,  $p < 0.005$ ) and

between AHI and PANAS positive ( $r = 0.82$ ,  $p < 0.005$ ), indicating acceptable convergent validity. Findings confirmed the convergent validity and test retest reliability of the AHI and thus it can be used as a measure of happiness among working adults in similar populations.

Happiness may not be the best measure of psychological well-being and an alternative known as flourishing was promoted as a new goal of positive psychology. The focus of positive psychology is well-being and the gold standard for measuring well-being is flourishing. The European Social Survey (ESS) is the best current gauge of flourishing and may provide a more complete picture of well-being in population surveys. The ability to measure well-being means Positive Health, a new field proposed by Seligman (2005), could link health with positive psychology to improve health outcomes and well-being. The approach of positive health could provide us with the vehicle to take us full circle back to WHO's optimistic definition of health in 1946 and make it a reality in the not too distant future: "*A state of complete positive physical, mental and social wellbeing and not merely the absence of disease or infirmity*", (WHO, 1946).

## **Introduction**

In 1946 the World Health Organisation (WHO) defined health as “a state of complete positive physical, mental and social wellbeing and not merely the absence of disease or infirmity” (World Health Organisation, 1946). Traditionally, the majority of research and practice in this field has considered health as the absence of disease, or at least risk and disease treatment and reduction. Conversely as far back as Aristotle there has been an understanding that well being is an essential part of the human condition. This focus on positive health, has now taken a further leap forward in the mental health field with the introduction of a relatively new discipline known as positive psychology, founded by Martin Seligman in 2000. This new area of psychology is interested in positive emotions and provides researchers with the option to study character strengths, virtues, optimism and well-being. Gable and Haidt (2005, p 105) proposed it is “the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, groups and institutions”. Wellbeing and happiness are the major focuses of positive psychology and the study and understanding of these concepts can help lessen or prevent disease when incorporated into interventions to improve health.

Chronic disease is the biggest health issue of our time and CVD will be the leading cause of death worldwide by 2030 (World Health Organisation, 2008). Non-modifiable factors for CVD risk are age, gender, ethnicity and family history. The main contributing factors to CVD, however, are lifestyle related and modifiable, meaning that CVD is largely preventable. These modifiable risk factors are smoking, sedentary behaviour, inadequate nutrition, psychosocial factors, obesity, hypertension, high cholesterol levels, type 2 diabetes. Physical activity and good nutritional practices act as protective factors that are also modifiable.

There is now a wealth of evidence to show the benefits of physical activity to physical health (Paffenbarger, Hyde, Wing & Hsieh, 1986; Warburton, Nicol & Bredin, 2006). In addition to the physical health benefits of physical activity, research also suggests that physical activity can benefit mental health and emotional wellbeing (Stephens, 1988; Fox, 1999; Biddle & Mutrie, 2001). Several studies have explored CVD risk and some elements of well-being. Giltay, Geleijnse, Zitman, Hoekstra and Schouten (2004) found high optimism produced a low risk ratio of 0.23 for CVD death. Similarly a positive correlation was found between high levels of optimism and increased protection against cardiovascular events (Kubzansky, Sparrow, Vokonas & Kawachi, 2001). Finally, Kubzansky and Thurston (2007) found a strong positive relationship between emotional vitality and lack of CVD.

Increasing focus within psychology and health research is being placed on positive psychology and as this field has grown, numerous tools have been developed to assess differing concepts of positive psychological concepts, for example, gratitude, optimism, work-life satisfaction, and happiness. Happiness in particular has been seen as an extremely subjective concept and thus the accurate quantification of this construct has been limited. Differing measures of happiness have been developed, including the Fordyce Emotions Questionnaire for current happiness, the General Happiness Questionnaire for enduring happiness, and the AHI Questionnaire, for assessing overall happiness. Assessing overall happiness may be particularly important in health related research, to identify relationships between happiness and health, and also to identify potential links between CVD risk factors, health behaviours and happiness. There is a paucity of studies that have investigated the associations between happiness, CVD risk factors, and health behaviours.

## **Thesis structure**

This thesis comprises progressive studies that are presented as sequential chapters.

Chapter 1 is a literature review which precedes the two papers and provides the context for the subsequent studies. Chapters 2 and 3 have been prepared as papers for publication in peer reviewed journals; therefore some information is repeated in these Chapters. The prefaces to these two sections bring together the separate but associated Chapters. In Chapter 4, the key findings and future directions that emerge from this research are discussed and contextualised within the wider concept of health and well-being. Supplementary information not provided in the thesis chapters (ethics approval, participant questionnaires, and demographic forms) is included as Appendices.

This research fulfils the guidelines for an Auckland University of Technology Masters Thesis by demonstrating the completion of research in a self-directed investigation which contributes to the knowledge of the associations between health and happiness. Furthermore, research findings have been disseminated to the international academic community.



## **Statement of the problem**

While it is likely that there are associations between CVD risk factors, health behaviours, and happiness, and that these factors may have a synergistic/positive or negative relationship with each other, little is known of these relationships and the contribution of specific risk factors or health behaviours to well-being. Further knowledge of these relationships can provide evidence for targeted interventions that could simultaneously reduce the negative CVD risk factors and negative health behaviours while increasing happiness and positive health behaviours. With growing interest in researching happiness it is critical that accurate measures are employed. It is essential to conduct validity and reliability testing of the AHI when using a different population than pilot validity and reliability studies have previously used.

Accordingly, the aims of this thesis are as follows:

1. To systematically review existing evidence for associations between health and happiness, in particular CVD risk factors and health behaviours.
2. To examine whether any associations exist between happiness and CVD risk factors and health behaviours.
3. To measure the convergent validity and the test re-test reliability of an existing measure of overall happiness; the AHI.

## **Significance of the Research**

By undertaking this research I aim to significantly add to the fields of health and psychological well-being in the following ways:

1. By enhancing the limited body literature relating to happiness and CVD risk factors and health behaviours.
2. By disseminating the results to the wider academic community through the publishing of two articles in Chapters 2 and 3, through the publishing of the thesis in Auckland University of Technology scholarly commons, and through the seminar conference presentation.
3. By providing evidence that can be used by practitioners to intervene to reduce the negative CVD risk factors and negative health behaviours while increasing happiness and positive health behaviours.
4. By providing evidence on the validity and reliability of the AHI as a measure of happiness in similar New Zealand populations.

## **Study Delimitations**

Parameters specific to this body of work are as follows:

1. Happiness and physical activity and nutrition patterns data gathered using self-report methods may be subject to bias.
2. Chapters 2 and 3 encompass literature published up to the end of 2010. Relevant literature published after this time has not been included in these chapters, however more recent literature has been included in the general discussion in Chapter 4 and the literature review in Chapter 1.
3. This thesis was written from a positive psychology paradigm and as such does not investigate the barriers and challenges to health and well-being or happiness.

## **Study Limitations**

1. The study population comprised a high proportion of people identifying as being of Pacific or Asian Indian ethnicity. It is possible that there were measurement issues with terminology and comprehension.
2. There were two samples used in study 2 which were from two distinct populations, therefore caution should be applied in generalising these findings across markedly different populations.
3. The test re-test reliability study was conducted over a two day period and may yield different results if conducted over a longer timeframe.

## **Chapter One: Review of the Literature**

### **Health definitions and models**

The WHO defines health as “a state of complete positive physical, mental and social wellbeing and not merely the absence of disease or infirmity” (World Health Organisation, 1946). This definition has generated controversy ever since its inception in the 1948 Preamble to the Constitution of the World Health Organisation and has been called masterful or dysfunctional; profound or meaningless; and rejected as inviting medicalisation and abuse of state power in the name of health (Callahan, 1973). Bok (2008) insists the definition can function both as inspiration and as a cautionary example, by reminding us of the aspirations of WHO, while being conscious of the shortfalls that still exist in the practice of healthcare and health promotion around the world.

Despite this definition the current model of health internationally is a deficit disease or medical model. In this model the overwhelming priority is given to treating rather than preventing illness. As this model tends to view disease in terms of individual physiology and seeks biological causes to disease, it ignores the fact that the determinants of many diseases (especially chronic disease) can be attributed to social or lifestyle issues (Mishler, 1981). Approaches to public health and health promotion have historically been based on this same deficit model. While it is important and necessary to identify levels of need and health priorities, balancing this with an assets model (a model which supports the creation of health) can “accentuate positive capability to activate solutions” (Morgan & Ziglio, 2007, p17).

## **Chronic disease, cardiovascular disease: epidemiology**

Traditionally, public health efforts involved the prevention of infectious diseases (e.g., smallpox, polio), using strategies such as large-scale screening and vaccination. These efforts have largely been effective in the developed world, and now chronic diseases, (diseases of long duration and generally slow progression such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes), are now the leading cause of death in developed nations. As such, an increasing focus of contemporary public health research in developed countries is the promotion of health through understanding and reducing risk factors for chronic, non-communicable diseases, both at the individual and population level.

The prevalence of chronic diseases accelerated from the 1990s due to increased urbanisation and industrialisation. This resulted in populations exhibiting more sedentary lifestyles coupled with a marked increase in the intake of dietary fats and processed foods. Around the 1970s this acceleration in chronic disease prevalence leveled off and in some cases, begun to decline (Baum, 2008). Possible reasons for this are a combination of development of medications, mass education on the dangers of smoking and high cholesterol levels, and some general lifestyle shifts. Despite this encouraging trend, chronic diseases remain the largest global health issue of our time. WHO developed the Global Burden of Disease Study in 1990 to ensure a consistent framework was available to compare the burden of disease and injuries, and the risk factors that cause them, in different populations. This study also introduced a new metric; the disability adjusted life year (DALY) which extends the years of lost life (YLL) in the population to include equivalent years of healthy life lost to poor health

and disability. The most recent update from the Global Burden of Disease Study in 2004 shows that preventable deaths related to lifestyle diseases make up the majority of all deaths worldwide, with 21.9 % of deaths being attributed to Ischaemic heart disease and Cerebrovascular disease. Combined these two CVDs are also responsible for the greatest number of DALYs (7.2% overall, Table 1). As can be seen in Figure 1, CVD's were the leading cause of death in the world in 2004, particularly among women; causing 32% of all deaths in women and 27% in men in 2004. This equates to 12.9 million deaths of an estimated 59 million deaths (World Health Organisation, 2008). WHO predicts that, globally 17.4 million people will die from CVDs in 2030 and that it will be the leading cause of death worldwide. Figure 2 illustrates this trend with Ischaemic heart disease and stroke combined to be the leading cause of death worldwide. Cancer and road accidents are predicted to be the other major causes of death to increase by 2030, with HIV/AIDS, tuberculosis, and malaria (all infectious diseases) predicted to decrease.

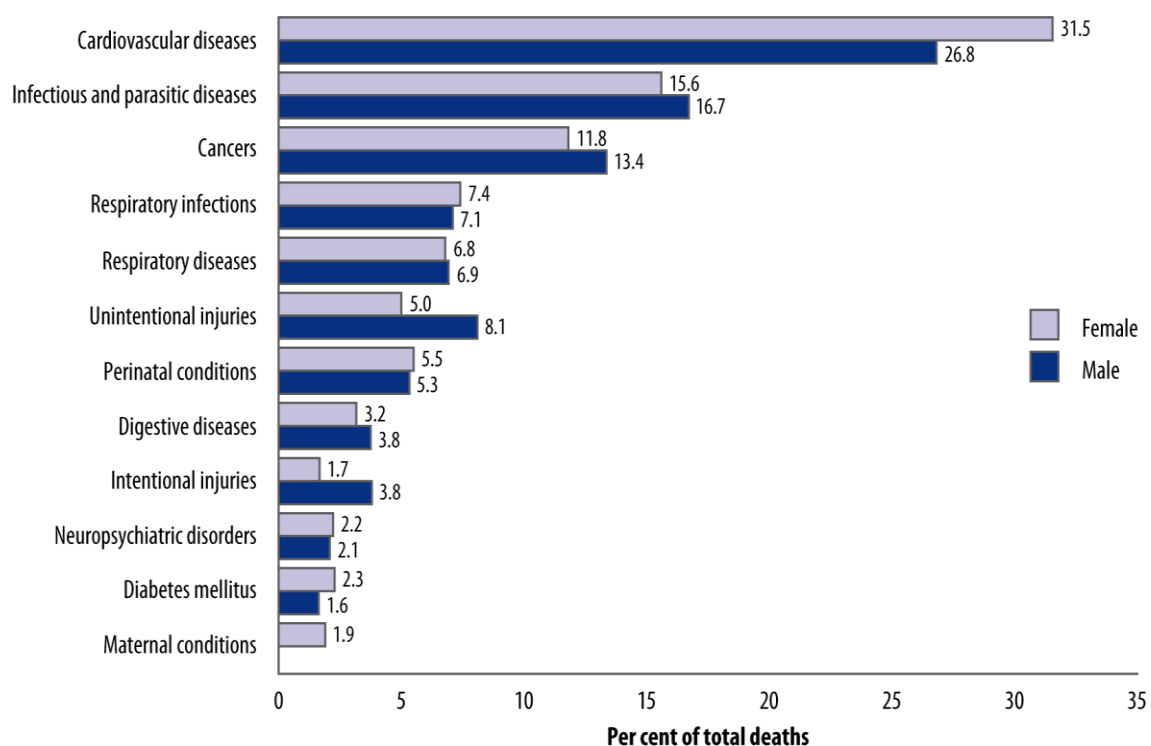
Table 1: Leading causes of mortality and burden of disease in the world, 2004

<b>Mortality</b>	<b>%</b>	<b>DALYs</b>	<b>%</b>
Ischaemic heart disease	12.2	Lower respiratory infections	6.2
Cerebrovascular disease	9.7	Diarrhoeal diseases	4.8
Lower respiratory infections	7.1	Depression	4.3
COPD	5.1	Ischaemic heart disease	4.1
Diarrhoeal diseases	3.7	HIV/AIDS	3.8
HIV/AIDS	3.5	Cerebrovascular disease	3.1
Tuberculosis	2.5	Prematurity, low birth weight	2.9
Trachea, bronchus, lung cancers	2.3	Birth asphyxia, birth trauma	2.7
Road traffic accidents	2.2	Road traffic accidents	2.7
Prematurity, low birth weight	2.0	Neonatal infections and other	2.7

Note: data from World Health Organisation, (2008)

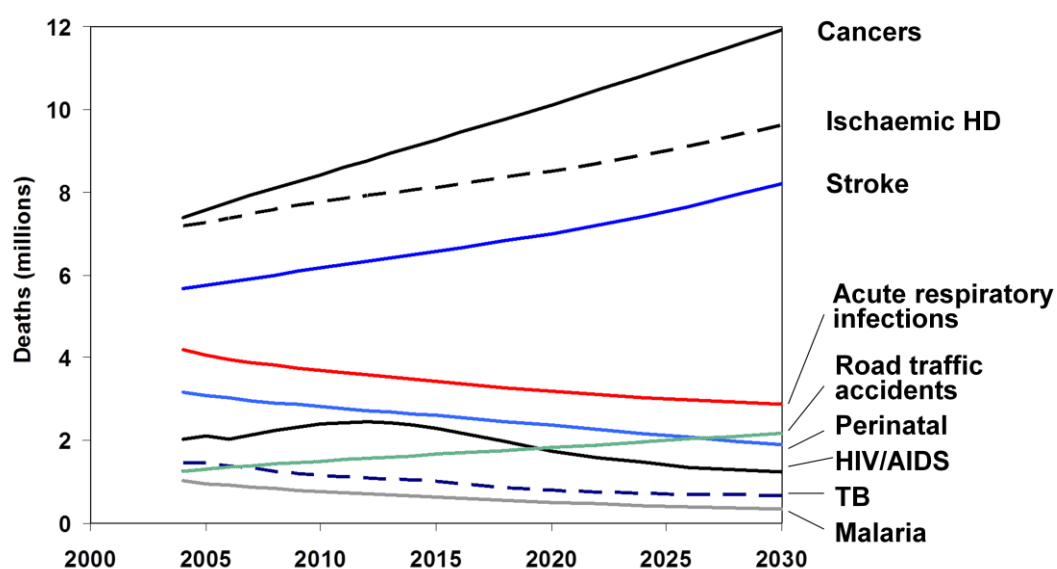
Key: COPD = Chronic obstructive pulmonary disease; DALY = disability life adjusted years.

Figure 1: Distribution of deaths by leading cause groups, males and females, world, 2004



Note: From World Health Organisation, (2008)

Figure 2: Global projections for selected causes, 2004 to 2030



Note: From World Health Organisation, (2008).

## Cardiovascular disease: epidemiology in New Zealand

Cardiovascular diseases are the leading cause of death and hospitalisation in New Zealand (see table 2), accounting for 41% of all deaths in 1999. It is also the leading cause of years lost to premature mortality, accounting for 33% of YLL between 45 and 64 years of age. Māori have the highest rates of mortality for all categories of CVD; Māori are 1.8 times more likely to die from CHD than non-Māori and the mortality rate for Māori aged under 65 is almost three times higher than non-Māori (Hay, 2001).

Table 2: Leading causes of death in New Zealand, 2000

<b>Total population (% rounded)</b>	<b>Males</b>	<b>Females</b>	<b>Total</b>
Coronary heart disease	24	21	22
Other diseases of the heart and circulation	7	10	8
Cerebrovascular disease	8	13	10
Cancer (all forms)	30	27	29
Chronic obstructive pulmonary disease	6	4	5
Pneumonia and influenza	1	2	1
Transport accidents	3	1	2
All other causes	22	23	22

Note: Data from Hay, (2001)

Despite these statistics, currently there are no national systematic cardiovascular screening programmes in New Zealand. Tools are available, however for cardiovascular risk assessment by providers such as primary healthcare organisations and private health providers. The National Heart Foundation of New Zealand spends a large proportion of its time and resources on health promotion and prevention of CVDs in contrast with our national health system which operates predominately in primary and secondary cardiovascular health care. A key population health objective of the Ministry of Health (MOH) is to reduce the incidence and impact of CVD in New Zealand by prevention, management and the reduction of health inequalities.



A study in 2006 aimed to inform district health boards and primary healthcare organisations by producing population estimates of CVD prevalence and distribution of CVD risk in New Zealanders to ensure systematic identification and management of CVD risk. They found that of the projected 2.09 million people aged over 35 in New Zealand in 2005, approximately 1.5 million (72%) would meet the criteria for formal CVD assessment. Approximately 151,000 people (7%) have suffered a heart attack or stroke or have angina. About 272,000 people (13%) are at high CVD risk (>15% based on the Framingham equation) and a further 10% of the total population are at moderate risk (10-15%). The authors recommended that if those people most at risk are identified and managed then New Zealand has the potential to substantially reduce CVD as the leading cause of mortality and morbidity and reducing health disparities between ethnic and socioeconomic groups (Wells, Broad, Jackson, 2006).

### **Cardiovascular disease: pathophysiology**

Cardiovascular disease refers to any disease that affects the cardiovascular system and blood vessels. These include CHD, cerebrovascular disease (stroke), congestive heart failure, rheumatic heart disease, congenital heart disease and peripheral artery disease. The debilitating and often fatal complications of CVD are most often seen in the middle aged or elderly, however the main pathological process leading to CVD is atherosclerosis which begins early in life and progresses gradually throughout the lifespan. Atherosclerosis involves deposits of fatty substances, cholesterol, cellular waste and calcium in the endothelium of an artery. This build up is called plaque and thickens the endothelium significantly, reducing the diameter of the artery decreasing blood flow and reducing oxygen supply. When these blood vessels become too narrow

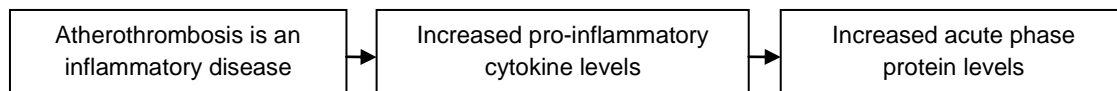
and hardened a blockage that prevents blood flowing to the heart or the brain results in a heart attack or stroke, respectively (American Heart Association, 2003).

There is a growing evidence base on the role of chronic inflammation in CVD and indeed in most chronic diseases. Inflammation is the activation of the immune system in response to infection, irritation or injury. It is characterised by an influx of white blood cells, redness, heat, swelling, and pain. Acutely, inflammation acts as a defense mechanism for the body. Chronic inflammation however, is harmful and linked with CVD as the inflammation eventually damages the arteries which can cause hemorrhaging (American Heart Association, 2003).

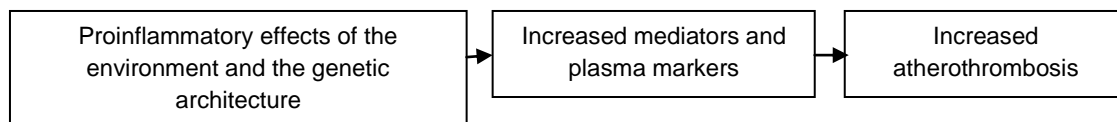
The inflammatory component of CVD was recognised over 150 years ago by Virchow (1858) but it was not until recently that researchers have been able to clearly link inflammation and CVD. In 2003 Tracy reviewed the emerging relationships of inflammation and CVD. The review discusses the work of Meades et al. (1986) who identified fibrinogen as a risk marker with approximately the same strength to that of cholesterol and that of another acute-phase protein called C-reactive protein. A large number of epidemiological studies then showed that higher values of C-reactive protein indicated higher CVD risk. It was unclear however if these high levels of acute-phase proteins reflected the underlying disease or actually contributed to it. Figure 3 illustrates three possible ways of looking at the relationship of inflammation mediators and markers to atherothrombotic disease. Tracy (2003) proposed that the third model is most likely, that is, that vascular disease is in fact an inflammatory process, and that markers of inflammation reflect this underlying process, but that these markers also participate in the process, making it worse.

Figure 3: Complex interplay of atherothrombotic disease with plasma markers of CVD risk: a positive feed-back pathway. (Tracy, 2003).

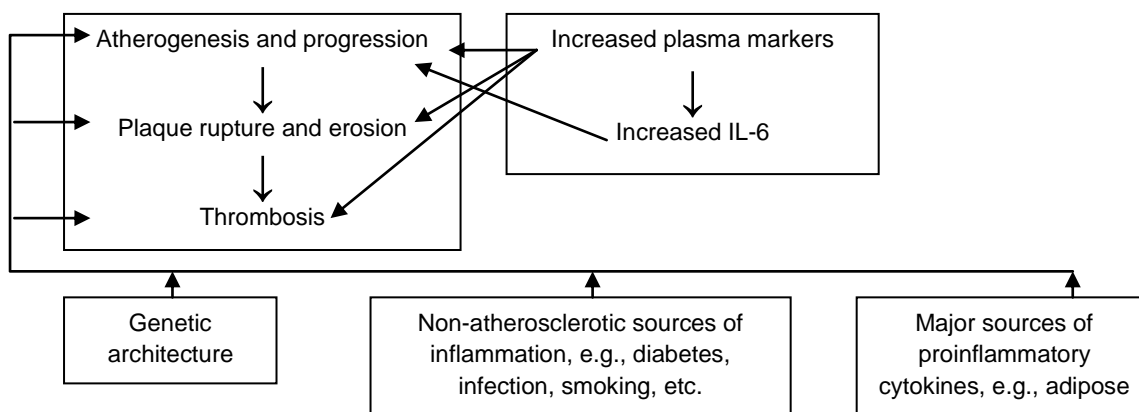
*In model 1, the plasma inflammation marker simply reflects the underlying disease:*



*In model 2, increased inflammation mediators/markers cause the disease:*



*The positive feedback model combines models 1 and 2:*



## Aetiology and risk factors of cardiovascular disease

Risk factors statistically increase the probability of developing CVD rather than the certainty of developing CVD. The risk factors discussed in detail below have been identified after many years of epidemiological research and longitudinal studies and causal relationships have been repeatedly shown. CVD is caused by a number of risk factors, both modifiable, and non-modifiable; however the main contributing risk factors to CVD are lifestyle-related and modifiable, meaning that CVD is largely preventable.

Non-modifiable factors for CVD risk are age, gender, ethnicity and family history. The risk of CVD increases with age and the majority of people who die from a heart attack are aged 65 or older (Corti, Guralnik & Bilato, 1996). Age remains one of the strongest predictors of the disease and while nothing can be done to reduce age, modifying other risk factors may delay the degenerative changes associated with aging.

Men are more likely than women to develop CVD, especially before the age of 40, however after menopause the risk for women increases but not to the same level as for men (American Heart Association, 2003). It is not completely understood if this is because androgens increase risk or if estrogens are protective, however the fact that women's risk rises after menopause suggests the protective role of estrogens is the predominant factor. Nevertheless CVD is the number one cause of death for women in New Zealand at 44% of total deaths and men at 39% of total deaths (Hay, 2001).

Another significant factor is ethnicity; in New Zealand, age-specific death rates are two to three times higher for Māori compared with non-Māori in those aged less than 75 years. The rate of stroke mortality for Pacific peoples is highest, followed by Māori, European/Other and Asian respectively (Hay, 2001). It is not yet understood the exact combination of factors such as smoking, access to healthcare, and socioeconomic factors that contribute to the disparity of CVD outcomes in these ethnic groups.

Internationally African Americans are two times more likely to have high blood pressure which increases the risk of CVD than Europeans (American Heart Foundation, 2003). It appears that there is a hereditary tendency towards CVD, having close relatives that have had a heart attack or stroke before 50 years of age increase an individual's risk. In some cases such as familial hypercholesterolemia (very high cholesterol levels) the pattern of inheritance is well understood but for most CVD risk

factors the specific way in which inheritance plays a role is not clear. In addition to hereditary factors, environment plays a role; for example prior generations did not have the level or access to medical care or knowledge regarding health promoting behaviours as current generations do (American Heart Association, 2003).

The main contributing factors to CVD, however, are lifestyle related and modifiable. Indeed, interventions to improve lifestyle behaviours such as physical activity and nutritional practices have had a positive effect on CVD mortality and quality of life including DALY reduction. The risk factors involved in CVD are complex and often interact with each other, operate up or down stream from each other, or in concert with each other to provide an identifiable total risk. Individual modifiable risk factors and their relationship with CVD are discussed in more detail below.

### *Smoking*

Cigarette smoking is a major contributor to CVD even though smokers tend to be thinner and have lower blood pressure than non-smokers. Individuals who smoke, regardless of their level of other risk factors, are at significant risk of premature CVD and death. In New Zealand the results from the 2006/07 New Zealand Health Survey showed that one in five adults (19.9%) were current smokers and Māori adults had one and a half (for men) to two times (for women) the rate of smoking compared to men and women in the total population (Ministry of Health, 2008a). Overwhelming evidence shows that smoking is detrimental to health and is a risk factor in CVD (Yusuf, et al, 2004) and the Framingham Heart study shows that the risk of sudden death increases more than tenfold in men and fivefold in women who smoke (Anderson, Wilson, Odell & Kannel, 1991). There is also a large body of evidence from cohort studies regarding the beneficial effect of smoking cessation on CVD (Center for Disease Control, 1990).

Some studies suggest that about 10 years after stopping smoking mortality risk is reduced to that of people who have never smoked (Qiao, Terrahauta, Nissinen, & Tuomilehto, 2000). Other studies report that a much longer time is required (Ben-Shlomo, Smith, Shipley, & Marmot, 1994) or that the age of quitting has an impact on survival (Doll, Peto, Boreham, & Sutherland, 2004). It is well accepted however that having never smoked cancels out this risk factor and quitting smoking reduces it considerably, although many people are still exposed to the detrimental effects of smoking through passive smoking.

### *Sedentary behaviour and physical activity*

There is international acceptance that sedentary behaviour is detrimental to health while physical activity is beneficial to health (Blair, Lamonte, & Nichman, 2004; Tremblay, Colley, Saunders, Healy, & Owen, 2010). Physical activity improves cardiovascular fitness, has beneficial effects on weight control, lowers blood pressure, and can reduce inflammation (Fletcher, Balady, Froelicher, Hartley, Haskell & Pollock, 1995; Smith, Dykes, Douglas, Krishnaswamy & Berk, 1999). Since the seminal work of Morris in establishing a link between physical inactivity and chronic disease (Morris, Heady & Raffle, 1953) and the early studies of Paffenbarger, Hyde, Wing, & Hsieh, (1978), numerous studies have confirmed and extended the knowledge on the benefits of physical activity to health. Inadequate physical activity has been recognized as an independent risk factor for premature development of CHD. It has been estimated that approximately 12 percent of all mortality in the United States is related to the lack of regular physical activity and that physical inactivity is associated with at least a twofold increase in the risk for coronary events, (Powell, Thompson, Caspersen & Kendrick, 1987).

More recently several meta-analyses have examined the association between physical activity and CVD. Berlin & Colditz (1990) found that the risk of death from CHD was higher for people with sedentary occupations compared to those with active occupations. In 2004 Oguma & Shinoda-Tagawa showed that physical activity was associated with a reduced risk of overall CVD, CHD, and stroke. This reduced risk showed a dose-response up to a certain level of activity. In addition to the amount of exercise, the degree of cardiovascular fitness, as determined by the duration of exercise and maximal oxygen uptake on a treadmill, is also associated with a reduction in risk in overall cardiovascular mortality (Balady, Larson, Vasan, Leip, O'Donnell & Levy, 2004).

In New Zealand public health guidelines recommend that adults are physically active for at least 30 minutes a day on most days of the week. In the 2006/07 New Zealand Health Survey half of adults (50.5%) reported that they were regularly physically active, meeting the guidelines. One in seven adults were classified as sedentary and there was an increase in sedentary behaviour from the previous survey in 2002/03 (Ministry of Health, 2008a). In summary, a sedentary lifestyle is associated with increased risk of CVD and physical activity is a protective factor for CVD.

### *Inadequate nutrition*

There is a considerable body of evidence regarding the effects of nutrition on CVD however much of this evidence is from observational studies which may not have adequate controls for confounding factors. Inadequate nutrition includes overeating and plays a major role in weight gain and obesity, another risk factor for CVD. Increasing the intake of fruits and vegetables may reduce the risk of CVD through a variety of micronutrients, antioxidants, phytochemicals, flavonoids and fibre. As the evidence on

the individual nutrients is inconclusive the current recommendations is to eat a variety of fruits and vegetables daily (World Health Organisation, 2007). The 2006/07 New Zealand Health Survey shows that there is an increasing trend of adequate fruit intake but a decline in the proportion of men and women who consumed the recommended three or more servings of vegetables per day (Ministry of Health, 2008a). In 1997 Ness and Powles reviewed studies examining the association of consuming fruit and vegetables with CVD. For CHD, 11 out of 13 ecological and case control studies found a significant protective effect. For stroke, 9 out of 13 studies found a significant protective effect. Joshipur et al (2001) evaluated the association between fruit and vegetable consumption and CHD in the Nurses' Health study. Their results were consistent with Ness and Powles' review that support a protective effect of fruit and vegetable intake on CVD risk.

Population studies have shown that high sodium (salt) intake is associated with an increased risk of high blood pressure, a significant risk factor for CVD. Conversely the efficacy of reduced sodium intake in lowering blood pressure is well established (Stamler et al, 2006; Cohen, Hailpern, Fang, & Alderman, 2006; Cutler, Follmann & Allender, 1997). There is also extensive evidence to show that saturated fat intake raises low density lipoprotein (LDL) cholesterol while polyunsaturated fatty acids and monounsaturated fatty acids lower total cholesterol and LDL cholesterol (Hu, Manson & Willett, 2001; Mensink & Katan, 1992). Taken together, the evidence shows that high dietary intake of saturated fat and salt and low intake of fruits and vegetables are linked to cardiovascular risk. There is strong evidence that reducing saturated fat, salt and increasing fruit and vegetables is cardio protective and can help prevent overweight and obesity.



## *Obesity*

Obesity is a major health issue, even though in some cases there is evidence of a flattening in the increase of obesity, e.g., in children (Olds & Maher, 2010).

Epidemiological studies have shown a relationship between overweight and obesity with CVD (McGee, 2005; Wilson, D'Agostino, Sullivan, Parise & Kannel, 2002).

Obesity is also strongly related to other CVD risk factors of raised blood pressure and type 2 diabetes (Haslam & James, 2005). It also appears that how weight is distributed may be more important than exactly how much people weigh. Android obesity or central adiposity refers to carrying excess weight around the abdominal area and is associated with an increased risk of CVD, hypertension and type 2 diabetes (Lee, Jacobs, Schreiner, Iribarren & Hankinson 2007). Weight status is most commonly classified using BMI calculated as  $\text{kg/m}^2$ , where kg is weight in kilograms, and m is height in meters. People who are obese (i.e. a BMI of  $30 \text{ kg/m}^2$  or greater) are two to three times more likely to develop CHD than those who are not obese. In New Zealand one in three adults (36.1%) are overweight and a further one in four (25.5%) are obese (Ministry of Health, 2008a).

A meta-analysis of randomized controlled trials has shown that a weight reducing diet combined with physical activity reduces LDL cholesterol and improves control of blood pressure and diabetes (Avenell et al, 2004). A combined approach of diet and physical activity with behavioural therapy appears to be the most successful strategy for sustained weight loss and reduction in CVD and the risk factors of CVD.

### *Hypertension*

High blood pressure or hypertension is estimated to cause about 7 million premature deaths worldwide, 4.5% of the disease burden, and 64 million DALYs. It is a major risk factor for CVD and often coexists with other CVD risk factors, such as obesity, type 2 diabetes, and dyslipidaemia (World Health Organisation, 2008). Results from the Framingham Heart Study showed that people with hypertension had a higher death rate, when all causes were added together, than did those with normal blood pressure readings (Anderson, Wilson, Odell & Kannel, 1991).

Hypertension is classified as blood pressure readings that consistently exceed 140/90mmHg with both levels determining an individual's risk; however hypertension may be diagnosed with high levels of either diastolic or systolic blood pressures independent of the other. Trials with individuals at high CVD risk show reductions in CVD morbidity in people whose blood pressure is reduced to levels below the above thresholds (Miura et al, 2001). In New Zealand there was an increase in the prevalence of high blood pressure for men (no increase for women) from 2002/03 to 2006/07. In 2006/07 one in seven adults had high blood pressure requiring medication (Ministry of Health, 2008a); however the actual number is likely to be much higher due to the asymptomatic nature of hypertension. Treating hypertension with antihypertensive drugs and lifestyle changes can make a substantial reduction in the risk of CVD.

### *Elevated serum cholesterol*

Elevated levels of serum lipids (cholesterol and triglycerides) are one of the most important risk factors for CVD. The level of total cholesterol in the blood is a strong predictor of CVD and stroke. Levels of total cholesterol under 200mg/dl are considered to be normal, those between 200 and 239 mg/dl to be borderline high and levels above

240mg/dl high. However two types of cholesterol can be measured independently: high density lipoprotein (HDL) and LDL cholesterol and much evidence has shown the higher the HDL the higher the risk while LDL protects against CVD (Pignone, Phillips & Mulrow, 2000).

Approximately one in six adults in the USA have high cholesterol and people with high cholesterol have twice the risk of developing CVD than those with cholesterol level in the normal range (Centre for Disease Control, 2009). In New Zealand one in twelve adults reported having levels of cholesterol that required the prescription of cholesterol-lowering medication in 2006/07 (Ministry of Health, 2008a) but like blood pressure, high cholesterol is asymptomatic and so the actual prevalence is likely to be far greater. A number of randomized trials have shown that reductions in total and LDL-cholesterol levels (almost entirely with statins) reduce coronary events and mortality and a diet low in saturated fat and cholesterol can lower serum cholesterol by an average of 5% (Downs, et al., 1998).

### *Type 2 diabetes*

Diabetes mellitus or type 2 diabetes is a serious disease in itself as well as a major risk factor for CVD. Diabetes is defined by the body's inability to control blood glucose (glycaemia). Diabetes is a chronic condition, which can also cause kidney failure, eye disease and foot ulceration. In addition to the importance of diabetes as a risk factor, diabetics have a greater burden of other CVD risk factors than non diabetics, including hypertension, obesity, and increased total-to-HDL-cholesterol ratio (World Health Organisation, 2008).

In New Zealand, it is estimated that the number of people diagnosed with diabetes exceeds 200,000 (predominantly type 2 diabetes) and it is estimated there are an additional 100,000 people with undiagnosed diabetes. Within the New Zealand population, the prevalence of diabetes in Māori and Pacific populations is around three times higher than among other New Zealanders (Ministry of Health, 2010).

Worldwide, CVD accounts for 60% of all mortality in people with type 1 and type 2 diabetes, the risk of cardiovascular events is two to three times higher in people with diabetes and disproportionately higher in women (Laing, et al, 2003). Multiple studies have shown that improvements in diet, weight reduction and physical activity can ensure good glycaemic control and substantially improve the CVD outcomes and reduce the incidence of type 2 diabetes (DCCT/EDIC Study Research Group, 2005).

### *Psychosocial factors*

Psychosocial factors such as stress, anxiety, depression and personality type may contribute to the early development of atherosclerosis and future development of CVD both directly through increased inflammation and indirectly through increasing traditional risk factors such as smoking, hypertension and sedentary behaviour (Rozanski, Blumenthal, & Kaplan, 1999). Observational studies have indicated depression, anxiety, and stress can influence the major risk factors of CVD (Rugulies, 2002). In a Finnish cohort study it was found that employees with high levels of stress had a CVD mortality risk 2.2 times that of their less stressed colleagues (Kivimäki, Leino-Arjas, Luukkonen, Riihimäki, Vahtera & Kirjonen, 2002). A study of 1305 men with a mean age of 62 years found that symptomatic depression, as measured by the Minnesota Multiphasic Personality Inventory, was associated with an increased risk of CHD and angina pectoris (Sesso, Kawachi, Vokonas, Sparrow, 1998).

Other personality traits and affective disorders may be associated with the development of CHD. The Normative Aging Study followed 1305 men who were free of CHD and completed the Minnesota Multiphasic Personality Inventory. After a mean follow-up of 7-8 years, those with the highest level of depression, anger, or social competitiveness (dominance) had an increased risk of CHD compared to those with the lowest levels (Januzzi, Stern, Pasternak, DeSanctis, 2000; Siegman, Kubzansky, Kawachi, Boyle, Vokonas & Sparrow, 2000). An association between type A personality (a sense of time pressure, chronic impatience and excessive hostility) and exaggerated cardiovascular responses has been shown (Corse, Manuck, Cantwell, Giordani, & Matthews, 1982). The research on the contribution of psychosocial risk factors to CVD is not conclusive but the above studies illustrate the associations quite clearly.

### **Positive psychology**

Increasing focus within psychology and health research is being placed on “positive psychology”, a new area of psychology that is interested in positive emotions and the effect of positive emotions on mental and physical wellbeing (Seligman, Steen, Park & Peterson, 2005). Positive psychology has grown from the recognition of an imbalance in psychology where most research has focused on mental illness rather than mental wellness. Martin Seligman, the founder of Positive Psychology, maintains “there are two complimentary strategies for improving the human condition. One is to relieve what is negative in life; the other is to strengthen what is positive” (Seligman, 2002, pg11). This field is not intended to replace psychology which necessarily focuses on the negative – depression, mental illness, and adversity – but to provide researchers with the option to study character strengths, virtues, optimism, and well-being. The psychology field has made great progress in finding out what is wrong with individuals or groups

but very little about what is right with people. In one metaphor, psychology was said to be learning how to bring people up from negative eight to zero but not as good at understanding how people rise from zero to positive eight (Gable & Haidt, 2005). While it is acknowledged that those who are suffering should be helped before those who are doing well, positive psychology supposes that an understanding of strengths can help lessen or prevent disease or stress.

The dimensions of positive psychology focus on three areas of human experience; at the subjective level positive or subjective states such as happiness, joy satisfaction with life and optimism are studied; at the individual level positive individual traits are studied such as character strengths or virtues; and at the group or societal level positive psychology focuses on the development and maintenance of positive institutions (Compton, 2005).

For the past ten years the primary goal of positive psychology has been to increase happiness both individually and at a group and societal level but the future task of positive psychology is to understand how the factors that build strengths contribute to physical health, subjective well-being, functional groups and flourishing institutions (Gable & Haidt, 2005).

## **Happiness**

Since Aristotle's time many thinkers have considered happiness an appropriate goal for society and in 1776 the American Declaration of Independence listed the rights of all men to life, liberty and the pursuit of happiness. Jeremy Bentham, a utilitarian philosopher in 18<sup>th</sup> century England identified happiness as the sum of pleasures and

pains (Bacon, Brophy, Mguni, Mulgan & Shandro, 2010). Happiness is a key component of wellbeing but there is little consensus on its definition or cause. Happiness is defined by Argyle (1997) as a positive inner experience. Veenhoven (2003) describes happiness as the ultimate goal of life while Diener (1984) suggests that happiness is the sum of many small pleasures which may fluctuate substantially over time.

These differing definitions confirm that happiness is very much a subjective construct. There are two broad concepts of happiness; hedonic and eudaimonic. The hedonic concept focuses on subjective well-being and is defined as more positive affect, less negative affect, and greater life satisfaction (Diener & Lucas, 1999); in contrast the eudaimonic concept focuses on psychological well-being and is defined as meaningfulness (McGregor & Little, 1998).

Different theories exist about the causes of happiness, for example social comparison theories suggest that happiness results from a comparison between a standard and an actual condition while telic theories suggest that happiness is gained when some state, goal or need is fulfilled and activity theories state that happiness is obtained from social interaction, leisure or other specific activities (Furnham & Cheng, 1997).

Studies examining personal or lay causes of happiness have found multiple causes for happiness from intelligence, physical attractiveness, financial security, friends, social networks and extrovert personality types (Furnham & Brewin, 1990). The results would suggest that no single factor is responsible for happiness. Diener and Seligman (2002, p84) suggest that “happiness is like beautiful symphonic music – necessitating many instruments without any one being sufficient for beautiful quality”.

A number of tools have been developed to assess differing concepts of positive psychology, for example, gratitude, optimism, work-life satisfaction, and happiness (Veenhoven, 2003). Happiness in particular has been seen as an extremely subjective concept and thus the accurate quantification of this construct has been limited. Differing measures of happiness have been developed, including the Fordyce Emotions Questionnaire, the Subjective Happiness Scale, and the Steen Happiness Index (SHI). The Fordyce Emotions Questionnaire is a brief measure of current happiness (Fordyce, 1987). The Subjective Happiness Scale (SHS) assesses respondent's subjective sense of global happiness (Lyubomirsky & Lepper, 1999). The SHI was developed to capture upward changes in happiness and was designed to be sensitive to changes in levels of happiness (Seligman, Steen, Park & Peterson, 2005). More specifically the SHI evaluates changes in happiness based positive emotions, engagement, and meaning in life. The original SHI consisted of 20 items with five statements from which respondents must choose one to describe themselves in the present. The SHI has been changed from 20 items to 24 items and has been renamed the AHI.

Assessing overall happiness may be particularly important in health related research, to identify relationships between happiness and health. Ensuring the tools used to measure happiness are valid and reliable is vital. Compared with the SHS and the Fordyce Emotions Questionnaire, the AHI offers a tool to measure current state happiness with the ability to capture changes in happiness, rather than being a global or general trait measure of happiness.



## **Happiness and health**

It is widely acknowledged that mental factors may influence physical functioning, psychological well-being has a positive effect on health, and mental distress has negative effects on physical health. Therefore a common assumption is that being happy is conducive to good health. The topic of health and happiness has been studied in some detail and the majority of studies find that happiness and health are positively associated. Yet there are also exceptions to this, for example Van Dam (1989) argues that positive attitude cannot stop serious illness and the idea of fighting cancer with happiness can even be harmful. There is also some doubt about the protective effect of happiness and even reports of greater mortality among happy people as a result of their more risky lifestyle (Friedman, Tucker, Tomlinson-Keasey, Schwartz & Wingard, 1993).

To balance this negativity many more studies have found consistently positive relationships and that these relationships can work in both directions i.e., that happiness can improve health and that healthy people are happier (Feist, Bodner, Jacobs, & Miles, 1995). The findings of two meta-analyses (Argyle, 1997; Veenhoven, 2008) indicate that happiness does not predict longevity in sick populations but that it does predict longevity in healthy populations. There is now convincing evidence that happiness directly affects health positively and that happy people are more likely to engage in protective or positive health behaviours.

A study with young Swiss adults showed that feeling happy most of the time was strongly associated with good health, however it was acknowledged that most of the participants felt happy either all of the time or most of the time (Perneger, Hudelson &

Bovier, 2004). This over-reporting of happiness can result in bias and cause problems with the validity of happiness measures. A larger study of older adults found that self-reported health was a better predictor of happiness than objectively reported health (Angner, Ray, Saag & Allison, 2009). This does not mean that the relation with 'real health' is weaker as objective measures do not capture all relevant aspects of health.

An emerging area of research is that of happiness and physical activity and the research suggesting that increasing physical activity can lead to improvements in mental and physical health is persuasive (Biddle, 2000). There is limited evidence however that physical activity can also improve satisfaction with life, and may increase overall happiness (Giaccoobbi, Hausenblas & Fry, 2003). Some recent studies have shown that physical activity is related to higher life satisfaction (Fox, Stathi, McKenna & Davis, 2007; Stubbe, de Moor, Boomsma & de Geus, 2007), yet others have found no relationship (Netz, Wu, Becker & Tenenbaum, 2005). A possible explanation for these conflicting results could be the differing measures that have been used to quantify physical activity.

On the balance of evidence it is apparent that there is a positive association with health and happiness but as yet actual causality is unclear. Barak (2006) commented that happiness is a key component of positive well-being although the relationship between happiness and health is complex.

## **Cardiovascular disease and happiness**

Emerging research suggests that simply having a positive effect may be beneficial for reducing cardiovascular risk, purportedly through mechanisms of reduced inflammatory processes. As discussed previously in this review, negative affective states such as depression are associated with premature mortality and increased risk of CVD and it has been suggested that positive affective states such as happiness are protective, but the pathways through which these affects may be mediated are not well understood.

In a study by Steptoe, Wardle and Marmot (2004) it was found that increased levels of happiness decreased levels of cortisol, a key stress hormone related to abdominal obesity, type 2 diabetes, and hypertension (average difference of 32.1% between the lowest and highest happiness quintiles). Small but significant decreases were also found in heart rate and plasma fibrinogen (an inflammatory marker and predictor of future CVD) with increases in happiness.

Happiness has been studied in relation to its effect on BMI, which at levels of above 25, is a risk factor for CVD. In a study of 700 Dutch citizens BMI had a small negative effect on happiness but indicated that the effect of BMI on happiness is mainly indirect, via perceived health (Cornelisse-Vermaat, Antinides, Van Ophem & Van den Brink, 2006). In another study, Cook and Chater (2010) measured happiness in association with BMI and preventative health behaviours. It was found that those who have higher levels of happiness have lower BMI values and, importantly that this enhances health protective behaviours.

Several studies have explored the associations between CVD risk and optimism, emotional vitality, and level of life enjoyment which can be considered components of happiness. Giltay, Geleijnse, Zitman, Hoekstra and Schouten (2004) found high optimism produced a low ratio risk of 0.23 for CVD death. Similarly a positive correlation was found between high levels of optimism and increased protection against cardiovascular events (Kubzansky, Sparrow, Vokonas & Kawachi, 2001). Kubzansky and Thurston (2007) found a strong positive relationship between emotional vitality and lack of CVD. In a study to examine mental vitality and its associations with cardiovascular health, mental vitality in 1041 general patients was significantly associated with a decreased likelihood of having a diagnosis of CVD controlling for age and gender (Richman, Kubzansky, Maselko, Ackerson & Bauer, 2009). In a large scale longitudinal study, 88,175 Japanese men and women who were free of CVD at baseline were followed for twelve years. It was concluded that a lower perceived level of life enjoyment was found to be associated with higher risks of CVD incidence and mortality among middle aged men, suggesting a protective role of positive psychological conditions on CVD (Shirai, et al, 2009).

While happiness may have a synergistic/positive relationship with CVD, little is known of these relationships as there is a paucity of studies that have investigated associations between CVD and happiness, the relationships of these CVD risk factors, and the effect of individual CVD risk factors on happiness. Positive psychology and health researchers need to collaborate to increase the research output in the area of health and well-being to further the existing data that supports a link between happiness and improved cardiovascular outcomes.

## **Chapter Two: Happiness and health: associations with cardiovascular disease risk factors**

### **Preface**

It was identified in the previous chapter that little was known about the relationships that may exist between CVD risk factors and health behaviours and happiness. The evidence presented in Chapter 2 aims to explore these relationships by examining individual risk factors and health behaviours, and total CVD risk, in relation to happiness.

This paper adds to the limited body of evidence in this field by examining links between physical and behavioural risk factors for poor cardiovascular health and their links to psychological well-being beyond mental ill health (e.g., depression, anxiety and stress). This study looks carefully for associations between happiness and positive health behaviours.

## **Introduction**

As far back as 1946 WHO defined health as “a state of complete positive physical, mental and social wellbeing and not merely the absence of disease or infirmity” (World Health Organisation, 1946). Traditionally, the majority of research in the health field has considered health as the absence of disease; however there is a growing body of research on positive mental and physical wellbeing as health indicators.

There is now a wealth of evidence to show the benefits of physical activity to physical health and reducing the risk of chronic disease such as CVD (Paffenbarger, Hyde, Wing & Hsieh, 1986; Warburton, Nicol & Bredin, 2006; Brach, Simonsick, Kritchevsky, Yaffe, & Newman; Wessel et al, 2004). In addition to the physical health benefits of physical activity, research also suggests that physical activity can benefit mental health and emotional wellbeing (Stephens, 1988; Fox, 1999; Biddle & Mutrie, 2001; Hamer, Stamatakis & Steptoe, 2008). Positive mental health comprising positive emotion, engagement, purpose, and happiness is not merely the absence of mental illness and is quantifiable (Seligman, 2008). Happiness has been seen as an extremely subjective concept however, and thus the accurate quantification of this construct has been limited. Within the new field of positive psychology it is now possible to use a number of valid and reliable tools to measure concepts such as happiness such as the AHI, a measure of overall happiness.

There has been an increasing amount of research investigating whether positive emotions have a protective effect on physical health. In a review of the literature on positive affect, Pressman and Cohen (2005) found that positive affect is associated with lower morbidity and increased longevity for older individuals. More specifically to this

study, happiness and health has been the subject of much research. In an analysis of 30 studies Veenhoven (2008) tested the notion that happiness is good for your health and found that happiness does not predict longevity in sick populations but it does so in healthy populations. The size of this effect was stronger than that of smoking or not. In a study of health and happiness of young Swiss adults Perneger, Hudelson & Bovier (2002) found the association between happiness and mental health to be strong and yet the association between happiness and physical health was weak and statistically non-significant. Cook and Chater (2010) examined the relationship between happiness, BMI and preventative health behaviours. They found that happiness significantly enhanced health preventative behaviours, and that those who expressed higher levels of happiness had a lower BMI.

In addition several studies have explored the associations between CVD risk and positive emotion. Giltay, Geleijnse, Zitman, Hoekstra and Schouten (2004) found high optimism produced a low ratio risk of 0.23 for CVD death compared with high pessimism when adjusted for age, sex, chronic disease, smoking and alcohol consumption. Similarly a positive correlation was found between high levels of optimism and increased protection against cardiovascular events (Kubzansky, Sparrow, Vokonas & Kawachi, 2001). Kubzansky and Thurston (2007) reported a strong positive relationship between emotional vitality and lack of CVD. More recently, Richman, Kubzansky, Masello, Ackerson and Bauer (2009) found that mental vitality reduced the odds of cardiovascular outcomes and suggested that mental vitality may serve a protective function in the development of CVD.

Currently there is substantial evidence to suggest that being significantly unhappy is associated with negative cardiac outcomes (Wulsin & Singal, 2003) and evidence to

show positive affect is beneficial to health. There is limited information however on whether being happy provides cardio-protection. The aim of this study was thus to examine associations between happiness and the individual health behaviours that contribute to the risk of CVD.

## **Methods**

### **Study population and procedures**

Participants were recruited from one workplace based in Auckland, New Zealand. To be eligible participants were required to be aged 20 years or older and either part time or full time employees of the workplace. The workplace was a 'blue collar' workplace, with the primary business of producing biscuits and confectionery. Participants were recruited as part of the "Brief Interventions" project, a workplace intervention promoting and supporting healthy lifestyles. The data presented here are from the baseline assessment of this intervention study. All employees from the workplace were invited to participate. A team of health professionals and researchers visited the workplace and each participant underwent a CVD risk assessment and answered three questionnaires: The AHI, a physical activity and nutrition patterns questionnaire, and a demographic survey. Data were collected between 03 May and 14 May 2010.

Informed consent was gained from all participants and ethical approval was granted by the host institution ethics committee.



## Measures

### Self Report Measures

#### *Happiness*

The AHI was used as a measure of overall happiness (Seligman, Steen, Park & Peterson, 2005). The inventory comprises 24 questions to which there is a group of 5 statements as possible answers. Participants are asked to tick the one statement in each group which best describes the way they have been feeling in the past week, including the day of completing the questionnaire. Scores are coded on a scale of 1 to 5, with 5 indicating greater happiness levels (e.g., 1 = my life does not have any purpose or meaning, 5 = I have a very clear idea about the purpose or meaning of my life; 1 = I am pessimistic about the future, 5 = I feel extraordinarily optimistic about the future). No items are reverse scored. Participant's scores are summed and averaged to provide an overall happiness score.

#### *Demographic information*

Participants completed a brief demographic survey to identify sex, age, ethnicity and smoking status. Ethnicity was classified using Statistics New Zealand classifications (Statistics New Zealand, 2010). Smoking status was classified as non-smoking or smoking.

#### *Physical activity and nutrition patterns*

An omnibus questionnaire was used to assess health status and risk behaviors. The physical activity component comprised the New Zealand Physical Activity Questionnaire Short Form (NZPAQ-SF) (McLean & Tobias, 2004). The NZPAQ-SF is a modified version of the International Physical Activity Questionnaire Short Form, a

valid and reliable self-report instrument developed in 2003 (Craig et al, 2003). The NZPAQ-SF has been shown to be acceptable for measuring population level physical activity prevalence in the New Zealand population (McLean & Tobias, 2004). Two items from this survey were used in the current investigation, firstly: “What do you estimate is the total time that you spend sitting during an average day?” Item responses were categorised into 0-2 hours, 3-4 hours, 5-6 hours or more than 6 hours. The second item used was: “Thinking about all your activities over the last 7 days (including brisk walking), on how many days did you engage in at least 30 minutes of moderate activity that made you breathe a little harder than normal OR at least 15 minutes of vigorous activity that made you breathe a lot harder than normal?” Responses were categorized as sedentary (0 days), insufficiently active (1-4 days) and sufficiently active (5-7 days) in line with current New Zealand recommendations for physical activity (Hillary Commission, 2001). The nutrition component included questions from the 2006/07 New Zealand Health Survey that relate to dietary behaviours (Ministry of Health, 2008b). For the purposes of the current study, one item was examined, being: “Last week, on how many days did you have something to eat for breakfast?”

## Physical Measures

### *Body Mass Index*

Height was measured by stadiometer and weight was obtained using calibrated digital scales (Seca, Hamburg, Germany). BMI was then calculated as weight in kilograms/height in metres<sup>2</sup>. BMI data was categorised into normal, overweight and obese using WHO cut off points (World Health Organisation, 2006) and also taking into account differing ethnicity based cut off points for Māori, Pacific Island, and Asian Indian ethnicities (Rush, Freitas & Plank, 2009).

### *Waist circumference*

Waist circumference was taken midway between the inferior margin of the last rib and the crest of the ilium in a horizontal zone and was measured to the nearest 0.1 cm. Sex-specific thresholds were used to define waist circumference as low/normal or high (> 80 cm for women; > 94 cm for men) as per WHO international classifications (World Health Organisation, 2000).

### *Cholesterol*

Using the Cholestech LDX, a blood sample enabled testing of total cholesterol, HDL and LDL cholesterol levels. For this study, total cholesterol, HDL, and LDL cholesterol levels were examined as separate variables. Thresholds used to classify high total cholesterol, HDL, and LDL were 5.0 mmol/L, 1.0 mmol/L, and 3.0 mmol/L, respectively. The accuracy and precision of the Cholesterol LDX is highly comparable (between 2% and 6%) to a lipid profile obtained in clinical diagnostic laboratories (Cholestech Corporation, 2003).

### *Blood Pressure*

After at least 5 minutes of sitting, blood pressure was measured in the right arm using a digital sphygmomanometer (Omron IA2, Vernon, USA). If a reading of systolic BP  $\geq$  140mmHg and/or diastolic  $\geq$  90mmHg was found, the procedure was repeated at the end of the physical assessment and the second measure was used. For this study systolic and diastolic blood pressure were examined as separate variables. They were categorised as low/normal being <143mmHg systolic and <89mmHg diastolic and high being >144mmHg systolic and >90mmHg diastolic in line with current international guidelines (World Health Organisation, 1999).

### *CVD Risk*

Overall CVD risk was calculated using the PREDICT workplace tool (Enigma, 2005).

This tool uses the New Zealand Guidelines for CVD-Diabetes (New Zealand Guideline Group, 2005) and the Framingham equation (Anderson, Wilson, Odell & Kannel, 1991) to calculate an index of the risk for developing CVD. Variables included in the equation are sex, age, systolic blood pressure (mmHg), smoking status (smoking or non-smoking), total cholesterol, HDL cholesterol, and diabetes status (type 1 or 2 diabetes or no diabetes). For this study, the CVD risk factor score was categorised into low (0-10) or medium/high (> 10).

### **Statistical analyses**

Descriptive statistics were calculated to determine the mean and standard deviation of the AHI sum by differing individual demographic and health variables. Pearson correlations were calculated between the AHI sum and each demographic and health variable. One way analysis of variance (ANOVA)'s were performed to identify whether any significant differences existed in AHI scores by demographic and health variables. Bivariable logistic regression was used to investigate the relationship between potential predictor variables and AHI classification (low or high). Variables associated with AHI classification at  $p < 0.20$  were then examined simultaneously in multivariable logistic regression. Non-significant factors ( $p > 0.05$ ) were removed from the multivariable regression in a stepwise fashion until all remaining variable/s in the multivariable model were significant ( $p < 0.05$ ).

All data analyses were conducted using SPSS 17.0 software and confidence intervals were set at 95%.

## **Results**

Of the 222 participants in the Brief Interventions sample, 27 participants did not complete the three questionnaires or the cardiovascular risk assessment, leaving a final sample of 195 participants (60% male). Of the full sample the mean age of participants was 39.8 years (SD 9.71) with a range of 20-63 years. The mean AHI sum score was 79.46 (SD 11.76) with a range of 48-115. Full demographic information for participants included in analyses is provided in Table 1. A majority were non-smokers (76.6%), and 41.0% were classified as obese.

Pearson correlations performed on all individual demographic and health variables showed no meaningful relationships between variables. Table 1 shows the ANOVA results for all variables. Post hoc testing was performed for ethnicity using the Tukey HSD test to identify significant differences between specific ethnic groups. Results showed that those of Māori and Asian Indian ethnicity were statistically significantly different in terms of happiness ( $p = 0.022$ ) with Asian/Indians reporting a higher level of happiness. To determine the size of the effect, the sum of squares between groups was divided by total sum of squares to obtain Eta squared. The result was 0.050 which is classified as a small effect (Cohen, 1988). Eta values for total cholesterol and LDL cholesterol were 0.040 and 0.027, respectively, both classified as a small effect (Cohen, 1988).

Table 3: Descriptive information for demographic and health variables, along with ANOVA results for associations with AHI score (n = 195)

Variable	n (%)	AHI Sum Mean (SD)	F-statistic	p-value
Gender			0.831	0.363
male	78 (40)	80.40 (11.28)		
female	117 (60)	78.82 (12.07)		
Age range			0.373	0.773
< 30	38 (19.5)	77.92 (11.64)		
31-40	64 (32.8)	79.53 (13.52)		
41-50	67 (34.4)	80.42 (10.32)		
> 50	26 (13.3)	79.04 (11.77)		
Ethnicity			3.335	0.021
European/NZ	60 (31.7)	79.00 (11.95)		
Maori	26 (13.8)	75.77 (11.53)		
Pacific Island	58 (30.7)	78.57 (11.83)		
Indian/Asian	45 (23.8)	79.59 (11.61)		
BMI range			2.423	0.091
normal	42 (22.1)	76.02 (12.76)		
overweight	72 (36.9)	80.71 (10.59)		
obese	80 (41.0)	80.18 (12.00)		
Smoking status			3.517	0.062
non-smoker	144 (76.6)	80.27 (10.88)		
smoker	44 (23.4)	76.45 (12.24)		
Waist Circumference			0.000	0.062
low/normal	67 (34.4)	79.46 (10.88)		
high	128 (65.6)	79.45 (12.24)		
CVD risk factor score			0.055	0.815
low	138 (87.0)	79.46 (11.71)		
medium/high	39 (22.0)	79.74 (12.53)		
Sitting time			1.466	0.225
0-2 hours	38 (19.5)	82.29 (11.96)		
3-4 hours	73 (37.4)	77.51 (13.02)		
5-6 hours	34 (17.5)	79.50 (11.30)		
> 6 hours	50 (25.6)	80.12 (9.62)		
Breakfast			2.842	0.061
never	11 (5.6)	71.82 (9.74)		
1-4 times/week	53 (27.3)	78.62 (13.09)		
5 + times/week	130 (67.1)	80.26 (11.02)		
Physical activity			1.609	0.203
sedentary	96 (49.2)	78.14 (13.02)		
insufficiently active	67 (34.4)	80.00 (10.36)		
sufficiently active	32 (16.4)	82.28 (10.19)		
Total cholesterol			8.232	0.005
normal	135 (69.2)	77.87 (12.06)		
high	60 (30.8)	83.02 (10.19)		
High density lipoprotein			0.039	0.844
normal	107 (54.8)	79.61 (11.74)		
low	88 (45.2)	79.27 (12.15)		
Low density lipoprotein			5.006	0.027
normal	111 (62.4)	77.96 (11.22)		
high	67 (37.6)	81.97 (12.15)		
Systolic blood pressure			0.449	0.504
low/normal	136 (70.1)	79.99 (11.26)		
High	58 (29.9)	78.76 (12.46)		
Diastolic blood pressure			0.030	0.863
low/normal	118 (60.8)	79.73 (11.33)		
high	76 (39.2)	79.43 (12.06)		

Key: ANOVA = one way analysis of variance; AHI = Authentic Happiness Inventory; BMI = body mass index; CVD = cardiovascular disease; n = number; SD = standard deviation.

Because of the relative homogeneity in AHI scores, participants were classified into tertiles by AHI scores (low, medium, high), and only those in the highest and lowest tertiles included in further analyses ( $n = 130$ ). Bivariable logistic regression was conducted on the six variables with  $p < 0.20$  from the ANOVA results (Table 1). Five of these variables retained  $p < 0.20$  in bivariable logistic regression as follows (and shown in Table 2): ethnicity ( $p = 0.105$ ), smoking status ( $p = 0.016$ ), breakfast ( $p = 0.129$ ), total cholesterol ( $p = 0.024$ ), and LDL cholesterol ( $p = 0.103$ ). Multivariable logistic regression was conducted on these five variables. LDL cholesterol was removed as the highest p-value ( $p = 0.723$ ) and the multivariable logistic regression was repeated with remaining factors. This process was repeated, with factors removed in the following order: ethnicity ( $p = 0.374$ ), breakfast ( $p = 0.372$ ) total cholesterol ( $p = 0.058$ ). Smoking status was the only significant variable remaining ( $p = 0.016$ ).

Table 4: Bivariable Logistic Regression in tertiles (n = 130)

Variable	n	Mean (SD)	Odds Ratio	(95% CI)	p-value
Ethnicity					
European/NZ	41	0.488 (0.506)	reference		0.105
Maori	18	0.333 (0.485)	0.525	(0.165, 1.667)	
Pacific Island	39	0.462 (0.505)	0.900	(0.374, 2.166)	
Indian/Asian	29	0.690 (0.470)	2.333	(0.861, 6.323)	
Smoking status					
non-smoker	97	0.557 (0.499)	reference		0.016
smoker	30	0.300 (0.466)	0.341	(0.142, 0.821)	
BMI range					
normal	31	0.387 (0.495)	reference		0.268
overweight	45	0.578 (0.499)	2.167	(0.850, 5.513)	
obese	54	0.500 (0.505)	1.583	(0.645, 3.888)	
Breakfast					
never	10	0.200 (0.422)	reference		0.129
1-4 times/week	6	0.460 (0.505)	3.400	(0.634, 18.224)	
5 + times/week	11	0.549 (0.501)	4.865	(0.973, 24.323)	
Total cholesterol					
normal	90	0.433 (0.498)	reference		0.024
high	40	0.650 (0.483)	2.429	(1.122, 5.256)	
LDL cholesterol					
normal	73	0.452 (0.501)	reference		0.103
high	48	0.604 (0.494)	1.850	(0.883, 3.876)	

Key: CI = Confidence Interval; n = number; SD = standard deviation; p = significance.

## Discussion

The purpose of this study was to examine whether any relationships existed between happiness and the individual health behaviours and risk factors associated with CVD.

The results showed smoking status and happiness were related in that non smokers were slightly happier than smokers in this sample. This finding is consistent with other research; Dawkins, Acaster and Powell (2007) found that smokers had reduced positive affective responses to pleasurable film clips indicating that smokers demonstrated significantly lower levels of happiness than non-smokers. In Hedonism and Happiness, Veenhoven (2003) investigated happiness and use of stimulants. This analysis revealed little relationship between smoking and happiness at an individual level but did note that non-smokers were as happy as moderate smokers while heavy smokers were somewhat



less happy. Overall unhappiness with life was positively related to being a smoker by Emmons, Wechsler, Dowall & Abraham (1998) in their research with US college students. Recent research from Japan (Ogimoto & Higaki, 2010) illustrates a concept that ‘smoking creates thunderclouds’. The thunder represents the major complications of cigarette smoking, the rain represents the gradually eroded health that is the foundation of happiness, and thus the article demonstrates diagrammatically that long term smoking wears away happiness.

Combined, these small effects but consistent results suggest that indeed, smoking and happiness are negatively associated. This has been demonstrated using the AHI in the current study, and other measures of psychological wellbeing in previous research. Possible reasons for this are that it is universally accepted that smoking is detrimental to health. As health and happiness are associated, a smoker is doing something they know is bad for them, and so at some level this may make them unhappy despite the enjoyment they gain from smoking. Knowing that there is a physical and psychological addiction to smoking could be another cause for decreasing happiness levels. It is also well known that financial pressures can cause unhappiness and the cost of smoking may also play a role in happiness levels.

Results from the ANOVA and the bivariable analyses indicated that ethnicity, BMI range, breakfast consumption, total cholesterol, and LDL cholesterol were potentially related to happiness but after being considered in the multilevel model, these relationships no longer remained significant. Previous research has shown mixed results when looking at individual variables in relation to happiness and it may well be that factors such as eating breakfast and having a healthy BMI, while desirable, have little effect on happiness when examined on their own. It is likely that a combination of

health factors in addition to positive mental wellbeing may have an effect on happiness. A positive relationship between happiness and physical activity could have been anticipated given previous research linking physical activity and positive mental health but was not found in this study. Measurement issues with the physical activity and the AHI may explain this finding somewhat. Both were self report measures, which may be limited by self report biases associated with recall, comprehension, and social desirability (Knauper & Turner, 2003; Mackay, Schofield & Schluter, 2007). For example, Chambers & Windschitl (2004) found that individuals routinely rate themselves higher than others on a variety of attributes in particular and satisfaction with their life. To avoid this bias it is suggested that an indirect measurement technique may provide more accurate results. This uses two ratings – one for personal happiness and one for others' perceived happiness – and then uses the difference between the two as a measure of happiness (Klar & Giladi, 1999).

The homogeneity found across the AHI data could also explain why relationships that may exist were not identified through the analysis. Most people report overall happiness as relatively high despite what they may actually be feeling. Alexandrova (2008) highlights issues with overall or global measures of happiness or life satisfaction. She reports that major changes in certain areas of one's life such as personal or professional life should and do affect happiness; however some of the major impacts on happiness appear to come from small changes in mood. This kind of temporal mood can either positively or negatively increase happiness or life satisfaction scores. Even negative events that took place a long time ago can increase current reported happiness or life satisfaction. It can be argued that global happiness reports are merely constructions drawn on the spot from whatever information, mood and environment is available at the time (Schwarz & Strack, 1999).

It is also possible that happiness may not be the most appropriate measure of subjective well-being or that the AHI was not the best measure of overall happiness available for use with this population. The AHI has been validated using on-line US samples which are markedly different from our New Zealand paper based and high pacific and Asian Indian sample. It is possible that there were issues with terminology and comprehension.

Seligman (2011), founder of the positive psychology movement, now believes the concept of happiness has limitations and is currently researching five crucial elements of well-being within a concept called flourishing (translated from ancient Greek word eudaimonia meaning “well-being” or “flourishing”). These five elements are positive emotion, engagement, relationships, meaning & accomplishment. This broader concept of happiness or well-being could make measurement of this construct more robust as engagement; relationships and accomplishment are possible to measure objectively in addition to the self report measures of positive emotion and meaning. A major study by Huppert et al (2009) is currently measuring well-being across Europe using the concept of flourishing. This represents one of the first systematic attempts to develop a set of subjective well-being measures for use in national and international studies. Flourishing incorporates the two distinct theories of well-being, the hedonic approach and the eudaimonic approach (Huppert et al, 2009).

Future research into the health behaviours of people who experience well-being or can be said to be flourishing may give us new ways of intervening to solve the biggest health issue of our time, that of chronic disease (including CVD).

## **Conclusion**

Despite the fact that many smokers report that smoking makes them happy, the current study findings indicate a negative relationship between smoking and happiness. This is an important finding and is consistent with other literature on smoking and happiness. It is hoped that practitioners and health promoters will use this knowledge when developing smoking cessation interventions as happiness is a goal of the vast majority of people.

Further research is needed to look at happiness and smoking in other populations and using other measures of happiness and psychological well being. Large scale research is also needed to examine health and subjective well-being using different measures of well being such as flourishing.

## **Chapter Three: Validity and reliability of the Authentic Happiness Inventory**

### **Preface**

The accurate measurement of happiness and other positive psychological concepts is vital to ensure the continuing growth of positive psychology and the future of collaboration between positive psychology and health researchers.

In light of the results found in the previous chapter it was considered important to conduct validity and reliability testing on the measure of happiness used (AHI), in a New Zealand population, as the psychometric properties of the AHI, are not as yet published. This was primarily to examine any validity and reliability issues which may have affected the results of Study 1, but also to add the body of literature on validity and reliability of the measurement positive psychological concepts.

## **Introduction**

Increasing focus within psychology and health research is being placed on positive psychology; a new area of psychology that is interested in positive emotions and the effect of positive emotions on mental and physical wellbeing (Seligman, Steen, Park & Peterson, 2005). Positive psychology has grown from the recognition of an imbalance in psychology where most research has focused on mental illness rather than mental wellness.

A number of tools have been developed to assess differing concepts of positive psychological concepts, for example, gratitude, optimism, work-life satisfaction and happiness (McDowell, 2010). Happiness in particular has been seen as an extremely subjective concept and thus the accurate quantification of this construct has been limited. Veenhoven (1995, p34) defined happiness or life satisfaction as “the degree to which one judges the quality of one’s life favourably”. Happiness is often seen as one of the most important goals in life and the last few decades have seen an increase in research on happiness or the more broadly defined subjective well-being.

Differing measures of happiness have been developed, including the Fordyce Emotions Questionnaire, the Subjective Happiness Scale, and the AHI Questionnaire. The Fordyce Emotions Questionnaire is a brief measure of current happiness (Fordyce, 1987). It is used to understand baseline mood levels but the very general nature of this questionnaire is a potential limitation. The questionnaire asks, “in general how happy or unhappy do you usually feel”, with response options ranging from 0 = extremely unhappy to 10 = extremely. Respondents are then asked to quantify their response into percentage of time feeling happy, unhappy and neutral. This measure has been

demonstrated to have good reliability in many studies (Fordyce, 1987). For example test re-test reliability has been found to be as high as 0.98 over a two day period and 0.81 over a one month interval. Convergent validity has also been established with strong positive correlations between the Fordyce Emotions Questionnaire and many other measures of happiness and well-being (Fordyce, 1987).

The SHS (Lyubomirsky & Lepper, 1999) assesses respondents subjective sense of global happiness by averaging four items; two generally (I consider myself 1 = not very happy to 7 = a very happy person) and two comparatively (compared to most of my peers I consider myself 1 = less happy to 7 = more happy). This scale is widely used in research and shows good psychometric properties (Schwartz, et al, 2002; Tkach & Lyubomirsky, 2006). This measure has been shown to have a test re-test reliability of 0.72 over one month interval and an internal consistency of 0.86 (Lyubomirsky & Lepper, 1999).

The SHI (Seligman, Steen, Park & Peterson, 2005) was developed to capture upward changes in happiness and was designed to be an opposite to the Beck Depression Inventory (Beck, Ward, Mendelson, Mock & Erbaugh, 1961) in that it is meant to be sensitive to changes in levels of happiness. More specifically the SHI evaluates changes in happiness based positive emotions, engagement, and meaning in life. The original SHI consisted of 20 items with five statements from which respondents must choose one to describe themselves in the present. The SHI has been changed from 20 items to 24 items and has been renamed the AHI.

Assessing overall happiness may be particularly important in health related research, to identify relationships between happiness and health. Ensuring the tools used to measure happiness are valid and reliable is vital. Compared with the SHS and the Fordyce

Emotions Questionnaire, the AHI offers a tool to measure current state happiness with the ability to capture changes in happiness, rather than being a global or general trait measure of happiness. The AHI, if proven valid and reliable, may be a useful measure of happiness when looking at interventions to increase happiness. This study aims to test the convergent validity and test-retest reliability of the AHI with a convenience sample of working adults, and to explore the AHI with exploratory factor analysis to ascertain if the items were explaining one key factor, i.e., happiness.

## **Methods**

### Study population and procedures

#### *Test-retest reliability and convergent validity*

A convenience sample of adults ( $n = 30$ ) was recruited from Auckland University of Technology staff via the Auckland University of Technology staff electronic notice board. A sample of 30 adults was recruited to ensure that appropriate test-retest and convergent validity confidence limits could be generated by fulfilling the minimal acceptable criteria of intraclass correlation coefficient (ICC) values above 0.7 (Baumgartner & Chung, 2001). To be eligible, participants were required to be employees of Auckland University of Technology (either part time or full time), and aged 20 years or older. On day 1 of data collection, participants were asked to complete a brief demographic survey (gender, age, ethnicity, occupation, qualification level) and then to complete the AHI. On the following day (day 2), the participants were asked to complete the AHI, and then to complete two other questionnaires; the SWLS and the PANAS. Order of completion of the SWLS and PANAS after completing the AHI was randomly assigned. Data were collected in December 2010.



### *Exploratory factor analysis*

Data for the exploratory factor analysis were drawn from the Auckland University of Technology University sample plus a separate sample of adults ( $n = 230$ ) participating in the “Brief Interventions” project. Brief Interventions is an Auckland-based workplace intervention promoting and supporting healthy lifestyles. The data presented here are from the baseline assessment of this intervention study. All employees of the worksite who were aged 20 years or over were invited to participate. A team of health professionals and researchers visited the workplace and each participant underwent a CVD risk assessment and completed three questionnaires: the AHI, a physical activity and nutrition patterns questionnaire, and a demographic survey. Data were collected in July 2010.

Informed consent was gained from all participants and ethical approval was granted by the host institution ethics committee.

### **Measures**

The AHI is a measure of current overall happiness that was developed to measure upward changes in happiness levels and reflects three kinds of happy lives; the pleasant life, the engaged life, and the meaningful life. The inventory comprises 24 questions to which there is a group of 5 statements as possible answers ranging from a negative to an extreme positive. No items are reverse scored. Participants are asked to tick the one statement in each group which best describes the way they have been feeling in the past week, including the day of completing the questionnaire (e.g.; 1 = my life does not have any purpose or meaning, 5 = I have a very clear idea about the purpose or meaning of my life; 1 = I am pessimistic about the future, 5 = I feel extraordinarily optimistic about

the future). Scores from the 24 items are summed and averaged to provide an overall happiness score. Pilot work with over two hundred adult participants has shown evidence for convergent validity for the AHI in comparison with other measures of happiness using Pearson's correlation ( $r = 0.79$  with the General Happiness Scale,  $r = 0.74$  with the Fordyce Happiness Scale) (Seligman, Steen, Park & Peterson, 2005). To date, no further evidence for the reliability or validity of the AHI has been reported.

The SWLS and PANAS were used as comparison measures for examining the convergent validity of the AHI. The SWLS is a 5-item scale of global life satisfaction (Diener, Emmons, Larsen & Griffin, 1985). This scale measures the emotional components of positive affect and the absence of negative affect, plus one cognitive element; life satisfaction, which refers to the person's internal subjective assessment of their overall quality of life. Participants rate the degree to which they agree with each item (1 = strongly disagree, 7 = strongly agree). The SWLS has been shown to be a valid and reliable measure of life satisfaction and is widely used across a range of age groups and population types (Pavot, Diener, Colvin & Sandvik, 1991). Evidence for the internal consistency of the SWLS has been provided (Cronbach's alpha coefficient = 0.85).

The PANAS is used to measure state affect and was developed by Watson and Clark (1988). Positive affect is conceptualised in terms of enthusiasm, alertness and positive engagement (Watson, Clark & Tellegen, 1988). The PANAS contains 10 positive and 10 negative words such as "interested", "excited", and "distressed" or "scared".

Participants are asked to indicate to what extent they feel this way right now for a series of affect descriptors like angry (1 = very slightly or not at all, 5 = extremely). The PANAS is widely used in psychological research and extensive evidence exists for its

validity and reliability (McDowell, 2006; Watson, Clark & Tellegen, 1988 & Crawford & Henry, 2004).

In addition to the above questionnaires, participants completed a demographic survey to identify gender, age, ethnicity, occupation, and qualification level. Statistics New Zealand statistical standards for occupation, education level and qualifications were used to classify these factors (Statistics New Zealand, 2010)

### **Statistical analyses**

The internal consistency of items within each measure (AHI, SWLS, and PANAS) was assessed using Cronbach alpha coefficients.

#### **Exploratory factor analysis**

The underlying structure of the AHI was explored using exploratory factor analysis after first confirming the data were suitable for this process by examining sample size and the strength of the relationship among the items. A sample of at least 150 is recommended for exploratory factor analyses to determine if a data set is suitable for factor analysis (Tabachnick & Fidell, 2007). Principal component analysis (PCA) was used to extract the factors. The number of factors to be retained was guided by Kaiser's criterion and inspection of the screeplot.

### Test-retest reliability

Assuming random variance between AHI scores for day 1 and day 2, test-retest reliability was determined using a one-way ICC model. The ICC value cut-off ranges used for the current study were 0.00-0.20 (weak agreement), 0.21-0.40 (poor agreement), 0.41-0.60 (moderate agreement), 0.61-0.80 (substantial agreement), and 0.81-1.0 (almost perfect agreement). Overall an ICC above 0.70 is considered an acceptable measure of test-retest reliability (Baumgartner & Chung, 2001).

### Convergent validity

Pearson product-moment correlations were used to examine convergent validity for the AHI (day 2), SWSL, PANAS positive, and PANAS negative scales in the sub sample of adults (n=30). Preliminary analyses were performed to ensure no violation of the assumption of normality. Criteria established by Cohen (1998) were applied as follows: small,  $r = 1.0-2.9$ ; medium,  $r = 3.0-4.9$ ; large,  $r = 5.0$  to  $1.0$ .

All data analyses were conducted with SPSS 17.0 software and confidence intervals were set at 95%.

## Results

All Auckland University of Technology University staff completed the AHI in full. Eight (4%) participants were removed from the Brief Interventions sample due to non completion of the AHI (n = 7), and missing values in their completed AHI (n = 1). The final sample for analyses (n = 222) was 39.2% male, predominantly full-time working adults, with a mean age of 40.2 years. Full participant characteristics are shown in Table 5.

Table 5: Demographic profile of study participants

Characteristic	n or (mean)	% or (SD)
Gender		
Male	87	39.2
Female	135	60.8
Age	(40.2)	(10.3)
Ethnicity		
NZ/European	76	34.2
Maori	23	10.4
Pacific Island	67	30.2
Asian	45	20.3
Other	11	5.0
Work Status		
Full-time	218	98.2
Part-time	4	1.8

Key: n = sample size; SD = standard deviation

#### Internal Consistency

The Cronbach alpha coefficient for the AHI in the total sample (n=222) was 0.92, this exceeded the recommended value of 0.70 (Nunnally, 1978), indicating adequate internal consistency. For the SWSL, the Cronbach alpha coefficient was 0.85, and for the PANAS the Cronbach alpha coefficient for positive affect was 0.92 and 0.89 for negative affect.

#### Exploratory Factor Analysis

The total sample of adults (n=222) was included for the exploratory factor analysis. The Kaiser-Meyer-Olkin value, which is a test of sampling adequacy, was 0.94, exceeding the recommended value of 0.6 (Kaiser, 1970 & Tabachnick & Fidell, 2007) and Bartlett's test of Sphericity reached statistical significance ( $p = 0.05$ ), therefore factor analysis was appropriate. Principal components analysis showed the presence of five

components with eigenvalues exceeding 1, with one factor explaining 36.1% of the variance. Inspection of the screeplot (Figure 4) supported a one factor solution. The one factor solution was Question 24 which was the general or global happiness question, with response options being: my life is a bad one, my life is a good one, my life is a very good one, and my life is a wonderful one.

Figure 4: Screeplot of Eigenvalues and Authentic Happiness Inventory item numbers



#### Test-retest reliability

Table 6 presents the results of the test-retest analyses for the AHI in the sub-sample (n=30). For individual items, ICC values ranged from 0.05 to 0.92, with 15 of the 24 items showing ICC values of 0.70 or greater ( $p < 0.001$ ). For the overall AHI sum, the test-retest reliability was  $ICC = 0.92$ ,  $p < 0.001$ .

Table 6: Test re-test reliability of the Authentic Happiness Inventory in a sample of adults

Item	n	ICC	95% CI (lower bound-upper bound)	F	P
1	30	0.58	(0.27 - 0.78)	3.79	<0.001
2	30	0.55	(0.25 - 0.76)	3.46	<0.001
3	30	0.66	(0.40 – 0.82)	4.90	<0.001
4	30	0.05	(-0.92 – 0.39)	1.09	0.405
5	30	0.26	(-0.11 – 0.56)	1.67	0.083
6	30	0.72	(0.50 – 0.89)	6.23	<0.001
7	30	0.59	(0.29 – 0.78)	3.82	<0.001
8	30	0.88	(0.77 – 0.94)	15.92	<0.001
9	30	0.73	(0.50 – 0.86)	6.34	<0.001
10	30	0.75	(0.54 – 0.87)	7.07	<0.001
11	30	0.58	(0.29 – 0.78)	3.77	<0.001
12	30	0.89	(0.77 – 0.94)	16.38	<0.001
13	30	0.77	(0.58 – 0.89)	7.8	<0.001
14	30	0.87	(0.75 – 0.94)	14.67	<0.001
15	30	0.92	(0.84 – 0.96)	24.0	<0.001
16	30	0.89	(0.78 – 0.95)	16.78	<0.001
17	30	0.81	(0.64 – 0.90)	9.48	<0.001
18	30	0.79	(0.60 – 0.89)	8.31	<0.001
19	30	0.54	(0.23 – 0.75)	3.33	<0.001
20	30	0.71	(0.48 – 0.85)	6.00	<0.001
21	30	0.92	(0.83 – 0.96)	22.75	<0.001
22	30	0.55	(0.24 – 0.76)	3.44	<0.001
23	30	0.77	(0.56 – 0.88)	7.50	<0.001
24	30	0.80	(0.63 – 0.90)	9.21	<0.001
Sum total	30	0.92	(0.83 – 0.96)	23.05	<0.001

Key: ICC = intraclass correlation coefficient; CI = confidence interval; F = variance ratio; p = significance.

### Convergent Validity

There was a strong positive correlation between AHI and SWLS ( $r = 0.76, p < 0.005$ ) and a strong positive correlation between AHI and PANAS positive ( $r = 0.82, p < 0.005$ ). There was a medium negative correlation between AHI and PANAS negative ( $r = 0.48, p < 0.005$ ). Therefore high levels of happiness were positively associated with both high levels of life satisfaction and positive affect while levels of happiness were negatively associated with levels of negative affect as expected.

### Discussion

This study aimed to assess the utility, reliability, and validity of the AHI for use with working adults. We utilized exploratory factor analysis to understand if the 24 questions in the AHI adequately captured the construct being measured (happiness) and to ascertain if there was reason to exclude certain items. Our results showed that one factor explained 36.1% of the variance in the data set. This factor had an eigenvalue of 8.7, which far exceeded values found for the other items. This question was conceptualized as relating to general happiness and life satisfaction. Our findings indicate that this item could be reliably used as a single item scale of happiness. Previous research on single item scales of happiness validates the concept that these measures are as valid and reliable as many multiple item scales (Brebner, Donaldson, Kirby & Ward, 1995; Cammock, Joseph & Lewis, 1994; Diener, Sandvik, Pavot & Fujita, 1992; Furnham & Cheng, 1997). Furthermore Burish (1997) maintained that short scales were as valid as long scales and lengthening a scale beyond some point could actually weaken its validity.



In terms of research application, the single item is more economical for large scale population surveys and for research projects in which participant time is limited. If researchers are interested in only an overall happiness or life satisfaction score there is little benefit in asking multiple questions when a single question can give reliable and valid data (Cummins, 1995).

Results from the test-retest and convergent validity analyses showed initial support of the AHI as a valid and reliable measure of happiness. The test-retest of the AHI sum total showed an ICC value of 0.92 which is well above the recommended cut off value for acceptability of 0.70. Although there is no published data available on the between-day reliability of the AHI, this result compares favourably to similar examinations with comparable measures. For example, the Subjective Happiness Scale has been reported to have a test-retest reliability of 0.90 over 7 days (Lyubomirsky & Lepper, 1997); the Brief Life Satisfaction Scale a reliability of 0.91 over 7 days (Funk, Huebner & Valois, 2006); the SWLS from 0.50 to 0.80, from 2 days to 3 months (Pavot & Diener, 1993) and the PANAS range from 0.40 to 0.70 from 2 days to 4 months (Watson, Clark & Tellegen, 1988). Acknowledging the temporality of happiness (Gable & Haidt, 2005), we chose a relatively short timeframe between the first and second AHI assessments (i.e., 1 day).

This approach was taken in the interest of capturing possible variability in AHI reliability, rather than variability in happiness as a function of time. Had we stipulated a longer time frame between testing occasions, it is possible that the test-retest reliability of the AHI would have been reduced. Nine out of the 24 individual questions failed to reach an acceptable ICC value of 0.7 or above. Further research on these individual questions is needed to examine the reasons for this; however as the overall sum ICC

value was acceptable, reliability of the use of the AHI sum can be assumed for this sample.

Examination of convergent validity with the AHI showed a strong positive correlation with both the SWLS ( $r = 0.76$ ) and the PANAS positive ( $r = 0.82$ ) and a medium negative correlation between the AHI and the PANAS negative ( $r = -0.48$ ). Pilot data from the University of Pennsylvania support these results with the General Happiness Questionnaire ( $r = 0.79$ ) and the Fordyce's Happiness Scale ( $r = 0.74$ ) (Seligman, Steen, Park & Peterson, 2005). In this study the SWLS showed a strong positive correlation with the PANAS positive of 0.62 which is consistent with previous studies ranges of 0.40 to 0.62 and a medium negative correlation with the PANAS negative of -0.46 with previous studies ranges of 0.26 to 0.48 (Lucas, Diener & Suh, 1996).

The sample used in this study was small and consisted of university staff members which could be considered to lack variability, as such further testing with larger numbers and different populations is recommended. Once the AHI pilot studies currently underway have been completed it will be of value to compare the results with the results of this study. Although the pilot studies involve internet users it has been found that survey data collected via the internet is no more or less biased than data collected via traditional methods (Gosling, Vazire, Srivastava & John, 2004).

Overall, the results of this study show that when using the AHI for the intention it was developed it is appropriate to use in its entirety and can be considered to have acceptable test re-test reliability and convergent validity when used with working adults. Evidence is also provided for the possible use of one item as a single measure of

happiness. Further research is needed to examine the accuracy and reliability of using this single item as a standalone measure, and in conjunction with other questionnaires.

## **Conclusion**

Findings confirmed the convergent validity and test retest reliability of the AHI and thus it can be used as a measure of happiness among working adults. Future research using larger sample sizes and samples of other populations can add to the validity and reliability of the AHI, as can research examining the internal reliability, content validity and construct validity.

## **Chapter Four: General Discussion**

### **Research Summary**

The paper presented in Chapter 2 examined whether any relationships existed between happiness and health behaviours and risk factors associated with CVD. Previous research has shown relationships exist between CVD and some aspects of well-being such as optimism but there is currently little research examining specific risk factors and health behaviours. This paper has added to the literature in that it attempted to identify specific CVD risk (or protective) factors that were associated with happiness. It is hoped that future research with larger and more diverse samples, using other measures of well-being, will be undertaken to explore this field.

The results from the study in Chapter 2 identified only one significant relationship in this sample that of happiness and smoking, with smokers found to be less happy than their non-smoking counterparts. This finding can provide further evidence for health practitioners and health promoters when designing and implementing smoking cessation programmes. Conversely it may well be that by increasing well-being or happiness individuals are less likely to smoke and this could work alongside the education and self-regulation strategies employed by smoking cessation programmes. Historical public health approaches to smoking cessation using education and self-regulation strategies alone have not been effective. Consequently, this field has progressed to a more ecological approach to behaviour change, including environmental interventions such as voluntary bans on smoking in areas not already controlled by mandates.

Although no other significant relationships with happiness were found, it is possible that other relationships may indeed exist. It is likely that a combination of health factors and positive mental well-being may have an effect on happiness. The lack of significant findings may have been due to measurement issues with the AHI, including potential over-reporting of happiness leading to homogeneity in AHI scores, and the possibility that the AHI was not the best measure of psychological well-being that could have been used.

The paper presented in Chapter 3 aimed to address some of the above concerns about the AHI by testing the validity and reliability of the tool in a sample of New Zealand working adults. Psychometrics is the science of measuring or scaling psychological attributes and defines a set of criteria for a test that evaluates its validity and reliability. A test is said to be valid if it measures what it sets out to measure. Reliability of a test has two distinct meanings, one referring to the stability over time and the second referring to internal consistency (Kline, 1993). The importance of validity and reliability in health measurement cannot be underestimated. This study was an important component of the thesis, especially in light of the questions raised from the results of the first study. Previous reliability and validity data on the AHI was limited to an internet pilot study of predominantly US adults and it is recognised that demonstrating validity and reliability in different populations is essential.

This investigation confirmed the convergent validity of the AHI with a strong positive correlation between the AHI, the SWLS and the PANAS positive, and confirmed the test re-test reliability of the AHI total sum score, with an ICC value of 0.92 over two days in this sample. This study also provided some evidence through exploratory factor analysis for the possible use of a single item (question 24, a global or overall question

on happiness) as a measure of happiness which has been shown to have adequate validity and reliability. Currently many large population surveys do not measure happiness or well-being and this could be an important addition to large scale research without over-burdening participants or researchers. Further research is still needed to examine the content and construct validity of the AHI and convergent validity and test re-test reliability with different or larger populations.

The results from both studies have added to the knowledge base in the field of physical and psychological wellbeing. One fundamental question has emerged from these studies, being: “Is happiness the most appropriate measure of well-being? The remainder of this discussion addresses this question in the wider context of health and provides some implications and suggestions for further research.

### **Health and well-being: The wider context**

Positive psychology originated from a backlash within the field that psychology was not producing enough knowledge about what makes life worthwhile. This field is not intended to replace psychology which necessarily focuses on the negative – depression, mental illness, and adversity – but to provide researchers with the option to study character strengths, virtues, optimism, and well-being. Gable and Haidt (2005, p 105) proposed that positive psychology is “the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, groups and institutions”. The psychology field has made great progress in finding out what is wrong with individuals or groups but very little about what is right with people. While it is acknowledged that those who are suffering should be helped before those who are doing well, positive psychology supposes that an understanding of strengths can help lessen or

prevent disease or stress. For the past eleven years a major focus of positive psychology has been on happiness.

Happiness as a construct has been difficult to define and there is still no consensus on this. Numerous descriptions exist, including a positive inner experience (Argyle, 1997) and the ultimate goal of life (Veenhoven, 2004). Just as it is difficult to define, happiness can also be difficult to measure, and many different self report measures exist. Several problems have recently been identified with measurement of happiness, in particular that of over-reporting of happiness and temporal mood changes which can positively or negatively affect happiness scores. According to Lykken and Tellegen (1996) individuals routinely rate themselves higher than their peers on a variety of attributes and capabilities particularly in happiness and life satisfaction. They reported that in one study of contentment, 86% of respondents placed themselves in the upper 35% contentment group. Klar and Giladi (1999) have suggested that it is possible to avoid this bias by using an indirect measurement technique that uses two ratings, one for personal happiness and one for others perceived happiness, and uses the differences between the two.

Alexandrova (2008) highlighted the issue of temporal mood changes when implementing overall or global measures of happiness or life satisfaction. Some of the major impacts on happiness scores appear to come from small changes in mood. This kind of temporal mood can either positively or negatively increase happiness or life satisfaction scores. Even negative events that took place years ago can increase current reported happiness or life satisfaction. Factors that can alter mood can also be the set up of the room in which the questionnaire is taken, the state of the weather, and numerous other mood altering factors that are difficult to control. Schwarz and Strack (1999)

believe happiness or life satisfaction reports do not reflect any stable inner state. They argue that global happiness reports are merely constructions drawn on the spot from whatever information, mood, and environment is available at the time.

The field of positive psychology is accelerating and this section discusses recent research that has just become available on alternatives to measuring happiness. Martin Seligman, the founder of positive psychology, has identified limitations to the concept of happiness and proposes an alternative concept known as flourishing (Seligman, 2011). He believes the focus of positive psychology is well-being, the gold standard for measuring well-being is flourishing, and so the goal of positive psychology is to increase flourishing. This term comes from what the ancient Greeks called eudaimonia which roughly translates to well-being or flourishing. Interestingly its polar opposite word, languishing, has been used in psychology for hundreds of years to depict a state of mental illness.

Seligman (2011) developed an acronym, PERMA, for what he defines as the five crucial elements of well-being or flourishing. They are Positive emotion, Engagement, Relationships, Meaning, and Accomplishment. Each of these elements is pursued for its own sake. Positive emotion can be considered the pleasant life and includes happiness and life satisfaction which are subjective measures. Engagement can also be considered flow or the feeling of being lost in a task, this is also measured subjectively.

Relationships refer to the ability to make positive social interactions with others and much research has examined the benefits of this. Positive relations can be measured both subjectively and objectively. Meaning is about belonging to and serving something that individuals believe is bigger than their self and can be measured both subjectively and objectively. Finally, accomplishment is about achievement, success, mastery, or



winning for its own sake and can be measured both subjectively and objectively (Seligman, 2011).

To date, the best gauge of flourishing comes from a study of 23 European countries using the European Social Survey (ESS) (Huppert et al., 2009). This survey comprises a reliable set of subjective indicators of well-being to provide a more complete picture of wellbeing than has been previously known and that will be able to better inform public policy. These indicators include collecting information about relationships and about people's sense of accomplishing something worthwhile as well as the existing information generally collected in relation to happiness and life satisfaction. These indicators mirror Seligman's theory of well-being and have ensured both hedonic and eudaimonic components of well-being are reported. The way people relate to each other has been extensively researched under the work of social capital (Hulliwel & Putnam, 2005) and much work on accomplishment has been undertaken in mastery and competence research (Ryan & Deci, 2001). Preliminary findings from the ESS show that Denmark and Switzerland rank highest in Europe with more than 25% of their citizens meeting the definition of flourishing while Hungary, Portugal and Russia are near the bottom with less than 10% flourishing.

Another interesting recent concept of well-being comes from Action for Happiness, an organisation launched in April 2011 to create more happiness globally, through changing social trends. Action for Happiness was founded by Lord Layard, Geoff Mulgan and Anthony Seldon and is based on the latest research in the science of happiness (Layard, 2010; Huppert, 2008). Their concept of happiness is similar to Seligman's concept of well-being and incorporates 10 key concepts with the acronym GREAT DREAM; Giving, Relating (social connections), Exercising, Appreciating

(mindfulness), Trying out (learning new things), Direction, Resilience, Emotion (positive), Acceptance, and Meaning. Given the importance of physical activity to this thesis it is pleasing to see the inclusion of exercising here.

Studies from social capital research suggest that social networks promote a sense of belonging and well-being and that happy people have stronger social relationships than less happy people (Diener & Seligman, 2002; Morrow, 2001). Regular physical activity is associated with a greater sense of well-being (Biddle & Ekkekakis, 2005), protects against the onset of depressive symptoms and anxiety (Dunn, Trivedi, Kampert, Clark & Chambers, 2005), and mood and affect can be improved with small changes in activity levels of sedentary people (Acevedo & Ekkekakis, 2006). Being in a state known as mindfulness has been shown to predict the positive mental states self regulated behaviour and heightened self knowledge (Brown & Ryan, 2003). It has been suggested that feelings of satisfaction in learning new tasks is associated with a sense of well-being (MacLeod, Coates, Hetherington, 2008). Participation in community service or volunteering is an important predictor of life satisfaction, especially for older age groups (Harlow & Cantor, 1996).

As concepts that encompass more than just positive affect and mood, both PERMA and GREAT DREAM show that positive psychology is progressing beyond the simplified concept of happiness. This body of research continues to grow using these concepts to measure well-being and to intervene to grow the well-being of more people, groups, and organisations.

Chronic diseases can be considered the major health issue of our time, with chronic disease the leading cause of death in developed nations and CVD topping that list.

Middle and high income countries have CVD as their leading cause of death. Low income or developing countries have CVD as their second leading cause of death after infectious diseases; however, this is predicted to move to the leading cause by 2030 due to urbanization and industrialisation causing changes in lifestyles that are detrimental to health. By 2030 it is predicted that globally 23.4 million people will die from CVD per year and CVD will be the leading cause of death worldwide (World Health Organisation, 2008).

Non-modifiable factors for CVD risk are age, gender, ethnicity, and family history. The main contributing factors to CVD, however, are lifestyle-related and modifiable, meaning that CVD is largely preventable. These modifiable risk factors are smoking, sedentary behaviour, inadequate nutrition, stress, obesity, hypertension, high cholesterol levels, type 2 diabetes. Physical activity and good nutritional practices (e.g., being physically active at least 30 minutes per day on most days of the week, limiting consumption of high sodium foods and eating 5+ fruit and vegetables per day) act as protective factors that are also modifiable.

The WHO defines health as “a state of complete positive physical, mental and social wellbeing and not merely the absence of disease or infirmity” (World Health Organisation, 1946). Despite this, the current model of health worldwide remains a deficit disease model where the overwhelming priority is given to treating, rather than preventing, illness. The disease model of health comes from the strongly scientific tradition of biomedicine and according to this perspective health can be determined secondarily to disease so health and disease lie at opposite ends of a uni-dimensional continuum (Engel, 1977). This model tends to view disease in terms of individual physiology and only seeks biological causes to disease whereas the determinants of

many diseases, especially chronic disease, can be attributed to social or lifestyle issues. The disease model of health ignores the social, cultural and institutional context in which health care occurs (Mishler, 1981). The model also promotes the separation of mental health and physical health. An alternative model, the complete state model of health, also exists. An evaluation of the complete state model of health revealed that there exists no standard by which to measure, diagnose and study the presence of mental health or flourishing and that by default, science (and therefore our medical systems) treat mental health as the absence of psychopathology Keyes (2005). Keyes proposed that health and illness are correlated but separate dimensions rather than a single bipolar dimension and that together they form a complete state of health. He concluded that mental health has been studied for too long as merely the absence of mental illness and recommended the study and promotion of mental health to increase the flourishing and well-being of individuals.

Public health and health promotion has its origins in preventing infectious disease and transcends the disease model especially in terms of the importance of the social, cultural and community context (Sim, 1990). However public health still operates as a deficit model focusing on identifying the problems and needs of populations that require high levels of dependence on hospitals and welfare services. Unfortunately this only allows a maintenance or restoration approach to public health with no scope for improvement of health beyond the absence of disease. This means that public health currently addresses the needs of those who are already unhealthy rather than simultaneously examining 'healthy' populations and looking at ways to increase their well-being. In 2007 Morgan and Ziglio discussed the evidence for an assets model of public health. They stated that an assets model could accentuate positive capability and activate solutions. They promoted a salutogenic notion of health that focuses on improving the self-esteem and

coping abilities of individuals and communities which would eventually lead to less dependence on hospitals and other health systems. Morgan and Ziglio concluded that redressing the balance between assets and deficit models for public health could inform policy makers to make more positive decisions about public health policy and would promote a positive and inclusive approach to action.

Seligman (2005) proposed a new field; Positive Health, with a review paper written for the International Association of Applied Psychology. Positive health describes a state beyond the mere absence of disease and is definable and measurable. Seligman suggested that positive health be separated into three kinds of independent variables: subjective, biological, and functional - all of which are quantifiable. Subjective measurements can be used to measure a sense of well-being as defined by positive emotion, engagement, relationships, meaning and accomplishment. Biological measurements can consider variables such as BMI, blood pressure, and temperature, as well as variables specific to disorders such as CVD. Functional variables will measure how well an individual functions both physically and within their environment.

Seligman's work on the importance of well-being for its own sake fits well into the idea of connecting positive psychology with health to bring about positive changes to health at an individual and a system level. A substantial body of research exists from which it can be inferred that building mental health prevents and relieves mental illness (Seligman, Rashid & Parks, 2006; Seligman, Steen, Park & Peterson, 2005). In addition recent research has shown optimism and positive affect can predict CVD and mortality which means it is likely that a state of positive health will increase longevity and improve prognosis (Giltay, Geleijne, Zitman, Hoekstra & Schouten, 2004; Kubzansky, Sparrow, Vokonas & Kawach, 2001).

In what could be seen as a parallel with psychology and positive psychology, positive health can be seen as a way of linking health with positive psychology to improve health outcomes using an assets model. This could change the deficit disease model in health that is patently not working and help to alleviate the greatest health issue of our time, that of chronic disease. By adopting well-being or flourishing as the major goal for health, through interventions we may be able to change negative health behaviours that contribute to illness into positive health behaviours that promote positive health. Current research on changing negative health behaviours suggests that education and self-regulation alone are unlikely to be effective in improving health behaviours (Everson-Hock, Taylor, Ussher, Faulkner, 2010; World Health Organisation, 2002; Blank, Grimsley, Goyder, Ellis & Peters, 2007). If an individual is flourishing or has a positive sense of well-being however, they may be more likely to engage in positive health behaviours and less likely to engage in negative health behaviours. In relation to CVD this could mean more people being physically active, eating well, not smoking, and maintaining a healthy BMI. When promoting health behaviours to improve CVD outcomes, positive health would focus on increasing an individual's well-being and would be a cross disciplinary approach aimed at improving relationships, social connections, positive affect, accomplishment, and meaning. An example of this could be a pedometer based group physical activity challenge such as the 10,000 steps programme that encourages more physical activity in a day as well as promoting healthy relationships with work colleagues or friends and family members. Targets such as walking the length of New Zealand would provide accomplishment while raising money for a charity could add meaning to this challenge. In this way individuals would be improving their health through physical activity while simultaneously improving their well-being.

In New Zealand, population health is measured using the New Zealand Health Survey, the latest of which was completed in 2007 (Ministry of Health, 2008b). This survey does not currently measure well-being but in a true deficit model measures psychological distress using the Kessler 10-item scale (K10) and physical and mental health status using the Medical Outcomes Study Short Form 36 (SF 36). Key findings from this report show that the majority of New Zealanders are in good health and have excellent access to health care services; however a considerable number of New Zealanders did not meet healthy behaviour recommendations (Ministry of Health, 2008a). These data are used to inform health and public policy and so the inclusion of well-being data in this survey would be extremely useful to the promotion of positive health in New Zealand. A set of indicators such as used by Huppert et al. (2009) in the ESS to measure well-being across Europe could be adopted in New Zealand and used in conjunction with the New Zealand Health Survey to obtain data on well-being. This information could be used to inform social and health policy and promote the importance of well-being that could inform interventions in public health.

Acknowledgement needs to be made in relation to the many barriers and challenges that exist to well-being or flourishing. Suffering, poverty, inequality, persecution, political unrest, violence, and many other negative states that currently exist can make the attainment of well-being or flourishing a low priority or seemingly impossible to obtain. This thesis is written from the paradigm of positive psychology however, and hence discussion of these issues is beyond the scope of this writing.

## **Implications and future research**

The cross-disciplinary approach of positive health could provide us with the vehicle to take us full circle back to WHO's optimistic definition of health in 1946 and make it a reality in the not too distant future.

*“A state of complete positive physical, mental and social wellbeing and not merely the absence of disease or infirmity”, (World Health Organisation, 1946).*

Using a model of positive psychology and positive health it is possible to reexamine existing longitudinal studies to examine if positive health predicts longevity, decreased health costs, better mental health, and better prognosis when illness presents. The aspects of positive health that predict these outcomes can then be targets for intervention. In this way a focus on positive health as opposed to the deficit disease model can be cost saving and life saving. Large national and international surveys such as the ESS can more accurately measure well-being or flourishing to provide data that can inform public and health policy and be used to intervene to achieve positive health and well-being. Future research should use a cross-disciplinary approach between positive psychology and behavioural science to examine the association between positive well-being and improving health behaviours.

Smoking and happiness was found to be significantly associated in Chapter 2, with smokers found to be less happy than their non-smoking counterparts. This finding can provide further evidence for health practitioners and health promoters when designing and implementing smoking cessation programmes using ecological approaches.

Chapter 3 confirmed the convergent validity and the test re-test reliability of the AHL.

The study also provided some evidence for the possible use of a single item as a measure of global happiness which has been shown to have adequate validity and



reliability. Currently many large population surveys do not measure happiness or well-being and this could be an important addition to large scale research. Further research is still needed to examine the content and construct validity of the AHI and convergent validity and test re-test reliability with significantly different populations.

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## **Appendices**

## Appendix 1: Northern Regional ethics approval



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### Northern X Regional Ethics Committee

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15 April 2010

Professor Grant Schofield  
Faculty of Health & Environmental Sciences  
Auckland University of Technology  
Private Bag 92 006  
Auckland 1142

Dear Grant

**NTX/10/03/014**      **Brief interventions for promoting physical activity, healthy eating and weight management in primary care and workplace settings: PIS/Cons V#2, 12/04/10**  
Principal Investigator: Professor Grant Schofield  
Co-Investigators: Dr Scott Duncan, Mr Nick Garrett, Mr Gerhard Sundborn, Ms Carynj Zinn, Dr Lannes Johnson, Dr Louise Schofield, Dr Felicity Goodyear-Smith  
Localities: Auckland University of Technology, Harbour Health, Harbour West, Waiora Health Care, West Fono Health Trust, Vitality Works Ltd

Thank you for the final requirements, received 9 April 2010. The above study has been given ethical approval by the Northern X Regional Ethics Committee.

#### Approved Documents

- PPCR007 Referee Summary V#1 dated 8 April 2010
- Participant Information Sheet – Primary Care V#2 dated 12/04/10
- Participant Information Sheet – Primary Care – All Eligible Patients, V#2 dated 12/04/10
- Participant Information Sheet – Primary Care Eligible Patients P1, V#2 dated 12/04/10
- Participant Information Sheet – Primary Care V#2 dated 12/04/10
- Participant Information Sheet – Primary Care Eligible Patients P1, V#2 dated 12/04/10
- Participant Information Sheet – Consented Eligible Patients P2, V#2 dated 12/04/10
- Consent Form – Primary Care and Workplace, V#2 dated 12 April 2010
- Participant Information Sheet – Workplace W1, V# 2 dated 12 April 2010
- Participant Information Sheet – Workplace W2, V# 2 dated 12 April 2010
- Participant Information Sheet – Eligible Workplace W1, V# 2 dated 12 April 2010
- Participant Information Sheet – Eligible Workplace W2, V# 2 dated 12 April 2010
- Questionnaire – Workplace -V# 01 dated March 2010
- Questionnaire – Primary Care -V# 01 dated March 2010
- Workplace advertisement

#### Certification

The Committee is satisfied that this study is not being conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is being carried out.

#### Accreditation

The Committee involved in the approval of this study is accredited by the Health Research Council and is constituted and operates in accordance with the Operational Standard for Ethics Committees, April 2006.

#### Progress Reports

The study is approved until 1 November 2012. However, the Committee will review the approved application annually and notify the Principal Investigator if it withdraws approval. It is the Principal Investigator's responsibility to forward a progress report covering all sites prior to ethical review of the project on **15 April**



**2011.** The report form should be forwarded to you prior to this date but if not received, it is available on <http://www.ethicscommittees.health.govt.nz> (forms – progress reports). Please note that failure to provide a progress report may result in the withdrawal of ethical approval. A final report is also required at the conclusion of the study.

#### **Final Report**

A final report is required at the end of the study. The report form is available on <http://www.ethicscommittees.health.govt.nz> (progress reports) and should be forwarded along with a summary of the results. If the study will not be completed as advised, please forward a progress report and an application for extension of ethical approval one month before the above date.

#### **Requirements for SAE Reporting**

The Principal Investigator will inform the Committee as soon as possible of the following:

- Any serious adverse events occurring during the study which are considered related to the study.

All SAE reports must be signed by the Principal Investigator and include a comment on whether he/she considers there are any ethical issues relating to this study continuing due to this adverse event. It is assumed by signing the report, the Principal Investigator has undertaken to ensure that all New Zealand investigators are made aware of the event.

#### **Amendments**

All amendments to the study must be advised to the Committee prior to their implementation, except in the case where immediate implementation is required for reasons of safety. In such cases the Committee must be notified as soon as possible of the change.

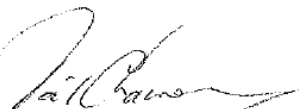
**Please quote the above ethics committee reference number in all correspondence.**

The Principal Investigator is responsible for advising any other study sites of approvals and all other correspondence with the Ethics Committee.

It should be noted that Ethics Committee approval does not imply any resource commitment or administrative facilitation by any healthcare provider within whose facility the research is to be carried out. Where applicable, authority for this must be obtained separately from the appropriate manager within the organisation.

We wish you well with your study.

Yours sincerely



**Pat Chainey**  
**Administrator**  
**Northern X Regional Ethics Committee**

Cc: C. Grinter, AUT



## MEMORANDUM

### Auckland University of Technology Ethics Committee (AUTEC)

---

To: Grant Schofield  
From: **Madeline Banda** Executive Secretary, AUTEC  
Date: 7 December 2010  
Subject: Ethics Application Number 10/275 **Validity and reliability of the Authentic Happiness Inventory in working adults.**

---

Dear Grant

Thank you for providing written evidence as requested. I am pleased to advise that it satisfies the points raised by a subcommittee of the Auckland University of Technology Ethics Committee (AUTEC) at their meeting on 11 November 2010 and that I have approved your ethics application. This delegated approval is made in accordance with section 5.3.2.3 of AUTEC's *Applying for Ethics Approval: Guidelines and Procedures* and is subject to endorsement at AUTEC's meeting on 24 January 2011.

Your ethics application is approved for a period of three years until 7 December 2013.

I advise that as part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/research/research-ethics/ethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 7 December 2013;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/research/research-ethics/ethics>. This report is to be submitted either when the approval expires on 7 December 2013 or on completion of the project, whichever comes sooner;

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are reminded that, as applicant, you are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

Please note that AUTECH grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to make the arrangements necessary to obtain this.

When communicating with us about this application, we ask that you use the application number and study title to enable us to provide you with prompt service. Should you have any further enquiries regarding this matter, you are welcome to contact Charles Grinter, Ethics Coordinator, by email at [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz) or by telephone on 921 9999 at extension 8860.

On behalf of the AUTECH and myself, I wish you success with your research and look forward to reading about it in your reports.

Yours sincerely

A handwritten signature in black ink, appearing to read 'M Banda'.

Madeline Banda

**Executive Secretary**

**Auckland University of Technology Ethics Committee**

Cc: Janine Shepherd [janine9@vodafone.net.nz](mailto:janine9@vodafone.net.nz)

## Appendix 3: Authentic happiness inventory

ID Number \_\_\_\_\_

Date \_\_\_\_\_

Time \_\_\_\_\_

Test 1 or 2 \_\_\_\_\_

Please read each group of five statements carefully. Then circle the one statement in each group that best describes the way you have been feeling for the past week, including today. Be sure to read all of the statements in each group before circling your choice.

1. A. I feel like a failure.  
B. I do not feel like a winner.  
C. I feel like I have succeeded more than most people.  
D. As I look back on my life, all I see are victories.  
E. I feel I am extraordinarily successful.
2. A. I am usually in a bad mood.  
B. I am usually in a neutral mood.  
C. I am usually in a good mood.  
D. I am usually in a great mood.  
E. I am usually in an unbelievably great mood.
3. A. When I am working, I pay more attention to what is going on around me than to what I am doing.  
B. When I am working, I pay as much attention to what is going on around me as to what I am doing.  
C. When I am working, I pay more attention to what I am doing than to what is going on around me.  
D. When I am working, I rarely notice what is going on around me.  
E. When I am working, I pay so much attention to what I am doing that the outside world practically ceases to exist.
4. A. My life does not have any purpose or meaning.  
B. I do not know the purpose or meaning of my life.  
C. I have a hint about my purpose in life.  
D. I have a pretty good idea about the purpose or meaning of my life.  
E. I have a very clear idea about the purpose or meaning of my life.

5. A. I rarely get what I want.  
B. Sometimes, I get what I want, and sometimes not.  
C. Somewhat more often than not, I get what I want.  
D. I usually get what I want.  
E. I always get what I want.
6. A. I have sorrow in my life.  
B. I have neither sorrow nor joy in my life.  
C. I have more joy than sorrow in my life.  
D. I have much more joy than sorrow in my life.  
E. My life is filled with joy.
7. A. Most of the time I feel bored.  
B. Most of the time I feel neither bored nor interested in what I am doing.  
C. Most of the time I feel interested in what I am doing.  
D. Most of the time I feel quite interested in what I am doing.  
E. Most of the time I feel fascinated by what I am doing.
8. A. I feel cut off from other people.  
B. I feel neither close to nor cut off from other people.  
C. I feel close to friends and family members.  
D. I feel close to most people, even if I do not know them well.  
E. I feel close to everyone in the world.
9. A. By objective standards, I do poorly.  
B. By objective standards, I do neither well nor poorly.  
C. By objective standards, I do rather well.  
D. By objective standards, I do quite well.  
E. By objective standards, I do amazingly well.
10. A. I am ashamed of myself.  
B. I am not ashamed of myself.  
C. I am proud of myself.  
D. I am very proud of myself.  
E. I am extraordinarily proud of myself.
11. A. Time passes slowly during most of the things that I do.  
B. Time passes quickly during some of the things that I do and slowly for other things.  
C. Time passes quickly during most of the things that I do.  
D. Time passes quickly during all of the things that I do.  
E. Time passes so quickly during all of the things that I do that I do not even notice it.

- 
12. A. In the grand scheme of things, my existence may hurt the world.  
B. My existence neither helps nor hurts the world.  
C. My existence has a small but positive effect on the world.  
D. My existence makes the world a better place.  
E. My existence has a lasting, large, and positive impact on the world.
13. A. I do not do most things very well.  
B. I do okay at most things I am doing.  
C. I do well at some things I am doing.  
D. I do well at most things I am doing.  
E. I do really well at whatever I am doing.
14. A. I have little or no enthusiasm.  
B. My enthusiasm level is neither high nor low.  
C. I have a good amount of enthusiasm.  
D. I feel enthusiastic doing almost everything.  
E. I have so much enthusiasm that I feel I can do most anything.
15. A. I do not like my work (paid or unpaid).  
B. I feel neutral about my work.  
C. For the most part, I like my work.  
D. I really like my work.  
E. I truly love my work.
16. A. I am pessimistic about the future.  
B. I am neither optimistic nor pessimistic about the future.  
C. I feel somewhat optimistic about the future.  
D. I feel quite optimistic about the future.  
E. I feel extraordinarily optimistic about the future.
17. A. I have accomplished little in life.  
B. I have accomplished no more in life than most people.  
C. I have accomplished somewhat more in life than most people.  
D. I have accomplished more in life than most people.  
E. I have accomplished a great deal more in my life than most people.
18. A. I am unhappy with myself.  
B. I am neither happy nor unhappy with myself—I am neutral.  
C. I am happy with myself.  
D. I am very happy with myself.
- 

- E. I could not be any happier with myself.
19. A. My skills are never challenged by the situations I encounter.  
B. My skills are occasionally challenged by the situations I encounter.  
C. My skills are sometimes challenged by the situations I encounter.  
D. My skills are often challenged by the situations I encounter.  
E. My skills are always challenged by the situations I encounter.
20. A. I spend all of my time doing things that are unimportant.  
B. I spend a lot of time doing things that are neither important nor unimportant.  
C. I spend some of my time every day doing things that are important.  
D. I spend most of my time every day doing things that are important.  
E. I spend practically every moment every day doing things that are important.
21. A. If I were keeping score in life, I would be behind.  
B. If I were keeping score in life, I would be about even.  
C. If I were keeping score in life, I would be somewhat ahead.  
D. If I were keeping score in life, I would be ahead.  
E. If I were keeping score in life, I would be far ahead.
22. A. I experience more pain than pleasure.  
B. I experience pain and pleasure in equal measure.  
C. I experience more pleasure than pain.  
D. I experience much more pleasure than pain.  
E. My life is filled with pleasure.
23. A. I do not enjoy my daily routine.  
B. I feel neutral about my daily routine.  
C. I like my daily routine, but I am happy to get away from it.  
D. I like my daily routine so much that I rarely take breaks from it.  
E. I like my daily routine so much that I almost never take breaks from it.
24. A. My life is a bad one.  
B. My life is an OK one.  
C. My life is a good one.  
D. My life is a very good one.  
E. My life is a wonderful one.
-

## Workplace

This questionnaire will help us understand more about your physical activity and nutrition patterns.

1. On average, how many servings of fruit (fresh, frozen, canned or stewed) do you eat per day?

**DO NOT INCLUDE FRUIT JUICE OR DRIED FRUIT**

A "SERVING" = 1 medium piece of fruit like an apple  
OR 2 small pieces of fruit like two apricots  
OR ½ cup of stewed fruit

(Tick one box only)

- I don't eat fruit ☐  
Less than 1 serving per day ☐  
1 serving per day ☐  
2 servings per day ☐  
3 or more servings per day ☐  
4 or more servings per day ☐

2. On average, how many servings of vegetables (fresh, frozen or canned) do you eat per day?

**DO NOT INCLUDE VEGETABLE JUICES**

A "SERVING" = 1 medium potato/kumara or 1 Cup of taro  
OR ½ cup cooked vegetables like peas  
OR 1 cup of salad vegetables  
For example, 2 medium potatoes + ½ cup of peas = 3 servings

(Tick one box only)

- I don't eat vegetables ☐  
Less than 1 serving per day ☐  
1 serving per day ☐  
2 servings per day ☐  
3 or more servings per day ☐  
4 or more servings per day ☐

3. How often do you eat fast food or takeaways from places like McDonalds, KFC, Burger King, pizza or burger shops, or fish and chip shops?

**PLEASE THINK ABOUT BREAKFAST LUNCHES, DINNERS AND SNACKS**

(Tick one box only)

- Never – I don't eat fast food or takeaways ☐  
Less than once per week ☐  
1-2 times per week ☐  
3-4 times per week ☐  
5-6 times per week ☐  
7 or more times per week ☐

4. Last week, on how many days did you have something to eat for breakfast?

**PLEASE THINK ABOUT BREAKFAST YOU EAT ON WEEKENDS AND WEEKDAYS. PLEASE INCLUDE BREAKFAST DRINKS SUCH AS SMOOTHIES.**

Number of days in a week on which I eat something for breakfast:

5. How often do you drink soft drinks or energy drinks? Soft drinks include carbonated or fizzy drinks such as Coca-Cola, Pepsi, lemonade, ginger beer and energy drinks.

**PLEASE DO NOT INCLUDE DIET DRINKS, FRUIT JUICES OR FRUIT DRINKS, FLAVOURED WATER OR SPORTS DRINKS**

(Tick one box only)

- Never – I don't drink soft drinks or energy drinks ☐  
Less than once per week ☐  
1-2 times per week ☐  
3-4 times per week ☐  
5-6 times per week ☐  
7 or more times per week ☐

Drawn from dietary habits questionnaire used in the Adult Nutrition Survey, face to face.

Now, we'd like you to think about sports, exercise and all the different types of physical activity you take part in.

6. During the last 7 days, on how many days did you walk at a brisk pace – a brisk pace is a pace at which you are breathing harder than normal? This includes walking at work or school while getting from place to place, at home and at any activities that you did solely for recreation, sport, exercise or leisure.

**PLEASE ONLY THINK ABOUT BRISK WALKING DONE FOR AT LEAST 10 MINUTES AT A TIME.**

- a.  days per week (GO TO Question 7).  
b. None (GO TO Question 8).

7. How much time did you typically spend walking at a brisk pace on each of those days?

- a.  hours  minutes

8. During the last 7 days, on how many days did you do moderate physical activities? "Moderate" activities make you breathe harder than normal, but only a little – like carrying light loads or bicycling at a regular pace.

**PLEASE DO NOT INCLUDE WALKING OF ANY KIND PLEASE ONLY THINK ABOUT THOSE PHYSICAL ACTIVITIES DONE FOR AT LEAST 10 MINUTES AT A TIME.**

- a.  days per week (GO TO Question 9).  
b. None (GO TO Question 10).

9. How much time did you typically spend on each of those days doing moderate physical activities?

a.  hours  minutes

10. During the last 7 days, on how many days did you do vigorous physical activities? "Vigorous" activities make you breathe a lot harder than normal ("huff and puff") – like heavy lifting, digging, aerobics or fast bicycling.

PLEASE ONLY THINK ABOUT THOSE PHYSICAL ACTIVITIES DONE FOR AT LEAST 10 MINUTES AT A TIME.

a.  days per week (GO TO Question 11).  
b. None (GO TO Question 12).

11. How much time did you typically spend on each of those days doing vigorous physical activities?

a.  hours  minutes

12. Thinking about all your activities over the last 7 days (including brisk walking), on how many days did you engage in:

- At least 30 minutes of moderate activity (including brisk walking) that made you breathe a little harder than normal, OR
- At least 15 minutes of vigorous activity that made you breathe a lot harder than normal ('huff and puff')

a.  days per week.  
b. None.

13. What do you estimate is the total time that you spend sitting during an average day? (Remember to include time spent sitting whilst travelling to and from work), at work, and at home e.g., TV eating).

(Tick one box only)

Less than 1 hour ☐  
1 to 2 hrs ☐  
3 to 4 hrs ☐  
5 to 6 hrs ☐  
7 to 8 hrs ☐  
More than 10 hrs ☐

14. About how many hours altogether did you work in the past 7 days? (If more than 97, enter 97).

Number of hours (00-97).

15. How many hours does your employer expect you to work in a typical 7-day week? (If it varies, estimate the average. If more than 97, enter 97.)

Number of hours (00-97).

16. Now please think of your work experiences over the past 4 weeks (28 days). In the spaces provided below, write the number of days you spent in each of the following work situations.

In the past 4 weeks (28 days), how many days did you...

Number of days (00-28)

- a. miss an entire work day because of problems with your physical or mental health? (Please include only days missed for your own health, not someone else's health.)
- b. miss an entire work day for any other reason (including vacation)?
- c. miss part of a work day because of problems with your physical or mental health? (Please include only days missed for your own health, not someone else's health.)
- d. miss part of a work day for any other reason (including vacation)?
- e. come in early, go home late, or work on your day off?

17. About how many hours altogether did you work in the past 4 weeks (28 days)? (See examples below.)

Number of hours in the past 4 weeks (28 days)

Examples for Calculating Hours Worked in the Past 4 Weeks

- 40 hours per week for 4 weeks = 160 hours
- 35 hours per week for 4 weeks = 140 hours
- 40 hours per week for 4 weeks with 2 8-hour days missed = 144 hours
- 40 hours per week for 4 weeks with 3 4-hour partial days missed = 148 hours
- 35 hours per week for 4 weeks with 2 8-hour days missed and 3 4-hour partial days missed = 112 hours

18. On a scale from 0 to 10 where 0 is the worst job performance anyone could have at your job and 10 is the performance of a top worker, how would you rate the usual performance of most workers in a job similar to yours?

Worst Performance 0 1 2 3 4 5 6 7 8 9 10 Top Performance  
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

19. Using the same 0-to-10 scale, how would you rate your usual job performance over the past year or two?

Worst Performance 0 1 2 3 4 5 6 7 8 9 10 Top Performance  
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

20. Using the same 0-to-10 scale, how would you rate your overall job performance on the days you worked during the past 4 weeks (28 days)?

Worst Performance 0 1 2 3 4 5 6 7 8 9 10 Top Performance  
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

# Participant Information Sheet



## Date Information Sheet Produced:

20 October 2010

## Project Title

*Validity and Reliability of the Authentic Happiness Inventory in working adults*

## An Invitation

You are invited to take part in this study that is about testing the validity and reliability of the Authentic Happiness Inventory, a questionnaire designed to measure happiness. Information is being collected by *Janine Shepherd* (researcher), and the study is being undertaken to gain a Masters degree in Public Health at Auckland University of Technology, and Prof Grant Schofield and Dr Melody Oliver are the project supervisors. Your participation is strictly voluntary, and if you choose to participate, you are free to withdraw from the research at any time without giving reason and with no adverse consequences. It is expected that the findings from this study will enable future researchers' to use the Authentic Happiness Inventory if proven to be valid and reliable.

## What is the purpose of this research?

To measure the validity and reliability of the Authentic Happiness Inventory, which is a questionnaire developed by Christopher Peterson of University of Michigan and available on the University of Pennsylvania Authentic Happiness website. To do this the researcher will test its stability over time by correlating scores from participants who are administered the same test twice (test retest) and compare the scores from this questionnaire with those of the already valid and reliable Satisfaction with Life Scale (SWLS) and the Positive and Negative Affect Scale (PANAS) questionnaires.



### **What will happen in this research?**

The researcher will meet with you during working hours explain the study, and if you choose to participate, you will be asked to complete and sign a consent form. After this you will be asked to complete a brief demographic questionnaire and to choose a time where you are able to complete the questionnaires on two consecutive days, this should take no more than 15-20 minutes of your time. On day one you will complete the Authentic Happiness Inventory and on day two you will redo the Authentic Happiness Inventory and complete the PANAS and the SWLS questionnaires. These questionnaires ask about your satisfaction with life, your positive and negative state of mind, mood, self esteem and happiness levels.

### **How was I chosen for this invitation?**

Working adults over the age of 20 years are being invited to take part in this research. Potential participants are initially being identified via the AUT staff electronic notice board researcher and invited to participate in the study.

### **What are the discomforts and risks?**

No clinical discomforts or risks are anticipated from participating in the study, however some participants may experience emotional discomfort at answering questionnaires relating to self esteem, positive and negative state of mind and happiness levels. Participants are encouraged to contact the researcher or research supervisor at the contact details below if they have any concerns at all and will have access to AUT health and counselling services at no charge if required.

### **What are the benefits?**

This is an opportunity to have input into informing research methodologies for studies investigating the validity and reliability of the Authentic Happiness Inventory.

### **How will my privacy be protected?**

The information collected from you will be kept strictly confidential, and will be stored as coded (instead of named) information. The consent forms will be kept separate from other information collected and will be locked away and kept strictly confidential. Information will be destroyed after 6 years. No participants will be identified in any research reports.

### **What are the costs of participating in this research?**

It is estimated that the questionnaires will take approximately 20 minutes to complete each day on two consecutive days.

### **What opportunity do I have to consider this invitation?**

Invitation to participate in this study is open until 30 adults have enrolled in and completed the study. The study will be conducted during November 2010 and December 2010.

### **How do I agree to participate in this research?**

If you agree to participate in the research, you will need to complete and sign a consent form.

### **What do I do if I have concerns about this research?**

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, *Prof. Grant Schofield*, 921 9999 ext 7307.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTECH, Madeline Banda, *madeline.banda@aut.ac.nz* , 921 9999 ext 8044.

### **Whom do I contact for further information about this research?**

#### **Researcher Contact Details:**

*Janine Shepherd*

*AH221c*

*Centre for Physical Activity and Nutrition Research*

*Email:*

*Phone: 921 9999 ext 7848*

#### **Project Supervisor Contact Details:**

*Prof. Grant Schofield*

*AH221e*

*Centre for Physical Activity and Nutrition Research*

*Email: grant.schofield@aut.ac.nz*

*Phone: 921 9999 ext 7307*

Approved by the Auckland University of Technology Ethics Committee on 11 November, AUTECH Reference number 10/275.

## Appendix 6: Consent form

<h1>Consent Form</h1>	 <p><b>AUT</b> UNIVERSITY TE WĀNANGA ARONUI O TAMAKI MAKAU RAU</p>
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*Project title:*                      **Validity and Reliability of the Authentic Happiness Inventory in working adults.**

*Project Supervisor:*            **Prof. Grant Schofield and Dr Melody Oliver**

*Researcher:*                      **Janine Shepherd**

- ☐ I have read and understood the information provided about this research project in the Information Sheet dated 20 October 2010
- ☐ I have had an opportunity to ask questions and to have them answered.
- ☐ I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- ☐ I am a working adult over 20 years of age.
- ☐ I agree to take part in this research.

Participant's signature: .....

Participant's name: .....

Participant's contact details :

.....

Date:

**Approved by the Auckland University of Technology Ethics Committee on 07 December 2010**  
**AUTEC Reference number 10/275**

*Note: The Participant should retain a copy of this form.*

## Appendix 7: Demographic survey

### **Identification details** *[to be completed by the researcher]*

ARC. Adult respondent code: \_\_\_\_\_

Date1. Day 1<sup>st</sup> measure: \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Time1. Time 1<sup>st</sup> measure: \_\_\_\_\_

Date2. Day 2<sup>nd</sup> measure: \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Time2. Time 2<sup>nd</sup> measure: \_\_\_\_\_

### **Demographic details** *[to be completed by the participant]*

1. **Name** \_\_\_\_\_

2. **Gender**

☐ Male

☐ Female

3. **Date of birth** \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

4. **Ethnicity**

☐ New Zealand/European

☐ Maori

☐ Caucasian

☐ Pacific Island

☐ Indian

☐ Asian/South Asian

☐ Other

3. **How would you best describe your occupation?**

- ☐ Manager
- ☐ Professional
- ☐ Technician/trades worker
- ☐ Community/personal service worker
- ☐ Clerical/administrative worker
- ☐ Sales worker
- ☐ Machinery operator/driver
- ☐ Labourer

**4. Do you work full time or part time?**

- ☐ Full time
- ☐ Part time - if part time, please state approximate hours worked per week:

\_\_\_\_\_ hours/week

**5. What is your highest qualification? (Please state)**

\_\_\_\_\_

## Appendix 8: Satisfaction with life scale

**ID Number** \_\_\_\_\_

**Date** \_\_\_\_\_

**Time** \_\_\_\_\_

Below are five statements that you may agree or disagree with. Read each one and tick the response that best describes how strongly you agree or disagree.

1. **In most ways, my life is close to my ideal.**

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Slightly disagree
- ☐ Neither agree nor disagree
- ☐ Slightly agree
- ☐ Agree
- ☐ Strongly agree

2. **The conditions of my life are excellent**

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Slightly disagree
- ☐ Neither agree nor disagree
- ☐ Slightly agree
- ☐ Agree
- ☐ Strongly agree

3. **I am completely satisfied with my life**

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Slightly disagree
- ☐ Neither agree nor disagree

- ☐ Slightly agree
- ☐ Agree
- ☐ Strongly agree

4. **So far I have gotten the most important things I want in life**

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Slightly disagree
- ☐ Neither agree nor disagree
- ☐ Slightly agree
- ☐ Agree
- ☐ Strongly agree

5. **If I could live my life over, I would change nothing**

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Slightly disagree
- ☐ Neither agree nor disagree
- ☐ Slightly agree
- ☐ Agree
- ☐ Strongly agree

## Appendix 9: Positive and negative affect scale

**ID Number** \_\_\_\_\_

**Date** \_\_\_\_\_

**Time** \_\_\_\_\_

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way during the past few weeks. Use the following scale to record your answers.

**1 = very slightly or not at all    2 = a little    3 = moderately    4 = quite a bit    5 = extremely**

- \_\_\_\_\_ Interested
- \_\_\_\_\_ Distressed
- \_\_\_\_\_ Excited
- \_\_\_\_\_ Upset
- \_\_\_\_\_ Strong
- \_\_\_\_\_ Guilty
- \_\_\_\_\_ Scared
- \_\_\_\_\_ Hostile
- \_\_\_\_\_ Enthusiastic
- \_\_\_\_\_ Proud
- \_\_\_\_\_ Irritable
- \_\_\_\_\_ Alert
- \_\_\_\_\_ Ashamed
- \_\_\_\_\_ Inspired
- \_\_\_\_\_ Nervous
- \_\_\_\_\_ Determined
- \_\_\_\_\_ Attentive
- \_\_\_\_\_ Jittery
- \_\_\_\_\_ Active
- \_\_\_\_\_ Afraid

## Appendix 10: Letter to all participants

17th January 2011

Dear Participant,

Thank you for taking part in the research regarding the Reliability and Validity of the Authentic Happiness Inventory prior to Christmas. All data has now been collected and the data analysis process has begun. Without willing participants I would be unable to undertake this research so your input is very much appreciated.

Please be aware that AUT offers a free and confidential health and counselling service if answering any of the questionnaires raised any issues for you that you would like to address. AUT Health and Counselling service can be contacted on 09 9219992 (City Campus) or 09 9219998 (North Shore Campus). Further information about this service is available on the AUT website.

Once again, thanks for taking part and I will email you a copy of the paper when it is completed in several months time. Please do not hesitate to contact the researcher, Janine Shepherd, on [janine.shepherd.aut.ac.nz](mailto:janine.shepherd.aut.ac.nz) or 021 2857145 if you have any questions or queries about the research.

Kind regards

Janine Shepherd  
AUT Master of Public Health Student