Pathways to Health in a Deprived Population:
Relationships between Smoking, Mental Health & Physical Health

Kim Kemp

Main text: 22,438 words

Main text including abstract: 22,643 word

Doctorate in Clinical Psychology – The University of Edinburgh – 2010

D. Clin. Psychol. Declaration of own work

This sheet must be filled in (each box ticked to show that the condition has been met), signed and dated, and included with all assessments - work will not be marked unless this is done

Name:

Assessed work: Case Study Conceptualisation Research proposal Case Study

SSR Essay Question Paper Thesis

(please circle)

Title of work:

I confirm that all this work is my own except where indicated, and that I have:

- Read and understood the Plagiarism Rules and Regulations ☐
- Composed and undertaken the work myself ☐
- Clearly referenced/listed all sources as appropriate ☐
- Referenced and put in inverted commas any quoted text of more than three words (from books, web, etc) ☐
- Given the sources of all pictures, data etc. that are not my own ☐
- Not made undue use of essay(s) of any other student(s) either past or present (or where used, this has been referenced appropriately) ☐
- Not sought or used the help of any external professional agencies for the work (or where used, this has been referenced appropriately) ☐
- Not submitted the work for any other degree or professional qualification except as specified ☐
- Acknowledged in appropriate places any help that I have received from others (e.g. fellow students, technicians, statisticians, external sources) ☐
- Complied with other plagiarism criteria specified in the Programme Handbook ☐
- I understand that any false claim for this work will be penalised in accordance with the University regulations ☐

Signature …… **Date** ……

Please note:

a) If you need further guidance on plagiarism, you can:

i/ Speak to your director of studies or supervisor

ii/ View university regulations at http://www.ed.ac.uk/schools-departments/academic-services/policies-regulations

b) Referencing for most assessed work should be in the format of the BPS style guide, which is freely available from the BPS web site

"I declare that I am the sole author of this thesis and that the work contained herein is my own. This thesis, or any part of it, has not been submitted for any other degree or professional qualification".

Name: ……. **Date:** ……..

Table of Contents

Acknowledgements

Thank you to the participants of my study – without them, this would not have been possible.

Thank you to the Keep Well Team in Fife for allowing me to conduct my research in association with such an important and inspiring intervention. Thanks in particular go to Margaret Bell and Kerry Humphries.

Thank you to my academic supervisor, Paul Morris, for his critique of my work.

Special thanks to Pauline Adair for her help and supervision with this research but also for her support, guidance and enthusiasm throughout my training.

Finally, I would like to thank my parents and brother for their endless support and encouragement throughout my training and in everything I do.

Abstract

Introduction:
Recently there has been increasing interest in understanding and addressing health inequalities and enhancing the well-being of the population as a whole through anticipatory care and better health care delivery. The current study aimed to investigate the predictive relationships between smoking behaviour, physical health, and mental health in a deprived population using models of mediation.
Method:
Participants had attended a Keep Well health check, a national programme offering health screening, advice, referrals and signposting to individuals aged 45-64 living in deprived areas. Participants completed a questionnaire measuring smoking status, physical health (RAND general health subscale), mental health symptoms (GHQ-12), positive mental health (WEMWBS), and demographic information.
Results:
The current study found that smoking mediated the relationship between mental health problems and physical health, as well as mediating the relationship between positive mental health and physical health.
Discussion:
These findings suggest that by offering interventions to encourage individuals to stop smoking health care providers can hope to reduce mental health problems via direct effects but also via an indirect benefit of improvements in physical health. There are also opportunities to improve physical health via the direct effects of reducing mental health problems and increasing positive mental health, as well as the indirect effect of smoking.

Chapter 1 Introduction

1.1 What is Health?

> "Health is a large word. It embraces not the body only, but the mind and spirit as well;… and not today's pain or pleasure alone, but the whole being and outlook of a man."
> James H. West

More than 60 years ago, the World Health Organization (WHO, 1948) defined health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (p.100). This definition is remarkable on two counts: firstly, it highlights the physical, social and mental components that constitute entire health; and secondly, it proposes that health is more than just the absence of illness. Since then, there has been reasonably slow progress in the realisation of this definition in scientific and practical fields (Ryff & Singer, 1998). Typical indices of health status still focus on disease and negative concepts and epidemiology often instinctively considers rates of mortality and morbidity but not psychological morbidity (Bowling, 2004; Ryff & Singer, 1998). There is therefore further scope to consider psychological morbidity, in particular, wellness and positive functioning when conceptualising health and what it is to be healthy.

Mental health has been similarly defined, originally by Jahoda in 1958, but more recently by the World Health Organisation (2004) in its first report on mental health promotion. In this, the WHO describes mental health as the presence of "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (2004; p.12). This conceptualisation will be

discussed in further detail later but it serves at this point as a helpful reminder of health as achieving potential, integration and positive functioning.

In Scotland, there is now increasing recognition of how health is a complex interaction of many factors, and income, environment, community, mental and physical health, and health behaviours are just a few of the influences on health and well-being (Fife Health & Wellbeing Alliance, 2007; Scottish Executive, 2003c). For example, a large body of research suggests that physical and mental elements of health can influence each other (e.g. Tsaousis & Nikolaou, 2005), emotional state can influence the perception of physical symptoms (e.g. Salovey *et al*., 2000), as well as playing a part in personal choices and health behaviours that cause and contribute to health conditions or illness (e.g. Brandon, 1994; Friedli, 2009). There is also increasing interest in understanding and addressing health inequalities and enhancing the well-being of the population as a whole. This is now being delivered through anticipatory care and preventive health care delivery, improvements in people's physical environments, social change and access to resources (e.g. Scottish Executive, 2003c; 2005a; The Scottish Government, 2007a; 2008a; Scottish Office, 1999).

Health inequalities exist largely due to the number of factors involved in health and well-being, and the complexity of the relationships between them (Adler *et al*., 1999 as cited in Gallo *et al*., 2006). These include wider determinants of health (e.g. housing and education), individual risk factors (e.g. diet, tobacco use) and the accessibility and responsiveness of health services (National Audit Office, 2010).

Interventions aiming to improve health and well-being and reduce inequalities are therefore likely to be required to address the complexity of these links in order to be effective. Indeed, authors have already suggested interventions identifying and addressing individual risk factors in isolation such as smoking or physical activity are unlikely to be entirely successful on their own in improving the general health and well-being of individuals from more deprived backgrounds (Fife Health & Wellbeing Alliance, 2007; Friedli, 2009). The Fife Health & Wellbeing Alliance (2007) for instance suggest that planning is required to address community, educational and economic issues associated with inequalities.

The current study aims to simultaneously examine the relationships between health behaviour, mental health, and physical health in a deprived population. It will pay equal attention to positive and negative elements of mental well-being and functioning, and consider one particular health behaviour, smoking, which has been associated with both physical and mental health (e.g. Woolf *et al*., 1999). It will test the existence and predictive nature of previously reported relationships between these variables and also how they relate to a relatively new construct, positive mental health (Ryff *et al*., 2006). Given the interest of health professionals, researchers and the Government in improving the health of the population and addressing health inequalities, this research has chosen to investigate the relationships between these factors in a socioeconomically deprived population and who have attended an intervention screening for risk factors for coronary heart disease, the Keep Well health check.

1.2 Describing the Links

In an attempt to shed light on the complex relationships between physical health, mental health (both positive mental health and mental health problems) and smoking, the next section will discuss the current knowledge and understanding of each relationship in turn and how these fit within political and health agendas. It will then discuss these with regards to health inequalities and socioeconomically deprived populations.

1.2.1 Mental Health Problems and Positive Mental Health

> "Just because you're not sick, doesn't mean you're healthy."
> Author Unknown

As mentioned previously, a typical approach to health in research and clinical areas has been to primarily consider illness or disease. This has also applied to mental health, with a focus largely on understanding, measuring and treating levels of depression, anxiety and psychiatric disorders. More recently however, researchers, clinicians and governing bodies have turned their attention to both positive and negative aspects of mental health (Ryff *et al*., 2006). This has led to recognition of the need to clarify and define what is meant by mental health, an already debated and contested concept (Herron & Mortimer, 1999; Herron & Trent, 2000).

There is increasing agreement on the use of the term mental health as a broad, overarching concept that includes both positive mental health (sometimes referred to as mental well-being) and mental health problems (sometimes referred to as negative

mental health, mental illness, or mental distress). There is also recognition of this in the priorities of governing and health bodies and an interest in the value of adding the promotion of mental health and well-being to general health and mental health policies. For example, at an international level, the WHO Mental Health Declaration and Action Plan for Europe (WHO, 2005) highlights the importance of establishing the mental health of populations beyond levels of mental health problems. Within Scotland, improving mental health is both a public health priority and a national priority, as indicated in, for example, *Towards a Healthier Scotland* (Scottish Office, 1999), *Our National Health: A Plan for Action, A Plan for Change* (Scottish Executive, 2000), *Partnerships for Care: Scotland's Health White Paper* (Scottish Executive, 2003c), the strategic framework for health improvement *Improving Health in Scotland: The Challenge* (Scottish Executive, 2003a) and more recently in *Delivering for Health* (Scottish Executive, 2005a), *Delivering for Mental Health* (Scottish Executive, 2006), *Better Health, Better Care: Action Plan* (Scottish Government, 2007a) and *Equally Well* (Scottish Government, 2008a).

There is also increasing interest in how best to capture changes in mental health and positive mental health at a population level and most recently there has been the inclusion of positive mental health measures in population-based surveys (e.g. Braunholtz *et al*., 2007). Research in this area is important because measures of mental health problems show floor effects in samples of the general, non-clinical population and may not effectively capture any change that occurs following intervention (Parkinson, 2007b).

There has been substantial discussion and research on whether positive mental health and mental health problems are opposite ends of a bipolar continuum or are better understood as separate independent dimensions, also known as the two continua model (Keyes, 2002; 2005; 2007; Ryff *et al*., 2006). Historically, the investigation of population mental health has focused on the mental health problem continuum (Stewart-Brown, 2002) and so the body of research considering this broader conceptual understanding of two separate continua is still emerging. There is however, evidence from empirical research to support this understanding. Population surveys using versions of the General Health Questionnaire (GHQ) have found sociodemographic and psychosocial characteristics to vary across the two continua (Hu *et al*., 2007; Huppert & Whittington, 2003). These studies found that higher levels of positive mental health were associated with being younger, employed and having no or fewer physical health problems and a different pattern of these variables for individuals reporting no or fewer symptoms of mental health problems. Hu *et al*. (2007) conducted exploratory and confirmatory factor analyses with GHQ-12 questionnaire data from the British Household Panel Survey and Health Survey for England, collected from 9204 participants. They found two factors within the data and suggested that these factors corresponded to symptoms of mental health problems and positive mental health. In this study they found females to have significantly higher symptoms of mental health problems but not to differ from males on positive mental health. They found unemployment to be significantly associated with lower levels of positive mental health but not symptoms of mental health problems. Hu *et al*. (2007) concluded therefore that scores associated with the continua are "not merely mirror images of each other" (p.1011). The independence

of positive mental health and mental health problems has also been suggested by surveys of the Scottish population. Taulbut *et al*. (2009) reported that gender and socioeconomic deprivation were not associated with positive mental health scores, a very different picture compared with that of mental health problems, where those living in the most deprived areas had a significantly higher score on the GHQ-12 (a measure of psychological distress).

Studies investigating measures of neuroendocrine and cardiovascular function have also supported this independence. Ryff *et al.* (2006) found that biomarkers (e.g. cortisol, cholesterol, blood pressure) which correlated significantly with levels of positive mental health were not found to be associated with levels of mental health symptoms and suggests that both of these constructs (positive mental health and mental health problems) show a different and distinct "biological signature" (p.92).

Keyes (2002; 2005; 2007) has proposed that on these two continua, positive mental health ranges from a low to a high level ("flourishing") and mental health problems range from absence through levels of mild, moderate, severe and diagnosable. Various authors suggest that these two continua are independent and therefore people with mental health problems can still experience high levels of positive mental health and vice versa (Huppert & Whittington, 2003; Keyes, 2002; 2005; 2007; Ryff *et al*., 2006). Analyses of data from the Midlife in the United States Survey found that only 20% of individuals without mental health problems were found to possess high levels of positive mental health (Keyes, 2002). This is higher than those with a diagnosis of depression, 7% of whom had high levels of positive mental health (Keyes, 2002).

Studies using this dataset have also described the impact of positive mental health and mental health problems (as diagnosed by the DSM-III-R) on health and social outcomes. Having low levels of positive mental health but no mental health problems was found to be more detrimental than having a mental health problem and high levels of positive mental health. Those individuals with no mental health problems and high levels of positive mental health reported the healthiest psychosocial functioning, fewest days off work and the fewest health problems (Keyes, 2002; 2005; 2007).

Several studies have looked at the degree to which measures of symptoms of mental health problems correlate with measures of positive mental health. Overall, these show a large, negative correlation: for example, Keyes and colleagues report measures of psychological well-being as correlating -.51 with the Zung Depression Inventory and -.55 with the Center for Epidemiological Studies Depression (CESD) Scale (Keyes, 2002; 2005; Ryff & Keyes, 1995). More recently, studies of the Scottish Population have reported a similar degree of correlation between scores on the GHQ-12 and the Warwick Edinburgh Mental Well-Being Scale (WEMWBS) of -.54 (Braunholtz *et al*., 2007) and -.53 (Stewart-Brown & Janmohamed, 2008). Stewart-Brown and Janmohamed (2008) argue that the relationship between these measures supports the two continua model conceptualisation of mental health: individuals who had the same score on the GHQ-12 had a wide range of WEMWBS scores. They conclude, "…so although lower WEMWBS scores tend to be associated with higher GHQ-12 scores, one is not simply the inverse of the other. The two scales are therefore not measuring the same thing." (Stewart-Brown &

Janmohamed, 2008, p.11). Keyes (2005) similarly suggests that although scores on measures of mental health problems and positive mental health correlate approximately -.5, this means only one quarter of the variance in scores on these measures is shared.

To summarise, it can be argued that when investigating mental health, particularly at a population level, it is important to consider positive mental health as well as mental health problems. This is for a number of reasons:

1) Recent conceptualisations describe mental health as being a state beyond absence of mental illness and as one of well-being and positive functioning;
2) Positive mental health and mental health problems have been demonstrated to be independent constructs with separate biological processes and different associations with demographical and social variables; and
3) At a population level, measures of mental health problems may display floor effects and be insensitive to change.

Governing political and health bodies that aim to understand and improve the mental health of the population are now increasingly aware of the need to take a complete health approach to promoting mental health for all and this includes focusing on positive mental health for individuals and the general population (Huppert, 2005). Indeed, the Scottish Executive (2003a) writes "promoting positive mental health and taking action to prevent mental ill health are therefore essential components of all health improvement work" (p.4). Health promotion already has begun to encompass

this conceptualisation and there appears to be interest in developing new positive psychological therapies focusing on facilitating positive mental health (e.g. Fava *et al*., 1998).

1.2.1.1 Further Defining Positive Mental Health

Positive mental health is a complex construct and there has been great debate about how best to define it. Added to this is the confusion that comes from various terms being used interchangeably – "positive mental health", "mental well-being" and "well-being". This construct has been described in a number of ways and with research in this area in its early stages, it may be some time before any one model is universally accepted. There is however, some growing consensus on how best to relate together the concepts described in this area and it is now generally accepted that positive mental health refers to a collection of emotional and cognitive attributes (Parkinson, 2006). Research in this area discusses the experiential and functioning aspects of positive mental health and there are two perspectives which have distinct bodies of research (Huppert *et al.*, 2005; Keyes, 2007; Ryan & Deci, 2001):

- The hedonic perspective which focuses on the subjective experience of affect (e.g. positive mood) and life satisfaction (the cognitive appraisal of one's life); and
- The eudiamonic perspective which focuses on self-realisation or personal growth, relationships and positive functioning.

For many authors (e.g. Huppert, 2005), it is important that the conceptualisation of positive mental health includes both these perspectives and is not just concerned with hedonic elements, as positive mood does not necessarily make for personal growth and can be achieved by artificial means (e.g. alcohol or drugs). Huppert *et al*. (2005) report that there is a bidirectional pathway between hedonic and eudaimonic well-being – positive mood encourages positive functioning and positive functioning can lead to positive mood.

Evidence is now growing on the attributes associated with positive mental health and its consequences on other life domains. For instance, Keyes (2002) reported that individuals with greater positive mental health report fewer limitations of daily living and fewer days off work due to illness. There are also estimates of population levels of positive mental health appearing, for example, Keyes (2002) revealed 17.2% of his studied population were "flourishing" (i.e. reporting high levels of positive mental health) and 56.6% reported moderate levels of positive mental health. In this study 3,032 adults who participated in the 1995 Midlife in the United States study completed the Composite International Diagnostic Interview Short Form scales (to determine depressive symptoms), two scales of emotional well-being, Ryff's measures of psychological well-being and Keyes' measures of social well-being. Individuals' scores on these measures were standardised and divided into thirds. Individuals who scored in the upper third of one of the two emotional well-being scales and six of the 11 scales of psychological and social well-being were classified as "flourishing". Individuals who scored in the lower third of the same number of scales were classified as "languishing", and those who were neither flourishing nor

languishing (i.e. the middle third) were classified as "mentally healthy". Although this study included many aspects of positive mental health and functioning and a large sample, the classification of individuals into categories is questionable and the rationale not given for how scores on measures would determine classification of individuals.

Since then, research has continued and a more rigorous psychometric approach adopted for the development and validation of measures of positive mental health. One measure that has been used more recently in studies of the adult Scottish population is the Warwick Edinburgh Mental Wellbeing Scale (WEMWBS). It does not categorise individuals but instead has been used to comment on average levels of positive mental health. For example, in a study of 1,216 Scottish individuals Braunholtz *et al*. (2007) reported 14% as having "good" scores for positive mental health (a WEMWBS score one standard deviation above the mean) and 73% as having "average" positive mental health. These authors report that scores on this measure of positive mental health were normally distributed among the population.

Studies are yet to satisfactorily establish the relationships and direction of causation between demographic and other variables and levels of positive mental health but some evidence is emerging. Generally, married individuals report higher levels of positive mental health than those who are single, divorced or separated (Braunholtz *et al*., 2007; Huppert *et al*., 2005). There do not seem to be any clear relationships between mental well-being and gender, age or financial status and there are mixed results regarding levels of education, which may reflect its own impact on variables

such as health and income (Huppert *et al*., 2005). The strongest relationships seem to be with physical health and employment status. Those reporting physical health problems reported lower levels of positive mental health, as did individuals who were unemployed (Braunholtz *et al*., 2007; Huppert *et al*., 2005). Huppert *et al*. (2005) has reported demographic variables as accounting for 25% of the variance in scores on measures of positive mental health.

1.2.2 Mental Health and Physical Health

> "When the head aches, all the body is the worse."
> English Proverb

The link between physical and mental health is already well known, particularly the co-occurrence of physical illness and mental health problems (WHO, 2004). It has increasingly become an area of interest politically, with agendas to address mental health to improve overall health and well-being, and to improve the physical health of those experiencing mental health problems (Myers *et al*., 2005; The Scottish Government, 2008b). Authors have highlighted the importance of considering both physical and mental health when designing and implementing interventions to improve one or the other in order for these to be successful (Myers *et al*., 2005; Stewart-Brown, 1998).

1.2.2.1 The Influence of Physical Health on Mental Health

Generally, those who rate their health as "good" in surveys have been those who also report fewer symptoms of mental health problems and higher levels of positive

mental health (Braunholtz *et al*., 2007; Scottish Executive, 2005b). Physical health problems and disability influence the risk of mental health problems, for example depression and anxiety (Prince *et al*., 2007), and this has been demonstrated with a number of health conditions including chronic pain (e.g. Bair *et al*., 2003), diabetes (e.g. Marcus *et al*., 1992) and heart conditions (Silverstone, 1990). Long-standing physical health problems have been found to be related to an increased rate of reported mental health problems (Singleton *et al*., 2001) and this has been demonstrated in longitudinal studies also (Singleton & Glyn, 2003). Singleton & Glyn (2003) conducted an 18-month follow-up of people interviewed in the 2000 Psychiatric Morbidity Survey and found longstanding physical health complaints at time one to be associated with the later development and persistence of common mental health disorders as measured 18 months afterwards. Explanations for the relationship between physical health problems and mental health problems include difficulties coping with the impact on physical illness on functioning, activities and relationships. Generally, it is now appreciated that it may be possible to improve the mental health of individuals through physical health improvement, for example, by modifying health behaviours and practices and reducing the impact of chronic conditions through better self-management (Lorig *et al*., 1999; The Scottish Government, 2008b).

1.2.2.2 The Influence of Mental Health on Physical Health

Reciprocally, there is a significant body of research that highlights that mental health can have an impact on physical health. Rates of physical illness and mortality are

higher with people who have mental health problems, and they are at increased risk from cardiovascular disease, diabetes, and stroke, among other conditions (Friedli, 2009; Myers *et al*., 2005; The Scottish Government, 2007b; 2008a). The role of emotions and cognitions in coronary heart disease has been confirmed in various studies as a direct physiological influence, even after controlling for behavioural factors (Gallo *et al*., 2004; Gallo & Matthews, 2003). Depression has been found to be a significant independent risk factor for the onset of coronary disease. Wulsin & Singal (2003) carried out a systematic review of studies with the general population and found depressive symptoms contributed significantly as an independent risk factor for the onset of coronary disease, greater than that of passive smoking but less than that for active smoking. Penninx *et al*. (2001) also found depression (as defined by DSM-III criteria) to increase the risk of cardiac mortality in individuals with and without cardiac disease. They examined a cohort of 2,847 men and women for 4 years; at baseline 450 of these individuals had a diagnosis of cardiac disease and 2,397 did not. After adjusting for demographic factors, smoking, alcohol use, blood pressure and body mass index, they found that compared with non-depressed cardiac patients, cardiac patients with minor depression had a relative risk of 1.6 for subsequent cardiac mortality, and those with major depression had a relative risk of 3.0. For those without cardiac disease at baseline, the relative risk of cardiac mortality for those with minor depression was 1.5 and for those with major depression was 3.9. The mechanisms by which mental health influences physical health are unclear but suggestions include the poorer health behaviours of individuals with mental health problems (Carney *et al*., 2002; Myers *et al*., 2005; Penninx *et al*., 2001), exclusion and discrimination due to having a mental health problem (Friedli,

2009) or pathophysiological mechanisms (Penninx *et al*., 2001; Ryff & Singer, 1998).

1.2.2.3 The Relationship between Positive Mental Health and Physical Health

While there is growing evidence about the impact of mental health problems on health status, there is also growing evidence of the impact of positive mental health on physical health (Huppert *et al.*, 2005). The presence or absence of positive mental health, as mentioned above, influences a number of other domains including health behaviours and recovery from illness (Friedli, 2009), which in turn will play a part in how individuals perceive their health. Positive mental health has been demonstrated to be associated with general health including self-rated health status (Dolan *et al*., 2006) as well as specific disease such as stroke and heart disease (Keyes, 2004; Ostir *et al*., 2001). Surveys of British and Scottish populations have found that positive mental health (i.e. high scores on a measure like the WEMWBS) is associated with having few or no physical health problems (Braunholtz *et al*., 2007; Hu *et al*., 2007; Tennant *et al*., 2007) and individuals rating their health as "very good" had significantly higher positive mental health scores than those rating their health as "very poor" (Tennant *et al*., 2007). In an American population, Keyes (2005) found the prevalence of health conditions to be highest amongst those with low scores for positive mental health and lowest amongst those who had high positive mental health scores.

It has been suggested that promoting positive mental health and encouraging specific positive emotions (for example, joy, interest and contentment) could be ways to improve physical health by improving overall health (Fredrickson, 2000; Friedli, 2009) and health behaviours (The Scottish Government, 2008a). The data reported so far however, only shows that they are related and the mechanisms by which causation could occur are unclear and complex. Several have been suggested (Gallo *et al*., 2004) and these include enhancing health behaviours (which will be discussed in relation to smoking later), social networks, physiological mechanisms and stress buffering (Fredrickson, 2001; Friedli, 2009).

To summarise, there appears to be a close relationship between physical health and mental health. Evidence comes from various sources and highlights some key findings regarding mental health problems:

1) Longitudinal and cross-sectional studies suggest that physical health problems influence the risk of individuals developing mental health problems.
2) Survey data suggest that those who report their health as "good" report fewer symptoms of mental health problems and increased levels of positive mental health.
3) Individuals with mental health problems are at increased risk of morbidity and mortality from a number of diseases.
4) Evidence suggests that emotions and cognitions can have a direct and independent physiological influence on disease development (e.g. CHD).

5) There is growing evidence suggesting positive mental health can play a part in how individuals perceive their health and it has been associated with fewer health problems. This has led to speculation about whether improving positive mental health could be a way to improve overall health.

1.2.3 Smoking and Physical Health

The links between tobacco use and poor health are well established in relation to specific diseases and symptoms, for example, lung cancer, chronic obstructive pulmonary disease and cardiovascular disease (Woolf *et al*., 1999). Tobacco use is the biggest cause of premature preventable death in the United Kingdom (Peto *et al*., 2006) and every year, over 13,000 people in Scotland die from smoking related illnesses, equating to 24% of all deaths (Health Scotland *et al.*, 2007).

Smoking is also known to cause a number of diseases, just some of which are coronary heart disease, lung cancer, chronic bronchitis, emphysema, pneumonia and chronic obstructive pulmonary disease. It can also cause cancer of the mouth, nose, throat, oesophagus and larynx, and stroke (Action on Smoking and Health, 2008).

Research and population studies are also generating evidence regarding the impact of tobacco use on global health. Arday *et al*. (2003) and results from the Scottish Health Survey (Scottish Executive, 2005b) found that smokers and former smokers report poorer health and poorer physical functioning than those who have never smoked.

1.2.4 Smoking and Mental Health

1.2.4.1 Smoking and Mental Health Problems

It is now generally accepted that healthy and unhealthy behaviours (for example, smoking) both influence and are influenced by people's mental health. There are numerous reports of a higher than average prevalence of tobacco use in individuals experiencing mental health problems (Carney *et al*., 2002; The Scottish Government, 2007c), both for those resident in psychiatric institutions (Meltzer *et al*., 1996; as cited in Brown, 2004) and those living in the community (Coultard *et al.*, 2000; as cited in Health Development Agency, 2004). Individuals with mental health problems are in fact, twice as likely to smoke compared with the general population (e.g. Glassman *et al*., 1990) and the mental health charity Mind, reports that 70% of people in inpatient units smoke (Mental health service users, 2007).

As well as being more likely to smoke, those with mental health problems are also more likely to smoke heavily (e.g. McCreadie, 2003) and to be more dependent on nicotine, as measured by the number of cigarettes smoked, time until first cigarette of the day and perceived difficulty in stopping (McNeill, 2001). Having more than one diagnosed mental health problem or reporting a greater number of mental health symptoms were associated with heavier smoking (Coultard *et al.*, 2000; as cited in Health Development Agency, 2004). These findings have been reported in countries around the world as well as in Scotland (e.g. Health Development Agency, 2004; Lerena, 2003).

Within the general population, cross-sectional and follow-up studies have also found a strong association between smoking and depression (Anda *et al*., 1990; Breslau *et al*., 1998). Poorer psychological (e.g. depression and anxiety) and mental functioning are more common in smokers (Arday *et al*., 2003; Lee, 1999; Son *et al*., 1997), and smokers also report higher stress levels than non-smokers (Parrott, 1999). The Scottish Health Survey (Scottish Executive, 2005b) reported that males who currently smoked had a 1.36 times greater odds of having a high score on the GHQ-12 than those who had never smoked.

A complete explanation for the association between smoking and mental health problems is not yet clear but several suggestions have been made (Wetzler & Ursano, 1988 Woolf *et al*., 1999). It is possible that some third factor is common to both of them, for example genetic or environmental psychosocial factors such as deprivation or exclusion (Kendler *et al*., 1993; Williams & Ziedonis, 2004). It may however, be that psychological distress or mental health problems contribute to smoking behaviour. Psychological distress plays a part in many aspects of smoking behaviour including initiation, progression, maintenance and ability to quit. For example, depression increases the likelihood of starting smoking and of progressing to regular and heavy smoking as smokers use nicotine to self-medicate their mood (Glass, 1990; Hughes, 2001). High levels of stress have also been associated with an increase in levels of smoking, reduced self-efficacy to stop smoking and difficulty not smoking when stressed (Ng & Jeffery, 2003). Depressed smokers are reported to be less able to quit smoking and more likely to relapse (Glassman *et al*., 1990; Hall *et al*., 1993) and it is generally discussed that psychological distress is a maintaining

factor in existing unhealthy habits (Lee, 1999). Zillman & Bryant (1985; as cited in Ng & Jeffery, 2003) suggest that aversive states such as stress or low mood motivate people to engage in unhealthy behaviours that bring them pleasure.

A possibly controversial alternative explanation, which Lee (1999) suggests, is that unhealthy behaviours lead to psychological problems. Brown *et al*. (1996) for example report that adolescent smokers are more likely to become depressed and suggest this is via the impact of long-term exposure to nicotine on neurobiological systems (e.g. the immune system) implicated in the aetiology of depression (Kendler *et al*., 1993). Given the population prevalence of smoking, this explanation seems unlikely. It is arguably more helpful to consider that smoking could be maintained by characteristics of psychological distress, for example, motivational deficits, reduced self-esteem and seeking social approval (Lee, 1999). A further recent explanation comes from work by Hajek *et al.* (2010) whereby they suggest smoking acts as a stressor, and there are genuine anxiety reducing effects as well as withdrawal discomfort associated with smoking. Their longitudinal study aimed to examine the temporal sequence between smoking and mental health problems and followed 469 patients who had had myocardial infarction or coronary artery bypass surgery and who wanted to stop smoking. They measured changes in perceived stress from baseline to 1 year using a single self-report item. They found no difference in perceived stress between future abstainers and future relapsers at baseline, and that those who maintained abstinence for the year (N = 194, 41%) reported significantly lower stress scores. This is arguably an interesting finding but they did not use a validated questionnaire of anxiety or stress which may mean that

these differences are not an accurate reflection of change. They did not control for other stressful life events and did not take regular measurements of perceived stress to allow them to indicate at what time point the changes in perceived stress occurred. It is not therefore certain that their results will generalise from this specific patient group to the general population.

Either way, this conceptualisation of smoking and mental health problems would make for a strong argument in favour of interventions to prevent or reduce unhealthy behaviours such as smoking, in order to improve physical health but also to enable potential reductions in subsequent psychological distress.

1.2.4.2 Smoking and Positive Mental Health

Research looking at healthy and unhealthy behaviours and positive mental health is much further behind that which investigates mental health problems like anxiety and depression. Woolf *et al*. (1999) report an association between smoking and emotional and social well-being, where current smokers reported lower scores on the SF-36 for vitality, social health, emotional role function and mental health. It has also been reported that people with higher levels of positive mental health may be more likely to look after their own health in the first instance via health behaviours (The Scottish Government, 2008a; Wetzler & Ursano, 1988), and may be more likely (or able) to stop smoking (Woolf *et al*., 1999). There is some evidence linking positive cognitions such as optimism and perceived control to better health behaviours (Mulkana & Hailey, 2001; Ziff *et al*., 1995). There has been less investigation of the

association between healthy behaviours and positive emotions, but Gallo *et al*. (2004) suggest that resilient emotional factors could play a role in behavioural pathways. Individuals with high levels of positive emotion may be more likely to adopt adaptive ways of coping and less likely to adopt unhelpful ways of coping (like smoking or eating high fat foods) when experiencing stress (Aspinwall & Taylor, 1997).

To summarise, there is substantial evidence that smoking both influences and is influenced by mental health. Regarding its relationship with mental health problems, there are a few key findings:

1) Individuals with diagnosed mental health problems report significantly higher rates of smoking, are more likely to smoke heavily and are more dependent on nicotine.
2) Within the general population, poorer psychological functioning and a greater number of reported mental health symptoms are reported by smokers compared with non-smokers.
3) Psychological distress appears to play a part in the initiation, progression, maintenance and inability to stop smoking.

There is also a link between positive mental health and smoking, with smokers reporting lower scores on measures of positive mental health. Positive emotions and cognitions have been suggested as contributing to the finding that those with higher levels of positive mental health are less likely to smoke and more likely to look after

their own health in the first instance, to make healthy lifestyle changes (e.g. to stop smoking) or to use more adaptive coping strategies when under stress.

1.2.5 The Complexity of the Links

There is a large and growing body of research relating to each of the constructs of physical health, positive mental health, mental health problems and smoking. There is also recognition by researchers, health professionals and policy makers that interventions to improve mental health, physical health or health behaviour should recognise and work with the complex interactions between these. Perhaps due to this complexity, there has been little effort to simultaneously investigate all of these constructs at once and there are no explicit theories or models in this area for researchers to draw on.

Previous studies have described and demonstrated differences, associations and correlations between smoking status, physical health, mental health problems and positive mental health but not examined the predictive nature of these relationships. Examining the relative influence of predictor variables and their interactions via mediating processes is one way by which it is possible to begin to understand these relationships. Models of mediation allow associations between variables to be examined in detail as well as allowing for speculation about possible causal pathways. Although they do not produce conclusions about causal links, they can provide guidance on what patterns of influence between variables are more plausible.

They are useful for developing theories as well as identifying possible points of intervention in applied work.

For one population in particular, the complexity of these relationships has been recognised and the importance of intervening to improve health is clear – the deprived population.

1.3 The Context of Deprivation and Socioeconomic Status

Inequalities in health are a major concern for developed countries, and internationally governing bodies are showing an increased interest in understanding and addressing health inequalities (e.g. Crombie *et al*., 2005). This also applies to Scotland (e.g. Scottish Executive, 2003c; 2005a; The Scottish Government, 2007a; 2008a; Scottish Office, 1999). Documents remark on the increased risks for individuals living in deprived areas for physical and mental health problems, poorer health behaviours as well as lower rates of employment and educational achievement and home ownership (e.g. The Scottish Government, 2007a). Although the physical and mental health and life expectancy of the UK population has been improving over the last 50 years, this has not occurred consistently across all segments of the population (e.g. Macintyre, 2007) and those living in more deprived areas are generally found to have higher rates of morbidity and mortality compared with those living in more affluent areas (The Scottish Government, 2007a; 2008a). Inequalities in health across socioeconomic status exist for both physical and mental health conditions, but are seen most clearly for cardiovascular disease, arthritis, diabetes,

chronic respiratory disease, certain types of cancer, schizophrenia and anxiety (Adler & Snibbe, 2003; Gallo & Matthews, 2003; Macintyre, 2007).

Numerous surveys have reported differences in mortality and morbidity, to the disadvantage of the lower social classes. In Scotland, individuals in the most deprived areas were more likely to report their health as "bad" or "very bad", have longstanding illness, and acute sickness than those in the most affluent areas (Mercer & Watt, 2007; Scottish Executive, 2005b). For example, the percentage of 45-64 year-olds reporting their health as "not good" was 25.1% in the most deprived areas of Scotland compared with 10.4% in the most affluent areas (Scottish Executive, 2003b). Equivalent ratings of health have been reported for the Scottish population (Braunholtz *et al*., 2007; Myers *et al*., 2005; Scottish Executive, 2005b; Taulbut *et al*., 2009). Individuals from deprived areas are 2.95 times more likely to die from coronary heart disease than those from more affluent areas (Scottish Executive, 2003b). This report also documents how there has been a significant increase in the inequality ratio with regards to this disease from 1991 to 2001, as those from more affluent groups showed greater improvement than those in more deprived groups.

Poorer mental health has also been associated with greater socioeconomic disadvantage in the Scottish population, with individuals from this background being at greater risk of developing a mental health problem and reporting more symptoms of anxiety and depression (Gallo & Matthews, 2003; Myers *et al*., 2005; Taulbut *et al*., 2009). They are reported to be the group most susceptible to negative emotions, cognitions and related disorders due to their environment (for a review see Gallo &

Matthews, 2003; Lorant *et al*., 2003). The Scottish Executive has reported population scores for the GHQ-12 and found that females from deprived backgrounds were more likely to score 4 or above on this measure (denoting poor mental health) than females from more affluent backgrounds (with 25% and 18% scoring ≥4 respectively) and those from deprived backgrounds were also less likely to have a GHQ-12 score of zero (Scottish Executive, 2003b; 2005b; 2009a). This was not the case for males.

A somewhat different pattern emerges for positive mental health and it has been suggested that there is at most only a weak correlation between socioeconomic status or wealth and happiness or positive mental health (Ryan & Deci, 2001). Indeed, when surveying the Scottish population, Taulbut *et al.* (2009) did not observe any differences in positive mental health between areas of differing levels of deprivation. Dolan *et al*. (2006) also report that there is evidence of diminishing returns regarding increases in positive mental health and income, that is, the relationship between these constructs becomes weaker as income rises. Huppert & Whittington (2003) report that although socioeconomic group has not been associated with positive mental health, employment status has been, and individuals who are unemployed are more likely to report lower scores on positive mental health measures.

Arguably, one of the most influential documents in this area has been the Black Report (Black, 1980). In this report, Black demonstrated that extreme poverty and ill-health were inextricably linked and that material deprivation was a major determinant of ill-health and death. He also provided evidence to show that

inequalities in health continued to exist despite the introduction of the National Health Service but suggested that this was not due to a failure of the Service but more due to other social inequalities that influence health: income and employment, education, quality of housing, diet and the working environment. He suggested that in order to address these inequalities and improve health, structural and environmental factors governing people's lives needed to improve and recommended a number of social policy measures to tackle the problem. Almost 30 years on, health inequalities are universally agreed to be unacceptable and remain a prioritised issue for the Scottish Government (e.g. Scottish Executive, 2003c; The Scottish Government, 2007a).

More recently, studies have more closely examined the availability and ease of access to health care services as part of the picture of health inequalities. Primary care is one focus in this and Mercer & Watt (2007) write that "the provision of primary care service has not been closely related to health needs in more socioeconomically deprived areas" (p.503). This mismatch has been called the "Inverse Care Law", whereby the level of need for health care tends to vary inversely with its provision (Hart, 1971; Watt, 2002). In Mercer & Watt's (2007) study they collected information on GP consultations with 3,044 patients attending in deprived and affluent areas of West Scotland. They found that compared with those from more affluent areas, those from deprived areas had more problems they wished to discuss with their GP, yet their clinical encounter was shorter. Time to access their GP took longer and patients from deprived areas reported lower satisfaction with this access. This study also found that the types of problems that individuals from the

deprived areas presented with were different, with a greater number of psychological and social problems, and more chronic and multiple health problems compared with those from more affluent areas.

A comprehensive explanation for why health inequalities exist, and how best to address them, is not available as yet (Adler *et al*., 1999 as cited in Gallo *et al*., 2006). There is however, a growing body of evidence that describes emerging patterns and attempts to draw links between these patterns in a way that is useful for interventions. The World Health Organization defines health inequality as "differences in health status or in the distribution of health determinants between different population groups" (WHO, 2010, p.2). Health inequalities are generally understood by way of a gradient of health outcomes by socioeconomic status, whereby each more advantaged group has a longer life expectancy and better health (Gallo & Matthews, 2003; Macintyre, 2007). The gradient is steepest at the lowest levels of socioeconomic status and there does not seem to a "threshold" for good health. The gradient has led researchers to suggest there is a general underlying social ordering for health with numerous interconnected community and social factors (Adler *et al*., 1993; 1994; Gallo & Matthews, 2003).

Angell (1993) comments "in study after study, socioeconomic status emerges as one of the important influences in morbidity and mortality." (p.126). She describes it as "most mysterious", acting not directly on health, but instead through indirect mechanisms. There have been several explanations for the inequalities-health gradient. Suggestions that it is an artefact of the process of measurement or due to

social selection (i.e. "social drift" whereby those who are ill and unhealthy move down the socioeconomic ladder) have not generally been supported (e.g. Macintyre, 1997).

One of the most researched explanations is that health behaviours (e.g. smoking, diet) lead to the observed health inequalities. It is true that there are gradients for some health behaviours, i.e. there are different rates of tobacco use across socioeconomic groups which significantly accounts for differences in cancer incidence and mortality (Stellman & Resnicow, 1997, as cited in Lantz *et al*., 2001), but this explanation does not entirely explain the inequalities-health gradient. Cigarette smoking is strongly associated with a number of indexes of socioeconomic status including level of education, income and employment status. Those who are unemployed or have lower levels of education and income have been found to be more likely to smoke (Adler *et al*., 1994). Health-damaging behaviours such as smoking are thought to be coping strategies in the face of the problems related to low socioeconomic status – occupational uncertainty, poor housing and social exclusion (Friedli, 2009) and although rates of smoking are generally decreasing in the UK, those who continue to smoke are concentrated among the most deprived communities (Chapman, 2009; The Scottish Government, 2007b). Generally, health-related behaviours are thought to account for less than half of the association between health and socioeconomic status (Adler *et al*., 1994; Lantz *et al*., 2001) and the Department of Health has recently estimated that health interventions aimed at preventing or reducing the risk of health problems could directly influence 15 to 20% of inequalities in mortality rates (National Audit Office, 2010). This would suggest

that while changing individual health behaviours is important, interventions targeting this alone may have a limited impact on reducing health inequalities. In addition to this, certain lifestyle changes by individuals from lower socioeconomic backgrounds may be difficult or impossible in the context of deprivation due to fewer coping resources and lower levels of education (Williams *et al*., 2008).

A more recent suggestion is that psychological processes, i.e. emotions and cognitions, may play a part in mediating the association between socioeconomic status and health (Gallo & Matthews, 2003). Gallo & Matthew's (2003) review proposed a "reserve capacity model" that outlines how more deprived environments reduce individuals' resources to manage stress, which increases vulnerability to negative emotions and cognitions, e.g. depression, hopelessness and stress. This in turn impacts upon health outcomes through a number of intermediate paths including health behaviours, immune functioning and physiological systems via allostatic load (i.e. the physiological costs of chronic exposure to the heightened or fluctuating neuroendocrine or neural response due to repeated or chronic stress) (also suggested by Adler & Snibbe, 2003). They conclude by saying that there is sufficient evidence to suggest that the socioeconomic-health relationship is mediated (at least in part) by cognitive and emotional factors. Similarly, Friedli (2009) writes:

> "Mental health is also a key pathway through which inequality impacts on health. There is overwhelming evidence that inequality is a key cause of stress in itself and also exacerbates the stress of coping with material deprivation. This chronic stress is written on the body through specific physiological reactions, which are triggered by conscious and unconscious emotional and cognitive responses." (p.38)

In conclusion, the processes by which socioeconomic status influences the risk of death and disease are many and complex. One such programme in Scotland that aims to address inequalities while considering the complexity and interrelatedness of physical and mental health and health behaviours is the Keep Well Programme.

1.4 The Keep Well Programme

The Keep Well Programme was introduced with the aim to tackle the high rates of physical and mental health problems and unhealthy behaviours in deprived areas and the need to take account of mental health issues when tackling risk factors for physical diseases (The Scottish Government, 2008b).

The Keep Well Programme aims to assist with a number of the Scottish Government's priorities: reducing health inequalities, providing anticipatory care and reducing premature mortality due to coronary heart disease in the most disadvantaged communities. As mentioned previously, several government documents highlight the need to develop and provide targeted interventions to individuals in the most deprived parts of Scotland in order to reduce the health inequalities gap (e.g. Scottish Executive, 2003; 2005a; The Scottish Government, 2007a; 2008a; Scottish Office, 1999). Among these goals, *Delivering for Health* (Scottish Executive, 2005a) sets a target for reducing premature mortality due to coronary heart disease (CHD) in the most disadvantaged groups. This document also confirms that enhancing primary care services in deprived areas is a key national priority. *Equally Well* (The Scottish Government, 2008a) further elaborated on this

and emphasised the role of anticipatory care and providing evidence-based checks and early action for people at increased risk of disease.

Keep Well adopts a model of anticipatory care and aims to support health improvement in deprived communities by identifying and targeting those at increased risk of preventable disease (e.g. coronary heart disease) and offering appropriate interventions and services to tackle immediate clinical risk factors (e.g. high cholesterol and blood pressure), lifestyle risk factors (e.g. smoking and diet) and life circumstances (e.g. literacy and welfare issues) (NHS Health Scotland, 2010).

Following the successful implementation of the Keep Well Programme in Community Health Partnerships (CHPs) in Greater Glasgow (North and East), Lothian, Tayside and North Lanarkshire in 2006-2008, seven further CHPs (Fife, Aberdeen City, Ayrshire (North and East) and Glasgow (South West, Inverclyde and West Dunbartonshire) introduced the Programme. Within Fife, where the current study was conducted, the Keep Well Programme identified over 17,000 target patients registered with 50 GP practices, across all 3 CHPs. Over the past two years, health checks have been delivered in GP surgeries and in community settings as well as developing opportunistic ways to provide health checks to the travelling and homeless populations.

Given its aims and target population, The Keep Well Programme therefore presented as an opportunity to examine the links between physical and mental health and health behaviour (namely, smoking) in a deprived population.

1.5 Rationale for the Current Study

There is growing literature on the associations between mental health, physical health and smoking, and there is increasing recognition by health and governing bodies for the need to adopt a comprehensive approach to providing health care, including prevention (Scottish Executive, 2005a; The Scottish Government, 2008a). The aim is to promote and improve health and well-being in addition to addressing health risk and reducing disease prevalence. As part of the drive to reduce health inequalities the Scottish Government has developed an anticipatory care approach for individuals from disadvantaged backgrounds, who might be at risk of developing illness in the future (e.g. Scottish Executive, 2003c; 2005a; The Scottish Government, 2007a; 2008a; Scottish Office, 1999).

A valuable focus in health psychology is the identification and modification of factors that improve health and well-being and prevent and reduce disease. In addition, empowering individuals to make healthy choices regarding their lifestyle, physical, social and mental health and well-being are important public health priorities (Fife Health and Wellbeing Alliance, 2007). Improving positive mental health and well-being is of particular importance from a public health perspective and when designing interventions for the general population. Positive emotions, cognitions and functioning have been understudied in psychological research to date, but emerging research suggests that they have important implications for health and well-being beyond the effect of mental health problems (e.g. Cohen *et al*., 2003; Folkman & Moskowitz, 2000).

Understanding the relationships between smoking status, perceived health, and mental health (both distress and well-being) is arguably very important for considering the delivery of healthcare services given the differences in morbidity and mortality between smokers and non-smokers, and between those with and without psychological problems. The Government's intention to prioritise tackling inequalities (for example, The Scottish Government, 2005a; 2008a) and improve Scotland's mental health (e.g. Scottish Office, 1999; The Scottish Government, 2007a) highlights the importance of work in this area, particularly regarding deprived populations.

There is now increased emphasis on the need to understand what impacts on health and well-being and also how these components influence each other (e.g. Harris & Hastings, 2006 as cited in Fife Health and Wellbeing Alliance, 2007) in order to understand how to best intervene to improve these. Previous research has demonstrated high levels of psychological morbidity, poor health and unhealthy lifestyles in deprived populations and suggested that there are many complex links between these constructs. These studies have described and demonstrated differences, associations and correlations between smoking status, physical health, mental health problems and positive mental health but not examined the predictive nature of these relationships.

1.6 The Current Study – Pathways to Health

The previous discussion has highlighted the numerous possible links between mental health problems, positive mental health, smoking and physical health. As yet, previous research has reported associations and differences, and not examined predictive relationships. It is possible that these variables may interact in a number of ways and having two or more potentially predictive variables allows for examination of the effect of one while controlling for the other(s). There are many ways by which predictive variables may "work together" to affect an outcome variable and the current study aimed to examine two exploratory models of mediating interactions. Shrout and Bolger (2002) write "Mediation models of psychological processes are popular because they allow interesting associations to be decomposed into components that reveal possible causal mechanisms. These models are useful for theory development and testing as well as for the identification of possible points of intervention in applied work." (p.422).

In a mediated relationship, one predictor variable has its effect on the outcome variable via a second predictor variable. In this model, the mediating variable is not seen as an independent and separate predictor of the outcome variable but rather as an essential mechanism by which another variable influences the outcome variable (Miles & Shelvin, 2001). It is also the case that in a mediated relationship "we explicitly assume that the mediating variable precedes the outcome variable in time and that it is a plausible causal agent for the outcome variable" (Shrout & Bolger,

2002, p.423). The method by which this is determined is described in greater detail in the Methods Chapter in section 2.6.

The two models in the current study were generated in line with the conceptualisation of mental health described in section 1.2.1 above. The study included a measure of mental health problems and a measure of positive mental health and considered these independently. One health damaging behaviour (smoking) that has been associated with physical and mental health was also examined.

1.6.1 Generating Models of Health

The recent *New Horizons* document by HM Goverment (2010) summarises the large body of evidence in this area that has looked at the links between mental health and physical health. It argues that "Broadly, the evidence indicates that poor mental health is a larger contributor to poor physical health and health risk behaviours than the other way round." (p.56). Indeed, previous research indicates poor physical health is associated with mental health problems (Friedli, 2009; Myers *et al*., 2005; The Scottish Government, 2007b; 2008a) and smoking (e.g. Arday *et al*., 2003; Health Scotland *et al.*, 2007). Research would also suggest that smoking may be influenced by mental health problems – that is, those with mental health problems are more likely to smoke (e.g. Glassman *et al*., 1990).

The current study therefore generated two exploratory models to test to examine the proposed direct influence of mental health and its mediating influence via smoking on physical health.

1.6.2.1 Predicting that Smoking Mediates the Relationship between Mental Health Problems and Physical Health

The literature reported above (e.g. Arday *et al*., 2003; Braunholtz *et al*., 2007; Health Scotland *et al.*, 2007; The Scottish Government, 2007c) proposes direct relationships between mental health problems and smoking, smoking and physical health, and mental health problems and physical health. It might therefore seem reasonable to hypothesise that the likelihood of smoking is increased by mental health problems, and that smoking would also affect physical health, above and beyond the direct effect of mental health problems on physical health. To the author's knowledge, no previous study has explicitly examined the possibility of an additional mediating effect via smoking on the relationship between mental health problems and physical health and so the current study aimed to test this proposed model of interactions.

1.6.2.2 Predicting that Smoking Mediates the Relationship between Positive Mental Health and Physical Health

Research in the area of positive mental health is behind that investigating mental health problems but positive mental health has been associated with physical health, with those reporting lower levels of positive mental health reporting worse physical

health (e.g. Braunholtz *et al*., 2007). Smokers report lower levels of positive mental health (Woolf *et al*., 1999) as well as worse physical health (Arday *et al*., 2003; Health Scotland *et al.*, 2007). It is less clear in this instance whether positive mental health has a direct influence on physical health and whether smoking has an additional mediating influence on this relationship, but given the already reported associations between positive mental health and smoking, and positive mental health and physical health, it is possible that smoking might have an additional mediating influence on this relationship between positive mental health and physical health. In this instance, a second model was proposed to test the proposed direct influence of positive mental health and its mediating effect via smoking on physical health.

The current study therefore aimed to examine the following hypotheses:

Hypothesis 1: Mental Health Problems predicts Physical Health via a Mediating effect of smoking

The relationship between mental health problems and physical health will be mediated by smoking.

Hypothesis 2: Positive Mental Health predicts Physical Health via a Mediating effect of Smoking

The relationship between positive mental health and physical health will be mediated by smoking.

Chapter 2 Method

2.1 Participants

Participants were 600 individuals whose contact details were held on the Keep Well database and who had attended a Keep Well health check in the 12 months prior to this study. They had furthermore consented to being contacted for research and evaluation purposes. At the time of this study, the details of approximately 1500 individuals who had consented to being contacted were held. Those selected were individuals who had most recently attended a Keep Well health check. This was in order to maximise completed returns of the questionnaire.

The Keep Well Programme in Fife invites 45-64 year olds living within the 20% most deprived datazones to a health check. Individuals living in the datazones were identified by their postcode and the Scottish Index of Multiple Deprivation and identified via GP surgeries initially. Eligible Keep Well patients were contacted via a range of engagement methods including letter or telephone call. Other eligible individuals included those who are "hard to reach" and may not be registered with GP practices (i.e. the homeless or travelling communities) and other, more tailored and opportunistic approaches were adopted to offer the health check to these individuals. During the health check, individuals were assessed for their risk of developing cardiovascular disease through tests for high cholesterol and blood pressure, height, weight and BMI calculations and an assessment of their health behaviours (i.e. smoking, diet and exercise habits). If appropriate, individuals were

also asked about their current mental health, stress and sense of coping, and about their social and life circumstances. Based on this, individuals were offered appropriate interventions including medical intervention (to improve their blood cholesterol or blood pressure levels), referral to smoking cessation and weight management services, healthy lifestyle advice and information, and information regarding, and signposting to, mental health and social welfare services.

2.2 Procedure

Names and contact details for the 600 potential participants were held by the administrator for the Keep Well database. A mail merge document was produced by the administrator to invite participants to participate and questionnaire pack was assembled, franked and mailed to each of the 600 Keep Well health check attendees by the researcher (KK). Each pack included a letter of invitation to participate in the study (see Appendix I), an information sheet explaining the study and what participation would involve (see Appendix II), the questionnaire (described in further detail below), a promotional pen for the Keep Well Programme and a reply-paid envelope for the questionnaire.

Steps were taken to ensure all information that potential participants received about the study and needed to participate was as accessible as reasonably possible. All text was larger than Arial size 11 and line spacing of 1.5 was used. Consideration was given to ensure the layout of text was professional but also that instructions were as clear and as user-friendly as possible. Flesch Reading scores for the information

sheet and letter of invitation were 63.0 and the questionnaire had a score of 82.9, indicating they would be easily understandable by 13- to 15-year-old students. The number of items and reading level required for completion were also considered when choosing already validated questionnaires for inclusion in the questionnaire.

2.3 Ethical Considerations

Ethical approval was sought and obtained by both the University of Edinburgh Clinical Psychology Doctoral Programme Ethics Team and the NHS National Research Ethics Service (see Appendix III). This process highlighted three main ethical issues for the present study, namely informed consent; risks, burdens and benefits; and confidentiality.

Regarding informed consent, potential participants required an information sheet that clearly described the study and what participation would involve. The information sheet was developed using National Research Ethics Committee guidelines in order to ensure a level of detail which ensured informed consent. This included information about the purpose and process of the research and what participants' contribution will involve, confidentiality, and the principal investigator's name and contact details if further information was required before or during the study period. Consent was implied by the completion and return of the questionnaire.

With regards to the potential risks, burdens and benefits of participating in the study, it was recognised that being asked about current health status and views about their

health could be upsetting for some Keep Well patients, as this population is considered to have poorer health and at a greater risk of developing heart disease, diabetes or having a stroke. The information sheet clearly highlighted this possibility and suggested participants did not complete the questionnaire if they felt it may cause upset. Patients were advised to contact their General Practitioner if they became concerned about their health as a result of completing the questionnaire.

To ensure confidentiality, no identifiable information was collected from, and they were told it would not be possible to identify them personally in any study reports. Participants interested in receiving a report of the findings of the study could complete an optional form with their name and address, which was detached from their completed questionnaire and stored separately as soon as it was received. All data collected from participants was kept within a locked filing cabinet within the Clinical Psychology Department, NHS Fife. The anonymised questionnaire data was entered by the researcher into the Statistical Package for the Social Sciences (SPSS) for analysis and stored on the NHS Fife secure server. The contact details of participants who wished to receive a copy of the report were shredded and disposed of safely after the report was sent.

2.4 Power Analysis

Previous research in this area has found significant relationships between smoking, physical health, mental health problems and positive mental variables and would predict a medium effect size in further research (e.g. Stewart-Brown & Janmohamed,

2008). In order to detect a medium effect size (.15; Cohen, 1992) using these four variables, an alpha level of .05 and power of .8, Cohen (1992) suggests a sample size of 84 for multiple regression analyses. 'GPOWER' Version 2, a statistical package used to formally calculate sample size (Faul & Erdfelder, 1992), indicated that a sample size of 85 is required for multiple regression analysis. This upper limit for suggested sample size was chosen.

2.5 Questionnaire

The questionnaire included various established and validated measures to determine physical health status, an indication of mental health problems and positive mental health as well as questions to determine smoking status and demographic characteristics. These are outlined below.

2.5.1 Demographic Characteristics

Questions were included to determine various demographic characteristics: age in years, gender, level of education (either no qualifications; Junior Secondary school; comprehensive/Senior Secondary school; Further Education College or Work Qualifications; University; or University Post Graduate), if currently employed, and current/previous occupation.

2.5.2 Smoking Status

Participants completed an initial question to determine their current smoking status, indicating if they were a current smoker; ex-smoker or non-smoker. Ex-smokers were then asked to indicate if they had given up smoking in the last year or more than one year ago. Current smokers were then asked to indicate their current average level of tobacco use in one day by reporting how many cigarettes, cigars or cigarillos, or roll-ups they might usually have. Smokers who reported roll-up use were asked to estimate how much tobacco they might use in a day.

2.5.3 Physical Health Status

The present study was primarily interested in participants' perception of their physical health overall and not mental health (as this was measured by other more appropriate measures, see below) or aspects of social well-being. The interest was in perception of health rather than the functional impact of participants' health. Various measures were considered for this purpose, for example the Sickness Impact Profile (Bergner *et al*., 1981), Duke Health Profile (Parkerson *et al*., 1990) and Nottingham Health Profile (Hunt & McEwan, 1980) but these either required training in their use or were not thought to be sensitive enough for use with a general population who may not report many health problems (Bowling, 2004).

It was decided that the general health subscale of the RAND 36-Item Health Survey Version 1.0 (Rand Health, 1993a) was the most appropriate measure for the purposes

of this study. The RAND 36-Item Health Survey is used worldwide and has been included in over 400 studies (Garratt *et al.,* 2002). To briefly highlight some of the findings from these studies, the measure has good results for tests of reliability and validity in a population of people attending various health providers and compared with longer health status measures (McHorney *et al*., 1992; Stewart *et al*., 1988). Furthermore, in a study of the general population by Jenkinson *et al*. (1994) it was shown to demonstrate criterion validity, correlating highly with patient reports of overall general health and to have Cronbach alpha coefficient scores above 0.8 for seven of the eight dimensions, indicating good internal consistency. It has been shown to discriminate between medical and psychiatric patients (McHorney *et al*., 1992) and those with minor versus chronic medical conditions (McHorney *et al*., 1993). Although studies of subgroups indicate slight declines in reliability for more disadvantaged respondents, internal consistency reliability coefficients still remain above 0.7 for all eight subscales (McHorney *et al*., 1994).

As indicated above, reliability and validity studies demonstrate that the subscales of the RAND 36-Item Health Survey can be used independently and this was verified for the purpose of this study (C. Sherbourne, personal communication, 27 October 2009). The general health subscale asks participants to use 5-point Likert scales to respond to 5 items. For item 1, participants rate their health (from "excellent" to "poor"); and then using a 5-point agree/disagree scale they rate 4 further items: 2) whether they consider themselves to be healthier than others; 3) to get ill more easily than others; 4) that their health is likely get worse; and 5) whether they consider their health to be excellent.

Scoring on these 5 items involved two steps: first, pre-coded numeric values for each item are re-coded using a scoring key (described by RAND Health, 1993b). Each item is re-coded to give a score from 0 to 100 (where a high score indicates a more favourable health state); then scores are averaged to produce an overall score for the scale.

In order to establish the impact of already existing illness or diseases, an additional question was included from the *Well? What do you think?* (2006) survey (Braunholtz *et al*., 2007). This asked participants to indicate whether they considered themselves to have a long-standing (for one year or longer) illness, disability or infirmity.

2.5.4 Mental Health Problems

Various instruments were considered for measuring mental health problems. A measure was needed that was short in length, considered a broad range of symptoms indicative of mental health problems and not be solely concerned with measuring the presence or severity of specific disorders. The 12-item version of the General Health Questionnaire (GHQ-12; Goldberg & Williams, 1988) was chosen as a short, easy to complete measure of mental health symptoms that has been used with the general population and within community or non-psychiatric clinical settings (Werneke *et al.*, 2000). It has been used in surveys of the Scottish population (e.g. Braunholtz *et al*., 2007) allowing for meaningful comparisons with the potential participant sample for the current study, and in studies examining mental health problems and positive mental health (see section 2.6.5; e.g. Stewart-Brown & Janmohamed, 2008).

Respondents' ratings on the 12 items aim to indicate how they have been feeling the last 4 weeks. It has been shown to be reliable, valid, specific and sensitive to detecting change (Hardy *et al.*, 1999; Werneke *et al.*, 2000) and this short version has comparable psychometric properties to longer versions of the questionnaire (Goldberg & Williams, 1988). In a series of studies, Cronbach's alpha scores have ranged from 0.82 to 0.90; test-retest reliability was 0.73; split-half reliability was 0.83; and sensitivity to detect psychiatric disorder was reported as 93.5% with 78.5% specificity (see Johnston *et al*., 1995 for a brief review).

The Likert scoring method was used in the present study as it reported gives a less skewed distribution of scores (Johnston *et al*., 1995). In this method, responses are given scores of 0, 1, 2 or 3 as appropriate. Responses are summed to provide an overall total score (from 0-36) with higher scores indicating poorer psychological health (Johnston *et al*., 1995).

2.5.5 Positive Mental Health

As a result of increasing interest in measuring and improving mental health and well-being, NHS Scotland commissioned work to consider appropriate existing measures of psychological well-being and if necessary, develop a measure that could be used to establish a core set of indicators to support the Scottish Government's drive on mental health improvement (Parkinson, 2007a). Work consisted of an extensive review and critique of existing measures (NHS Health Scotland, 2007), consultation with researchers and practitioners in the area (Parkinson, 2006). This review and

programme of research led to the development and validation of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS; NHS Health Scotland *et al.*, 2006).

The WEMWBS is a 14-item scale that considers various aspects of positive mental health including relationships, affect and functioning. Respondents score each positively worded item on a 5-point Likert scale. The minimum possible score is 14 and the maximum is 70 (Stewart-Brown & Janmohamed, 2008).

The scale has been tested and validated with both student and population samples and has been used in two surveys of the Scottish population, the *Health Education Population Survey* (2006) and the *Well? What do you think?* (2006) survey (Braunholtz *et al*., 2007). It has been demonstrated to have one single underlying factor, considered to be positive mental health with population scores approximate to a normal distribution and no ceiling or floor effects[1] (Braunholtz *et al*., 2007; Stewart-Brown & Janmohamed, 2008).

Content and face validity has been concluded from analysis of item response frequencies by Tennant *et al*. (2006; 2007). In both student and population samples, the WEMWBS's internal consistency has been good with Cronbach's alpha coefficients reported as 0.89 and 0.91 respectively. This suggests there may be opportunities to reduce the length of the scale further and recently, a shorter 7-item

[1] This lack of a ceiling effect suggests that the measure may have potential for documenting overall improvements in population mental well-being (Tennant *et al*., 2007).

version of the questionnaire has been developed (Stewart-Brown *et al*., 2009). As the only known measure of solely positive mental health[2], criterion validity was demonstrated by correlations with other measures of mental health and well-being (for example, the Satisfaction with Life Scale, Positive and Negative Affect Schedule) and the GHQ-12 as hypothesised (for more information see Tennant *et al*., 2007; or Stewart-Brown & Janmohamed, 2008). Test-retest reliability at one week was high (0.83) with a student population (Tennant *et al*., 2007).

2.6 Statistical Analysis

Questionnaires were scored by the researcher and data entered into SPSS Version 17.0 for Windows for analysis.

Descriptive data were generated for all variables and assumptions of normality were checked for predictor variables using exploratory techniques. Non-normally distributed data were transformed using natural log, square root and square functions.

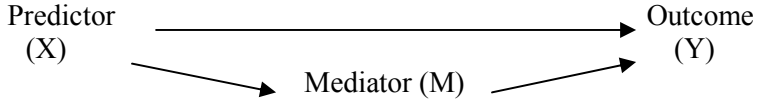
Correlational analysis was carried out to examine the relationship between smoking status, mental health problems (as measured by scores on the GHQ-12), positive mental health (as measured by scores on the WEMWBS) and physical health (as

[2] Tennant *et al*. (2007) argue that other existing instruments in this area take different conceptualisations of well-being as their starting point and also include aspects of mental illness as well as mental health (see this paper for more detail). The only other entirely positive scale relating to well-being is the "WHO-5" a 5 item scale covering physical and mental aspects of health (feeling vigorous, interested, cheerful) but not psychological functioning. The WEMBWS covers both perspectives of mental well-being (hedonic and eudiamonic), and includes items to measure psychological functioning.

measured by scores on the general health subscale of the RAND 36-Item Health Survey). Multiple regression analysis and boot-strapping were used to test the hypotheses.

To test both hypotheses, mediation analysis was carried out using the steps outlined in Miles and Shelvin (2001), which are based upon the work of Baron and Kenny (1986; as cited in Miles & Shelvin, 2001). These are:

1) Show that X (predictor variable) is a significant predictor of Y (outcome variable). This is done using regression analysis, entering Y as the dependent variable and X as the independent variable.
2) Show that X is a significant predictor of M (mediator variable). This is done using regression analysis, entering M as the dependent variable and X and the independent variable.
3) Show that M is a significant predictor of Y when controlling for X. This is done using regression, entering Y as the dependent variable and X and M as independent variables.
4) If M is a complete mediator of the relationship between X and Y, the effect of X, when controlling for M, should be zero. If it is only a partial mediator, the effect will be merely reduced, not eliminated. (Miles & Shelvin, 2001, p.190). In this step, the slope (Beta) coefficient for the predictor variable in step 3 is compared with that in step 1.



An additional calculation called bootstrapping was carried out in order to test the significance of the mediation effect (Shrout & Bolger, 2002). This procedure overcomes the limitations of other similar methods such as the Sobel test (Sobel, 1982; as cited by Preacher & Hayes, 2004) which can have reduced ability to detect true relationships amongst variables in smaller sample sizes due to non-normal distributions (Preacher & Hayes, 2004). For a detailed discussion of the statistical procedure behind bootstrapping please see Hayes (2009), Preacher and Hayes (2004) or Shrout and Bolger (2002). A macro for SPSS created by Preacher and Hayes (2004) was used, whereby following activation of the macro a further syntax command is used. The bootstrap estimate for the current study was based on 5000 estimates.

Chapter 3 Results

3.1 Participants

A total of 186 returned the questionnaire: a 31.0 % response rate. Eighty five males (45.7%) and 101 females (54.3%) returned the questionnaire. One participant had more than 25% missing data and so was removed from the data set.

The average age of male participants was 55.4 years (SD = 5.2 years) and for female participants was 56.6 years (SD = 6.3 years). Age for the total sample was an average of 56.1 years, ranging from 45 to 68 years (SD = 5.8 years). Fifteen participants indicated that their age was above 64 years, the top age range for the target population for Keep Well health checks.

Data held on the Keep Well database made it possible to compare the age and gender of participants in the current study with the invited sample of 600 potential participants. Of the 600 potential participants, 290 (48.3%) were male and 310 (51.7%) were female, indicating that a slightly larger proportion of females returned the questionnaire. The mean age of the 600 potential participants was 55.6 years, just 0.5 years younger than that of the current study sample.

One hundred and eighty four participants indicated their highest achieved education level (Table 3.1) with 46 (25.0%) leaving school without any qualifications, 47 (25.6%) completing Senior Secondary School and 53 (28.2%) attending either

Further Education College or obtaining Qualifications through employment. Due to the small number of participants who had achieved university postgraduate qualifications, this group was combined with those who had achieved university undergraduate qualifications.

Table 3.1 Highest Education Level Achieved

Education Level	**Number of participants (%)**
No qualifications achieved	46 (25.0%)
Junior Secondary School	25 (13.6%)
Senior Secondary School	47 (25.6%)
Further Education College/Work Qualifications	52 (28.2%)
University Qualifications	14 (7.6%)

Of the 184 that answered the question on employment status, 97 participants (52.7%) indicated they were currently employed or a carer. The other participants were either unemployed or indicated they were retired.

Ninety seven participants (53.0%) answered "yes" to the question "Do you have a long-standing illness, disability or infirmity?" Eighty seven participants (47.0%) answered "no".

3.2 Missing Data Analysis

As mentioned above, one participant had more than 25% missing data and so was removed from the data set.

All participants gave their age and gender. Two participants (1%) did not indicate their current employment status and one (0.5%) did not indicate their education level. Two participants (1%) did not answer the question about whether they consider themselves to have an illness or disability.

Of the individual RAND general health subscale items, just 1.8% items had not been completed by the total sample. Of all possible data from GHQ-12 items 1.8% were missing. Similarly 1.8% of responses to items on the WEMBS had been omitted.

In calculating total scores for each of the measures, missing values for items on the RAND general health subscale, the GHQ-12 and WEMWBS were adjusted according to instructions in their scoring manuals (Goldberg & Williams, 1988; RAND Health, 1993b; Stewart-Brown & Janmohamed, 2008), for example, the RAND general health subscale total score represented the average for all items that respondents answered. Following this, 'Missing Value Analysis' imputation for the above missing items was completed using the SPSS programme (Field, 2005). Tabachnick & Fidell (2007) suggest Expectation Maximization (EM) is preferable over simple mean substitution and so this method was used to replace the small amount of missing data for total scores.

Five participants (2.9% of the total sample) reported that they smoked but did not indicate how much they smoked. Again, Expectation Maximization (EM) was used to replace the small amount of missing data for these participants.

3.3 Calculation of Variables and Total Scale Scores

3.3.1 Smoking Status

Of the 185 participants included, 180 indicated their current smoking status. Of these, 49 participants indicated that they currently smoked (27.2%), 70 indicated that they had never smoked (38.9%) and 61 indicated that they were ex-smokers (33.9%). Seven participants (3.9%) had stopped smoking in the last year and 54 had stopped more than one year ago (30.0%). The small number of recent quitters (i.e. 7), were removed from further analysis as evidence suggests relapse is high and up to 75% of smokers who quit will relapse within the first year (Ossip-Klein *et al*., 1986). These participants therefore could arguably easily move from being ex-smokers to current smokers.

Current smokers indicated their typical daily use and this was used to create the variable "number of cigarettes smoked". For never smokers and ex-smokers this was labelled zero. For participants who indicated that they smoked cigars an equivalent was calculated using guidance from Lickint (1939, as cited in Schairer & Schöniger, 2001). Those who smoked roll-ups had indicated their typical tobacco usage in one day (in grams or ounces). The National Cancer Institute (2009) report the average

cigarette contains approximately 1 gram of tobacco each and this was used as a guide to calculate the number of cigarettes that this was equivalent to.

It was originally intended that the number of cigarettes smoked could be used as a continuous variable in the current study. However, the majority of participants scored zero (i.e. 74.7% were either never or ex-smokers) and a Kolmogorov-Smirnov test indicated that this data was not normally distributed (D (178) = .436, $p < .001$) and had a significant positive skew (z = 10.72, $p < .001$) and positive kurtosis (z = 6.83, $p < .001$). Transformation would not have been appropriate so the smoking variable was therefore categorised as never smokers (N = 70; 39.3%), ex-smokers (N = 59; 33.2%) and current smokers (N = 49; 27.5%). The management of this categorical variable in the regression analyses is described in greater detail below.

The mean number of cigarettes smoked by participants who smoked was 12.1 cigarettes per day.

Data held on the Keep Well database made it possible to estimate the smoking status of the 600 potential participants. This indicated that 191 (31.8%) of these patients were given advice about smoking and therefore possibly were smokers, a proportion slightly above that of the current study sample. This figure must be interpreted with caution though, as smoking status itself was not held on the database and it is possible that some patients were given advice about smoking even though they did not smoke as part of a comprehensive health check.

3.3.2 Physical Health

Participant scores on individual items for the RAND general health subscale were converted, summed and averaged to form a total score for each participant (RAND Health, 1993b). Cronbach's Alpha was calculated as a measure of reliability and was found to be reasonable at .82.

3.3.3 Mental Health Problems

Individual scores on the items of the GHQ-12 were scored using the Likert method of scoring, which gives a range of possible total overall scores from 0 to 36. Cronbach's alpha was calculated and found to be good at .94, indicating the scale was reliable.

Although it was not the intention of the current study to identify possible "caseness" within participant scores, it was possible to do so using the GHQ scoring method (i.e. scoring responses 0, 0, 1, 1). A threshold score of 4 or more on the GHQ-12 is often used to identify respondents with a potential psychiatric disorder or "caseness" (Goldberg & Williams, 1988) and using this cut-off point it was found that 51 (28.5%) of participants scored above 4.

3.3.4 Positive Mental Health

Individual scores on the items of the WEMWBS were summed to give a total score, which could range from 14 to 70. Cronbach's alpha was calculated and found to be good at .96, indicating the scale was reliable.

3.4 Exploratory Data Analysis

3.4.1 Tests of Normality

In addition to visual inspection of distributions, all variables were analysed to examine whether data was distributed in a pattern that was significantly different from a normal distribution. As the sample was $n > 50$ the Kolmogorov-Smirnov test was used, as recommended by Field (2005). *Z* scores of skewness and kurtosis, calculated by dividing skewness and kurtosis values by their standard error (Field, 2005), were also produced. Data with a z score of greater than +/- 1.96 were deemed to be distributed in a pattern significantly different from a normal distribution. It should be noted however that with large samples (Field, 2005 suggests >200), small standard errors are a problem and these criterion are less reliable.

Normality results for the RAND general health subscale, GHQ-12 and WEMWBS data are presented in Table 3.2.

Table 3.2 Normality Statistics for RAND General Health Subscale, GHQ-12 and WEMWBS

Variable	Kolmogorov-Smirnov statistic (d.f.) (*p* value)	Skewness (standard error)	Skewness *z* score	Kurtosis (standard error)	Kurtosis *z* score
RAND general health subscale (*N* = 178)	*D* (178) = .118 (*p* < .001)***	-.57 (.18)	-3.16	0.11 (.36)	0.31
GHQ-12 (*N* = 178)	*D* (178) = .142 (*p* < .001)***	1.13 (.18)	6.28	.84 (.36)	2.33
WEMWBS (*N* = 178)	*D* (178) = .04 (*p* = .20)	-.31 (.18)	-1.72	.19 (.36)	0.53

* significant at $p < .05$, ** significant at $p < .01$, *** significant at $p < .001$

Based on examination of both normality statistics and *z* scores on skewness and kurtosis, data for scores on the RAND general health subscale and GHQ-12 were considered to be non-normally distributed.

Data for the RAND general health subscale and GHQ-12 were transformed using squared, squared square root and natural log transformations and normality statistics for the transformed data are given in Table 3.3.

Table 3.3 Normality Statistics for Transformed RAND General Health Subscale and GHQ-12

Variable	Kolmogorov-Smirnov statistic (*p* value)	Skewness (standard error)	Skewness *z* score	Kurtosis (standard error)	Kurtosis *z* score
RAND general health subscale Squared ($N = 178$)	D (178) = .10 ($p < .001$)**	.27 (.18)	1.50	-.55 (.36)	-1.52
GHQ-12 Square Root ($N = 178$)	D (178) = .10 ($p < .001$)***	.60 (.18)	3.33	-.15 (.36)	-0.42
GHQ-12 Natural Log ($N = 178$)	D (178) = .07 ($p = .06$)	-.02 (.18)	0.11	-.15 (.36)	0.42

* significant at $p < .05$, ** significant at $p < .01$, *** significant at $p < .001$

The Kolmogorov-Smirnov statistic remained significant for the RAND general health subscale after transformation but this may have been due to the large sample size. The *z* scores for this variable were within +/- 1.96 and visual inspection indicated the transformed data was reasonably normally distributed. Normality statistics for the natural log transformed GHQ-12 scores indicated this data was normal distributed. It was therefore concluded that the transformed data was suitable for parametric analysis and subsequent analyses were conducted with square root RAND general health subscale data and natural log GHQ-12 data.

3.5 Descriptive Statistics

3.5.1 Physical Health, Mental Health Problems and Positive Mental Health Scores by Smoking Status

Median and inter-quartile ranges for the non-transformed total scores are presented for each smoking status category in Table 3.4.

This data indicates that current smokers reported the worst physical health (i.e. lowest scores on the RAND general health subscale) and never smokers reported the best physical health, which was also above the median score for the total sample. Ex-smokers reported better physical health than current smokers but worse physical health than never smokers.

With regards to mental health problems, current smokers reported the highest median score of mental health problems (i.e. highest scores on the GHQ-12) of the three groups, which was also above the median score for the total sample. Both never and ex-smokers reported lower median scores of mental health problems with ex-smokers reporting the lowest median scores out of the three groups.

Table 3.4 Median and inter-quartile range scores for non-transformed RAND general health subscale, GHQ-12 and WEMWBS total scale scores for each smoking status category

	Never ($N = 70$)	Ex-smoker ($N = 59$)	Current ($N = 49$)	Total sample ($N = 178$)
RAND Median score (Inter-quartile)	72.5 (55.0-80.0)	60.0 (50.0-75.0)	50.0 (40.0-70.0)	65.0 (48.8-75.0)
GHQ-12 Median score (Inter-quartile)	11.0 (8.0-15.0)	10.0 (6.0-14.0)	15.0 (9.0-21.5)	11.0 (8.0-16.25)
WEMWBS Median score (Inter-quartile)	49.0 (41.0-56.0)	49.0 (42.0-55.0)	42.0 (34.5-55.0)	47.0 (39.0-55.0)

Both never and ex-smokers reported the highest median score of positive mental health, which was above the median score for the total sample. Current smokers had the lowest median score of positive mental health out of the three groups.

3.5.2 Correlations between Physical Health, Mental Health Problems and Positive Mental Health Scores

Correlations were computed between physical health, mental health problems and positive mental health (i.e. scores on the RAND general health subscale, GHQ-12 and WEWMBS). Bonferroni correction was calculated at 0.017 and this level of significance applied to the correlational data. Table 3.5 reports these correlations for the total sample.

Table 3.5 Pearson's *r* Correlation Coefficients between Non-transformed and Transformed RAND and GHQ-12 measures

	Physical health: RAND transformed score (squared)	**Mental health problems: GHQ-12 transformed score (natural log)**
Mental health problems: GHQ-12 transformed score (natural log)	-.39 ($p < .001$)	-
Positive mental health: WEMWBS non-transformed score	.43 ($p < .001$)	-.78 ($p < .001$)

Significant correlations were found between all three measures. Scores on the RAND general health subscale and GHQ-12 were inversely correlated, that is better physical health was associated with lower levels of mental health problems. Scores on the RAND general health subscale and WEMWBS were positively correlated, that is, better physical health was associated with higher levels of positive mental health. Scores on the GHQ-12 and WEMWBS were highly inversely correlated, indicating higher levels of mental health problems were associated with lower levels of positive mental health.

3.6 Preparation for Hypotheses Testing

The above reported correlation between GHQ-12 and WEMBWS total scores suggested that these measures were highly inversely correlated (r = -.78). Previous literature has suggested however, that mental health problems and positive mental health may be independent (e.g. Stewart-Brown & Janmohamed, 2008) and in order to examine this further, multiple regression analyses of mental health were carried out using GHQ-12 and WEMWBS total scores separately as mental health measures.

As mentioned in section 3.3.1, the smoking variable was treated as a categorical variable with 3 groups: never, ex- and current smokers. Prior to being entered as independent variables in regression analyses, categorical variables must be re-coded. Dummy coding as described by Miles & Shelvin (2001) was used to code the smoking variable. In this instance two new variables were required to code the three smoking categories. They report: "…one group is considered to the reference group, and new dummy variables are created to identify which condition the other participants are in. …These two new variables refer to each group in the original independent variable *except* for the reference group" (Miles & Shelvin, 2000, p.47). Therefore, in the current study, never smokers were used as the reference group and two new variables were created: "never vs. current smokers" and "never vs. ex-smokers". The variable "never vs. current smokers" coded never smokers as -1, ex-smokers as 0 and current smokers as 1. The variable "never vs. ex-smokers" coded never smokers as -1, ex-smokers as 1 and current smokers as 0.

For each of the following regression analyses that entered smoking as an independent variable, both re-coded variables were used, thereby carrying out each comparison (i.e. never vs. current smokers and never vs. ex-smokers). Bonferroni correction was calculated at 0.025 and this level of significance applied to the output of the regression analyses.

3.6.1 Hypothesis Testing

Mediation analysis to examine if smoking had a mediating effect on the relationship between mental health and physical health followed the steps outlined in section 2.7 (Miles & Shelvin, 2001).

The bootstrapping procedure was carried out as detailed in Preacher and Hayes (2004) to examine the significance of the mediating effects of smoking on the relationship between mental health and physical health.

3.6.1.1 Hypothesis 1: The Relationship between Mental Health Problems and Physical Health will be Mediated by Smoking

In this model X was mental health problems (i.e. GHQ-12 scores; the predictor variable), Y was physical health (i.e. RAND general health subscale scores; the outcome variable) and M (the mediator variable) was smoking.

For step 1, to demonstrate that the predictor variable (mental health problems) was a significant predictor of the outcome variable (physical health), a forced entry regression entered GHQ-12 scores as an independent variable and RAND general health subscale scores as the dependent variable. GHQ-12 scores were found to have a significant effect on RAND general health scores (Beta = -.391, $p < .001$) and so it was concluded that mental health problems were a significant predictor of physical health (see Table 3.6).

For step 2, to demonstrate that the predictor variable (mental health problems) was a significant predictor of the mediator variable (smoking), logistic regression for each re-coded smoking variables was carried out. These entered GHQ-12 scores and the illness/disability variable as independent variables and used each of the re-coded smoking variables (never vs. ex-smokers and never vs. current smokers) as the dependent variable. RAND general health scores was a significant predictor for only one of the re-coded smoking variables (never vs. current smokers) (Wald = 6.83, $p = .008$) (see Table 3.6). The smoking variable never vs. ex-smokers was not significantly predicted by mental health problems (Wald = 1.03, $p = .289$) indicating that for these participants, scores on the GHQ-12 did not predict their smoking status. These results are in line with results presented in Table 3.4 where never, ex- and current smokers demonstrated median GHQ-12 scores of 11.0, 10.0 and 15.0 respectively. As this step was not satisfied for the never vs. ex-smokers comparison, steps 3 and 4 were only carried out for the never vs. current smokers variable.

For step 3, to show that the mediator variable (smoking) is a significant predictor of the outcome variable (physical health) when controlling for the predictor variable (mental health problems), a forced entry regression analysis entered the smoking variable for never vs. current smokers and GHQ-12 scores as independent variables and RAND general health subscale scores as the dependent variable. The smoking variable never vs. current smokers was found to be a significant predictor of RAND general health subscale scores (Beta = -.256, p = <.001) (see Table 3.6) when controlling for GHQ-12 scores.

For step 4, to examine the mediating effect of smoking on the relationship between mental health problems and physical health, the slope (Beta) coefficients for the GHQ-12 score variable were compared for steps 1 and 3 (see Table 3.6). These figures were -.391 and -.345 respectively indicating that smoking was a partial mediator of the relationship between mental health problems and physical health, but only for current smokers (when compared with never smokers).

Table 3.6 Mediation Analysis for the Relationship between Mental Health Problems and Physical Health with Smoking as Mediator

Step 1: Dependent Variable: RAND general health subscale					
Variable entered	**B**	**Std. Error**	**Beta**	***t***	**Sign.**
GHQ-12 score	-1777.04	315.63	-.391	-5.633	< .001
Step 2: Dependent Variable: Never vs. Ex Smokers					
Variable entered	**B**	**Std. Error**	**Wald**	**Sign.**	**Exp(B)**
GHQ-12 score	-.303	.35	1.03	.289	.574
Step 2: Dependent Variable: Never vs. Current Smokers					
Variable entered	**B**	**Std. Error**	**Wald**	**Sign.**	**Exp(B)**
GHQ-12 score	1.02	.37	6.83	.008	2.97
Step 3: Dependent Variable: RAND general health subscale					
Variable entered	**B**	**Std. Error**	**Beta**	***t***	**Sign.**
Never vs. Current smokers	-743.93	197.77	-.256	-3.76	<.001
GHQ-12 score	-1567.76	309.50	-.345	-5.07	< .001

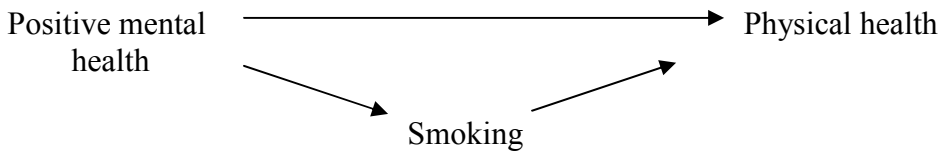
The bootstrapping procedure for this mediation effect confirmed this was a significant mediation effect (z = -1.99, p = .005) (see Table 3.7).

Table 3.7 Results of Bootstrapping for Mediation Effect of Smoking on Relationship between Mental Health Problems and Physical Health

Value	Standard Error	Lower Limit 95% Confidence	Upper Limit 95% Confidence	*z*	Sign.
-209.28	105.24	-415.54	-3.02	-1.99	.047

3.6.1.2 Hypothesis 2: The Relationship between Positive Mental Health and Physical Health will be Mediated by Smoking

In this model X was positive mental health (i.e. WEMWBS scores; the predictor variable), Y was physical health (i.e. RAND general health subscale scores; the outcome variable) and M (the mediator variable) was smoking.



For step 1, to demonstrate that the predictor variable (positive mental health) was a significant predictor of the outcome variable (physical health), a forced entry regression entered WEMWBS scores as an independent variable and RAND general health subscale scores as the dependent variable. WEMWBS scores were found to have a significant effect on RAND general health scores (Beta = .429 $p < .001$) and so it was concluded that positive mental health was a significant predictor of physical health (see Table 3.8).

For step 2, to demonstrate that the predictor variable (positive mental health) was a significant predictor of the mediator variable (smoking), logistic regression for each re-coded smoking variables was carried out. These entered WEMWBS scores and the illness/disability variable as independent variables and used each of the smoking variables (never vs. ex-smokers and never vs. current smokers) as the dependent variable. RAND general health scores was only a significant predictor for only one of the smoking dummy variables (never vs. current smokers) (Wald = 6.01, p = .019) (see Table 3.8). The smoking variable never vs. ex-smokers was not significantly predicted by positive mental health (Wald = .01, p = .925) indicating that for these participants, scores on the WEMWBS did not predict their smoking status. These results are in line with results presented in Table 3.4, where never, ex- and current smokers demonstrated median WEMWBS scores of 49.0, 49.0 and 42.0 respectively. As this step was not satisfied for the never vs. ex-smokers comparison, steps 3 and 4 were only carried out for the never vs. current smokers variable.

For step 3, to show that the mediator variable (smoking) is a significant predictor of the outcome variable (physical health) when controlling for the predictor variable (positive mental health), a forced entry regression analysis entered the smoking variable for never vs. current smokers and WEMWBS scores as independent variables and RAND general health subscale scores as the dependent variable. The smoking variable never vs. current smokers was found to be a significant predictor of RAND general health subscale scores (Beta = -.247, p = <.001) (see Table 3.8) when controlling for WEMWBS scores.

For step 4, to examine the mediating effect of smoking on the relationship between mental health problems and physical health, the slope (Beta) coefficients for the WEMWBS score variable were compared for steps 1 and 3 (see Table 3.14). These figures were .429 and .383 indicating that smoking was a partial mediator of the relationship between mental health problems and physical health, but only for current smokers (when compared with never smokers).

Table 3.8 Mediation Analysis for the Relationship between Positive Mental Health and Physical Health with Smoking as Mediator

Step 1: Dependent Variable: RAND general health subscale					
Variable entered	**B**	**Std. Error**	**Beta**	***t***	**Sign.**
WEMWBS score	88.50	14.50	.429	6.30	<.001
Step 2: Dependent Variable: Never vs. Ex Smokers					
Variable entered	**B**	**Std. Error**	**Wald**	**Sign.**	**Exp(B)**
WEMWBS score	.01	.02	.01	.925	1.21
Step 2: Dependent Variable: Never vs. Current Smokers					
Variable entered	**B**	**Std. Error**	**Wald**	**Sign.**	**Exp(B)**
WEMWBS score	-.04	.02	6.01	.019	1.02
Step 3: Dependent Variable: RAND general health subscale					
Variable entered	**B**	**Std. Error**	**Beta**	***t***	**Sign.**
Never vs. Current smokers	-718.91	194.48	-.247	-3.20	<.001
WEMWBS score	79.19	13.81	.383	5.73	<.001

The bootstrapping procedure for this mediation effect confirmed this was a significant mediation effect ($z = 2.01$, $p = .004$) (see Table 3.9).

Table 3.9 Results of Bootstrapping for Mediation Effect of Smoking on Relationship between Positive Mental Health and Physical Health

Value	Standard Error	Lower Limit 95% Confidence	Upper Limit 95% Confidence	*z*	Sign.
9.39	4.67	0.24	18.54	2.01	.0443

Chapter 4 Discussion

4.1 Discussion of Descriptive Statistics with Reference to the Literature

4.1.1 Smoking

Almost equivalent numbers of participants fell into the different smoking categories: 38.9% had never smoked, 33.9% had previously smoked and 27.2% were current smokers. Statistics from the 2007/2008 Scottish Household Survey (The Scottish Government, 2009a) suggests 25.2% of the general population smoke, which is slightly below that of the current study's population.

Survey data also indicates that 45% of individuals from Scotland's most deprived communities (compared to 11% in the least deprived areas) smoke (The Scottish Government, 2009a), which was greater than that found in the current study. This difference in smoking rates may be accurate or could be a reflection of self-selection to participate in the study or to attend the Keep Well health checks in the first instance, that is, smokers may have been less likely to have attended a health check and also to have participated in the study.

The current smokers in the present study indicated they smoked on average 12.1 cigarettes per day. The 2007/2008 Scottish Household Survey (Scottish Government, 2009a) reports the median number of cigarettes smoked by the general population as 15 per day, which is above that of the current study. This is unusual as

those from a deprived background have been reported to have higher levels of smoking (The Scottish Government, 2007b) but may reflect an actual difference in the population studied, i.e. attendees of a health check.

4.1.2 Physical Health

The current study included two indicators of participant physical health: the RAND general health subscale and a question asking if participants had an illness or disability that had lasted more than one year.

Previous reports looking at the health of Scottish individuals living in deprived areas have indicated they are more likely to report poorer health than those living in more affluent areas (Scottish Executive, 2005b). The average score for the study population on the RAND general health subscale was 60.7. The maximum score possible for this measure is 100 and previous general population studies have reported an average score of 63.0 for this subscale (McHorney *et al.*, 1993; Stewart *et al*., 1988). This suggests that overall the participants in the current study were generally as healthy as other general population samples and may not be in as poor health as indicated in other surveys. Caution must be taken with drawing further conclusions however as the individuals in the current study are just a small sample of the targeted deprived population of the Keep Well programme and had self-selected to attend a health check and to participate in the study. Indeed, the Keep Well programme is being further expanded in order to provide health checks in an appropriate and accessible way to those who may not have attended them previously

(often referred to as "hard-to-reach") including the homeless, those with a learning disability and travelling populations (O'Donnell *et al*., 2009), as well as those who have not yet attended their health check even though they were invited. It is possible that these individuals may have worse health than those attending the health checks as literature relating to the 'inverse care law' suggesting those with who need health care use services most access them less than those who have less need (Hart, 1971; Watt, 2002).

Over half of participants indicated they had a long-standing illness or disability and data from the Scottish Health Survey 2008 (Scottish Government, 2009b) for individuals of a similar age indicated that for the general population, 39-64% of men and 42-55% of women reported having a long-standing illness or disability, which could be considered comparable to that of the current study.

4.1.3 Mental Health Problems

The GHQ-12 was used as an indicator of mental health problems in the current study. It was scored using the Likert method for the purposes of analysis but also scored using the GHQ method. The threshold score of 4 or more using this latter method of scoring provided an indication of potential psychiatric morbidity or "caseness" and a figure for comparison with other population data. Over a quarter of participants scored above this threshold, which is greater than that reported by previously published Scottish population surveys but below that reported for other deprived areas of Scotland. The *Well? What do you think?* surveys of the general Scottish

population in 2004 and 2006 reported 18% and 17% (respectively) of their respondents had GHQ-12 scores above the 4+ threshold (Braunholtz *et al.*, 2007). A study by Mercer & Watt (2007) found 41.3% of individuals living in the most deprived areas of West Scotland had GHQ-12 scores about the 4+ threshold (N = 652). This higher rate of potential mental health problems is in line with previous studies of health inequalities that have described the association between socioeconomic disadvantage and greater risk of developing a mental health problem and reporting symptoms of anxiety and depression (Gallo & Matthews, 2003; Myers *et al*., 2005; Taulbut *et al*., 2009).

4.1.4 Positive Mental Health

Previous use of the WEMWBS, a measure of positive mental health, with the Scottish population (Braunholtz *et al*., 2007) reported a mean total score of 51.05 (SD = 8.54), above that for the current study sample which reports a median score of 47.0. For individuals from the same age range the reported mean score was 50.87 (SD = 8.70), which again was above that of the current study sample. Previous research has suggested that there is at most only a weak correlation between socioeconomic status or wealth and happiness or mental well-being (Ryan & Deci, 2001) and when surveying the Scottish population, Taulbut *et al.* (2009) did not observe any differences in positive mental health between areas of differing levels of deprivation.

4.2 The Nature of Relationships between Predictors with Reference to the Literature

4.2.1 Mental Health Problems and Positive Mental Health

As discussed in section 1.2.1, there is increasing awareness and agreement on the definition of mental health as a concept that includes both positive mental health and mental health problems (WHO, 2005). The current study aimed to capture this by the inclusion of established and valid questionnaires designed to measure both of these: the WEMWBS and the GHQ-12.

Previous literature has also discussed the relationship between these two variables and various authors (e.g. Keyes, 2002; 2005; 2007; Ryff *et al*., 2006) argue that they are best conceptualised not as opposite ends of a bipolar continuum, but instead as independent dimensions. They report having various forms of evidence to support this argument including differences in the demographic and psychosocial characteristics related to each of the dimensions (Hu *et al.*, 2007; Huppert & Whittington, 2003) and (negative) correlations of only a moderate nature (approximately $r = -.5$) between the two (e.g. Stewart-Brown & Janmohamed, 2008).

In the current study scores on the measures of mental health problems and positive mental health demonstrated a large significant inverse correlation with each other and shared over half of the variance in scores with each other. This is much greater than the moderate correlations reported previously (e.g. Stewart-Brown &

Janmohamed, 2008). This high correlation and degree of shared variance suggests that these variables are not entirely independent of each other. The current study examined the proposed independence of these variables further by investigating their roles in mediating relationships.

4.2.2 Mental Health and Physical Health

4.2.2.1 Mental Health Problems and Physical Health

As mentioned in section 1.2.2, there has been a large body of evidence describing the links between physical and mental health, particularly the co-occurrence of physical illness and mental health problems (WHO, 2004). The relationship between these appears to be reciprocal with physical health problems influencing the risk of individuals experiencing mental health problems and emotions and cognitions playing a part in disease development.

In previous surveys of the Scottish population, individuals who described their health as "good" reported fewer symptoms of mental health problems (Braunholtz *et al*., 2007; Scottish Executive, 2005b). The current study found a significant moderate negative correlation between scores of physical health and mental health problems, with individuals who reported better physical health also reported fewer mental health symptoms. Singleton *et al*. (2001) found people with long-standing physical health problems also had an increased rate of reported mental health problems, which was demonstrated in the current study. Participants in the current study who

indicated they had a long-standing illness or disability reported significantly higher levels of mental health symptoms than those without.

4.2.2.2 Positive Mental Health and Physical Health

Positive mental health has also been found to play a role in physical health with positive mental associated with having few or no physical health problems and better self-rated health status (Braunholtz *et al.*, 2007; Dolan *et al*., 2006; Hu *et al*., 2007; Tennant *et al*., 2007). In the current study, a significant positive relationship was found between physical health and positive mental health, indicating that individuals reporting better physical health also reported higher positive mental health scores. Participants with a long-standing illness or disability reported significantly lower levels of positive mental health compared to those without, which also is consistent with previous findings.

4.2.3 Smoking and Physical Health

Results from surveys of the Scottish population (as well as a large body of other evidence mentioned in section 1.2.3) indicate that smokers and former smoker report poorer health than those who have never smoked (Scottish Executive, 2005b). Participants in the current study who smoked reported the lowest scores on the RAND general health subscale, which indicates poorer health. When compared with never smokers, ex-smokers also reported poorer physical health, but had higher

scores than current smokers. It is therefore assumed that smoking was related to poorer health in the current study sample.

4.2.4 Smoking and Mental Health

4.2.4.1 Smoking and Mental Health Problems

Previous research indicates unhealthy behaviours (for example smoking) influence and are influenced by people's mental health. Individuals experiencing mental health problems report higher and heavier tobacco use (e.g. Carney *et al.*, 2002; McCreadie, 2003; The Scottish Government, 2007c) and poorer psychological well-being (e.g. depression and anxiety) is more common in smokers (Arday *et al*., 2003; Lee, 1999; Son *et al*., 1997). Higher levels of mental health problems have been found in male smokers compared with those who have never smoked (Scottish Executive, 2005b).

In the current study, participants who had never smoked or were ex-smokers had a similar level of reported mental health problems, which was significantly lower than that of current smokers. It is interesting to note that ex-smokers had scored a similar level of mental health symptoms as never smokers though it is unfortunately not possible to speculate about the causality between smoking status and mental health problems due to the design of the current study. It is possible that a reduction in mental health problems makes it easier for individuals to stop smoking as depression and stress have previously been associated with a greater likelihood of starting

smoking, difficulties quitting and maintaining a non-smoking status (Glass, 1990; Glassman *et al*., 1990; Hall *et al*., 1993). An alternative explanation might be that stopping smoking may lead to a reduction in mental health problems, indeed Hajek *et al*. (2010) have already suggested that stopping smoking reduces perceived stress.

4.2.4.2 Smoking and Positive Mental Health

Research investigating the links between positive mental health and health behaviours (for example, smoking) is increasing. Generally it is thought that individuals who report higher scores on measures of positive mental health are less likely to smoke (The Scottish Government, 2008a; Wetzler & Ursano, 1988). In the current study never smokers reported higher levels of positive mental health than ex-smokers, who in turn scored higher than current smokers. Therefore those who scored highest with regards to positive mental health were participants who had never smoked.

4.3 Hypothesis Testing

4.3.1 Hypothesis 1: The Relationship between Mental Health Problems and Physical Health will be Mediated by Smoking

Mental health problems were found to be a significant predictor of physical health in the current study, with higher levels of mental health problems being predictive of poorer physical health. Population studies have reported higher rates of physical

health problems such as cardiovascular disease and diabetes among those with mental health problems (Friedli, 2009; Myers *et al*., 2005; The Scottish Government, 2007b; 2008a). The causal pathway between these constructs has also been investigated and Wulsin & Singal (2003) and Penninx *et al*. (2001) report depression as a risk factor for the onset of coronary disease and for cardiac mortality. The current study cannot confirm the causality between these variables but can support the predictive relationship between mental health problems and physical health.

Mental health problems were also found to significantly predict smoking status, with higher levels of mental health problems being predictive of smoking, and this is consistent with previous research. Higher rates of tobacco use are reported for individuals with mental health problems in psychiatric and community settings (e.g. Carney *et al*., 2002; The Scottish Government, 2007c). It has been generally discussed that psychological distress is an initiating and maintaining factor in unhealthy habits such as smoking. For example, Glass (1990) and Hughes (2001) report smoking as a way to self-medicate depressed mood and Ng and Jeffery (2003) found high levels of stress were associated with cigarette smoking in a cross-sectional study. The current study confirms that mental health problems predicts smoking status but cannot comment further on causality.

Overall, smoking was found to be a significant mediating factor in the relationship between mental health problems and physical health in current smokers. This suggested that mental health problems had an additional indirect effect on physical

health via smoking, whereby those with mental health problems would be more likely to smoke and this potentially contributes further to physical health problems.

4.3.2 Hypothesis 2: The Relationship between Positive Mental Health and Physical Health will be Mediated by Smoking

Positive mental health was found to be a significant predictor of physical health in the current study, with higher levels of positive mental health being predictive of better physical health. This is consistent with findings for population studies in Scotland and the UK (Braunholtz *et al*., 2007; Hu *et al*., 2007; Tennant *et al*., 2007) and the United States (Keyes, 2005), where individuals with higher levels of positive mental health report having fewer or no physical health problems and better self-rated health (Dolan *et al*., 2006).

Positive mental health was also found to significantly predict smoking status for current smokers compared with never smokers, with current smokers reporting lower levels of positive mental health. As highlighted in section 1.2.4.2, research investigating the relationships between positive mental health and smoking is much further behind that relating to mental health problems. The current study indicated that there is a predictive relationship between positive mental health and smoking using an established and validated measure of positive mental health. Previous research has thus far only examined related constructs such as positive cognitions (e.g. optimism and perceived control) (Mulkana & Hailey, 2001). This is an area of interest as there is interesting recognition of well-being and positive elements of

mental health (The Scottish Government, 2008a; WHO, 2005). A better understanding of how positive mental health influences health behaviours such as smoking could inform how to design and deliver more effective smoking cessation interventions.

Overall, smoking was found to be a significant mediating factor in the relationship between positive mental health and physical health in current smokers. This suggests that positive mental health had an additional indirect effect on physical health via smoking, whereby those with higher levels of positive mental health would be less likely to smoke, which contributed further to better physical health. It has already been suggested that individuals with higher levels of positive mental health may be more likely to look after their own health via positive health behaviours (The Scottish Government, 2008a; Wetzler & Ursano, 1988) and may be more likely (or able) to stop smoking (Woolf *et al*., 1999). This model of mediation suggests that when considering how to improve the physical health of smokers, possible pathways by which to do this would be to target positive mental health and its effect on smoking, as this would have both direct and indirect benefits (via reduced smoking) upon enhanced physical health. This might indeed be useful regarding population-level health promotion approaches.

4.4 Summary of Findings

In summary, the current study has examined two possible statistical models of interaction in predicting health. It aimed to separately examine both aspects of

mental health in these models: mental health problems and positive mental health, to comment on possible differences in these models.

It examined how mental health problems combined with smoking in explaining physical health, and how positive mental health combined with smoking in explaining physical health. There was support for both mediation hypotheses suggesting smoking was a mediator between mental health problems and physical health; and between positive mental health and physical health in current smokers when compared with never smokers.

4.5 Methodological Considerations

It is important to consider the findings of the current study in the context of any methodological shortcomings. Access to potential participants via the Keep Well programme unfortunately meant there were three points at which individuals from the intended population could self-select and thus not be included in the potential study sample. The first point was at the decision to attend or not attend the Keep Well health check. As mentioned previously, eligible patients were contacted via a range of engagement methods including letter or telephone call. It has been widely reported that those from disadvantaged backgrounds have reduced access to health care services and interventions (e.g. McKee, 2002). It has been recognised that methods such as letter may not engage those who are "hard to reach" or not registered with GP practices and therefore other more tailored, intensive and opportunistic approaches are required (e.g. Macintyre, 2007). The second point of

self-selection was for those patients who did attend a health check but did not agree to being contacted for research and evaluation purposes (which included the current study). From discussions with several of the practitioners delivering the Keep Well health checks, it was confirmed that this number was small but it is possible that those who did not agree to being contacted, like those who did not attend the health check in the first instance, may have presented with a different pattern of smoking behaviour, physical health and mental health. A third point of self-selection was at the point of invitation to participate in the current study and complete and return the questionnaire.

The current study aimed to examine the relationships between smoking, physical health, mental health problems and positive mental health in a deprived population. Participants were individuals known to live in deprived areas of Fife and who had attended a Keep Well health check. As mentioned above, there were opportunities at which individuals self-selected and although the current study experienced a reasonable return rate, it is not possible be certain to what degree the above findings would generalise to a wider population of individuals from a deprived background or to the more general population. Certainly, individuals from a deprived background are not a uniform population and present with different constellations of physical, mental and lifestyle needs. Some of these needs may relate to the treatment of illness and disease but for others, a preventative and health promoting approach may be more appropriate.

The cross-sectional design of the current study unfortunately means it is not possible to draw conclusions about causal relationships between the variables examined. The difficulties inherent in establishing causal relationships have been widely discussed (e.g. Rubin, 2007) and randomised experiments are generally considered the gold standard for determining causal effects. In many instances however, ethical concerns mean variables of interest cannot be manipulated. For example, in the current study it would be difficult and unethical to manipulate participants' physical or mental health and thus an observational study was chosen. Rubin (2007) has discussed the possibility that observational studies can be used as an approximation of randomised studies, with the creation of subgroups and control groups allowing comparisons to be made. Imai, Tingley and Yamamoto (2010) have further proposed alternative experimental designs involving manipulation of the mediator variable and cohort studies may also be a valuable way of future research enabling us to better understand the causal relationships between physical and mental health.

There are also further considerations regarding the conceptualisation of smoking in the current study. Participants were asked to indicate their smoking status and there was a possibility that no smokers would complete and return the questionnaire, leading to problems analysing the data. In future similar studies, one way of minimising this risk would be to use a measure of attitudes and beliefs towards smoking, for instance, the Attitudes and Beliefs about Perceived Consequences of Smoking Scale by Budd and Preston (2001), Tipton and Riebsame's (1987) beliefs about smoking and health measure or the Smoking Attitudes Scale designed by Adams, Shore, and Tashchian (2000). These measures have been found to

demonstrate predictive validity, with for instance, smokers, ex-smokers, and non-smokers showing predictably different scores on Tipton and Riebsame's (1987) measure.

4.6 Uncontrolled Variables

As described above, there are a very large number of variables that contribute to physical and mental health and are of particular interest when studying a deprived population. These include for example, structural and environmental factors such as material deprivation, quality of housing, social stresses and safety. A number of other lifestyle factors and health behaviours are likely to also be influential, for example, diet and exercise, and to have contributed to participants' physical and mental health and how they scored on the measures included in the current study. Research is also beginning to better understand the influence of other psychological mechanisms in understanding the associations between socioeconomic status and health, for instance attitudes towards health care and making healthier lifestyle choices (e.g. Wiltshire *et al*., 2003).

As governing political and health organisations begin to appreciate the need to take a broad and comprehensive health approach to improving the physical and mental health of the population (and the particular importance of this for those with disadvantaged backgrounds) further research that appreciates these associations will be needed in order to develop effective health care services.

An interesting addition to the current study would be to examine the contribution of clinical factors to the above models, that is, measurements of BMI and blood cholesterol taken at participant's Keep Well health check. This was not possible due to practical and administrative constraints at the time of the current study, but could be possible in the future delivery and evaluation of Keep Well.

4.7 Strengths of Study

As mentioned above, research in this area is being increasingly required to consider and investigate the links between physical and mental health variables. The current study included validated questionnaires in order to measure physical health status, mental health symptoms and positive mental health and establish the links between these constructs through examining statistical models of mediation. The inclusion of the WEMWBS in the current study allowed the investigation of both positive mental health and mental health problems, in line with conceptualisations of mental health (e.g. WHO, 2005).

To the author's knowledge, no previous research has attempted to go beyond reporting differences and associations and examined the predictive relationships between these variables and also to investigate these within a deprived population. Given the interest and need to reduce health inequalities (e.g. Scottish Executive, 2003; 2005a; The Scottish Government, 2007a; 2008a) and the recent development of anticipatory health care initiatives such as the Keep Well programme, research of

this type will be vital in the understanding of how best to promote better health in disadvantaged populations who might not normally be able to access health services.

The current study was fortunate to have a return rate of 31%, above that expected but similar to other postal questionnaire studies with a deprived population (e.g. Cowie *et al*., 2010). Another study within Fife involving a questionnaire of a similar length and also including measures of mental health had demonstrated return rate of approximately 20% (H. Dale, personal communication, 27 October 2009). The good return rate of the current study may have been due to the decision to invite those who had recently attended their Keep Well health check and who may therefore be receptive to a study related to the programme and the issues addressed within the health check. A great deal of time was taken in the design, presentation and delivery of the questionnaire and there are a number of factors that may have contributed to this return rate. Cochrane reviews in this area (Edwards *et al*., 2007; 2009) highlight variables that improve the successful return of postal questionnaires. The current study adopted several of these including: pre-notification of being invited to participate in the study (i.e. when attending their health check, potential participants consented to being contacted for research and evaluation purposes); an unconditional incentive in the form of a complementary Keep Well programme pen; a reasonably short questionnaire; a personalised letter of invitation; University sponsorship (i.e. the logo of the University of Edinburgh was displayed on the letter of invitation, information sheet and questionnaire); an assurance of confidentiality; and use of colour-printed documents (the letter of invitation, information sheet and questionnaire were printed in coloured ink).

Care was also taken to produce clear and concise instructions and a questionnaire that was easy to complete. As reported in section 2.2, all document text was larger than Arial size 11 and line spacing of 1.5 was used. Consideration was given to ensure the layout of text was professional but also that instructions were as clear and as user-friendly as possible. Flesch Reading scores for the information sheet and letter of invitation were 63.0 and the questionnaire had a score of 82.9, indicating they would be easily understandable by 13- to 15-year-old students. The number of items and reading level required for completion were also considered when choosing already validated questionnaires for inclusion in the questionnaire. A pre-paid return envelope was included to minimise the inconvenience associated with participating in the study.

The current study was also fortunate to have very little missing data in the questionnaires returned. This may be due to the above variables that also promoted a good return rate. It meant that little data replacement was necessary prior to analysis and it is possible to be confident in the data collected being an accurate reflection of the individuals who participated.

4.8 Theoretical Implications

The current study supports the literature which suggests direct links between mental health problems and physical health (e.g. Friedli, 2009; Prince *et al*., 2007) and positive mental health and physical health (e.g. Dolan *et al.*, 2006; Huppert *et al*., 2005). It also supports the previously reported link between smoking and physical

health (e.g. Woolf *et al.*, 1999) and suggests predictive relationships between mental health problems and smoking, and positive mental health and smoking.

Evidence was found for mediating relationships suggesting that there are also indirect effects operating in addition to the above direct effects. It recommends further investigation of the possible further interactions between smoking, physical health, mental health problems and positive mental health, along with other important clinical variables.

The current study found mental health problems and positive mental health to have the same interactions in the mediating models. This could be considered evidence for them not existing as independent constructs but this may not necessarily be considered evidence against the need for a broader conceptualisation of mental health in which both positive and negative elements of mental health are included (as suggested by WHO, 2005). This is clearly an area for further research in order to establish how these elements relate to each other and other variables, and within different populations.

Overall, the current study highlights the importance of being aware of the potentially numerous links between constructs such as health behaviours, physical health and mental health, particularly in a deprived population where other social and environmental factors may also be influential.

4.9 Clinical Implications

The current study found smoking to be a significant mediating factor in the relationship between mental health problems and physical health in current smokers. This suggested that mental health problems had an additional indirect effect on physical health via smoking, whereby those with mental health problems would be more likely to smoke and this potentially contributes further to physical health problems. The Scottish Executive in *Delivering for Mental Health* (2006) has already identified improving the physical health of individuals with mental health problems as a priority. Smoking cessation interventions are one means by which this could be achieved but this remains a challenging area. Individuals with mental health problems report similar difficulties with stopping smoking as the general population (Brown, 2004) but mental health professionals may miss the opportunity to offer smoking cessation to patients (Himelhoch & Daumit, 2003) because they may think patients are not interested in stopping smoking, or they may consider their patient's physical health to not be a focus of their work (Brown, 2004). The current study confirms that professionals and organisations aiming to improve the physical health of individuals with mental health problems should discuss smoking cessation with these individuals.

Equally Well (2008) has already highlighted the need to develop anticipatory approaches for those whose health is at greater risk and individuals with mental health problems are known to be at an increased risk of poor health (The Scottish Government, 2008a). Health Checks like those in Keep Well are one means by

which this could be done and the Scottish Government has already recommended health promotion and screening for individuals with mental health problems (The Scottish Government, 2008a). They also however highlight that the evidence for successful health improvement interventions for this population is in the early stages and there is "considerable expertise among allied health professionals, clinical and health psychologists, health improvement practitioners and others engaged in general health promotion, which could be tapped into to improve effectiveness" (The Scottish Government, 2008a, p. 18).

In England and Wales there is also increasing recognition of the need for an integrated approach to addressing physical and mental health problems and *New Horizons* (HM Government, 2010) outlines a proposal to combine physical and mental health assessments into healthcare pathways. NHS Health Trainers have also been introduced to work with people who are at a greater risk of poor health and these professionals work individually with patients to "assess health and lifestyle risks, facilitate behaviour change, provide motivation and practical support. An integrated approach is taken to address the needs of the individual's physical and health problems." (HM Government, 2010, p.61)

Positive mental health was found to have an additional indirect effect on physical health via a mediating variable, smoking, in the current study. This model of mediation suggests that when considering how to improve the physical health of smoker, possible pathways by which to do this would be to target positive mental

health and its effect on smoking. This might indeed be useful regarding population-level health promotion approaches.

For clinical psychologists, the current study has highlighted the relationship between positive mental health and mental health problems and that a complete conceptualisation of mental health at individual and population levels should include both. Clinical psychologists, particularly those with knowledge and experience in health psychology, health promotion and behavioural change have much to bring to this area, as do community psychologists who seek to improve the health of communities, of which individuals are a part. Clinical psychologists typically work with those individuals with more complex presentations and various psychological and other issues. Clinical psychologists' training and experience in formulating multiple issues and appreciating the context in which these issues are a part suggests they would have much to bring to research and clinical work in an area such as this that involves many potential variables and a broad, holistic approach.

The current study has highlighted the links between smoking, mental health and physical health in a deprived population. It has already been suggested that "mental health is a key pathway through which inequality impacts on health" (Gallo & Matthews, 2003, p.38) and these authors have proposed emotions and cognitions to be influential in the relationships between inequalities and health, physical health and health behaviours. Psychologists intervening with individuals with complex physical and mental health issues may find it helpful to consider the findings of the current study when considering how best to intervene with patients and which of these issues

to address first. For instance, the finding that smoking can mediate the relationship between mental health and physical health suggests that smoking may be avoided, initiated or maintained by a person's mental health and thus contribute further to their physical health. It is not possible to infer causation from the findings of the current study but it is hoped that it can be appreciated by psychologists that their work to improve a person's mental health status also has other potential influences on their health behaviour and physical health. These could hypothetically in turn influence an individual's mental health and so psychologists may also wish to consider regularly asking about individuals' health behaviours and physical health, as positive changes and improvements in these domains could amplify and assist their own mental health interventions.

Governing bodies are increasing look to promote health as well as reduce health problems at a population level and address inequalities (e.g. Myers *et al*., 2005; Scottish Executive, 2003b; 2005a). Clinical psychologists have an important role to play in this, particularly in relation to mental health (Scottish Executive, 2006). An example of this comes in relation to the Keep Well programme which has included stress and well-being in health checks in some health board areas. Here clinical psychologists play a potential role in advising and training Keep Well practitioners on how to ask and include appropriate and clinically meaningful questions and how to respond appropriately to answers to these questions. Clinical psychologists' knowledge of psychometric measures and their appropriate application in clinical settings can provide guidance on whether screening questions are a useful addition to Keep Well. As the Keep Well health checks serve to sign-post and refer patients, it

is important that these practitioners feel equipped to provide the information that patients need and respond in a sensitive and effective way. Also as a potential receiving source of referrals, clinical psychologists have a duty to ensure patients are appropriately referred in a timely manner to clinical psychology and that they understand what to expect from that service.

There is also a potential role for clinical psychologists in the promotion of health and in the prevention of ill health. Besides an involvement in community psychology and developing psychologically healthy communities, a further previously mentioned example of this would be in the development of psychological therapies focusing on facilitating positive mental health (e.g. Fava *et al*., 1998). Clinical psychologists would also have a key role in evaluating the evidence and efficacy of these potential new therapies.

For those intervening to change health behaviours with individuals, it will be important to be aware of the likely influence of mental health factors on physical health and health behaviours when hoping to intervene to make positive changes with any of these. Williams *et al*. (2008) for instance discuss how depression can stand in the way of making positive lifestyle changes via hopelessness, the inability to plan and make decisions and follow recommendations. Psychological distress can also influence individuals' perception of support and sense of whether services can help with difficulties they are experiencing. This may be particularly important for deprived populations, where they may not have an understanding of what services provide and how to access them. Roddy *et al*. (2006) suggests this population may

have little previous positive experiences of services that are aware of the multiple and complex issues and provide appropriate and timely support and interventions. These individuals are also likely to need tailored and more intensive, long-term support, which can be difficult and stressful for service providers to provide (e.g. Macintyre, 2007).

4.10 Health Service Implications

The current study has demonstrated evidence for direct and indirect effects on mental health and physical health. It has highlighted the additional indirect impact of mental health problems on physical health via smoking and so by also offering mental health interventions that adopt healthy changes health care providers can also hope to improve individuals' physical health.

Smoking has been highlighted as a main contributor to health inequalities (Murray *et al.*, 2009; National Audit Office, 2010) and it has already been recognised that those from deprived backgrounds may need innovative, tailored and intensive interventions to change their smoking behaviour (e.g. Macintyre, 2007). This could include combining smoking cessation interventions with other approaches such as screening health checks like Keep Well or pro-active identification of smokers; pharmacy, dental and work place based interventions; drop-in services and incentive schemes (Murray *et al*., 2009). It may also be necessary for health care providers to adopt this approach for mental health and physical health endeavours. The current study suggests that smoking, physical health and mental health interact to influence each

other and ideally interventions would be mindful of the potential additional benefits that could be made on physical health via mental health and smoking cessation interventions and on mental health via the provision of physical health care. Certainly it has been suggested that improving the health behaviours of those experiencing inequalities should remain important as the Department of Health (National Audit Office, 2010) suggests thousands of people could be prevented from dying earlier with health interventions aimed at preventing or reducing the risk of ill health. Smoking cessation targeted at those with the highest levels of need has been recently highlighted as a key priority in England in order to address inequalities (National Audit Office, 2010).

Engaging with, designing and delivering appropriate services for individuals from a deprived population will be an ongoing challenge for the future, not easily addressed by methods used with more affluent populations. Making and maintaining lifestyle changes may be difficult or impossible in the face of social and financial vulnerability. Addressing health inequalities remains an issue for governing, health and research bodies and the current study contributes only part of the need for a better understanding of how the complex physical health, mental health and social issues for this population interact. The "inverse care law" outlines how the higher rates of illness and disease in some deprived populations are not matched with proportionate rates of use of health care services and recommendations are being made for the need for interventions to tackle the social issues (in addition to the health needs) of individuals from this population (e.g. Wiltshire *et al*., 2003).

Mercer & Watt (2002) also found that the number of problems that individuals from deprived backgrounds presented at a GP consultation with was significantly greater than those from less deprived areas, and that the nature of these problems was also different, with these individuals presenting more often with psychological and social problems (either with or without a physical problem). These individuals also presented with more chronic and complex physical health issues. For this reason, usual primary care services may find it difficult to meet these high demands (Mercer & Watt, 2007) and interventions like Keep Well may be better placed to try and address these as they potentially have more time for consultations, are encouraged to ask above various issues besides clinical and medical factors, have information on services relating to finances, literacy and social services, and adopt outreach techniques of engagement which are inherently more time consuming and challenging. Macintyre (2007) suggests that interventions to reduce health inequalities can be directed at various levels: the structural level via policies and regulations; the local level via services in specific areas of need; and the individual or family level via advice and targeted input. The current study suggests that physical and mental health, and smoking influence each other and for the deprived population who can experience inequalities in accessing services, health care providers should aim to capitalise on and generate further opportunities to offer health care that addresses these together when possible.

The current study found that positive mental health directly influenced physical health and also had an indirect effect via smoking. There is therefore also scope to use improvements in levels of positive mental health as a means by which to achieve

better physical health, both directly and associated indirect improvements in health behaviours like stopping smoking. This branch of work may look to intervene with those who are not experiencing 'case' or 'diagnosis' levels of physical or mental health problems, which at a population level is likely to be the majority (for instance, in the current study 71.5% scored below the level of "caseness" on the GHQ-12) and would aim to improve mental and physical health and promote well-being. Work in this area has yet to have the body of research and clinical attention dedicated to it that the illness and problem-orientated aspect has (e.g. Huppert, 2005). For example, within mental health therapeutic approaches such as mindfulness are beginning to be offered for the general population in groups and via self-help literature. Ryff and Singer (1998) have discussed how the positive health agenda could be applied at an individual level by practitioners in order to improve functioning, create meaningful relationships and daily health practices. The current study suggested that positive mental health is influential in smoking behaviour and Keyes (2007) argues that this positive health approach would work ultimately to increase and protect the number of individuals who are healthy, encourage good health practices and potentially reduce the need for health care.

5.0 Conclusion

The current study identified mediating associations between smoking, physical health, mental health problems and positive mental health in a deprived population. It found smoking to have an additional indirect effect on the relationship between mental health (both mental health problems and positive mental health) and physical

health. This would suggest that interventions to improve the physical health of those with mental health problems could hope for additional gains if these interventions assisted with healthy lifestyle changes such as smoking cessation.

There is also scope to use improvements in levels of positive mental health as a means by which to achieve better physical health, both directly and associated indirect improvements in health behaviours like stopping smoking.

As delivering anticipatory health care and reducing health inequalities are now being made a priority, there is a need for researchers, professionals and governing bodies to be innovative with how health care interventions are designed and delivered. These will need to be tailored, accessible and responsive to the various physical, mental and social needs of individuals from deprived backgrounds in order to be effective.

Chapter 6 References

Action on Smoking and Health (2008). *ASH Essential Information on: Smoking Statistics: Illness and Death.* London: Action on Smoking and Health. Retrieved April 21, 2010, from: http://www.ash.org.uk/files/documents/ASH_107.pdf

Adams, J., Shore, T., & Tashchian, A. (2000). Development and Validation of a Scale Measuring Attitudes toward Smoking. *Journal of Social Psychology*, 140, 615-624.

Adler, N.E., Boyce, T., Chesney, M., Cohen, S., Folkman, S., Kahn, R. *et al*. (1994). Socioeconomic Status and Health: The Challenge of the Gradient. *American Psychologist*, 49, 15-24.

Adler, N.E., Boyce, T., Chesney, M.A., Folkman, S. & Syme, S.L. (1993). Socioeconomic Inequalities in Health: No Easy Solution. *Journal of the American Medical Association*, 269, 3140-3145.

Adler, N.E. & Snibbe, A.C. (2003). The Role of Psychosocial Processes in Explaining the Gradient between Socioeconomic Status and Health. *Current Directions in Psychological Science*, 12, 119-123.

Anda, R.F., Williamson, D.F., Escobedo, L., Mast, E.E., Giovino, G.A. & Remington, P.L. (1990). Depression and the dynamics of smoking: a national perspective. *Journal of the American Medical Association*, 264, 1541–1545.

Angell, M. (1993). Privilege and Health: What is the Connection? *New England Journal of Medicine*, 329, 126–127.

Arday, D.R., Milton, M.H., Husten, C.G., Haffer, S.C., Wheeless, S.C., Jones, S.M. *et al*. (2003). Smoking and Functional Status among Medicare Managed Care Enrollees. *American Journal of Preventative Medicine*, 24, 234-241.

Aspinwall, L.G. & Taylor, S.E. (1997). A Stitch in Time: Self-Regulation and Proactive Coping. *Psychological Bulletin*, 121, 417-436.

Bair, M.J., Robinson, R.L., Katon, W. & Kroenke, K. (2003). Depression and Pain Comorbidity: A Literature Review. *Archives of Internal Medicine*, 163, 2433-2445.

Bergner, M., Bobbitt, R.A., Carter, W.B. & Gilson, B.S. (1981). The Sickness Impact Profile: Development and Final Revision of a Health Status Measure. *Medical Care*, 19, 787-805.

Black D. (1980). *Inequalities in Health. The Black Report*. London: DHSS. Retrieved April 25, 2010, from: http://www.sochealth.co.uk/Black/black.htm

Bowling, A. (2004). *Measuring Health: A Review of Quality of Life Measurement Scales* (3rd Edn). Milton Keynes: Open University Press.

Brandon, T.H. (1994). Negative Affect as a Motivation to Smoke. *Current Directions in Psychological Science*, 3, 33-37.

Braunholtz, S., Davidson, S., Myant, K. & O'Connor, R. (2007). *Well? What do you think? (2006): The Third National Scottish Survey of Public Attitudes to Mental Health, Mental Wellbeing and Mental Health Problems.* Edinburgh: Scottish Executive. Retrieved April 4, 2010, from: http://www.scotland.gov.uk/Resource/Doc/197512/0052833.pdf

Breslau, N., Peterson, E.L., Schultz, L.R., Chilcoat, H.D. & Andreski, P. (1998). Major Depression and Stages of Smoking: A Longitudinal Investigation. *Archives of General Psychiatry*, 55, 161-166.

Brown, C. (2004). *Tobacco and Mental Health: A Literature Review*. Edinburgh: Action on Smoking and Health Scotland. Retrieved April 21, 2010, from: http://www.ashscotland.org.uk/ash/files/tobacco%20and%20mental%20health.pdf

Brown, R.A., Lewinsohn, P.M., Seeley, J.R. & Wagner, E.F. (1996). Cigarette Smoking, Major Depression, and Other Psychiatric Disorders among Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 35, 1602-1610.

Budd, G.M. & Preston, D.B. (2001). College Students' Attitudes and Beliefs about the Consequences of Smoking: Development and Normative Scores of a New Scale. *Journal of the American Academy of Nurse Practitioners*, 13, 421-427.

Carney, R.M., Freedland, K.E., Miller, G.E., & Jaffe, A.S. (2002). Depression as a Risk Factor for Cardiac Mortality and Morbidity: A Review of Potential Mechanisms. *Journal of Psychosomatic Research*, 53, 897-902.

Chapman, S. (2009). The Inverse Impact Law of Smoking Cessation. *Lancet*, 373, 701-703.

Cohen, J. (1992). Quantitative Methods in Psychology: A Power Primer. *Psychological Bulletin,* 112, 155-159.

Cohen, S., Doyle, W.J., Turner, R.B., Alper, C.M. & Skoner, D.P. (2003). Emotional Style and Susceptibility to the Common Cold. *Psychosomatic Medicine,* 65, 652-657.

Cowie, L., Morgan, M. & Gulliford, M. (2010, 21 March). Handwritten 'Post-it' Notes, Questionnaire Formats and Response to a Postal Questionnaire Survey. *International Journal of Epidemiology*, 1-2. Retrieved July 29, 2010, from: http://ije.oxfordjournals.org/cgi/content/full/dyq043

Crombie, I.K., Irvine, L., Elliott, L., Wallace, H. (2005). *Closing the Health Inequalities Gap: An International Perspective.* Denmark: World Health Organization. Retrieved April 25, 2010, from: http://www.euro.who.int/Document/E87934.pdf

Dolan, P., Peasgood, T., White, M. (2006). *Review of research on the influences on personal wellbeing and application to policy making.* London: DEFRA. Retrieved April 18, 2010, from: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=14000

Edwards, P., Roberts, I., Clarke, M., DiGuiseppi, C., Pratap, S., Wentz, R. *et al*. (2007). Methods to Increase Response Rates to Postal Questionnaires [Cochrane Review]. *Cochrane Database of Systematic Reviews,* 18 (2).

Edwards, P.J., Roberts, I., Clarke, M.J., DiGuiseppi, C., Wentz, R. *et al*. (2009). Methods to Increase Response to Postal and Electronic Questionnaires [Cochrane Review]. *Cochrane Database of Systematic Reviews,* 8 (3).

Faul, F. & Erdfelder, E. (1992). *GPOWER: A Priori, Post-hoc, and Compromise Power Analyses for MS-DOS [Computer Program]*. Bonn, FRG: Bonn University, Department of Psychology.

Fava, G.A., Rafanelli, C., Cazzarro, M., Conti, S., Grandi, S. (1998). Well-Being Therapy: A Novel Psychotherapeutic Approach for Residual Symptoms of Affective Disorders. *Psychological Medicine*, 28, 475-480.

Field, A. (2005). *Discovering Statistics Using SPSS* (2nd Edn). London: Sage Publications Ltd.

Fife Health and Wellbeing Alliance (2007). *A Healthier Future for Fife: Fife's Joint Health Improvement Plan 2007-2010.* Retrieved April 11, 2010 from: http://www.cvsfife.org/health/jhipfinal.pdf

Folkman, S. & Moskowitz, J.T. (2000). Stress, Positive Emotion, and Coping. *Current Directions in Psychological Science*, 9, 115-118.

Fredrickson, B.L. (2000). Cultivating Positive Emotions to Optimize Health and Well-Being. *Prevention and Treatment*, 3, 1-25.

Fredrickson, B.L. (2001). The Role of Positive Emotions in Positive Psychology: The Broaden-and-Build Theory of Positive Emotions. *American Psychologist*, 56, 218-226,

Friedli, L. (2009). *Mental Health, Resilience and Inequalities.* Copenhagen: World Health Organization. Retrieved April 11, 2010, from: http://www.euro.who.int/document/e92227.pdf

Gallo, L.C., Ghaed, S.G. & Bracken, W.S. (2004). Emotions and Cognitions in Coronary Heart Disease: Risk, Resilience, and Social Context. *Cognitive Therapy and Research*, 28, 669-694.

Gallo, L.C. & Matthews, K.A. (2003). Understanding the Association between Socioeconomic Status and Physical Health: Do Negative Emotions Play a Role? *Psychological Bulletin*, 129, 10-51.

Gallo, L.C., Smith, T.W. & Cox, C.M. (2006). Socioeconomic Status, Psychosocial Processes, and Perceived Health: An Interpersonal Perspective. *Annals of Behavioral Medicine*, 31, 109-119.

Garratt AM, Schmidt L, Mackintosh A, Fitzpatrick R. (2002). Quality of Life Measurement: Bibliographic Study of Patient Assessed Health Outcome Measures. *British Medical Journal*, 324, 1417-1421.

Glass, R.M. (1990). Blue Mood, Blackened Lungs: Depression and Smoking. *Journal of the American Medical Association,* 264, 1583-1584.

Glassman, A.H., Helzer, J.E., Covey, L.S., Cottler, L.B., Stetner, F., Tipp, J.E. *et al*. (1990). Smoking, Smoking Cessation, and Major Depression. *Journal of the American Medical Association,* 264, 1546-1549.

Goldberg, D.P. & Williams, P. (1988). *A User's Guide to the General Health Questionnaire.* Basingstoke: NFER-Nelson.

Hajek, P., Taylor, T. & McRobbie, H. (2010). The Effect of Stopping Smoking on Perceived Stress Levels. Addiction, 105, 1466-1471.

Hall, S.M., Muñoz, R.F., Reus, V.I. & Sees, K.L. (1993). Nicotine, Negative Affect, and Depression. *Journal of Consulting and Clinical Psychology*, 61, 761-767.

Hardy, G.E., Shapiro, D.A., Haynes, C.E. & Rick, J.E. (1999). Validation of the General Health Questionnaire-12: Using a sample of employees from England's health care services. *Psychological Assessment*, 11, 159-165.

Hart, J.T. (1971). The Inverse Care Law. *Lancet*, 1, 405-412.

Hayes, A.F. (2009). Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium. *Communication Monographs*, 76, 408–420.

Health Development Agency (2004). *Smoking and Patients with Mental Health Problems*. London: Health Development Agency. Retrieved April 21, 2010, from: http://www.nice.org.uk/nicemedia/documents/smoking_mentalhealth.pdf

Health Scotland, ISD Scotland & ASH Scotland (2007). *An Atlas of Tobacco Smoking in Scotland: A Report Presenting Estimated Smoking Prevalence and Smoking-Attributable Deaths within Scotland.* Edinburgh: NHS Scotland/Scottish Public Health Observatory. Retrieved April 21, 2010, from: http://www.scotpho.org.uk/nmsruntime/saveasdialog.asp?lID=3907&sID=3256

Herron, S. & Mortimer, R. (1999). 'Mental Health': A Contested Concept. *International Journal of Mental Health Promotion,* 1, 4-8.

Herron, S. & Trent, D.R. (2000). Mental Health: A Secondary Concept to Mental Health Illness. *International Journal of Mental Health Promotion,* 2, 29-38.

Himelhoch, S. & Daumit, G. (2003). To Whom Do Psychiatrists Offer Smoking Cessation Counseling? *American Journal of Psychiatry*, 160, 2228-2230.

HM Government (2010). *Confident Communities, Brighter Futures: A Framework For Developing Wellbeing* London: The Stationary Office. Retrieved November 21, 2010, from: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_115936.pdf

Hu, Y., Stewart-Brown, S., Twigg, L. & Weich, S. (2007). Can the 12-item General Health Questionnaire be used to Measure Positive Mental Health? *Psychological Medicine*, 37, 1005-1013.

Hughes, J.R. (2001). Why does Smoking so often Produce Dependence? A Somewhat Different View. *Tobacco Control*, 10, 62-64.

Hunt, S.M. & McEwan, T. (1980). The Development of a Subjective Health Indicator**.** *Sociology of Health and Illness*, 2, 231-246.

Huppert, F. (2005). Positive Mental Health in Individuals and Populations. In Huppert, F., Bayliss, N. & Keverne, B. (Eds.) *The Science of Wellbeing* (pp.307-340). Oxford: Oxford University Press.

Huppert, F., Bayliss, N. & Keverne, B. (Eds.) (2005). *The Science of Wellbeing*. Oxford: Oxford University Press.

Huppert, F.A. & Whittington, J.E. (2003). Evidence for the Independence of Positive and Negative Well-being: Implications for Quality of Life Assessment. *British Journal of Health Psychology*, 8, 107-122.

Imai, K., Tingley, D. & Yamamoto, T. (2010). Experimental Designs for Identifying Causal Mechanisms. Retrieved November 21, 2010, from: http://imai.princeton.edu/research/files/Design.pdf

Jenkinson, C., Wright, L., Coulter, A. (1994). Criterion validity and reliability of the SF-36 in a population sample. *Quality of Life Research*, 3, 7-12.

Johnston, M., Wright, S. & Weinman, J. (1995). *Stress, Emotions and Life Events, Measures in Health Psychology: A User's Portfolio*. Windsor: NFER-Nelson.

Kendler, K.S., Neale, M.C., MacLean, C.J., Heath, A.C., Eaves, L.J. & Kessler, R.C. (1993). Smoking and Major Depression: A Causal Analysis. *Archives of General Psychiatry,* 50, 36-43.

Keyes, C.L.M. (2002). The Mental Health Continuum: From Languishing to Flourishing in Life. *Journal of Health and Social Behavior*, 43, 207-222.

Keyes, C.L.M. (2004). The Nexus of Cardiovascular Disease and Depression Revisited: The Complete Mental Health Perspective and the Moderating Role of Age and Gender. *Aging and Mental Health*, 8, 266-274.

Keyes, C.L.M. (2005). Mental Illness and/or Mental Health? Investigating Axioms of the Complete State Model of Health. *Journal of Consulting and Clinical Psychology*, 73, 539-548.

Keyes, C.L.M. (2007). Promoting and Protecting Mental Health as Flourishing. *American Psychologist*¸ 62, 95-108.

Lantz, P.M., Lynch, J.W., House, J.S., Lepkowski, J.M., Mero, R.P., Musick, M.A. & Williams, D.R. (2001). Socioeconomic Disparities in Health Change in a Longitudinal Study of US Adults: The Role of Health-Risk Behaviors. *Social Science and Medicine*, 53, 29-40.

Lee, C. (1999). Health Habits and Psychological Well-Being among Young, Middle-Aged and Older Australian Women. *British Journal of Health Psychology*, 4, 301-314.

Lerena, A., de la Rubia, A., Penas-Lledo, E., Diaz, F. & de Leon, J. (2003). Schizophrenia and Tobacco Smoking in a Spanish Psychiatric Hospital. *Schizophrenia Research,* 60, 313-317.

Lorant, V., Deliège, D., Eaton, W., Robert, A., Philippot, P. & Ansseau, M. (2003). Socioeconomic Inequalities in Depression: A Meta-Analysis. *American Journal of Epidemiology*, 157, 98-112.

Lorig, K.R., Sobel, D.S., Stewart, A.L., Brown, Jr. B.W., Ritter, P.L., González, V.M., Laurent, D.D. & Holman, H.R. (1999). Evidence Suggesting That a Chronic Disease Self-Management Program Can Improve Health Status While Reducing Utilization and Costs: A Randomized Trial. *Medical Care*, 37, 5-14.

Macintyre S. (1997). The Black Report and Beyond: What are the Issues? *Social Science and Medicine*, 44, 723-745.

Macintyre, S. (2007). *Inequalities in Health in Scotland: What Are They and What Can We Do About Them?* Retrieved March 6, 2010, from: http://www.scotland.gov.uk/Resource/Doc/199792/0053638.pdf

Marcus, M.D., Wing, R.R., Guare, J., Blair, E.H. & Jawad, A. (1992). Lifetime Prevalence of Major Depression and Its Effect on Treatment Outcome in Obese Type II Diabetic Patients. *Diabetes Care*, 15, 253–255.

McCreadie, R., on behalf of the Scottish Schizophrenia Lifestyle Group (2003). Diet, Smoking and Cardiovascular Risk in People with Schizophrenia: Descriptive Study. *British Journal of Psychiatry,* 183, 534-539.

McHorney, C.A., War, J.E. Jr., Lu, J.F.R., & Sherbourne, C.D. (1994). The MOS 36-Item Short-Form Health Survey (SF-36): III. Tests of Data Quality, Scaling Assumptions, and Reliability across Diverse Patient Groups. *Medical Care*, 32, 40-66.

McHorney, C.A., War, J.E. Jr. & Raczek, A.E. (1993). The MOS 36-item Short-Form Health Survey (SF-36): II. Psychometric and Clinical Tests of Validity in Measuring Physical and Mental Health Constructs. *Medical Care*, 31, 247-263.

McHorney, C.A., War, J.E. Jr., Rogers, W., Raczek, A.E. & Lu, J.F. (1992). The Validity and Relative Precision of MOS Short- and Long-Form Health Status Scales and Dartmouth COOP Charts. *Medical Care*, 30, S253-S265.

McNeill, A. (2001). *Smoking and Mental Health: A Literature Review.* London: Action on Smoking and Health. Retrieved April 21, 2010, from: http://www.ash.org.uk/files/documents/ASH_202.pdf

McKee, M. (2002). What can Health Services Contribute to the Reduction of Inequalities in Health? *Scandinavian Journal of Public Health*, 30 (Suppl 59), 54-58.

Mental Health Service Users Need More Help To Stub Out Smoking (2007, 26 June). *Mind*. Retrieved April 21, 2010, from: http://www.mind.org.uk/news/1791_mental_health_service_users_need_more_help_to_stub_out_smoking

Mercer, S.W. & Watt, G.C.M. (2007). The Inverse Care Law: Clinical Primary Care Encounters in Deprived and Affluent Areas of Scotland. *Annals of Family Medicine*, 5, 503-510.

Miles, J. & Shelvin, M. (2001). *Applying Regression and Correlation: A Guide for Students and Researchers*. London: SAGE Publications.

Mulkana, S.S. & Hailey, B.J. (2001). The Role of Optimism in Health-Enhancing Behavior. *American Journal of Health Behavior*, *25,* 388–395.

Murray, R.L., Bauld, L., Hackshaw, L.E. & McNeill, A. (2009). Improving Access to Smoking Cessation Services for Disadvantaged Groups. *Journal of Public Health*, 31, 258-277.

Myers, F., McCollam, A. & Woodhouse, A. (2005). *National Programme for Improving Mental Health and Well-Being: Addressing Mental Health Inequalities in Scotland - Equal Minds.* Edinburgh: Scottish Executive. Retrieved April 17, 2010, from: http://www.scotland.gov.uk/Resource/Doc/76169/0019049.pdf

National Audit Office (2010). *Tackling Inequalities in Life Expectancy in Areas with the Worst Health and Deprivation*. London: The Stationary Office. Retrieved August 2, 2010 from:
http://www.nao.org.uk/publications/1011/health_inequalities.aspx

National Cancer Institute (2009). *Cigar Smoking and Cancer.* Retrieved May 22, 2010, from: http://www.cancer.gov/cancertopics/factsheet/Tobacco/cigars

Ng, D.M. & Jeffery, R.W. (2003). Relationships between Perceived Stress and Health Behaviors in a Sample of Working Adults. *Health Psychology*, 22, 638–642.

NHS Health Scotland (2007). *Review of Scales of Positive Mental Health Validated for use with Adults in the UK: Technical Report.* Retrieved December 30, 2009, from:http://www.healthscotland.com/uploads/documents/7546-952-HSPMHScalesreport04.2.08[2].pdf

NHS Health Scotland (2010). *Keep Well*. Retrieved April 27, 2010, from: http://www.healthscotland.com/anticipatory-care/programmes/keepwell.aspx

NHS Health Scotland, University of Warwick & University of Edinburgh (2006). *The Warwick-Edinburgh Mental Well-being Scale (WEMWBS).* Retrieved December 30, 2009, from: http://www.healthscotland.com/documents/1467.aspx

O'Donnell, C., Mackenzie, M., Reid, M., Turner, F., Wang, Y., Sridharan, S. & Platt, S. (2009). *National Evaluation of Keep Well: Strategies for Reaching the Target Population*. Universities of Glasgow & Edinburgh. Retrieved June 16, 2010, from: http://www.healthscotland.com/uploads/documents/10104-KW%20Interim%20report%20Jun09.pdf

Ossip-Klein, D.J., Bigelow, G., Parker, S.R., Curry, S., Hall, S. & Kirkland, S. (1986). Classification and Assessment of Smoking Behaviour. *Health Psychology*, 5 (Suppl), 3-11.

Ostir, G.V., Markides, S. K., Peek, M.K & Goodwin, J.S. (2001). The Association between Emotional Well-Being and the Incidence of Stroke in Older Adults. *Psychosomatic Medicine*, 63, 210-215.

Parkerson, G.R. Jr., Broadhead, W.E. & Tse, C.K. (1990). The Duke Health Profile: A 17-item Measure of Health and Dysfunction. *Medical Care*, 28, 1056-1072.

Parkinson, J. (2006). *Indicators of Mental Health and Well-being – Constructs Consultation Paper.* Consultation Document. Retrieved December 30, 2009, from: http://www.healthscotland.com/documents/1465.aspx

Parkinson, J. (2007a). *Establishing a Core Set of National, Sustainable Mental Health indicators for Adults in Scotland: Final Report.* Edinburgh: NHS Health Scotland. Retrieved April 17, 2010, from: http://www.healthscotland.com/uploads/documents/5798-Adult%20mental%20health%20indicators%20-%20final%20report.pdf

Parkinson, J. (Ed.) (2007b). *Review of Scales of Positive Mental Health Validated for Use with Adults in the UK: Technical Report.* Edinburgh: NHS Health Scotland. Retrieved April 5, 2010, from: http://www.healthscotland.com/uploads/documents/7546-952-HSPMHScalesreport04.2.08%5B2%5D.pdf

Parrott, A.C. (1999). Does Cigarette Smoking Cause Stress? *American Psychologist*, 55, 817–820.

Penninx, B.W. Beekman, A.T., Honig, A. Deeg, D.J. Schoevers, R.A., van Eijk, J.T. *et al*. (2001). Depression and Cardiac Mortality: Results from a Community Based Longitudinal Study. *Archives of General Psychiatry,* 58, 221–227.

Peto, R., Lopez, A.D., Boreham, J. & Thun, M. (2006). *Mortality from Smoking in Developed Countries: 1950-2000 2nd Edition.* Retrieved April 21, 2010, from: http://www.ctsu.ox.ac.uk/~tobacco/

Preacher, K.J. & Hayes, A.F. (2004). SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models. *Behavior Research Methods, Instruments & Computers*, 36, 717-731.

Prince, M., Patel, V., Saxena, S., Maj, M., Maselko, J., Phillips, M. *et al* (2007). No Health without Mental Health – A Slogan with Substance. *The Lancet,* 370, 859–877.

RAND Health (1993a). *The RAND 36-Item Health Survey.* Retrieved April 5, 2010, from: http://www.rand.org/health/surveys_tools/mos/mos_core_36item_scoring.pdf

RAND Health (1993b). *RAND 36-Item Health Survey 1.0 Questionnaire Items*. Retrieved December 30, 2009, from: http://www.rand.org/health/surveys_tools/mos/mos_core_36item_survey.html

Roddy, E., Antoniak, M., Britton, J., Molyneux, A. & Lewis, S. (2006). Barriers and Motivators to Gaining Access to Smoking Cessation Services amongst Deprived Smokers – A Qualitative Study. *BMC Health Services Research*, 6, 147.

Rubin, D.B. (2007). The Design versus the Analysis of Observational Studies for Causal Effects: Parallels with the Design of Randomized Trials. *Statistics in Medicine*, 26, 20–36.

Ryan, R.M. & Deci, E.L. (2001). On Happiness and Human Potentials: A Review of Research on Hedonic and Eudaimonic Well-Being. *Annual Review of Psychology*, 52, 141-166.

Ryff, C.D. (1995). Psychological Well-Being in Adult Life. *Current Directions in Psychological Science*, 4, 99-104.

Ryff, C.D. & Keyes, C.L.M. (1995). The Structure of Psychological Well-Being Revisited. *Journal of Personality and Social Psychology*, 69, 719-727.

Ryff, C.D., Love, G.D., Urry, H.L., Muller, D., Rosenkranz, M.A., Friedman, E.M. *et al*. (2006). Psychological Well-Being and Ill-Being: Do They Have Distinct or Mirrored Biological Correlates? *Psychotherapy & Psychosomatics*, 75, 85-95.

Ryff, C.D. & Singer, B. (1998). The Contours of Positive Human Health. *Psychological Inquiry*, 9, 1-28.

Salovey, P., Rothman, A.J., Detweiler, J.B. & Steward, W.T. (2000). Emotional States and Physical Health. *American Psychologist*, 55, 110-121.

Schairer, E. & Schöniger, E. (2001). Lung Cancer and Tobacco Consumption. International Journal of Epidemiology, 30, 24-27.

Scottish Executive (2000). *Our National Health: A Plan for Action, a Plan for Change.* Retrieved April 14, 2010, from: http://www.scotland.gov.uk/Resource/Doc/158732/0043081.pdf

Scottish Executive (2003a). *Improving Health in Scotland: The Challenge.* Edinburgh: Scottish Executive. Retrieved April 11, 2010, from: http://www.scotland.gov.uk/Resource/Doc/47034/0013854.pdf

Scottish Executive (2003b). *Inequalities in Health: Report of the Measuring Inequalities in Health Working Group.* Edinburgh: Scottish Executive. Retrieved April 11, 2010, from: http://www.scotland.gov.uk/Resource/Doc/47171/0013513.pdf

Scottish Executive (2003c). *Partnerships for Care: Scotland's Health White Paper.* Edinburgh: Scottish Executive. Retrieved April 11, 2010, from: http://www.scotland.gov.uk/Resource/Doc/47032/0013897.pdf

Scottish Executive (2005a). *Delivering for Health*. Edinburgh: Scottish Executive. Retrieved April 11, 2010, from: http://openscotland.net/Resource/Doc/76169/0018996.pdf

Scottish Executive (2005b). *The Scottish Health Survey 2003: Summary of Key Findings.* Edinburgh: Scottish Executive. Retrieved April 17, 2010, from: http://openscotland.net/Resource/Doc/924/0019811.pdf

Scottish Executive (2006). *Delivering for Mental Health*. Edinburgh: Scottish Executive. Retrieved April 14, 2010, from: http://www.scotland.gov.uk/Resource/Doc/157157/0042281.pdf

The Scottish Government (2007a). *Better Health, Better Care: Action Plan.* Edinburgh: The Scottish Government. Retrieved April 11, 2010, from: http://www.scotland.gov.uk/Resource/Doc/206458/0054871.pdf

The Scottish Government (2007b). *Scotland's People: Annual Report: Results from 2007 Scottish Household Survey.* Edinburgh: The Scottish Government. Retrieved April 26, 2010, from: http://www.scotland.gov.uk/Resource/Doc/933/0067472.pdf

The Scottish Government (2007c). *Towards a Mentally Flourishing Scotland: The Future of Mental Health Improvement in Scotland 2008-11.* Edinburgh: The Scottish Government. Retrieved April 17, 2010, from: http://openscotland.net/Resource/Doc/201215/0053753.pdf

The Scottish Government (2008a). *Equally Well: Report of the Ministerial Task Force on Health Inequalities. Edinburgh: The Scottish Government.* Retrieved April 11, 2010, from: http://www.scotland.gov.uk/Resource/Doc/229649/0062206.pdf

The Scottish Government (2008b). *Mental Health in Scotland: Improving the Physical Health and Well Being of those Experiencing Mental Illness.* Edinburgh: The Scottish Government. Retrieved April 11, 2010, from: http://www.scotland.gov.uk/Resource/Doc/251663/0073699.pdf

The Scottish Government (2009a). *Scotland's People. Annual Report: Results from 2007/2008 Scottish Household Survey.* Edinburgh: The Scottish Government. Retrieved June 16, 2010, from: http://www.scotland.gov.uk/Resource/Doc/283301/0085783.pdf

The Scottish Government (2009b). *The Scottish Health Survey 2008.* Edinburgh: The Scottish Government. Retrieved June 16, 2010, from: http://www.scotland.gov.uk/Publications/2009/09/28102003/0

Scottish Office (1999). *Towards a Healthier Scotland: A White Paper on Health.* Retrieved April 11, 2010, from http://www.scotland.gov.uk/library/documents-w7/tahs-00.htm

Shrout, P.E. & Bolger, N. (2002). Mediation in Experimental and Nonexperimental Studies: New Procedures and Recommendations. *Psychological Methods*, 7, 422-445.

Silverstone, P.H. (1990). Depression Increases Mortality and Morbidity in Acute Life-Threatening Medical Illness. *Journal of Psychosomatic Research,* 6, 651–657.

Singleton, N., Bumpstead, R., O'Brien, M., Lee, A. & Meltzer, H. (2001). *Psychiatric Morbidity among Adults Living in Private Households, 2000.* London: The Stationery Office. Retrieved April 17, 2010, from: http://www.statistics.gov.uk/downloads/theme_health/psychmorb_sumrep.pdf

Singleton, N. & Glyn (Eds.) (2003). *Better or Worse: A Longitudinal Study of the Mental Health of Adults Living in Private Households in Great Britain.* London: The Stationary Office. Retrieved April 17, 2010, from: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4060694.pdf

Son, B.K., Markovitz, J.H., Winders, S. & Smith, D. (1997). Smoking, Nicotine Dependence, and Depressive Symptoms in the CARDIA Study: Effects of Educational Status. *American Journal of Epidemiology*, 145, 110-116.

Stewart, A.L., Hays, R.D. & Ware, J.E. (1988). The MOS Short-form General Health Survey: Reliability and Validity in a Patient Population. *Medical Care*, 26, 724-735.

Stewart-Brown, S. (1998). Emotional Wellbeing and its Relation to Health. *British Medical Journal*, 317, 1608–1609.

Stewart-Brown, S. (2002). Measuring the Parts Most Measures Do Not Reach: A Necessity for Evaluation in Mental Health Promotion. *Journal of Mental Health Promotion*, 1, 4-9.

Stewart-Brown, S. & Janmohamed, K. (2008). *Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) User Guide Version 1*. Retrieved January 7, 2010, from: http://www.healthscotland.com/documents/2702.aspx

Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., & Weich, S. (2009). Internal Construct Validity of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS): A Rasch Analysis Using Data from the Scottish Health Education Population Survey. *Health and Quality of Life Outcomes*, 7, 15-22.

Tabachnick, B.G. & Fidell, L.S. (2007). *Using Multivariate Statistics* (5th Edn). Boston: Pearson.

Taulbut, M., Parkinson, J., Catto, S. & Gordon, D. (2009). *Scotland's Mental Health and its Context: Adults 2009 – Briefing.* Edinburgh: NHS Health Scotland. Retrieved April 11, 2010, from: http://www.gcu.ac.uk/student/positiveliving/documents/AdultMHbriefingPDF.pdf

Ten Health Benefits of Stopping Smoking (2010, 23 July). *NHS Choices*. Retrieved 30 July 2010 from: http://www.nhs.uk/Livewell/smoking/Pages/Betterlives.aspx

Tennant, R., Fishwick, R., Platt, S., Joseph, S. & Stewart-Brown, S. (2006). *Monitoring Positive Mental Health in Scotland; Validation of the Affectometer 2 Scale and Development of the Warwick-Edinburgh Mental Well-Being Scale*. Edinburgh: NHS Health Scotland.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S. *et al*. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK Validation. *Health and Quality of Life Outcomes*, 5, 63-75.

Tipton, R.M. & Riebsame, W.E. (1987). Beliefs about Smoking and Health: Their Measurement and Relationship to Smoking Behavior. *Addictive Behaviors*, 12, 217-223.

Tsaousis, I. & Nikolaou, I. (2005). Exploring the Relationship of Emotional Intelligence with Physical and Psychological Health Functioning. *Stress and Health*, 21, 77-86.

Watt, G. (2002). The Inverse Care Law Today. *Lancet*, 360, 252-253.

Werneke, U., Goldberg, D.P., Yalcin, I. & Ustun, B.T. (2000). The Stability of the Factor Structure of the General Health Questionnaire. *Psychological Medicine*, 30, 823-829.

Wetzler**,** H.P. & Ursano**,** R.J. **(**1988). A Positive Association between Physical Health Practices and Psychological Well-being. *The Journal of Nervous and Mental Disease*, 176**,** 280**–**283**.**

Williams, S.L., DiMatteo, M.R. & Haskard, K.B. (2008). Psychosocial Barriers to Adherence and Lifestyle Change. In S.A. Shumaker, J.K. Ockene & K.A. Riekert (Eds.) *The Handbook of Health Behavior Change: 3rd Edition* (pp.445-62). New York: Springer Publishing Company.

Williams, J.M. & Ziedonis, D. (2004). Addressing Tobacco among Individuals with a Mental Illness or an Addiction. *Addictive Behaviors*, 29, 1067-1083.

Wiltshire, S., Bancroft, A., Parry, O. & Amos, A. (2003). "I Came Back Here and Started Smoking Again": Perceptions and Experiences of Quitting Among Disadvantaged Smokers. *Health Education Research: Theory & Practice*, 18, 292-303.

Woolf, S.H., Rothemich, S.F., Johnson, R.E. & Marsland, D.W. (1999). Is Cigarette Smoking Associated with Impaired Physical and Mental Functional Status? An Office-Based Survey of Primary Care Patients. *American Journal of Preventative Medicine,* 1**7**, 134–137.

World Health Organization (1948). Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. Retrieved April 11, 2010, from: http://www.who.int/about/definition/en/print.html

World Health Organization (2004). *Promoting Mental Health: Concepts, Emerging Evidence, Practice (Summary Report).* Geneva: World Health Organization. Retrieved April 11, 2010, from: http://www.who.int/mental_health/evidence/en/promoting_mhh.pdf

World Health Organization (2005). *Mental Health: Facing the Challenges, Building Solutions.* Copenhagen: World Health Organization. Retrieved April 14, 2010, from: http://www.euro.who.int/document/E87301.pdf

World Health Organization (2010). *Glossary of Terms Used.* Retrieved April 25, 2010, from: http://www.who.int/hia/about/glos/en/index1.html

Wulsin, L.R. & Singal, B. (2003). Do Depressive Symptoms Increase the Risk for the Onset of Coronary Disease? A Systematic Quantitative Review. *Psychosomatic Medicine*, 65, 201-210.

Ziff, M.A., Conrad, P. & Lachman, M.E. (1995). The Relative Effects of Perceived Personal Control and Responsibility on Health and Health-Related Behaviors in Young and Middle-Aged Adults. *Health Education & Behavior*, 22, 127-142.

Appendices

I Letter of Invitation

II Information Sheet

III Letter of Ethical Approval

Appendix I: Letter of Invitation

Department of Psychology
Stratheden Hospital
Cupar
Fife
KY15 5RR

Telephone: 01334 696336
Email: kim.kemp@nhs.net

Dear Sir/Madam,

You are being sent this research pack because you recently attended a Keep Well Health Check. I am asking for your help with my research which contributes to my Professional Doctorate in Clinical Psychology with the University of Edinburgh and NHS Fife.

Information about my research and everything you need to take part is included in this pack. A pen is also included and is yours to keep. If you are interested in taking part, please read the information sheet carefully. Please take time to think about whether or not you wish to take part.

If you have the read the information sheet and wish to take part, please complete the questionnaire. Please then return it in the envelope provided; you do not need a stamp. If you would prefer to complete the questionnaire with me over the telephone, please contact me on the telephone number above.

Thank you for taking the time to read about my research.

Yours sincerely,

Kim Kemp

Kim Kemp
Specialist Psychological Practitioner

Appendix II: Information Sheet

PARTICIPANT INFORMATION SHEET

Pathways to Health: Relationships between physical and mental health

Information about the Research

My name is Kim Kemp and I am required to undertake a study as part of my Professional Doctorate in Clinical Psychology. I would like to invite you to take part in my research study looking at the relationships between physical and mental health and well-being. However, before you decide to do so, I need to be sure that you understand firstly why I am doing it, and secondly what it would involve if you agree. I am therefore providing you with the following information. Please read it carefully and be sure to ask any questions you might have and, if you want, discuss it with others including your friends and family. I will do my best to explain the project to you and provide you with any further information you may ask for, now or later.

What is the purpose of the research?
Previous research has suggested there are important links between smoking behaviour, physical health, and mental health and well-being, and I would like to know more about these. A better understanding of these will help design and improve interventions like the Keep Well health check and help us support people who want to make healthy changes to their lifestyle.

Why have I been invited to take part?
You have been invited to join this study because you have attended a Keep Well health check in Fife. I have invited 600 Keep Well patients in Fife to complete my questionnaire.

Do I have to take part?
No, it is up to you to decide. Even if you have started to fill in the questionnaire, you can stop taking part at any time or choose not return it. If you decide to take part, please complete and return the questionnaire. Implied consent is used in order to ensure anonymity, so if you complete and return the questionnaire you are consenting for the information you provide to be used in this research project. Your decision whether or not to participate will not affect the health care you receive.

What will I have to do if I take part?
If you take part, I will ask you to complete one questionnaire, which is attached to this information sheet. Please complete and return it to me in the FREEPOST envelope as soon as possible. The questionnaire should take about 20 minutes to complete. If you would prefer to complete it over the phone, please telephone me to arrange that.

Is there anything I should be concerned about if I take part?
The questionnaire asks questions about your current health status and your views about your health, which may be upsetting for you. If you think answering the questions might upset you then you may choose not to take part. If the questionnaire causes you to become worried about your health, please contact your GP.

What are the possible benefits of taking part?
The study is not intended to benefit you personally. However, the information you give us will help us understand how to design and improve interventions like Keep Well in Fife and help inform work to help people live healthier lives. As a small contribution towards your time and help with this research, I am enclosing a pen which is yours to keep.

What happens at the end of the research?
Once you have completed the questionnaire and returned it sealed in the FREEPOST envelope provided, the data from the questionnaires will be entered on to secure NHS computers for analysis. The questionnaires will be kept in a locked NHS cupboard. All data will be destroyed 5 years after the end of the project. The results of the questionnaires will be provided to the Keep Well evaluation team. If you have requested one, you will be posted a copy of the research report.

Will it be kept confidential?
Yes – all information collected will be kept strictly confidential, in accordance with NHS Fife policies. I do not have access to your medical notes or the information given in your Keep Well health check. It will also not be possible to identify you or your answers in any way in the results of the study.

Who is organising and paying for the research?
It is being organised by the University of Edinburgh and NHS Fife. I am doing this research as part of my Professional Doctorate training in Clinical Psychology.

Who has reviewed this study?
The Tayside Committee on Medical Research Ethics B, which has responsibility for scrutinising all proposals for medical research on humans in Fife Forth Valley & Tayside, has examined the proposal and has raised no objections from the point of view of medical ethics. It is a requirement that the records in this research are available for scrutiny by monitors from NHS Fife, whose role is to check that research is properly conducted and the interests of those taking part are adequately protected.

What is there is a problem?
If you believe that you have been harmed in any way by taking part in this study, you have the right to pursue a complaint and seek any resulting compensation through the University of Edinburgh who are acting as the research sponsor. Details about this are available from the research team.

How can I find out more?
If you have any questions about the study, please contact me, Kim Kemp, on email kim.kemp@nhs.net, phone 01334 696336, and I will be happy to speak to you. If you wish to make a comment about the conduct of the research please contact Pauline Adair, NHS Fife on 01334 696336 or email paulineadair@nhs.net

Thank you for taking the time to read this information sheet and for considering taking part in my study.

Appendix III: Letter of Ethical Approval

NHS Fife NHS Forth Valley NHS Tayside

East of Scotland Research Ethics Service

Tayside Committee on Medical Research Ethics B

Research Ethics Office
Residency Block, Level 2
Ninewells Hospital & Medical School
DUNDEE
DD1 9SY

Miss Kim Kemp
Trainee Clinical Psychologist
Department of Clinical Psychology
Stratheden Hospital
Cupar
KY15 5RR

Date: 28 January 2010
Your Ref:
Our Ref: LR/**10/S1402/3**
Enquiries to: Mrs Lorraine Reilly
Extension: Ninewells extension 40099
Direct Line: 01382 740099
Email: Lorraine.reilly@nhs.net

Dear Miss Kemp

Study Title:	**Pathways to health in a deprived population: relationships between smoking, mental health and health status.**
REC reference number:	**10/S1402/3**
Protocol number:	**1.0**

Thank you for your letter of 21 January 2010, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information was considered in correspondence and by a sub-committee of the REC at a meeting held on 28 January 2010. A list of the sub-committee members is attached.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research

Application System or at http://www.rdforum.nhs.uk. Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Covering Letter		09 December 2009
REC application		09 December 2009
Protocol	1.0	30 November 2009
Investigator CV		09 December 2009
Evidence of insurance or indemnity		27 July 2009
CV - Dr Paul Graham Morris		15 December 2009
Participant Information Sheet	2	20 January 2010
Letter of invitation to participant	2	20 January 2010
Questionnaire	2	20 January 2010
Response to Request for Further Information		21 January 2010

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

10/S1402/3	**Please quote this number on all correspondence**

Yours sincerely

Mrs Sandra Forbes
Chair

Enclosures:	List of names and professions of members who were present at the meeting and those who submitted written comments. "After ethical review – guidance for researchers"
Copy to:	Ms Elspeth Currie, Queen's Medical Research Institute, Edinburgh NHS Fife R&D office

Tayside Committee on Medical Research Ethics B

Attendance at Sub-Committee of the REC meeting on 28 January 2010

Committee Members:

Name	Profession	Present	Notes
Mrs Sandra Forbes	Lecturer in Nursing	Yes	

Also in attendance:

Name	Position (or reason for attending)
Mrs Lorraine Reilly	Co-ordinator Committee B

Written comments received 27 January 2010:

Name	Position
Dr Carol MacMillan	Consultant in Intensive Care Medicine & Anaesthesia