PSYCHOLOGICAL FACTORS PREDICTING HEALTH BEHAVIOUR : THE RESPONSE TO RISK FACTOR SCREENING FOR CARDIOVASCULAR DISEASE

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A Thesis Submitted for the Degree of PhD
at the
University of St Andrews

1996

Psychological factors predicting health behaviour

the response to risk factor screening for cardiovascular disease

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Doctor of Philosophy

February 1996

I, Wendy M. Simpson, hereby certify that this thesis, which is approximately 67,000 words in length, has been written by me, that it is a record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

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Acknowledgements

For financial support:

I wish to thank the SHARP committee for financing my studentship for two years of this thesis and without whose support the studies could not have been carried out.

I am also grateful to The Scottish Home and Health Department for providing funding for the study reported in Chapter 2, to the Carnegie Trust for paying my fees and to Fife Educational Trust and the Sir Richard Stapley Educational Trust for providing additional bursaries.

For practical support:

In Hillbank Health Centre I wish to thank all the reception staff and secretaries who helped guide me through the system, who were eternally patient with my requests and queries and let me take up space at their reception desk. Thanks for all the chocolates and polos! I am also very grateful to the GPs who put up with extra demands on their busy schedules without complaint. In particular I would like to thank Janet Howie, the practice manager, who worked very hard to make sure the study ran smoothly.

I would like to thank the management staff at the three worksites who helped organise the distribution and collection of questionnaires. I am also grateful to Caroline Hay, Linda Graham and Neil Coulson who helped with the data collection and input for the worksite study.

I would like to thank Beth Pollard for her patience with my queries and her expert statistical advice; Val for her experienced input at many points throughout both design and writing up; Sheina for her support and intellectual guidance, particularly with Chapter 3; Joan for introducing me to SHARP and for her infectious enthusiasm for applied research and Dave for helping me develop my computer expertise over the past few years.

For emotional support:

I would like to thank all the CHUMS for coffees, cakes and GMS (general moral support) over the years, particularly Hafrun for transatlantic encouragement and for helping me believe in my work. I am also grateful to Barbara who kept nagging me to get it finished and to Dave for helping me keep it all in perspective.

A special thank you to all the people who gave up their time to take part in my studies and without whose responses this thesis could not have existed.

Finally I would like to thank Marie for taking me on in the first place, for her constant encouragement and support and for all the fun we had.

Dedicated to my parents

To Mum who is always there for me
To Dad who is my inspiration

Abstract

The two main aims of this thesis were first, to predict health behaviour and, second, to apply and test the existing psychological theories in this field. The health behaviours concerned were the responses to screening for risk factors for cardiovascular disease. Three empirical studies were carried out.

The first response to screening is whether one attends or not. Results showed that uptake of screening in worksite settings (N=425) (Chapter 2) could be predicted by the health beliefs derived from social cognition models. Intention to attend was the best predictor of attendance. However, differences in predictive beliefs between worksites suggested communication factors were also an issue. Subsequently, communication factors were investigated in a study of uptake in general practice (N=210) (Chapter 4) finding that the method of offering screening affected uptake significantly.

The second response to screening is the impact it has on the screenee. Results found that communication factors had little effect on screening impact in that there was little difference between three methods of offering screening in terms of their subsequent impact on patients' satisfaction, knowledge, intention or behaviour change (Chapter 4). Social cognitions, however, were found to predict impact in terms of behaviour change with a sample of attenders (N=59) at a screening clinic in general practice (Chapter 3). In the latter study, perceived threat was the best predictor of behaviour change.

Four social cognition models were compared against each other in the classification of attenders and non-attenders in the Worksite study (Chapter 2). Apart from Social Learning Theory the other models performed adequately, but the Theory of Reasoned Action was the most successful. More recent theories were examined in the prediction of behaviour change following screening (Chapter 3). The data supported the stage model, the Precaution Adoption Process. The internal structure of the Health Action Process Approach was questioned, but the addition of an 'action phase' in this model showed promise.

If preventable, why not prevented

King Edward VII

1. Introduction

1.1 Overview to thesis

The two main aims of this thesis are first, to predict and explain health behaviour and, second, to apply and test the existing psychological theories in this field. The health behaviour concerned is the response to screening for risk factors for cardiovascular disease (CVD) (i.e. coronary heart disease, stroke and peripheral vascular disease). This includes the response to being offered screening and the response following screening, e.g. in terms of intention to change behaviour to reduce one's risk and actual behaviour change. The first aim is of an applied nature as it concerns an attempt to understand the factors which may influence the way screening is practiced. Whereas the second aim is mainly of a theoretical nature in the sense that it concerns the evaluation and comparison of theories to provide insight into their development.

1.1.1 Predicting and explaining health behaviour

'Health behaviour' has been defined by Kasl and Cobb (1966) as:

> *any activity undertaken by a person believing himself to be healthy for the purpose of preventing disease or detecting it at an asymptomatic stage (p.246)*

Harris and Guten (1979) used the term 'health-protective behaviour' to refer to:

> *any behaviour performed by a person regardless of his or her perceived health status, in order to protect, promote or maintain his or her health, whether or not such behaviour is objectively effective toward that end (p.18)*

The second definition is much wider in that it includes those who may have symptoms or may consider themselves ill. Also, it covers motivations for the behaviour beyond disease prevention. This definition is more useful for the topic of this thesis; individuals who attend a screening appointment will not all perceive themselves as completely healthy, nor, perhaps, will they all change their behaviour following screening with the motivation of preventing CVD. For

example, an asthmatic patient may attend a screening appointment to discover their risk of developing heart disease. Following screening they may decide to give up smoking, not only to prevent their chance of heart disease, but also with the aim of promoting their everyday health and well-being. Thus, this second definition will be implied throughout the thesis, but rather than using the longer term, 'health-protective behaviour', it will simply be referred to as 'health behaviour'.

Examples of health behaviour using the term defined above include taking physical exercise, eating a healthy diet, going for regular dental check-ups, getting enough sleep, going to a hypnotist in an attempt to quit smoking, etc. In this thesis, the health behaviours of particular interest are any behaviours associated with screening for risk factors of CVD; these include attending screening appointments (often referred to as health checks) and the behaviours used to modify risk factors such as stopping smoking, changing to a healthier diet, taking more exercise or losing weight. Throughout the thesis, these behaviours will sometimes be referred to as "screening-related" behaviours to clarify their distinction from general health behaviours.

Understanding health behaviour has become increasingly important since the marked change in disease patterns in western industrialised countries in the past 100 years. Infectious diseases have continuously decreased probably due to the progress of social and hygienic conditions and the medical development of preventatives and cures. Subsequently, chronic diseases, especially CVD and cancer have become the leading causes of death in western industrialised countries (Kittel, 1993). CVD includes coronary heart disease (CHD), stroke and peripheral vascular disease. CVD is responsible for about one-half of deaths, nearly one-third of permanent disability and a high proportion of the use of health services. About three-quarters of CVD deaths are due to CHD (Kittel, 1993). Epidemiological evidence has shown that the main established risk factors for CVD, i.e. smoking, high blood pressure and high cholesterol levels are largely determined by personal behaviour. Therefore, a high proportion of mortality and disability might be preventable by health behaviour changes.

As the US secretary of Health, Education and Welfare stated,

> *we are killing ourselves by our own careless habits (p. viii)*
>
> *you, the individual, can do more for your own health and well-being than any doctor, any hospital, any drug, any exotic medical device (p. Viii)*
>
> (Califano, 1979)

Understanding why people do or do not change their behaviour to promote and maintain their health is one of the main aims of health psychology as stated below in the widely accepted definition proposed by Matarazzo (1982),

> *Health psychology is the aggregate of the specific educational, scientific and professional contributions of the discipline of psychology to the promotion and maintenance of health, the prevention and treatment of illness, the identification of etiologic and diagnostic correlates of health, illness and related dysfunction, and the analysis and improvement of the health care system and health policy formation. (P.4)* (my emphasis)

Many of the concepts in the relatively new discipline of health psychology are derived from social psychology which has had a long research interest in the relationships between beliefs and attitudes (i.e. cognitive factors) and behaviour. Applied to health, these concepts can provide useful information as to what might predict health behaviour. Of course there may be other, external, reasons, e.g. economic, social, environmental, etc. as to why people carry out health behaviours, but the primary concern of this area of health psychology (and this thesis) is the effect of cognitive factors.

1.1.2 Application and development of theory

The second aim of this thesis is to apply theoretical models of health behaviour to the study of screening-related behaviour. Lewin's assertion (1948) that there is nothing so practical as a good theory sets the scene for the use of theories as a

means of guiding the methods used to predict and explain the behaviour. Moreover, the particular behaviour studied will hopefully further knowledge of the applicability and generalisability of the models.

The theories applied in this thesis are generally known as 'social cognition models' referring to an individual's perception of social situations and the relationship between their perceptions and behavioural propensities within such situations (Abraham & Sheeran, 1993). Section 1.3 will provide a description and evaluation of the use of these models in research to date.

1.2 Screening in health care

1.2.1 Screening for risk factors vs. Screening for disease detection

The concept of screening in health care is "a preventive activity which seeks to identify an unsuspected disease or pre-disease condition for which an effective intervention is available" (p. 1) (Stone & Stewart, 1994).

Safer (1986) has noted that screening for risk factors (SRF) should be distinguished from the more general form of screening for disease detection (SDD). SDD (e.g. cervical cancer screening) is based on a biomedical model of disease and involves testing for specific diseases or their precursors and attempting to classify people as cases or non-cases. The cases might then benefit from treatment. SRF (e.g. screening for CVD risk factors), on the other hand, is based on a general susceptibility model of mortality and morbidity and involves testing for risk factors or likely predictors of disease and usually informing people, in some way, of their chances of developing a particular disease sometime in the future. Safer identified a number of important differences between the two types of screening. First, SRF includes questioning about behaviours which requires self-report measures of risk-increasing behaviours (cf. physical and biochemical tests in SDD procedures). Second, the outcome of the procedure in SRF is an abstract risk factor score which may be relatively meaningless to the participant,

especially considering that many people are unrealistically optimistic about their risk of developing disease (Weinstein, 1982). Third, the action required will most likely depend on the individual's behaviour and not a prescription of therapy or drugs from a health professional. In SDD the causes of the disease will often be seen as outwith the control of the individual, whereas, in SRF, the at-risk individual may be held responsible for their own health status. Therefore the SRF screenee may not have the supportive social environment which they require to change and maintain any health behaviours.

These differences point to the need for psychological methods to help assess SRF programmes, particularly in providing attention to the psychological processes which control and guide behaviour change. Of course, psychological methods are also used in assessing SDD programmes, but the psychological issues are likely to be different. For example, psychologists may be interested in the outcomes of a SDD programme in terms of anxiety following a false positive result, or satisfaction with communications with health professionals. Whereas, their primary interest in SRF programmes may be the effect of the individual's attitudes on their ability to change and maintain their health behaviour.

1.2.2 Risk factors for cardiovascular disease (CVD)

Identifying people who are prone to CVD depends on a number of factors known as 'risk factors'. A multitude of factors potentially associated with CVD have been accumulated from insurance statistics, epidemiological studies and intervention trials (Coope, 1992). However, three major elements have been established clinically as risk factors: hypercholesterolaemia (high cholesterol levels), hypertension (high blood pressure) and cigarette smoking (Kittel, 1993). Other risk factors which are often taken into consideration in screening programmes are: family history of CVD and/or diabetes, alcohol use, body mass index, dietary salt, presence of diabetes and previous heart disease or angina (McEwan & Ritchie, 1989).

Risk factors differ considerably in their predictive power. A high body mass index, for example is a poor predictor when allowance is made for other factors

associated with it (Coope, 1992), for example, high blood pressure, high cholesterol and a predisposition to diabetes (Kittel, 1993).

The risk factors have a synergistic effect. In other words, multiple risk factors increase the overall risk by a greater amount than the sum of the individual risks (Coope, 1992; Kittel, 1993). Thus, someone with a moderate level of a number of factors may be at higher risk than someone with a very high level of one risk factor. Screening programmes are therefore usually designed to investigate a person's risk on the basis of several factors as opposed to one or two.

1.2.3 Screening - history and modern practice

Although screening is relatively new in medical terminology, it has existed as a concept for many years. Ever since the Boer war, when, following a medical examination, there was a very high rejection rate of army volunteers, there has been an awareness of the possibility of latent disease in the community. Screening situations have existed in the form of routine examinations of schoolchildren, industrial workers and immigrants since Victorian times (Hart, 1992).

The initiation of public health screening programmes in the US started out with their National Health Council's encouragement to Americans in 1923 to 'Have a Health examination on your Birthday'(Hart, 1992). In the UK, the pioneer health centre in Peckham, London, which opened in 1935, was devised as an experimental enquiry into the nature of health. An important part of the project was an annual thorough medical inspection for each member of the family (Scott-Samuel, 1990).

From that time on, there was a rapid development in screening techniques for particular diseases (or monophasic screening) such as tuberculosis, cervical cancer, metabolic disorders, asthma and urinary infection. Mass 'detection drives' for diabetes, glaucoma, cervical cancer and breast cancer followed (Hart, 1992).

Multiphasic screening (or screening for many conditions at the same time) became popular in the US, Germany and Japan after the Swedish brothers Gunner and

Ingmar Jungner had developed a battery of ten chemical tests which were successfully used for mass screening purposes in Sweden (1961-1969).

In Britain, similar multiphasic screening units were set up privately by BUPA (British United Provident Association). According to Hart (1992) the foundation of the National Health Service in 1948 held up the development of preventive services for the general public due to an initial emphasis on therapeutic medicine. However, due to a few dedicated practitioners and the rise in public expectation of better preventive care, general practice soon became the focus for screening programmes in the community (Hart, 1992). Currently there is a major focus on screening in ante-natal clinics for foetal abnormalities (e.g. Marteau *et al*, 1989), cystic fibrosis carrier status (e.g. Mennie *et al*, 1993) and in some areas for HIV infection (Chrystie *et al*, 1995). However, this area is beyond the scope of this thesis and therefore will not be introduced in any detail.

1.2.3.1 Screening and Intervention Programmes in General Practice

General practice has been described as the best place to perform screening due to the "ongoing responsibility accepted by practitioners for monitoring the health care of their practice population" (Hart, 1992). Over the years much of the initiative in preventive activities was taken by general practitioners and nurses themselves. For example, in Scotland in 1989, a small group of general practitioners and nurses formed a multi-disciplinary cardiovascular disease prevention group calling itself S.H.A.R.P. (Scottish Heart and Arterial disease Risk Prevention) with the objective of creating awareness and enthusiasm for action against cardiovascular disease throughout Scotland (McEwan & McEwen, 1989). Screening for cardiovascular risk factors has been on the increase in general practice in the UK, particularly since the government white paper, 'The Health of the Nation' (1992) which set targets for coronary heart disease prevention and subsequently, in Scotland, with the introduction in 1993 (Scottish Home and Health Department, 1993) of a new contract for general practitioners (GPs) governing health promotion. The contract requires that not only those with pre-existing vascular disease but also apparently healthy individuals between the

ages of 15-74 should be screened for cardiovascular risk factors and given health promotion advice.

The two main forms of organising risk factor screening in general practice are opportunistic (sometimes referred to as case-finding) or systematic programmes. Opportunistic screening exploits the opportunity which arises when a patient attends the doctor for a normal consultation. Its intention is to reach as many of the practice population as possible and is based on the finding that 60% of patients see their general practitioner at least once in a 1-year period and over 95% do so in a 5-year period (Ritchie, 1992). Systematic programmes involve systematically inviting patients to attend the practice to be screened (often every three years). The screening would then usually take the form of a special clinic, often run by a practice nurse. There is some evidence of divergent opinions amongst health professionals about the relative merits of these different methods of organising screening and as yet there is no evidence as to which method might be more effective (Calnan *et al*, 1994). Calnan & Williams (1993) found that there was more chance that tests and assessment of risk factors would be carried out systematically in a screening clinic than in an opportunistic consultation. However the opportunistic approach does not have the same difficulties in recruiting the target population and avoids the problem of non-attendance (Bradley, 1992).

Medical and psychological studies of risk factor screening in general practice have investigated different methods of inviting patients in a systematic programme (e.g. Norman, 1993), how screening is organised in general practice (Calnan & Williams, 1993) uptake rates (e.g. Norman & Conner, 1993, Sacks and Marsden, 1989) and the impact of screening on risk factor modification (e.g. OXCHECK Study Group, 1994; FHS Group, 1994; McEwan *et al*, 1993).

Two of the studies contained in this thesis were based in a general practice setting (see Chapters 3 and 4).

1.2.3.2 Screening and Intervention Programmes at the Worksite

The other main arena for risk factor screening is the worksite. Worksite health promotion programmes have been very popular in the US (e.g. Johnson and Johnson's "Live for life" programme, Sarafino, 1990) and Australia (e.g. Gomel *et al*, 1993) and are now developing in the UK. These programmes often begin with a health screen followed by some form (or several forms) of intervention such as counselling, a change of work environment (e.g. healthier foods in the cafeteria) and / or a self-help package.

Worksites have several advantages for running health promotion programmes (Cohen, 1985). For risk factor screening, the main advantages of running the programme at the worksite are convenience and the opportunity to involve people who might be missed by other programmes, particularly working age men who are most at risk. A review of worksite smoking cessation programmes (Klesges *et al*, 1989) concluded that this setting seems to be more effective in encouraging participation than clinic-based programmes (as in general practice). However, the success of the programme is likely to be affected by not only the method of intervention used, but also the nature of the worksite itself. These authors speculated that factors such as the size of the worksite, socio-economic level of the workers and management/worker relations may affect the programme's success.

There is evidence that health promotion programmes at the worksite are effective in reducing many of the factors which are associated with a higher risk of CVD, e.g. smoking (Klesges *et al*, 1989; Gomel *et al*, 1993), weight (Cohen *et al*, 1987), responses to stress (Sallis *et al*, 1987), dietary fat intake (Barratt *et al*, 1994), blood pressure (Murza *et al*, 1994) and cholesterol levels (Murza *et al*, 1994). Worksite programmes have also been effective in increasing physical fitness (e.g. Heirich *et al*, 1993). Comparing different forms of intervention has shown that screening alone is not as effective in producing behaviour changes as screening plus some form of counselling (Gomel *et al*, 1993; Heirich *et al*, 1993). Michie *et al* (1995) examined the impact of two methods of giving screening results in a randomised controlled trial at a hospital worksite. The first method

provided simple information whereas the second provided more extensive feedback including target-setting and a written contract. At a six-month follow-up, those who received more extensive feedback had lost significantly more weight and increased their exercise significantly more than the other group.

A mobile screening service visiting worksites provided the setting for one of the studies in this thesis (see Chapter 2). This did not provide all the potential beneficial aspects of screening at the worksite. Particularly lacking was any form of supportive intervention at the three worksites involved. However, it did have the major benefit of convenience.

1.2.4 Psychological issues in screening for CVD risk factors - uptake and impact

1.2.4.1 Issues in uptake of screening

The importance of considering psychological issues in screening for risk factors was outlined in Section 1.2.1. Not only is it important to consider issues affecting behaviour change following screening. The behaviour of attending (or not attending) is also an issue. The success of screening depends on good uptake rates. There is evidence that uptake rates for risk factor screening programmes do vary, but in general have not been particularly high. For example, a study by Pill *et al* (1988) found that, of 1570 male and female patients invited to a health check by an open invitation (i.e. no fixed appointment) at their general practice, only 549 (35%) attended. In another study based in general practice, Norman and Conner (1993) found a similar uptake rate of 37% when patients were sent an open invitation. However, in the same study almost double the rate (70%) was achieved when letters offered an actual appointment time. It is particularly important that those at possible risk attend screening appointments. In an attempt to recruit subjects for the National Heart, Lung and Blood Institute's Multiple Risk Factor Intervention Trial (MRFIT), Greenlick *et al* (1979) sent out invitations to men considered to be of high or low priority based on level of risk identified from previous medical records. Despite additional written and telephone invitations to those in the high priority group, only 6,240 (49%)

accepted the invitation to be screened. The low priority group were sent only one invitation and 494 (7.9%) attended. In order to improve uptake rates, it is important to investigate factors which may influence attendance and non-attendance.

Psychological research into the factors influencing uptake of screening can be divided into three main areas: organisational influences, health professional factors and patient factors (Marteau, 1993; Orbell, 1994).

Organisational factors

Organisational factors include where the screening is carried out (e.g. in general practice or at the worksite as discussed in Section 1.2.3) and whether the screening programme is organised using a systematic programme involving a special clinic or by opportunistic means as discussed in Section 1.2.3.1. Within systematic programmes, there is also the question of how the patient is invited. In previous research looking at different methods of inviting people to a screening appointment it has been found that higher rates of attendance were generally achieved when: a. the letter of invitation contained a fixed appointment (as opposed to an open invitation) (Norman & Conner, 1993); b. the invitation to attend was made in person by a health professional (e.g. Mann *et al*, 1988) and c. when screening was offered to those already receiving care (Watson *et al*, 1991). The second and third conditions above require that the target group attend the health centre and therefore, although screening rates may be high, coverage of the targeted population may not be as good as letter invitation methods allow. For example, Sacks and Marsden (1989) found that although an uptake rate of 94% was achieved by personal invitation from the GP during ordinary consultations, only 25% of the target population had been screened in two and a half years. Norman (1993) compared personal and letter invitation methods within a single practice and found that, although the two methods resulted in similar uptake rates (63.5% and 61.2% respectively), only half as many patients in the personal invitation group were invited in a year. A study by Bekker *et al* (1993) investigated six methods of offering cystic-fibrosis testing in primary care. The six methods included letter and personal invitation methods but also looked at

whether information about testing was provided and whether testing was available immediately or at a later date. The results showed that the most effective method in terms of uptake rates was a personal one with a researcher approaching the patient in the waiting room and offering an immediate chance to be tested (70%). This was more effective than the same personal approach, but an offer of an appointment to return for testing at a later date (25%). Both these methods were more successful than any of the written invitations for testing, even when testing was offered immediately (17%).

The content of the invitation has also been raised as an issue. A message which stressed the possible 'wellness' outcomes of screening was found to produce higher rates of uptake than a message stressing the threat of disease in a sample of young people with a family history of hypertension (Gintner *et al*, 1987). According to prospect theory, (Tversky and Kahnemann, 1981) in risky situations, people are more likely to act when they perceive they would lose out if they do not act than if they feel they would gain something by acting. A study by Meyerowitz and Chaiken (1987) looked at the effect of message framing on the practice of breast self examination (BSE). Consistent with the theory outlined above, women who received a message stressing the negative consequences of not performing BSE had higher rates of BSE four months later than those who received a message stressing the potential gains of BSE. Another study, however, which looked at the effect of different message contents (i.e. framing) on follow-up of abnormal papanicolaou tests (a screening tool to detect cervical cancer) found no significant effect of framing on attendance at follow-up (Lauver & Rubin, 1990). The subjects in this sample were, however, different from those described in the above study, as they were truly at risk (i.e. abnormal cells had been found) as opposed to possibly at risk. This might suggest that people who are actually at risk are influenced differently by loss/gain messages than those who are not at risk.

Health professional factors

The second issue affecting uptake is the behaviour of the health professional. Marteau and Johnston's review (Marteau and Johnston, 1990) pointed to the

need to consider the health-related beliefs and behaviour of health professionals. In the various studies emphasising the differences between attenders and non-attenders as the main determinant of uptake, health professional's behaviour has often been ignored. However, since the health professional is often involved in inviting the patient, if not actually carrying out the screening itself, their beliefs and attitudes towards screening are likely to be relevant. Schucker *et al* (1987) found that doctors lacked knowledge in how to offer advice on behavioural changes and were unsure of the benefits of screening. If this is the case, they may be less rigorous in inviting patients to a clinic. Recent studies have shown effects of health professionals' beliefs on uptake rates. Bekker and Marteau (1994) found that general practitioners' beliefs about and attitudes towards breast cancer screening affected the proportions of women attending for breast screening. In a study of uptake of antenatal HIV testing, an overall screening rate of 17% was obtained, but rates obtained from 12 different midwives ranged from 3% to 82% (Meadows *et al*, 1990). Meadows *et al* (1990) suggested that the behaviour of the midwives in terms of the ways they presented the test was likely to affect uptake rates. Another study, using taped consultations, which found significant positive correlations between the amount of information provided about the test and uptake of prenatal screening, gave some support to this hypothesis (Marteau, 1993).

Patient factors

There will also be factors pertaining to the individual which determine their own attendance or non-attendance. Several studies have compared attenders and non-attenders to determine differences which may explain their behaviour. Attenders have been found to be older, wealthier and more likely to have used medical services routinely (Greenlick *et al*, 1979; Pill *et al*, 1988). They have also been found to be better educated, better motivated to look after their health, have fewer ties and commitments and to perform more health behaviours (Pill *et al*, 1988). These factors suggest that those who attend may be least likely to benefit from screening. Those who may benefit most, i.e. those with 'unhealthy' behaviours may be less likely to attend due to denial of the usefulness of such

programmes. Eiser and Gentle (1989) found that smokers, drinkers and non-joggers rated health education campaigns as more irrelevant than their 'healthy' counterparts. Further reasons for non-attendance are provided by a study by Pill and Stott (1988). They found that the majority of their sample, a group of patients who had not responded to the offer of a health check in general practice, stated that they were not interested or they simply forgot to attend. Eleven percent felt that screening was inappropriate.

As shown above, some of the factors which have explained attendance are demographic variables, such as age, wealth and education. Although demographic variables provide useful information to help develop communications to target those groups who may be less likely to attend, health psychologists are more interested in the processes by which demographics work at an individual behavioural level; not just who attends, but also why they attend. A person's attitudes and beliefs towards screening may be influenced by their socio-economic status, their age, their education, etc., but it is their attitudes and beliefs which are the most readily changeable and which are the focus of most psychological research into the determinants of uptake of screening. They are also the focus of this thesis and will be described in detail in Section 1.3 of this chapter.

1.2.4.2 Issues in the impact of screening

In terms of the impact of screening, a number of studies have found evidence of detrimental effects. A positive result can lead to labelling effects. For example, telling a patient they have hypertension can lead to absenteeism, low self-esteem or poor marital relationships simply as a result of being labelled as hypertensive (see Marteau, 1989). A false positive result can lead to problems even when the result is subsequently proved negative. It can cause depression (Bloom & Monterossa, 1981) and anxiety (Marteau *et al*, 1988). A negative result is usually reassuring, but detrimental effects include the 'certificate of health' effect, the possibility that attending screening is enough to keep one healthy or that excluding one risk implies lack of other or subsequent risk. It may also bolster 'unrealistic optimism' (Weinstein, 1982), i.e. feelings of invulnerability. These

effects may reinforce unhealthy lifestyles. A negative result may also reduce the likelihood of returning for future tests. Moreover, a negative result can increase anxiety as found in population screening of CVD (Stoate, 1989) which may be due to raising uncertainty about the possibility of disease which was not thought about before screening became available. Those who received a negative result following screening for Huntingdon's disease (a genetic disorder) continued to see the disease as a threat and were reluctant to stop attending for screening (Marteau *et al*, 1994). The authors suggest that this result may be understood as a form of functional pessimism.

In terms of the beneficial impact of screening, the main benefits of screening are expected to be: a reduction in morbidity and mortality; effective treatment of disease (SDD); reduction of risk status (SRF); improved understanding of risk factors (SRF) and reassurance for those found negative (SDD), or of low risk (SRF).

These benefits can be reduced due to, first, the need for follow-up intervention which is time-consuming; second, low uptake of follow-up due to patients forgetting test results or regarding test results as unimportant (Rastam *et al*, 1988); third, poor advice from health professionals who may tell the patient not to worry or give them no specific advice (Rastam *et al*, 1988); and fourth, the grave reality that reduction of mortality is not always guaranteed even if the individual attends screening and makes the necessary behaviour changes. This is because changing a weak behavioural correlate of heart disease such as dietary cholesterol may have little impact on someone's susceptibility to heart disease due to the interactive effect of the multiple risk factors (Kaplan, 1984).

There have been medical studies looking at the impact of risk factor screening in terms of risk factor modification. The British Family Heart Study is one example (FHS group, 1994). This was a very large-scale randomised controlled trial in 26 general practices in 13 towns in Britain (N=12,472) with the objective of evaluating cardiovascular screening and lifestyle intervention in terms of measured change in risk factors after one year. A pair of practices within each of the thirteen towns was randomly allocated either to the intervention or the control

group. The intervention involved an initial screening appointment, then a nurse-led programme of lifestyle counselling where changes were negotiated with the participants and follow-up was provided. There was a re-screen after one year. The control groups received only the initial screen and the re-screen after one year. The results showed that the coronary risk score was approximately 16% lower after one year in the intervention groups compared with the control groups. This result was interpreted by the authors as disappointing. However, the same results were interpreted by other authors as "a cause for celebration", considering the terrible state of Britain's mortality from CHD (Beevers & Curzio, 1994). Johnston (1995) argues that the interpretation of research findings can be biased by the researchers, who, in the FHS study, provided post hoc interpretations of any differences between the intervention and control groups as due to spurious effects. In general the discussion tended to diminish rather than enhance the findings. As pointed out by Johnston (1995) this caution may stem from economic considerations (i.e. not wanting to waste health service money by implementing programmes which may not work). Nevertheless, she also warns that this caution might result in the rejection of the opportunity to reduce population morbidity and mortality, even if it is only by a small amount.

A similar, large-scale, randomised controlled trial (N=2136) based in general practice, the OXCHECK study (OXCHECK study group, 1994) reported that health checks run by nurses were ineffective in helping smokers to stop smoking. However, there was evidence that patients could be helped to modify their diet and total cholesterol concentration.

On a smaller scale, within one general practice, McEwan *et al* (1993) followed a cohort of Scottish men (n=270) to test the acceptability and effectiveness of screening by the primary care team. In a before-after design, the men were screened and subsequently attended for review and further counselling three to five times over a period of three years. They reported significant changes in several risk factors including salt reduction, cigarette smoking, blood pressure and cholesterol levels. However, as the authors admit, the lack of a control group makes it difficult to determine whether this result was due entirely to the effect of

the efforts of the primary care team. Heightened public awareness of risk factors may have contributed to the change over time.

There have been psychological studies looking at the emotional and cognitive impact of screening for disease detection as detailed earlier and studies looking at health beliefs predicting health behaviour change (which will be discussed in Section 1.3). However, little is known concerning the impact of risk factor screening on health behaviour change which is one of the aims of this thesis. A notable exception to this lack of research is a study by Michie *et al* (1995) who showed, in a randomised controlled trial with a sample of hospital staff, that screening plus advice and target setting resulted in significantly greater changes in exercise behaviour and weight reduction compared to screening followed only by feedback of results.

The social cognition models which will be used to help explain uptake behaviour will also be used to help explain the impact of screening in terms of health behaviour change.

1.3 Social cognition models and their relevance to screening

1.3.1 Main theoretical models

1.3.1.1 Description of the main theoretical models

As previously stated, this thesis is concerned primarily with the role of health beliefs in the practice of health behaviours. In this section, the main theoretical models which have been developed and used to guide psychological research in this area will be introduced. Although these models have been developed and tested to cover a wide range of health and other behaviours, uptake of screening for risk factors will be considered as the health behaviour concerned in order to help describe the models and to keep within the context of the thesis' topic. However, it should not be overlooked that, in this thesis, the models will also be employed in the prediction of health behaviour change following screening. At this stage, the models will simply be described. Details of the models' application in research studies and critical evaluations will follow in later sections.

The Health Belief Model

The Health Belief Model (HBM) (Rosenstock 1974, Janz and Becker, 1984) was designed in the early 1950's by a group of social psychologists at the US Public Health Service. According to Rosenstock (1974), the HBM was developed specifically with the aim of understanding "the widespread failure of people to accept disease preventives or screening tests for the early detection of asymptomatic disease". Although it has been adapted to deal with sick-role (Becker, 1974) and illness behaviours (Kirscht, 1974), its original aim makes the HBM relevant to the topic of this thesis. The basic components of the HBM are derived from a well-established body of psychological and behavioural theory : the expectancy-value approach. Expectancy-value models hypothesise that behaviour depends mainly on two variables (1) the value placed by an individual on a particular goal and (2) the estimation of the likelihood that a given action will achieve that goal (Maiman & Becker, 1974). Two major reviews of the HBM have provided empirical support for the model's constructs (Becker, 1974; Janz &

Becker, 1984) and it is still the most commonly used model in research concerning health behaviour. Its importance has been emphasised by Johnston (1995) who states that "it has encouraged researchers to adhere to an explicit model of the process (relating health beliefs to behaviour) rather than assuming an intuitive, unshared model" (my words in parenthesis).

The four central beliefs which the health belief model identifies as important to health behaviour are:

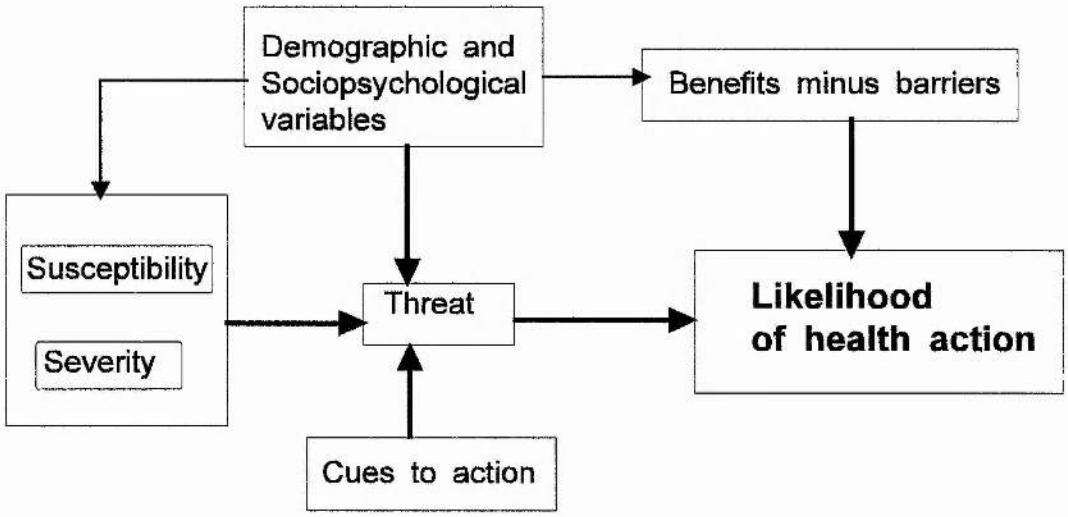
1. *perceived susceptibility*, e.g. perception of the personal likelihood of developing CVD

2. *perceived severity*, e.g. perception of the seriousness of CVD if it occurs

3. *perceived benefits*, e.g. perception of the benefits of the recommended action, such as attending a screening appointment - is screening likely to reduce the threat of CVD; are there other benefits, such as improved well-being, etc.?

4. *perceived barriers*, e.g. perception of the costs of the recommended action, such as attending a screening appointment - what are the physical, psychological and economic costs of attending?

Figure 1: The basic elements of the Health Belief Model (HBM) (adapted from Janz and Becker, 1984)



As shown in Figure 1, the *susceptibility* and *severity* components are combined to produce the *perceived threat*. *Threat* and the weighing up of *benefits* against *barriers* are seen as the two major determinants of the likelihood of health action. Other variables are seen as modifying factors, i.e. they affect behaviour only indirectly through their effect on *threat* and *benefits/barriers*. These modifying factors consist of a group of demographic, socio-psychological and structural variables which are not clearly specified but show that the authors realise the importance of external influences on individuals' beliefs. The other modifying factor is *cue to action* which fits into the model as a trigger to the decision making process, influencing perceived threat. This *cue to action* can be internal, such as symptoms, or external, such as a reminder phone call or letter. In the context of attending a screening appointment, the cue is more likely to be the latter as screening by definition is carried out at an asymptomatic stage.

The HBM would therefore suggest that the most likely person to attend a screening appointment would be someone who believes they are at risk of cardiovascular disease, who sees the consequences of the disease as serious, who perceives less problems with attending than benefits of being screened and who

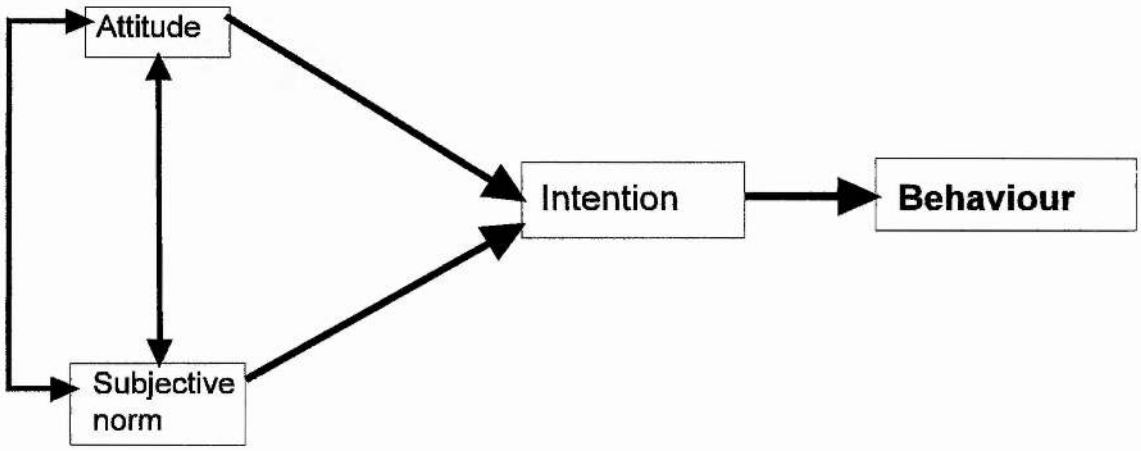
receives some form of a cue to action such as a letter of invitation to attend a screening clinic.

Finally, in some studies (e.g. Norman and Conner, 1993; Norman, 1993) additional 'motivating' variables have been added to the core components of the HBM. These motivational factors include health value (Lau, Hartman & Ware, 1986) and the perception of health as under one's own control (Wallston & Wallston, 1981).

Theory of Reasoned Action / Theory of Planned Behaviour

The Theory of Reasoned Action TRA (Fishbein & Ajzen, 1975; Ajzen and Fishbein, 1980) and the Theory of Planned Behaviour (TPB) (Ajzen, 1988) will be described under one heading because the TPB is a later modification of the TRA. The TRA, which is another expectancy-value model, was developed to understand and predict many forms of behaviour as diverse as family planning and voting in general elections. Although they appear less often than the HBM in studies of health behaviour, the TRA and TPB have been applied successfully to the prediction of health behaviours such as giving blood (Bagozzi, 1981) and losing weight (Schifter and Ajzen, 1985). More studies of the TRA/TPB relating to health behaviour will be outlined in Section 1.3.1.3.

Figure 2: The basic elements of the Theory of Reasoned Action (TRA) (Adapted from Ajzen & Fishbein, 1980)



The TRA is based on Ajzen and Fishbein's assumption that human beings are usually quite rational and make systematic use of information available to them. They argue that people consider the implications (or outcomes) of their actions before they decide to carry out (or not carry out) a particular behaviour. Hence the term, '*reasoned* action'.

The goal of the model is to predict behaviour. The above assumptions imply that a person's considered intention to perform (or not perform) the behaviour will be the most immediate determinant of action (Figure 2). Thus, according to this theory, the easiest way to determine if someone will attend a screening programme would be to ask them if they intend to go. The authors do admit that intention would not always be expected to lead to behaviour, but view any factors that lie between intention and behaviour as "unforeseen events" which the TRA does not attempt to identify.

In order to understand the process leading towards health behaviour, not merely to predict it, the models also include the proposed determinants of intention. The two general determinants of intention are classed as:

1. *attitude* toward the behaviour

    which consists of:

    a. beliefs about the likely outcome of the behaviour (referred to as *outcome expectancy* or *outcome efficacy*)

    b. the value placed on that particular outcome

2. *subjective norm*

    which consists of:

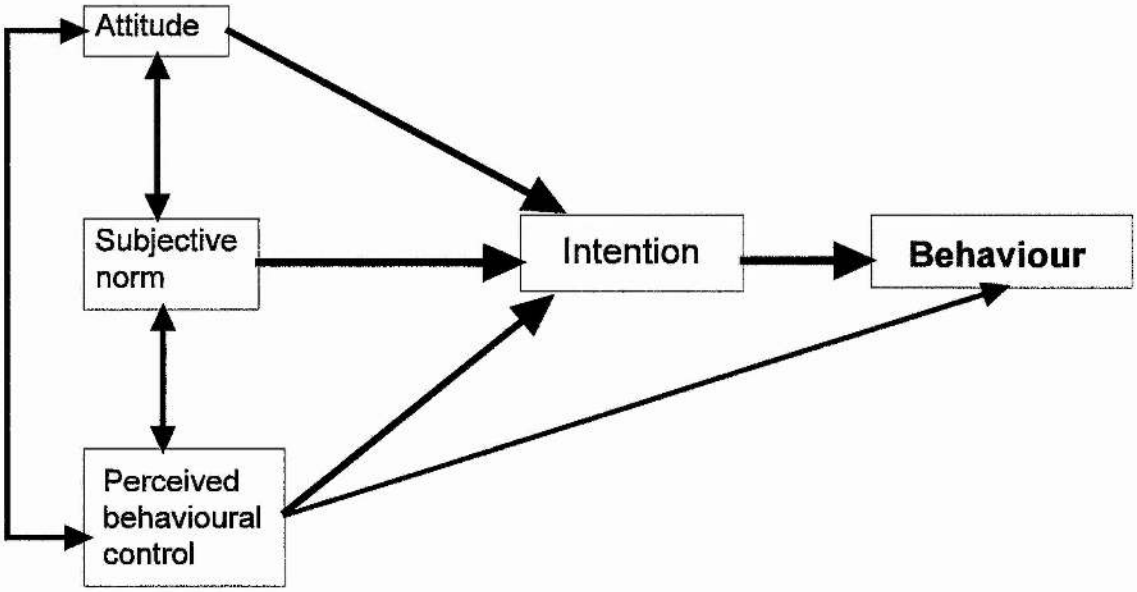
    a. beliefs about others' approval or disapproval of the behaviour

    b. the motivation to comply with others' opinions

The TRA would thus suggest that the most likely person to attend a screening programme would be someone who believes that screening would help reduce their personal risk and who values protection from disease. Moreover it would be someone who believes that people with whom they wish to comply, e.g. friends and family, would approve of their attending.

The extension to the TRA which transforms it into the TPB (Figure 3) is the addition of the variable *perceived behavioural control* (PBC). PBC is a measure of the extent to which the behaviour in question is perceived to be under the control of the individual. Johnston (1995) has likened the concept of PBC to *self-efficacy*. In the TPB, it is stressed that individuals who believe that they do not have the necessary resources to perform a particular behaviour are unlikely to form a strong intention to do it. Moreover there is a postulated link between PBC and actual behaviour, not via intention. Ajzen (1988) argued that when the individual is realistic in his/her perceptions of control over their behaviour, PBC should be able to predict behaviour directly.

Figure 3: The basic elements of the Theory of Planned Behaviour (TPB) (adapted from Ajzen, 1988)



Social Learning Theory

The constructs of Social Learning Theory (SLT) (Rotter, 1954) have also been used to predict health behaviour (e.g. Kristiansen, 1987; Norman, 1991) although like the TRA/TPB, SLT was not designed specifically for this purpose. This theory results from a merging of two distinct perspectives in psychology, namely learning theory (or behaviourism) and social psychology. From learning theory comes the phenomenon of reinforcement and from social psychology comes the more complex influence of social factors on personal attitudes towards the reinforcement. Thus, SLT, which is another expectancy-value model, states that the likelihood of behaviour is a function of the individual's expectancy, from social experience, that a certain behaviour will lead to a particular reinforcement (or outcome) and the extent to which that outcome is personally valued. Moreover, the expectancy of a particular behaviour resulting in a particular outcome will depend on the degree of power, or control, the individual feels they have over the situation. In SLT, this sense of control can be on either a general or situation-specific level. In the specific domain of health behaviour, the concept of perceived control was devised and operationalised by Wallston and Wallston (1981) as the Multidimensional Health Locus of Control Scale (MHLC) which is widely used in health behaviour research (Wallston, 1992). This scale measures the extent to which the individual feels they have control over their own health in three dimensions; the extent to which they feel that control over health events depends on themselves (internal), the actions of health professionals (powerful others) or simply good or bad luck (chance). For example, if a person has a strong *internal locus of control*, they believe that it is their own actions which ultimately affect how good/bad their health is. If, on the other hand, a person has a strong *powerful others locus of control,* they believe that the actions of health professionals will determine their health. Someone who has a strong *chance locus of control* believes that their health is controlled, not by themselves or by health professionals, but by good or bad luck.

Bandura (1982) has stressed the importance of the concept of *self-efficacy*, i.e. the belief in one's personal capability in achieving the desired outcome, within the

SLT framework. This construct has been very successful and has become extremely influential in current health behaviour research.

So, incorporating both Rotter's and Bandura's concepts, the variables of SLT are:

1. *outcome expectancy (*sometimes referred to as *outcome efficacy)*

2. *value of outcome*

3. *locus of control*

4. *self-efficacy*

This theory would suggest that the most likely person to attend a screening programme would be someone who believes that screening would be effective in reducing their risk of cardiovascular disease; who values their health; who may have either an *internal* or *powerful others* locus of control, but not one of *chance* (because they are likely to believe that it doesn't matter whether they attend a screening appointment if their health is ruled by good/bad luck) and who believes they have the personal capability to attend (and perhaps feels they would be able to make any necessary lifestyle changes).

1.3.1.2 Other influential models

The two models described below have been included due to their relevance to research in health behaviour. However, they are less well known and many of their concepts are similar to those in the main models described above. Therefore their inclusion in this thesis will remain at the descriptive level.

Protection Motivation Theory

Protection Motivation Theory (PMT) (Rogers, 1975; Prentice-Dunn & Rogers, 1986) was originally developed to provide a clear understanding of the response to fear appeals. The theory postulates that information about a health threat initiates two cognitive processes: threat appraisal and coping appraisal. Threat appraisal includes the components of *severity* and *susceptibility,* while coping appraisal includes *response efficacy* (perceived effectiveness of the behaviour) and *self-efficacy.* These processes combine to form *protection motivation,* a

mediating variable that directs activity to protect the self from harm, often assessed using measures of *intention* (Prentice-Dunn & Rogers, 1986; Fruin *et al*, 1991). *Protection motivation*, according to the theory, subsequently predicts behaviour.

Triandis' theory of social behaviour

According to Triandis (Triandis, 1964; Triandis, 1977), although intention is often an important predictor of behaviour, it is not a predictor of 'habitual' behaviours. Behaviours such as brushing teeth have often become automatic and therefore do not require complex decision-making; in situations like this, *habit* is weighted more than *intention* in this theory. The theory also considers variables such as *facilitating conditions*, *social factors* and *affect* toward the behaviour. However, these concepts are not unlike *benefits/barriers* (from the HBM), *subjective norm* and *attitudes* (from the TRA) respectively.

1.3.1.3 Application of the models to screening-related behaviour

This section will illustrate how the models described above have been employed in research which is in some way related to screening in health care. The studies described will thus include studies on actual uptake and impact of screening (both SDD and SRF), plus studies on health behaviour practices and changes, similar to those that may be required following screening for CHD risk factors. To organise the studies, they have been divided into sections headed by the model they have employed as their theoretical basis. Some studies may be mentioned more than once as they have employed more than one model. In this section, the studies will be described in terms of the kinds of populations in which the models have been used, the kind of health behaviour studied and the variables which were useful in explaining the behaviour. Some evaluation of the use of the models will be made, but a full evaluation will be given in Section 1.3.1.4.

Studies applying the Health Belief Model (HBM)

Reviews of studies using the HBM

Janz and Becker (1984) reviewed a total of 46 studies carried out between 1974 and 1984 which employed the HBM. Of these, 19 studies had an outcome measure relating to preventive health behaviours such as practice of breast self-examination (Hallal, 1982) and attendance at screening for high blood pressure (King, 1982). Many significant positive relationships were found between the individual HBM model dimensions and the health behaviour concerned. For these 19 studies, *susceptibility, barriers* and *benefits* were all consistent predictors of behaviour. *Severity* only showed significant results in about one-third of the studies. The authors speculated that healthy study respondents may have difficulty in conceptualising this dimension, or all respondents in a study may view the condition as very serious, thus producing little variability in the *severity* measure. This relates to screening for risk factors for cardiovascular disease in the sense that respondents are likely to be asymptomatic and also likely to view heart disease as serious. In the studies in this review which involved sick-role behaviour (i.e. actions taken after diagnosis of a medical problem to avoid illness or injury) severity was much more predictive of behaviour which lends support to the idea that this dimension may only be relevant to those experiencing symptoms or diagnosed as ill.

However there were several problems with the 19 studies which limit their generalisability. Only four of the studies were prospective. Retrospective studies are problematic as it is impossible to determine whether the beliefs have 'caused' the behaviour or if the behaviour has affected the beliefs. Also, only nine of these studies reported results on all dimensions of the HBM and there seemed to be a variety of ways of operationalising the variables used in different studies. Few studies looked at the predictive power of the model as a whole, most just treating the model as a group of separate variables, each of which would be expected to predict health behaviour.

Harrison *et al* (1992) carried out a meta-analyses of studies of health behaviour using the HBM (incorporating studies of screening, risk reduction and adherence to medical regimens). Of the 174 published studies which they found which employed the HBM and used adults as subjects, only 16 fitted their final criteria. These 16 studies were the only ones which measured all four[1] dimensions of the HBM (*susceptibility, severity, benefits* and *barriers*), which used the HBM as a predictor of behaviour and which mentioned some form of reliability of the measures.

An example of the studies reviewed was that by Champion (1985). This study found support for the model using multivariate analyses, stepwise multiple regression, to test the combined constructs of: *barriers, benefits, susceptibility, severity* plus *health motivation*. The dependent variable in this study was frequency of breast self examination (BSE). The sample of 301 women were recruited from various community groups. All five variables entered the regression equation and together explained 26% of the variance in BSE behaviour. *Barriers* explained the most variance (23%), *health motivation* explained an extra 2% and the rest of the variables did not add significantly to the description of frequency of BSE. Some examples of the *barriers* were 'embarrassment', 'having to start a new habit', 'time' and 'difficulty'. However, shortcomings of this study were its cross-sectional nature, i.e. women were asked about their beliefs and the frequency of BSE at the same time which questions the direction of causality. Also, the women all volunteered to take part in the study which may have biased the sample.

Although Harrison *et al* (1992) found support in their meta-analyses for the dimensions of the HBM predicting health behaviours, particularly *benefits* and *barriers*, the strongest relationship (using weighted mean effect sizes) only accounted for 10% of the variance in behaviour. However, as the authors admit, the lack of predictive ability may be due to the fact that they did not investigate the four variables together, only as individual variables; "there is a difference between individual beliefs and a health belief model that includes four dimensions"

[1] According to the authors, *cue to action* was excluded because it has received so little attention in empirical studies.

(p. 114). This meta-analyses highlights the fact that there are many studies which purport to use the HBM, but which do not use all the dimensions; which do not use reliable scales; which measure the HBM in different ways and which do not use the HBM as a model as such, but simply as a collection of useful, individual predictors. In those terms, the supposed widespread use of the HBM as a theoretical framework and predictive tool in studies of health behaviour could be viewed as a sweeping overestimation.

Janz and Becker's review and Harrison *et al*'s meta-analyses of studies using the HBM only go as far as studies published in 1987. Since then, the HBM has continued to appear in various studies of health behaviour as will now be described.

HBM studies of screening and health related practices relating to disease detection

Recent studies in the area of screening and health-related practices relating to disease detection have not been entirely consistent in the variables of the HBM they find to be important in predicting behaviour.

Uptake of mammography screening

In one such study, McBride *et al* (1993) found that *perceived susceptibility* to breast cancer did not differentiate between attenders and non-attenders in a mammography screening programme. This study investigated a combination of variables from both the HBM and SLT using a sample of 500 women who had had a mammogram and a random sample of 500 women who had been invited but did not obtain a mammogram. Due to the retrospective design of the study, this finding should be approached with caution, since it is possible that perceived susceptibility changes after mammography has taken place.

Using a prospective design (a stronger design for the prediction of behaviour), Vaile *et al* (1993) found that mammography screening attendance was predicted by *perceived susceptibility*. In this study, postal questionnaires were sent out to subjects before they received their invitation to attend for a mammogram. There

were 2060 respondents (65% response rate) who answered questions relating mostly to the TPB but with the addition of the variable of perceived susceptibility, from the HBM. Attendance was subsequently noted and responses of attenders and non-attenders were compared, finding that attenders were significantly more likely to have perceived themselves as susceptible to breast cancer.

Breast Self Examination (BSE)

In relation to performance of BSE, Slenker Duke *et al* (1994) found, with a sample of 92 low-income black women, aged from 40 to 70, that the *perceived barriers*: 'too much trouble' and 'difficult to learn' were significantly associated with BSE. *Perceived susceptibility* and *perceived severity* were not found to be significantly associated with BSE. However, all these variables were operationalised using single-item measures which are regarded generally as unreliable. Moreover, this study involved a telephone survey which used retrospective reports of BSE and as such does not provide strong supportive evidence for the (lack of) prediction by these beliefs. Also, the sample were drawn from a very specific population which is not representative of the population for whom BSE is recommended.

In a much larger study (N=757 women), also investigating BSE, Murray and McMillan (1993) found *health motivation* to be an important predictor of behaviour. This study used a questionnaire which was given to the participants in their homes (65% response rate). It measured various demographic variables and health beliefs including aspects of the HBM with the addition of *health motivation*. Again, the study was not prospective, but asked about BSE at the same point in time. The major strong point about this study compared to the previous studies reported was that it used multivariate analyses to assess the joint predictive ability of the variables. Of the variables from the HBM investigated, including the additional *health motivation* only the latter was significant in multiple logistic regression. Although *benefits of treatment, costs of attendance for treatment* and *health motivation* were positively associated with BSE at the univariate level of analyses, only *health motivation* emerged as a significant predictor in the multiple regression.

Uptake of Cervical Screening

Looking to studies of cervical screening uptake, Hennig and Knowles (1990) found that intention to have a PAP smear was predicted by *perceived barriers, perceived susceptibility* and *health motivation.* This study used a sample of 144 women with a mean age of 54 years. Advantages of the study were that all aspects of the core HBM were measured with the addition of *health motivation* and that multivariate analysis was used to assess the relative contribution of each of the models' variables and to test the predictive ability of the model. The HBM was found to predict 27% of the variance in intention. *Perceived barriers* made the most significant contribution to the equation followed by *perceived susceptibility* and then *health motivation*. Disadvantages of this study were; first, many of the variables (including the outcome variable, intention) were measured using single items, a method which is generally regarded as unreliable. Second, the independent variables and dependent variable were measured at the same time and as such does not provide as strong predictive evidence as if the dependent variable were measured at a later stage. Thirdly the outcome measure was intention, not behaviour and therefore the study is not a true test of the HBM whose end-point is behaviour.

Murray and McMillan (1993) investigated the beliefs associated with retrospective self-report of attendance for cervical screening within the same sample (N=757) as described in the section on BSE above. Of the HBM variables including *health motivation*, only *perceived barriers* to health care was found to be predictive of attendance for a cervical smear in multivariate analyses.

HBM studies of behaviour related to risk factor screening

Uptake of preventive health services

Looking to studies with more direct relevance to the topic of this thesis, Jensen *et al* (1992) examined predictors of the use of preventive health services (including both dental and medical services) among 402 elderly persons (aged 62 and over). Various hypothesised predictors were measured, including only *perceived susceptibility* from the HBM. Using logistic regression to determine the relative importance of the various predictors, the authors found that the use of preventive health services was positively related to a measure of short-term *perceived susceptibility* (which they distinguished from a measure of long-term *perceived susceptibility*). Dividing the dimension of *perceived susceptibility* in this manner seems to enhance its relationship with health behaviour and may prove successful in distinguishing between those who can actually envisage suffering from the disease and those who think they will probably contract it one day but too far in the future to worry about at present. However the predictive ability of this formation of *perceived susceptibility* cannot be too strongly supported by this study due to the use of a retrospective self-report measure of the use of preventive services.

Intention to exercise

Sharpe and Connell (1992) found that the *perceived barriers* component of the HBM was a useful predictor of exercise intention in a worksite study of older employees' (N=250, aged 50-69) exercise beliefs and reported frequency of exercising. This study investigated various health beliefs including only *perceived barriers* from the HBM. However, it was only analysed as a predictor of *intention* to exercise, not actual behaviour, and *intention* was not found to predict behaviour. The outcome of the HBM is not *intention*, but actual behaviour, so although this study purports to have used the HBM as a theoretical framework, the design does not reflect this aim.

Dietary behaviour change

Strychar *et al* (1993) looked at the relationship between *perceived susceptibility, benefits* and *barriers* and dietary behaviour changes following a cardiovascular screening programme held in a supermarket. The final sample, who completed the initial health belief and dietary behaviour questionnaire before screening and the three-month follow-up on dietary behaviour, numbered 1293 (38% response rate). In this prospective design study they found that *benefits* and *barriers* were related to dietary changes, but only for certain foods. High *perceived susceptibility* was not, however, associated with reduction in high-fat foods as had been expected. This study investigated three of the components of the HBM, which is more than many of the studies claiming to be using the HBM as a framework. However, it missed out *perceived severity* and *cue to action* and did not investigate the joint effect of the variables which would have been achieved with multivariate analyses.

Uptake of risk factor screening

A notable shortcoming of the three studies described above was that none of them used all the core components of the HBM. Two studies (Norman & Conner, 1993; Norman, 1993) which were investigating the health behaviour of attending a health check in general practice did include all four dimensions as well as pointing out the importance of the *cue to action* component. Both studies had prospective designs with health beliefs measured before the screening appointment. They had sample sizes of 818 and 299 respectively. Both studies found that *benefits* and *barriers* were useful predictors, but only Norman and Conner (1993) found these factors predictive of actual attendance behaviour. In the other study (Norman, 1993) they were only related to the intention to attend which is not part of the original HBM. S*usceptibility* and *severity* were not related to either intention or actual behaviour in any of the studies. However, the extra components of *health value*, *perceived control* and *intention* were included as part of the HBM and were found to be predictive of attendance.

The authors introduced the *cue to action* component of the model by investigating the effect of different methods of invitation on attendance rates. In one of the studies open letter invitations vs. fixed appointment letter invitations were examined (Norman & Conner, 1993) whilst in the other, fixed appointment letter invitations were compared with personal invitations by the GP during ordinary surgery (Norman, 1993). The effect of different methods of invitation on attendance behaviour was discussed in more detail in Section 1.2.4.1 of this chapter.

Norman & Conner (1993) were also interested in the possible effect of different methods of invitation on the predictors of attendance behaviour in terms of health beliefs. The authors hypothesised that being offered a service in different ways "may influence the way in which it is perceived by patients and so may modify the role of patients' health beliefs in predicting attendance behaviour". Their results showed that predictors of attendance did indeed differ depending on the way patients were invited. For those sent a fixed appointment, predictors of attendance were *high health value, powerful others locus of control, positive outcome expectancies* and lack of *motivational barriers*. For those sent an open invitation, *intention to attend* and *internal perceived control* were the best predictors. So, as far as the core HBM is concerned, *perceived barriers* was found to be the strongest predictor of attendance at health checks, but only when the *cue to action* was a letter with a fixed appointment.

Studies applying the Theory of Reasoned Action / Theory of Planned Behaviour

A meta-analyses of studies applying the TRA has been carried out (Sheppard *et al*, 1988) finding strong support for the predictive power of the model in various situations. However, since the model was designed to apply to all kinds of social situations, the studies included in the meta-analyses were not health-related and thus have not been included in this chapter due to lack of direct relevance.

Cervical screening intentions

More recently and with more direct relevance to this thesis, Hennig and Knowles (1990) tested the TRA in a study investigating intentions relating to cervical screening as described in more detail above in the section on studies relating to the HBM. *Attitudes* and *subjective norm* predicted 12% of the variance in intention to attend, both variables contributing equally to the equation. However, as noted above, this study was cross-sectional and although *intention* is included in the TRA, behaviour is the end-point of the model and was not measured in this study.

Breast cancer screening uptake

Using a prospective design with a sample size of 2060, Vaile *et al* (1993) found that *attitudes* and *subjective norm* were predictive of screening behaviour, in this case for breast cancer screening attendance. *Perceived behavioural control* from the TPB was also found to be predictive. This study also measured *perceived susceptibility* from the HBM and was thus reported in some detail in the section on the HBM above.

Intention to use condoms

Wilson *et al* (1992) tested the TRA and TPB in the prediction of intended condom use in 179 male and 123 female African teacher trainees using self-administered questionnaires. All the models' components were used and hierarchical multiple regression used to investigate the predictors of intention. Since the actual behaviour of condom use was not the end-point in the equation, this study tested only the internal structure of the TRA and TPB. The models as a whole were not tested. For males, the TRA yielded a significant equation and explained 23% of variance in intended condom use, however *attitude* toward the behaviour was the only significant predictor. The TPB explained 26% of the variance, with both *attitude* and *perceived behavioural control* as significant predictors, a finding that provides some support for the inclusion of the variable *perceived behavioural control* in the latter model. However, this study cannot

provide evidence for the direct effect of *perceived behavioural control* on behaviour as predicted by the model. Results for the females were found to be different: the TRA explained 38% of variance, and the TPB, 40%, but only *attitude* was significant in both models. So, in general, females' intentions to use condoms could be more easily predicted by their health beliefs than males' intentions, but *perceived behavioural control* was a factor only in the males' intended behaviour. This study highlights the importance of testing the models with different populations (e.g. males and females) as different constituents of the model's internal structure may be more salient for different groups.

Uptake of prenatal screening

In a study of uptake of a prenatal screening test, maternal serum alphafetoprotein (AFP) screening for spina bifida and Down's syndrome, Marteau *et al* (1992) looked at the effects of a group of health beliefs including *attitudes* from the TRA. Attitudes in this context was operationalised as attitudes towards doctors and medicine and attitudes towards termination of the foetus. The design was prospective, i.e. women completed the questionnaires before being offered the AFP test. One thousand women completed the questionnaires. The researchers found differences between *three* groups, i.e. they did not compare just attenders and non-attenders, but those who 'tested', 'declined' and 'omitted' (i.e. no reason given for not attending). Those who 'declined' were found to have less positive attitudes towards doctors and medicine than those who 'tested' while those who 'omitted' had more negative attitudes towards medicine than those 'tested'. Women who declined had more negative attitudes towards termination than the other two groups of women. With discriminant analyses they found that those who 'omitted' were more similar to those who 'tested' than those who 'declined' in terms of attitudes and beliefs. The same behaviour (not undergoing screening) in this study had two definable forms with different psychological predictors.

Uptake of risk factor screening

With more direct relevance to the topic of this thesis, a series of studies have applied the TRA and TPB to the prediction of attendance at health screening in general practice.

Conner and Norman (1992) included all components of the TPB in their prospective study involving 418 subjects (47.9% response rate). Looking first at the prediction of intention to attend a screening appointment, they found that 52% of the variance in *intention* to attend could be explained. However, *attitudes* and *normative influences* were significant predictors of *intention*, whereas p*erceived behavioural control* was not. Looking at the prediction of attendance behaviour, all the variables of the TPB including *intention* were regressed onto behaviour. The TPB predicts that *intention* would be the only significant predictor of behaviour, but this was not found to be the case. *Intention* was not significantly predictive and only *normative influences* emerged as a significant predictor. Only 4% of the variance in attendance behaviour could be explained.

Using the same sample as described above, Norman & Conner (1993) found that different beliefs from the TPB were predictive of attendance behaviour depending on how the patient had been invited to their screening appointment, i.e. whether they had been sent an open invitation or a fixed appointment time. They compared attenders and non-attenders in the two invitation groups separately. For the fixed appointment group, all the variables of the TPB were able to distinguish between attenders and non-attenders in the univariate analyses. For the open invitation group, *intention*, *attitude* and *perceived behavioural control* were able to distinguish between attenders and non-attenders, but not *subjective norm* components. They were unable to say how much variance was explained by the TPB alone as they tested the variables of the TPB along with the HBM components in the multivariate analyses.

Norman & Conner, (1994) examined the effects of the TRA and TPB on screening attendance behaviour in a sample who had previously been invited to attend a screening appointment a year previously. They were thus able to

examine the effect of prior behaviour within the cognitive process. In a prospective design where questionnaires were sent before screening invitations, 307 subjects responded (41%). They found that *attitudes* and *subjective norm* (the predictors of *intention* in the TRA) were able to predict 51% of the variance in *intention* to attend a health check. *Perceived behavioural control* added another 3% to the explanation of *intention* and prior screening behaviour added yet another 3%. As far as the prediction of behaviour was concerned, the TRA (including *intention*) explained only 1% of the variance and the addition of *perceived behavioural control* from the TPB was unable to increase the prediction of behaviour. However, the addition of prior behaviour into the equation was able to increase the prediction of behaviour by another 1%.

The authors hypothesised that if someone has previously attended screening, attending may be perceived differently and thus it is likely that different attitudes and beliefs will predict repeated behaviour and initial behaviour. This is in line with Marteau *et al*'s (1992) claim that screening attendance should not be seen as a homogenous behaviour. Therefore, Norman and Conner also considered the role of prior behaviour as a moderator in the relationship between beliefs and behaviour by conducting the analyses separately for those who had already attended a health check and those who had not. Results showed that for prior attenders, the TRA and TPB were not able to predict attendance. Whereas for prior non-attenders, the TPB was able to predict 11% of variance. The authors speculated that attending a health check for the first time may require much more cognitive effort than re-attending where a simpler decision process may operate.

Studies applying the variables of Social Learning Theory

SLT is less of a model than the other models described in this thesis in the sense that it does not predict the manner in which its constituent variables are combined to predict behaviour. It is more a collection of potentially useful variables than a model. Few studies have looked at all components of SLT in the prediction of health behaviour. However the components of *health locus of control* and *self-*

efficacy have been widely used in health behaviour studies, often as additions to the variables from the HBM or TRA/TPB.

For example, in the study of 757 women described above in some detail in the section on studies using the HBM (pages 29-30) Murray and McMillan (1993) found that a low belief in *powerful others (locus of control*) was a significant predictor of whether someone carried out BSE or not (in multivariate analyses). However a high belief in *powerful others* was a significant predictor of BSE frequency.

Several studies have found a relationship between *self-efficacy* and health behaviours. It has been shown to be related to the performance and frequency of BSE (Slenker Duke *et al*, 1994; Seydal, Taal and Wiegman, 1990; Murray & McMillan, 1993), to smoking cessation (Kavanagh *et al*, 1993; Schwarzer, 1994) and to making decisions about exercise behaviour (Marcus and Owen, 1992). Schwarzer and Fuchs (1995) provide a review of the widespread use and success of *self-efficacy* in relation to changing risk behaviours and adopting health behaviours.

With direct relevance to the topic of this thesis, Norman (1991) used variables from SLT (*HLOC beliefs, health value* and *efficacy of screening*) in a prospective study looking at the prediction of attendance at health screening in general practice. The sample consisted of 131 (59% response rate) male and female patients. None of the variables, individually, were able to distinguish significantly between attenders and non-attenders. In line with previous similar work (Kristiansen, 1987), interaction terms were formed between the *HLOC* sub-scales, *health value* and belief in the *efficacy of screening*. Using discriminant analyses, the best set of predictors was the three-way interaction term of *internal locus of control, health value* and *efficacy of screening* and its lower order derivatives. However this only classified 63.9% of the entire sample as either attenders and non-attenders which is not much better than chance. However, as the author points out, an important omission in this study is the variable of *self-efficacy* (Bandura, 1982).

In a more recent study, Norman (1995) investigated the role of the SLT in predicting health behaviours (i.e. smoking, exercise, alcohol consumption, diet and weight/height ratio). The sample were 107 adults (10.7% response rate) who responded to a short questionnaire relating to their beliefs about, and performance of, a range of health-promoting behaviours. The questionnaire was distributed by inserting it into a free community magazine delivered to 1000 village households. The study found that *internal locus of control* beliefs and *health value* were not related to health behaviours. Only *behaviour-specific outcome efficacy* beliefs were related to the specific behaviours of smoking and exercise, i.e. believing that not smoking and taking regular exercise would promote their health was linked to non-smoking and exercising behaviour respectively. It was predicted that *health value* would act as a moderator between *health locus of control* and *outcome efficacy* beliefs such that *internal locus of control* and *behaviour specific efficacy beliefs* would be more strongly related to behaviour for individuals who placed a high value on their health. To test this hypothesis the sample was split into individuals with high and low values at the median split on the health value scale. Results showed that *health value* did act as a moderator between *outcome efficacy* and behaviour such that *outcome efficacy* only influenced behaviour when *health value* was high. This moderating effect of health value did not work, however, for the relationship between *internal locus of control* and behaviour. In general, however, the correlations were low and led the author to conclude that SLT, especially the *health locus of control* construct, may not be able to fully explain the complexity of health behaviours. However, it is extremely difficult to draw firm conclusions from this study considering the very low response rate (10.7%) which suggests a biased sample who may be particularly interested in their health and the cross-sectional nature of the study which does not allow for strong predictive conclusions.

1.3.1.4 Evaluation of the main models' applicability and generalisability

Having described the use of the models in various studies in some detail, pointing out advantages and shortcomings of the various study designs where appropriate,

the current section will provide an overall summary of the evaluation of the models in terms of their contents and the way they have been used.

Evaluation of the contents of the models

The evaluation will mainly be in terms of the problems and disadvantages associated with the models. So, at this stage it is important to clarify the main advantages of the models' use. Norman and Conner (1993) have neatly summed up the general value of the social-cognition models.

> *"First, they provide a clear theoretical background to research, guiding the selection of variables to measure, the procedure for developing reliable and valid measures, and how these variables are combined in order to predict health behaviours and outcomes. Second, to the extent which they identify the variables important in predicting health behaviours and outcomes, they further our understanding of health."* (p.447)

Disadvantages and problems associated with the main models' contents are as follows:

- The models described assume a rational decision-making process which does not work for all health behaviours such as habitual behaviours (e.g. tooth-brushing) (cf. Triandis' Theory of Social Behaviour (see Section 1.3.1.2).

- Many of the studies have found that the beliefs in the models are more able to predict intention to act (a cognition) than actual behaviour. There is therefore an intention-behaviour gap which also needs to be addressed. As Abraham & Sheeran (1993) have pointed out, there is bound to be a problem considering we are "predicting behaviour with models of contemplation".

- As the above studies have shown, only some of the variables seem to be consistently predictive of health behaviour, e.g. *barriers* from the HBM, *attitudes* from the TRA, *self-efficacy* from SLT. However this lack of consistency may be a result of the lack of any form of consistency in the

design of studies using the models as frameworks, in terms of the variables used as the models' components.

Specific problems of the contents of the HBM

- The additions to the model have tended to make it more complex, but not more coherent.

- The concept of *severity* is perhaps redundant in health behaviour research (Janz and Becker, 1984).

- The concept of *cue to action* is in the model as a predictor of threat. According to the studies described above which looked at the effect of method of invitation on behaviour (i.e. Norman & Conner, 1993; Norman, 1993), it seems that this concept may be more useful if seen as an independent factor influencing behaviour directly, or possibly as a moderator of all the health belief components as it was shown to affect which beliefs predicted behaviour.

Evaluation of how the models have been used

Study designs

- Few studies have looked at the predictive power of the model as a whole, most just treating the model as a group of separate variables, each of which would be expected to predict health behaviour (especially in the HBM studies).

- Only a few of the studies have prospective designs. In Janz and Becker's (1984) review of the HBM, only four of the 19 studies were prospective. Although several of the studies in this chapter did have prospective designs, they do not represent the norm - they were chosen to be included in this review because of the strength of their designs. Retrospective and cross-sectional studies are problematic as it is impossible to determine whether the beliefs have 'caused' the behaviour or if the behaviour has affected the beliefs.

- Many of the studies have been designed to predict intention (dependent variable) instead of behaviour. Intention is not the endpoint of any model, and

it seems particularly unhelpful to determine the antecedents of intention if intention is not found to predict behaviour as shown in some studies (e.g. Sharpe & Connell, 1992).

- The measurement of outcome behaviour may not be as simple as it first appears as shown by Marteau *et al*'s study (1992) which emphasised that attendance at a screening programme should not be viewed as a simple 'attended' or 'not attended' outcome, but rather as three distinct outcomes: 'tested', 'declined' and 'omitted'.

Operationalisation of constructs

- There is a variety of ways of operationalising the variables used in different studies, i.e. different questions have been used to measure the same construct. As far as the HBM is concerned, Janz and Becker (1984) report that this is a "testament to the robustness of the model that the dimensions remain predictive despite these different measures". Specific questions have been used to relate to the specific requirements of a study question. For example, Marteau (1992) measured attitudes from the TRA in terms of attitudes towards doctors and medicine and attitudes towards termination in order to predict uptake of prenatal screening. Also, Jensen *et al* (1992) divided *perceived susceptibility* into short term and long term *susceptibility* which was an effective split for their elderly sample. This could be seen as an advantage of the models, in the sense that they are flexible to different health behaviours and different populations, but, on the other hand, it does limit their generalisability.

- Constructs have been missed out in many studies. Few studies reported results on all components of the HBM or SLT.

- In studies of the HBM, different 'additional variables' have been added in different studies which limits comparability across studies.

Statistical analyses of data

- Many studies have only employed univariate analyses. This is useful for asking if the variable can be used to distinguish those who act from those who do not, but it cannot show the joint effect of several variables and their relative predictive ability. In real life hardly ever does one variable act in isolation and this is reflected clearly in the definitions of the theoretical models which are based on empirical findings. It should therefore be reflected in the analyses of research data by the use of multivariate techniques.

- Few of the studies tested the predictive power of more than one model which is useful in order to compare the relative usefulness of each of the models for a particular outcome behaviour.

- The studies which did investigate more than one model rarely kept the models distinct in the analyses, i.e. variables of one model were not tested alone but with variables from the other models and demographic variables in order to achieve the best overall selection of predictive variables. This is a useful procedure for explaining particular behaviours and developing interventions, but not so useful for testing the models.

- Multivariate analyses has been carried out in different ways, i.e. discriminant analyses, multiple regression, logistic regression. In multiple regression, the result usually quoted is the percentage of variance in the outcome behaviour explained by the variables; in discriminant analyses it is the percentage of subjects who have been correctly classified by the variables in terms of the outcome behaviour; and in logistic regression the result is given in terms of odds ratios of likelihood, as regards the variables, of behaving in a particular way. These different types of results make it difficult to compare the same models across different studies and to compare different models.

1.3.1.5 Comparison of the models

Having evaluated the models in terms of their contents and how they have been used, this section will now compare the different models in terms of their relative predictive power and the similarity of their constructs.

Predictive power

It has been difficult to compare models in terms of their predictive power for the reason explained in the previous section. However, in general it seems that:

- The TRA and TPB explain more variance in health behaviour than the HBM despite the latter being designed specifically for the prediction of health behaviour and its widespread use.

- In recent studies, SLT variables have also been found to predict little variance, but the studies tend not to have used all the possible constructs.

- The TRA and TPB have probably been more successful due to the addition of *intention* which has been shown to be the most consistent and generally the most powerful predictor of behaviour; indeed, studies have shown that including *intention* in the HBM improves its predictive power.

- The TPB would be expected to have greater predictive power than the TRA due to the fact that it contains all the constructs of the TRA plus *perceived behavioural control*. However, as some studies have shown, this is not always the case and even if it does add to the explanation of variance, it is only by a little.

Construct similarity

The main social cognition models as described in this chapter have generally been perceived as distinct theories with different constructs. However, they all have their roots in expectancy-value theory and are generally based on the idea of subjective cost/benefit analyses. Recent authors (Schwarzer, 1992; Conner, 1993) have pointed out the similarities between several of the constructs in the different models. For example *perceived benefits* (HBM) has many similarities to

outcome expectancies (SLT) and the outcome efficacy component of *attitudes* (TRA). *Perceived barriers* can be likened to negative *attitudes*. *Perceived barriers* (HBM) can also be seen as the opposite of *self-efficacy* (SLT) if *self-efficacy* is measured in terms of being able to overcome difficulties, as it is by Schwarzer (1993). *Perceived behavioural control* (TPB) has often been likened to *self-efficacy* which are both, in some ways, similar to the concept of *internal locus of control* beliefs (SLT).

Although there are many construct similarities between the models, the main exceptions are the concept of *threat* (i.e. *perceived susceptibility/ perceived severity*) which is unique to the HBM and the concept of *subjective norm* which is unique to the TRA/TPB.

1.3.2 Stage models

Weinstein (1988) has presented a critique of the static nature of the above models of health behaviour which he suggests as one of the possible explanations of the models' low predictive power. What he calls the static nature of the models implies that, at any particular time point, the predictors of behaviour will be the same. He has proposed that the progress towards action consists of a series of orderly stages involving different variables as predictors at each stage. He views transitions between stages as barriers which must be overcome before action can be taken. This theory therefore has practical implications for interventions (i.e. that interventions should be tailored to the specific beliefs of the target audience). His stage model is entitled the Precaution Adoption Process (PAP).

The PAP model is similar to the trans-theoretical model of change (Prochaska and DiClemente, 1983; DiClemente *et al*, 1991) which will be described first. The latter is also a stage theory of health behaviour which has helped researchers to understand how people change a problem behaviour, such as smoking cessation, and how to increase the effectiveness of cessation programmes (Prochaska & DiClemente, 1983). The five stages of this model are shown in Figure 4.

Figure 4: Transtheoretical model of change (Prochaska & DiClemente, 1983)

1. **Precontemplation**	not intending to make changes
2. **Contemplation**	considering a change
3. **Preparation**	making small changes
4. **Action**	actively engaging in a new behaviour
5. **Maintenance**	sustaining the change over time

Figure 5: The Precaution Adoption Process (Weinstein and Sandman, 1992)

1. unaware of the issue

2. aware of the issue but not personally engaged

3. engaged and deciding what to do → decided not to act

4. planning to act but not yet having acted

5. acting

6. maintenance

Different strategies of change have been shown to be used by people at different stages, e.g. consciousness raising (information seeking) is a strategy used at the contemplation stage, but not at the action stage, when a helping relationship is more important (Prochaska and DiClemente, 1983).

Recently, this model has been applied to the adoption of exercise (Marcus & Owen, 1992; Booth *et al*, 1993) with the aim of determining if the same strategies of change are apparent when the behaviour involved is taking up a positive health-

promoting behaviour as opposed to stopping a negative, risk-increasing behaviour such as smoking. The results for exercise behaviour provided further support for the model, thus increasing its ability to be generalised. The individual strategies of change are detailed very thoroughly in this model and may be useful for understanding the behaviour change processes following screening for CHD risk factors and for providing suitable interventions.

The PAP (Figure 5) has the same general stages as the transtheoretical model in its format. However, these stages have been subdivided to define the stages more clearly and with the original aim of extending the model's use to the adoption of precautions which are newly available and the protection from hazards that have only recently been discovered (e.g. radon gas) (Weinstein and Sandman, 1992). The main difference is that the *precontemplation* stage of the transtheoretical model includes both people who have never thought about the issue and those who have thought about the issue but have decided not to act, i.e. those who may think they do not need to change their behaviour or really do not want to. Weinstein thought it was important to separate these two groups as he believed they have distinct beliefs and are not likely to be influenced equally by the same communication. For screening-related behaviours such as smoking, if someone has made a definite decision on the issue (e.g. they do not wish to give up) they are likely to be more resistant to persuasion than those who have never considered the possibility of giving up. This decision not to act after contemplation is at stage three in Weinstein's model (Figure 5). It is not defined as an additional 'stage' as such because it is not one which is along the route to action. Weinstein has also added an additional stage at the beginning of his model: a stage where people are unaware of the issue. This stage may be more relevant when investigating relatively unknown hazards such as radon gas. However, there may be sections of the population who are not aware of the link between their behaviour, such as smoking, and disease. Maintenance is considered as a final stage, but is not always necessary for certain precautions. For attending health screening, it may be less important, as going for screening is usually a one-off, or certainly an infrequent behaviour. However, this final stage may be important when studying life-style

changes following screening which have to be on-going to have an effect on health and which are often difficult to maintain, e.g. weight loss.

Weinstein (1988) has outlined possible determinants of each stage, with communication factors and experience important at the earlier stages and beliefs about severity, susceptibility, costs and benefits coming later as determinants of the decision to act. Stage 4 is a stage where people have made the decision to act but have not yet acted. This could be described as a stage within the intention-behaviour gap. Weinstein suggested that the determinants of behaviour, once the person has decided to act include more situational than cognitive factors, such as the time, effort and resources available, considering competing life demands, reminders of the threat and reminders to take the precaution. The latter two factors are comparable to the HBM's *cue to action.* However in the HBM, *cue to action* influences *threat* but does not influence actual behaviour. Weinstein (1988) used the analogy of an executive's 'messy desk' to explain the situation someone might find themselves in when they are at stage 4, i.e. when they have decided to act. They have more than likely also made plans to act in many other areas of their life which 'lie on their desk', and they also have plenty everyday responsibilities to face which use up their time. Therefore the plan, for example, to go for screening may just get covered over by another plan which is not necessarily more important but may take less time to do. However, if they receive a phone call reminder, the screening plan may just reach the 'top of the pile' again, and may even get done, but only if there is time!

The PAP has been tested using the precaution of home radon testing for radon gas as the basis for study. Radon gas testing has similarities to attending screening for risk factors for cardiovascular diseases as it does not, in itself provide protection from radon gas, but is the first step toward reducing radon risks. Seven data sets from studies of home radon testing were examined (Weinstein and Sandman, 1992). Results showed differences between the behaviour and beliefs of people at different stages as predicted by the model. One important distinction in the model is the difference in how people at different stages are expected to act if offered the opportunity. It was found that positive

responses to offers of assistance in home radon testing came almost entirely from those people who had reached the self-reported stage of *planning to test* (stage 4). Moreover, once people were at this stage, none of the belief, demographic or prior experience variables in this study were able to discriminate well between those who tested and those who did not. There is also clear evidence that the factors involved in distinguishing between those who have thought (stage 3, 1st part) and not thought (stage 2) about testing (i.e. knowledge, social experience) are different from those which distinguish between those who have decided (stage 4) to test and decided against (stage 3, 2nd part) testing (e.g. perceived risk, perceived concern of others).

Although these studies provide supporting data for the PAP model, it has yet to be tested for other types of health behaviour - radon testing is a fairly specialised behaviour in the sense that not many people know much about it, nor feel susceptible due to minimal media coverage. So the model cannot be automatically generalised to describe the adoption of more 'everyday' health precautions like quitting smoking until it is more fully tested. However, it may be a useful model of attendance for risk factor screening in populations where knowledge of the possibility and usefulness of screening is not known.

1.3.2.1 Critique of stage approach

Bandura (1995) has criticised the stage models, stating that they have undergone a 'dignified burial' in other areas of psychology. He believes that human functioning is too multi-faceted to fit into the strict categories. Moreover, he asserts that they are not 'true' stage models anyway in the sense that the stages are not conceptually distinct from each other. He argues that the pre-contemplative and contemplative stages are simply referring to different extents of the continuous variable, intention. This may be the case, but perhaps intention is not a continuous concept. There is no reason to assume that because intention is a single word it represents a single concept. In a similar vein, Bandura argues that the action and maintenance phases are not distinct concepts either but just different measurements of the amount of time spent doing the behaviour. Nonetheless, the measurement of time is an important issue in the evaluation of

behaviour change. Perhaps these models cannot be termed 'true' stage models in Bandura's sense and perhaps they do not provide more explanatory power than the 'static' models. However they can still be very useful in describing the process leading to health behaviour and helping in the design of interventions.

1.3.3 Current developments in social cognition research

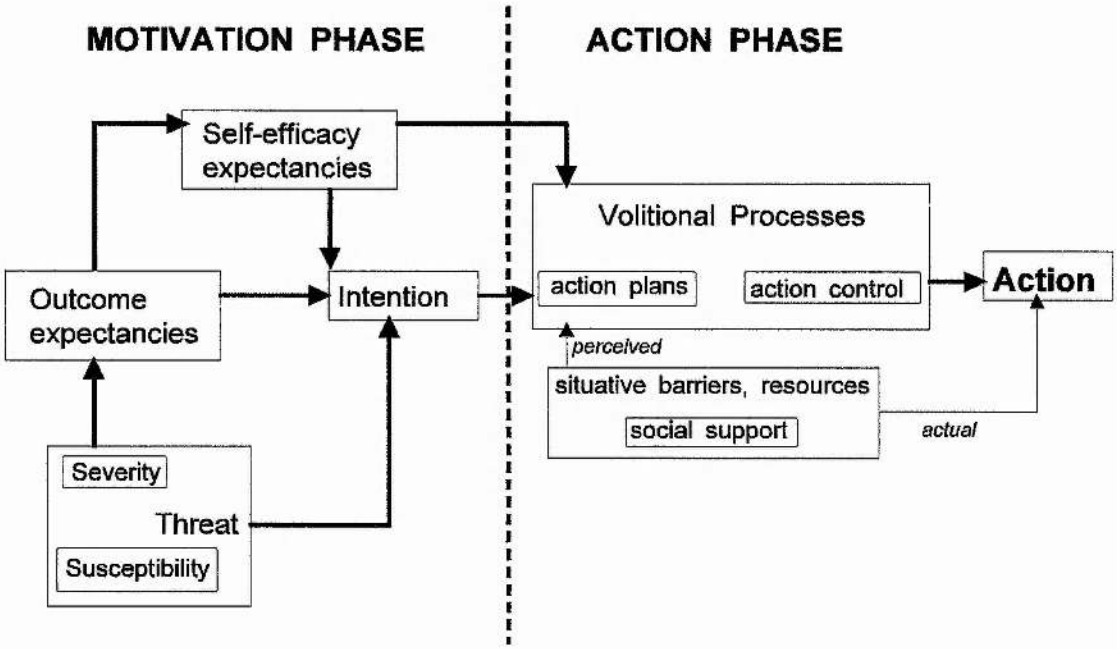
1.3.3.1 Combining the constructs of traditional models - the Health Action Process Approach

Schwarzer (1992) wished to refine and develop the earlier social cognition models on the basis of their main criticisms, especially the lack of explanation of the intention-behaviour gap and the similarity of constructs across the different models (see Section 1.3.1.4). He proposed a new framework called the Health Action Process Approach (HAPA) which takes a wide perspective, accounting for all aspects of health behaviour, i.e. adopting precautions, changing bad habits and abstaining from risky habits. He has emphasised the importance of self-efficacy (Bandura, 1982) as a predictor not only of intention to act, but also of action and its maintenance. According to Schwarzer (1992):

> *"Self-efficacy determines the appraisal of one's personal resources in stressful encounters and contributes to the forming of behavioural intentions. The stronger their self-efficacy beliefs, the higher are the goals people set for themselves, and the firmer their commitment to engage in the intended behaviour, even if failures mount." (p. 223)*

The model's main feature is the distinction between a decision-making or motivation stage and an action or maintenance stage. Schwarzer suggests that the social cognition models such as the HBM and the TRA/TPB have only dealt with the former stage. The action/maintenance stage proposes the actual process involved once the intention has been formed which is another attempt to explain the intention-behaviour gap, in this case in more systematic detail than Weinstein's 'messy desk' description.

Figure 6: The Health Action Process Approach (HAPA) (adapted from Schwarzer, 1992)



The HAPA is shown in Figure 6. The components of the decision-making / motivation phase summarise the important aspects of the main social cognition models described in Section 1.3.1 into one model. Self-efficacy expectancies are seen as a mediator between outcome expectancies (which include social outcome expectancies) and intention. However, outcome expectancies can influence intention directly when individuals have no experience with the health behaviour involved. Therefore the factor of having past experience with the behaviour is included in the sense that it works through self-efficacy expectancies. Self-efficacy expectancies have a direct link to behaviour as well as through intention. This process can thus be compared to the TPB where perceived behavioural control has links to behaviour both through intention and directly (see Section 1.3.1.1.2). Threat is assumed to influence outcome expectancies, but may be redundant if outcome expectancies are already established. These relationships between the different components of the model are hypothesised. It has not yet been established how these predictors of intention are actually combined.

The action phase is based on relapse prevention theory, volition theory and self-efficacy theory. According to the model, the action phase is dependent not only

on intention, but also on self-efficacy beliefs. Action plans are relevant whether or not the action involves avoiding a risk-increasing behaviour (e.g. smoking) or starting a positive health behaviour (e.g. exercise). The number and quality of action plans is likely to be governed by perceived self-efficacy. Self-efficacy beliefs secure effort and persistence which help to control the action plans in order that they are maintained. However, Schwarzer also suggests that situational factors, resources and support would also be important in this action phase. For instance, feeling confident that you can maintain your non-smoking behaviour once you have quit might not be completely effective if your partners and friends persist in smoking in your presence.

This is a fairly complex model which has not yet been tested as a whole, as far as the author is currently aware. However, it provides some useful ideas for the study of risk factor screening, in the sense that it provides a conceptual framework for the many different types of behaviour involved in this area, i.e. uptake of screening; change of risky behaviours (i.e. short term impact of screening) and maintenance of healthy behaviour (i.e. longer-term impact of screening. It also points to the consistent power of self-efficacy beliefs within this entire framework which provokes research to investigate the supposed regulating effect of this variable in both the motivation and action phases.

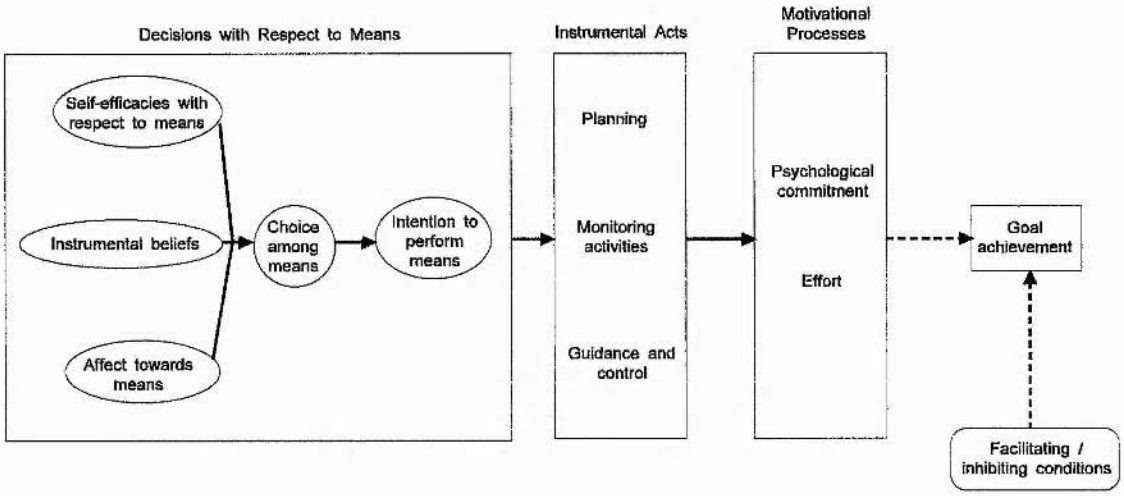
1.3.3.2 Operationalisation of the intention - behaviour gap

In several of the preceding sections, mention has been made of the elusive intention-behaviour gap. The HBM has been criticised for the reason that its constituent beliefs and attitudes are often more likely to predict behavioural intention than actual behaviour. Moreover, although intention is usually correlated with behaviour, the correlations are often small, suggesting that people do not always do what they intend to do. A current challenge to health psychologists is defining what psychological (or non-psychological) factors may fit into the gap, i.e. what factors will provide that final push into action after people have formed an intention. Weinstein has attempted to describe the gap

with his analogy of the executive's 'messy desk'. Schwarzer devoted half of his model, i.e. the action phase, to its possible mechanism.

Bagozzi's (1992) work provides further elaboration of the action plans and action control components described as part of Schwarzer's model (the HAPA). In fact these factors relate to only one part of Bagozzi's model which is called the Volitional Model of Goal-Directed Behaviours (Figure 7).

Figure 7: The Volitional Model of Goal-directed Behaviours (Bagozzi, 1992)



The outcome behaviour in this model is described as 'goal achievement'. Goals are referred to by Bagozzi as behaviours which "one strives to perform with the foreknowledge that any performance will be problematic" (p. 195). This relates to changing risky habits such as quitting smoking or cutting down dietary fat.

The model is basically an elaboration of intention, for example with risk factor modification it is not enough to say "I'm going to reduce my risk factors for heart disease". One has to elaborate the intention starting with knowledge of various means (i.e. ways of achieving the goal) of doing it.

As shown in Figure 7, first of all, various means are appraised. There may be many different ways of achieving a goal, e.g. if reducing weight is the goal, it can be done by taking more exercise, or changing one's diet. Furthermore both these means can be broken down into means of taking more exercise and means of

changing one's diet. A person may use the means they used last time if it is a goal pursued frequently in the past, or they may look for the easiest means, or the one that comes to mind first. Three distinct appraisal tasks are carried out: self-efficacies with respect to means, instrumental beliefs (outcome expectancies), affect towards (or desirability of) means. Based on this appraisal, a choice among means is made and an intention to perform means may follow. Second, instrumental acts take place which include planning, monitoring activities, guidance and control (similar to Schwarzer's concepts of action plans and action control). Third, motivational processes are required to initiate the action. These include psychological commitment and effort which can be expressed by statements such as "My decision is a very good one"; "I am committed to carrying out my intention" (Bagozzi, 1992, page 199). So this model includes motivational processes after an intention is made (cf. HAPA which implies that the motivation phase stops as the action phase begins).

As stated before, stage 2 of this model is similar to the action phase of Schwarzer's HAPA. However, neither of these models have provided a clear indication of how to operationalise action plans and action control.

Gollwitzer (1993) has proposed that intentions are more likely to lead to behaviour if accompanied by what he calls 'implementation intentions'. An implementation intention is an elaboration of an intention in terms of thinking about when, where and/or how to put it into action. According to Gollwitzer (1993); "implementation intentions commit the person to executing an intended goal-directed behaviour once the specified situational context is encountered. Implementation intentions, therefore, establish linkages between situations and behaviour" (p. 152). The theory is that once an implementation intention is formed, the individual passes control for the behaviour to the environment. When the specified situation is encountered, it will act as an external 'cue to action' which will bring to mind the intended action. For example, if a person wishes to take up more exercise, they can elaborate this intention by forming a mental action plan in terms of an activity, and an exact time and place to carry out this activity.

Gollwitzer set out to test his hypothesis that people should achieve goals more successfully if they have made an implementation intention. In an experimental study where a random half of the subjects were instructed to form an implementation intention as to when and where they would write a report, he found that the task was much more likely to be completed on time for the experimental group. Orbell and Hopkins (1994) tested the power of implementation intentions in a study with more direct relevance to the topic of this thesis: a study of breast self examination (BSE). Female students completed questionnaires assessing components of the TPB in relation to BSE including an item measuring intention to perform BSE. A random half were instructed to make an implementation intention in terms of where and when they intended to perform BSE. At one-month follow-up, a higher proportion of students who had formed the implementation intention had performed BSE compared with the control group. In order to investigate the theory of how implementation intentions work, the researchers asked those who had not performed BSE to give reasons. In line with the theory that the implementation intention works as a 'cue to action', fewer of the experimental group reported forgetting as a reason compared to the control group.

It is however possible that the studies described above found *implementation intention*s to be effective because the subjects had to make their *implementation intention* in the presence of an experimenter. There could be an element of conformity or social desirability involved which may not be present if the subject was alone. A possible shortcoming of the theory is that although it makes sense to consider when and where one is going to do something, it seems less likely that one would be able to imagine when and where one is going to stop doing something (e.g. eating cream cakes) unless it was an habitual behaviour (e.g. smoking).

However, as the research described above has shown, Gollwitzer's theory of *implementation intention*s provides, at least, a straightforward starting-point to the operationalisation of the intention-behaviour gap.

1.3.4 Implications for research on screening-related behaviour

- There is a need to do further work on the main social cognition models to determine their usefulness in risk factor screening research, eliminating some of the previous design problems by: (1) using prospective studies (2) including all the models' variables, (3) using multivariate analyses to test the predictive power of the model as opposed to its constituent variables and (4) comparing the different models within one study population.

- There is a need to test the newer models (PAP, HAPA) in the field of health behaviour change. Research on screening-related behaviour is a good starting point for this.

- Previous research into screening-related behaviour has identified a need for an investigation of the intention-behaviour gap. Further research into screening-related behaviour should attempt to operationalise the 'gap-filling' constructs proposed by Bagozzi, Schwarzer and Gollwitzer and test their predictive ability.

1.4 Overview of the progression of studies

The three studies which constitute the empirical work of this thesis progressed in the manner described below.

Study 1 (Chapter 2), 'Social Cognition Models and the Prediction of Uptake of CVD Risk Factor Screening at the Worksite' was an evaluation of a risk factor screening programme across several worksites in Scotland with the main aim of investigating uptake rates in general and across different worksites, and comparing the health beliefs of attenders and non-attenders[2]. The analyses was developed further by combining the data from the three worksites and using it to test and compare the social cognition models which had been applied. Differences in the social composition between the three worksites were also compared in an attempt to explain the differences in uptake rates and predictive variables between the worksites.

Knowledge of the importance of complete measurement and statistical analyses of the models was developed during work on this initial project. Raised awareness of the recent developments in social cognition research as described earlier; the similarity of the constructs in the various models, their relative lack of predictive power and the problem of operationalising the intention-behaviour gap led to the second study (Chapter 3) 'The Health Action Process Approach, the Precaution Adoption Process and the Prediction of Behaviour Change Following CVD Risk Factor Screening in General Practice'. This study incorporated some of the new approaches to social cognition models and improved construct operationalisation.

The initial project also pointed to the need to look more closely at factors beyond those within the individual which is the domain of the social cognition models. Methods of organising the screening programme within each worksite seemed to be having an effect on uptake. The third study (Chapter 4), 'Organisational Factors in the Uptake and Impact of CVD Risk Factor Screening in General

[2] Initially I was a research assistant on this project (funded by a Scottish Office Grant). I helped in the design of the questionnaires and analysed the data for the initial report. There were other research assistants on the project who helped with data collection and data input: Caroline Hay, Linda Graham and Neil Coulson.

Practice' was thus designed to investigate this hypothesis in detail by setting up a randomised trial to test the effects of three different ways of offering screening.

The second and third studies were also developed to investigate not only the uptake of screening but also health behaviour change following screening (i.e. impact). As mentioned earlier in Section 1.2.4.2, there has been little psychological research on the impact of risk factor screening (i.e. health behaviour change following screening). Therefore Study 2 looked at social cognition variables predicting health behaviour change following screening. Study 3 looked at the effect of different organisational factors on health beliefs and health behaviour change following screening.

2. Social Cognition Models and the Prediction of Uptake of CVD Risk Factor Screening at the Worksite

2.1 Abstract

This study investigated the rate of uptake of a worksite screening programme for cardiovascular disease risk factors and applied four social cognition models [Health Belief Model (HBM), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB) and Social Learning Theory (SLT)] to the prediction of uptake. A total of 425 subjects, based at three worksites, completed a social cognition questionnaire prior to the arrival of the mobile screening unit. Uptake was subsequently noted. Results showed that uptake rates varied across the three worksites, suggesting that differences in social composition and communication methods may affect uptake. Using the entire sample, the TRA, TPB and HBM were all able to discriminate between attenders and non-attenders. The TRA was the most successful model. However, the variables, cue to action and perceived barriers added to the power of intention to attend in predicting attendance. Differences found between the worksites in terms of the variables predictive of attendance suggest that a stage model approach, such as the Precaution Adoption Process (Weinstein, 1988) may be a useful way of explaining uptake.

2.2 Introduction

It was stated at the end of the Introduction chapter (Section 1.3.4) that there is a need to do further work using the main social cognition models to determine their usefulness in risk factor screening research, eliminating some of the previous design problems by: (1) using prospective studies (2) including all the models' variables, (3) using multivariate analyses to test the predictive power of the model as opposed to its constituent variables and (4) comparing the different models within one study population. The present study was thus designed to address these issues.

The four main social cognition models described in Chapter 1 [i.e. The Health Belief Model (HBM) (Rosenstock 1974), The Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1980), the Theory of Planned Behaviour (TPB) (Ajzen, 1988) and Social Learning Theory (SLT) (Rotter, 1954)] were applied to the understanding of the health beliefs which explain uptake of a cardiovascular disease (CVD) risk factor screening programme. An additional goal was to use the data to further our understanding of the models and to compare their usefulness in this area of health research. According to Weinstein, (1993) very few empirical studies have compared the relative strengths and weaknesses of different social cognition models:

> *despite a large empirical literature, there is still no consensus that certain models of health behaviour are more accurate than others, that certain variables are more influential than others...In general, researchers have failed to carry out the winnowing process that is necessary for scientific progress (p.324)*

As stated in Chapter 1, Cardiovascular disease (CVD) is a major health problem in the United Kingdom, particularly in Scotland. This has encouraged efforts to identify high-risk individuals and to counsel them about health behaviour changes. Indeed, the rate of screening for risk factors for cardiovascular disease has vastly increased in recent years, especially since the new guidelines for general

practitioners (Scottish Home and Health Department, 1993). The success of such screening programmes, however, is not guaranteed. The effectiveness depends, first of all, on good uptake rates (especially of those at risk). There is general evidence that uptake rates for risk factor screening programmes do vary, but in general have not been particularly high (see Section 1.2.4.1 for details). In order to improve uptake rates it is important to investigate factors which may influence attendance and non-attendance. As suggested above, social cognition models can be used to specify the variables which are important in reaching a health-relevant decision including attending a screening appointment.

Previous studies of health checks have used the variables of the HBM in comparing attenders and non-attenders. In the review of these studies in Chapter 1 (Section 1.3.1.3) it was highlighted that the component of *perceived severity* was not a consistent predictor of health behaviour. Janz and Becker (1984) showed that *perceived severity* was much more effective in predicting sick-role behaviour and they speculated that healthy study respondents may have difficulty in conceptualising this dimension. It would therefore seem unnecessary to include this component in a study of attendance at a health check, particularly when it is important to keep the questionnaire length short for ease of completion and better response rates.

The *cue to action* component of the HBM is described as relating to either internal cues, i.e. symptoms, or external cues such as a phone call or letter. In previous studies of attendance at health checks, the invitation letter has been described as the *cue to action* (Norman & Conner, 1993, Norman, 1994). Workers may find out about screening at their workplace in different ways, either by posters, discussions with colleagues, direct invitations from employers, etc. Without monitoring all the different ways of communicating about screening, a worker's knowledge of the availability of screening can act as an indication that he/she has received a *cue to action*.

Several previous studies have evaluated versions of the HBM which have been modified by the addition of variables found to be useful in predicting health behaviour in other studies, such as *health value* and *health locus of control*

(Conner & Norman, 1992; Norman, 1993; Norman & Fitter, 1989). If the different social cognition models are to be compared, there continues to be some value in assessing the predictive ability of the core HBM as well as the modified version.

The TRA/TPB has been successful in explaining a range of health-related behaviours including exercise behaviour (Godin *et al*, 1989) and dietary behaviour (Sparks *et al*, 1992), but its use in the prediction of attendance at health screening has been limited and has shown mixed results (see Section 1.3.1.3 for details). Perceived Behavioural Control (PBC), the addition to the TRA which transforms it into the TPB has not been shown to be a useful predictor of either intention to attend a health check (Conner and Norman, 1992) or actual attendance behaviour (Norman and Conner, 1994). Since PBC has not been successful in previous studies of attendance at health checks, it is possible that the traditional operationalisation of this variable in terms of the perceived ease in carrying out a behaviour may not be appropriate when the outcome behaviour is attending a health check. Perhaps when a person considers attending a health check, the critical PBC is not over actual attendance but over the behaviours that may follow, i.e. recommended behaviour change. It is acknowledged that using this amended operationalisation would limit the adequacy of a generalisable test of the TPB. But in the situation where it is already known that the TPB is no more effective than the TRA it would seem appropriate to adapt the model in a way that may provide new insight into the process of attending a health check.

The constructs of Social Learning Theory (SLT) (Rotter, 1954) have also been used to predict health behaviour but like the TRA/TPB, the use of SLT in the study of health screening attendance has been limited (See Section 1.3.1.3).

Other single variables associated with uptake of risk factor screening in previous studies have included demographic factors (Greenlick *et al*, 1979; Michie *et al* (1995); Pill *et al*, 1988); knowledge about health (Michie *et al* (1995)); concern about health (Michie *et al* (1995)) and health status (Waller *et al*, 1990).

With the availability of the different models, it is important to compare their relative contributions to the understanding of this particular health-relevant decision, i.e. the decision to attend a screening appointment. It may also be important to choose not only the most useful model, but also the 'best' combination of variables from the four models and other variables.

While the social cognition models postulate individual factors influencing health-related behaviour, organisational factors such as method of invitation and where the screening is set are also likely to affect attendance (Marteau, 1993; Orbell, 1994) There is evidence that health promotion programmes at the worksite, which is the setting for this paper, are effective in reducing many of the factors which are associated with a higher risk of CVD (see Section 1.2.3.2). Worksites are also convenient locations for running screening programmes and provide the opportunity to involve full-time workers who may be missed by programmes in general practice. A review of worksite smoking cessation programmes concluded that this setting seems to be more effective in encouraging participation than clinic-based programmes (Klesges *et al*, 1989), but that the success of the programme is likely to be affected by not only the method of intervention used, but also the nature of the worksite itself. These authors speculated that factors such as the size of the worksite, socio-economic level of the workers and management/worker relations may affect outcomes. It is therefore important to compare the uptake rates of different worksites and to examine the nature of, and any explanations for, any difference.

2.2.1 Research Questions and Hypotheses

1. What is the rate of uptake of a worksite screening programme for cardiovascular disease?

Hypothesis: Due to greater convenience at the worksite, the rate of uptake will be higher than in previous studies in general practice settings.

2. Which individual variables (derived primarily from social cognition models) distinguish between attenders and non-attenders?

Hypothesis: Attenders will be more likely to report beliefs consistent with the social cognition models' predictions of who will carry out a health-related behaviour.

3. What power do the five social cognition models (i.e. core HBM, extended HBM, TRA, TPB & SLT) have to discriminate between attenders and non-attenders?

Hypotheses: The five models will differ in their power to predict attendance. In particular, the TPB would be expected to have more power than its predecessor, the TRA. Moreover, due to the consistency of intention *as a predictor in previous studies, the models which include this variable (TRA/TPB) may be expected to be superior to the models which omit it (HBM/SLT). Previous research also suggests that the HBM will be more successful than the SLT (Wallston & Wallston, 1984).*

4. Are there any differences between worksites concerning the variables and models which are predictive of attendance?

Hypothesis: The models themselves and their component variables will differ across worksites, although there are no explicit hypotheses as to the nature of, or explanations for, these differences.

2.3 Method

2.3.1 Subjects

The sample consisted of workers from three worksites in Dundee, Scotland. Worksite 1 was a further education college, Worksite 2 was a section of the City Council Cleansing Department and Worksite 3 was a factory producing greetings cards, etc.. All of these worksites were due to be screened by the S.H.A.R.P. (Scottish Heart and Arterial disease Risk Prevention) mobile screening unit. The worksites were chosen to ensure adequate distributions of male and female workers and of manual and non-manual workers across the entire sample.

There were 852 workers approached all together at the three worksites; 483, 69 and 300 respectively. At Worksites 1 and 3 all the workers were approached, whereas in Worksite 2, all those available on the days of the study were approached. This was because these workers did not have a fixed working location and it was thus very difficult to contact them all in the week prior to the screening unit's arrival.

2.3.2 Design

This study had a prospective design. It consisted of just one questionnaire which was sent to workers in the week prior to the arrival of the screening unit at their worksite. The independent variables measured by this questionnaire were variables derived from the social cognition models and some demographic variables. The dependent variable was whether the worker subsequently attended the mobile screening unit

2.3.3 Procedure

All workers at each site were contacted, provided with an information letter about the study and asked to complete the questionnaire in the week prior to the arrival of the screening unit. This was done before workers were required to indicate whether they would attend. The worksites differed in the extent to which they would allow the research workers access to the workers. At Worksite 1, workers were sent the questionnaire via their individual pigeon holes. Workers returned

the questionnaires to a locked mailbox situated in their workplace. It was possible to give the questionnaire to the individual workers in the other two worksites, but only possible to have them complete it and return it immediately to the research worker in Worksite 2. In Worksite 3, the questionnaires were collected by the worksite management and sent on to the researchers. Subsequent attendance at the screening unit was recorded and thus questionnaire responses could be compared between attenders and non-attenders.

The Screening Unit

The mobile screening unit was parked in a convenient location in each of the worksite grounds. Two nurses were on duty, so two workers could be seen in each 20 minute session. Information about risk factors was recorded on a computer programme especially designed for this purpose (see Appendix 1 for details of the information recorded). The information recorded included: age, occupation, family history of premature cardiovascular disease and diabetes, consumption of tobacco, alcohol and salt, exercise participation and relevant history of chest pain. Blood pressure, cholesterol level, height and weight were measured. Counselling was also given on how to reduce risk factors unless risk factors were very low. A 'risk score' was calculated (see Appendix 1) and given to the worker.

2.3.4 Measures

Table 1 shows details of the independent variables measured in the study. Appendix 2 is a sample of the actual questionnaire. Table 1 refers to this questionnaire by giving the section and numbers where the variable is situated in the questionnaire, e.g. D4.

Table 1: Operationalisation and reliability of independent variables

Name of variable	Description / examples of items	No. of items	Response Scale	Range of possible scores	Internal Reliability Cronbach α
Demographic Variables					
Age	Subjects asked to write their age	1	—	—	—
Sex	Male (1) or female (2)	1	1-2	1-2	—
Marital status	coded as 'married'(1) and 'not married'(2)	1	1-2	1-2	—
Education	*Did you continue your education after school?*	1	0-1	0-1	—
From the HBM[3]					
Number of benefits (D3)	given a list of possible benefits, (e.g. *reassure me about my health, get a break from work,*) the number of benefits ticked was counted	9	0-1	0-9	.54
Number of barriers (D4)	given a list of possible barriers, (e.g. *fear of the results; I already feel healthy*) the number of barriers ticked was counted	15	0-1	0-15	.70
Perceived susceptibility (C1, C2)	*How likely do you think it that you will: have a heart attack (before or after 65), develop cancer, have a stroke*	4	1-4	4-16	.82
Cue to action[4] (A4a)	*Some workers get the chance to have their health screened at their workplace. Does your workplace plan to do this?*	1	0-1[5]	0-1	—
From the TRA[6]:					
Intention (to attend) (A4c)	*Some workers get the chance to have their health screened at their workplace. Would you attend?*	1	1-5	1-5	—
Subjective norm[7]: Colleagues (F1, F2)	*Would the people you work with wish you to have your health screened?* (1) *What proportion of the people you work with would have their health screened?*(2)	2	1-5* 1-7*	1-5 1-7	.55[8]
Subjective norm[9]: Family (E1-2)	*Would your family wish you to have your health screened?* *Would other members of your family have their health screened if screening was available?*	2	1-5*	2-10	.82

[3] Perceived severity has been omitted from the HBM due to its lack of predictive power in previous research

[4] This way of operationalising cue to action may be better described as knowledge of screening availability as explained in the introduction (page 67)

[5] Yes=1, No=0, Don't know =0

[6] the TRA also comprises *number of benefits* and *number of barriers* as *attitudes*

[7] For information about this variable, see below

[8] These two items were kept separate due to the low value of Cronbach's alpha

[9] For information about this variable, see below

Table 1 (cont.): Operationalisation and reliability of independent variables

Name of variable	Description / examples of items	No. of items	Response Scale	Range of possible scores	Internal Reliability Cronbach α
From the TRA (cont.):					
Attitudes: Efficacy of screening (D5)	*How effective do you think health screening is in reducing your chances of getting heart disease?*	1	1-4	1-4	—
Attitudes: Health value[10] (B3-4)	*How often do you think about your health?* *How concerned are you about your health?*	2	1-4*	2-8	.75
From the TPB[11]:					
Self-efficacy (PBC) (D6)	*How good would you be at changing your behaviour if you were told it was necessary to reduce your risk of heart disease?*	1	1-4	1-4	—
From SLT[12]:					
MHLC[13] Internal Powerful others Chance (G1-18)	*I am directly responsible for my health* *Health professionals keep me healthy* *When I stay healthy I'm just plain lucky*	factor scores	—	—	—
Other variables					
Knowledge[14] Main causes Specific behaviours	knowing main behavioural risk factors specific knowledge of cholesterol and exercise	factor scores	—	—	—
Unalterable causes	knowledge of diabetes and hereditary risks				
No. correct	no. of true/false statements answered correctly	20		1-20	.64
No. of misconceptions	no. of true/false statements answered wrongly	20		1-20	
No. of uncertainties	no. of true/false statements given 'don't know'	20		1-20	
Health status (B1-2)	*How would you describe your health compared with someone of your own age?* *Compared with the people you work with, how would you describe your health?*	2	1-4* 1-5*	2-9	.66

* reverse-coding, i.e. high value equals low belief and vice versa

[10] Items adapted from Norman (1991), although here they have been used as an operationalisation of the value component of attitude in the TRA

[11] TPB also comprises all variables of TRA

[12] SLT also comprises *efficacy of screening*, *self-efficacy* and *health value*

[13] For details of this measure, see below

[14] For details of how these measures were formed, see below

2.3.4.1 Subjective norm

This variable from the Theory of Reasoned Action has not been operationalised exactly as defined by the model (see Chapter 1, page 26). The first part of subjective norm : 'beliefs about others' approval or disapproval of the behaviour' has been operationalised. However, the second component of subjective norm: 'motivation to comply with others' opinions' has not been operationalised due to difficulty in wording this component in a meaningful way. Instead, an additional component has been added which concerns the belief about what others would do, which may be better described as a descriptive norm. So, although the variables are labelled 'subjective norm: family' and 'subjective norm: colleagues' throughout this chapter it is acknowledged that the particular operationalisations used in this study do not reflect the exact meaning of subjective norm as defined by the model. They would be more correctly described as 'colleague norm' and 'family norm'.

2.3.4.2 Health locus of Control

Perceived control of health (from SLT) was measured using the MHLC (The Multi-dimensional health locus of control scale) (Wallston & Wallston, 1981), a widely used measure in this field. The scale comprises 18 items designed to incorporate the three dimensions of control: Internal, Powerful Others and Chance. Principal components analyses was performed to investigate how well the scale divided into the three components. Thus, three factors were chosen to be extracted in the analyses. The three resulting factors explained 16.9%, 13.6% and 8.1% of the variance respectively. After varimax rotation, each of the six Internal, plus one of the Powerful Others items (i.e. *Following doctor's orders to the letter is the best way for me to stay healthy)* loaded highly on Factor 1. All of the Chance items loaded highest on Factor 2 and the first five Powerful Others items loaded highest on Factor 3. So the three dimensions of Perceived Control were confirmed in this sample, apart from the finding that the above Powerful Others item fits in better with the Internal locus of control. The three factors were labelled 'Internal', 'Powerful Others' and 'Chance'.

2.3.4.3 Knowledge

This measure consisted of: (1) nine multiple choice questions (See Appendix 2, Section A: items 2,3,9,10,11,13,14,15,16) with between three and nine possible responses to which the subject had to tick one or more, and (2) twenty statements (see Appendix 2, Section A: items 17-36), to which the subject had to give a 'true', 'false' or 'don't know' response. These questions were devised for the purposes of this study to measure knowledge of the risk factors of CVD and their modifiability. They were validated by two doctors and two nurses, who actually carried out the screening service, by asking them to complete the questionnaire to the best of their skilled knowledge and then removing any questions to which there was *any* disagreement over the correct response.

(1) For each of the nine questions, a score was derived, and principal components analyses was performed resulting in three factors explaining 27.4%, 13.2% and 11.8% of the variance respectively. Varimax rotation was then performed. The five items loading highly on factor 1 could be described collectively as knowledge of the main risk factors for CVD, thus this factor was labelled "main causes". The two items loading highly on factor 2 were concerned with knowing which foods can reduce cholesterol level and with the optimum form of exercise, thus this factor was labelled "specific behaviours". The two items loading highly on factor 3 were concerned with risk factors which are unalterable, i.e. diabetes and family history, thus this factor was labelled "unalterable causes".

(2) The twenty knowledge statements were checked for their reliability using Cronbach's alpha[15]; $\alpha = .64$, a result which was not improved by removing any of the items. From the answers to these knowledge statements, a score representing the total number of misconceptions (items to which the subject had given the wrong answer), uncertainties (items where 'don't know' was the response) and correct answers was calculated for each subject.

[15] For the purposes of this calculation, the 'true' and 'false' categories were recoded as either 'right' or 'wrong' depending on whether the statement was actually true or false and the 'don't know' category was recoded as 'wrong'.

2.4 Results

2.4.1 Statistical analyses

Data screening

Prior to analysis, all the variables were examined to check for accuracy of data entry, a plausible range of the variable and missing values. This was carried out using aspects of the FREQUENCIES programme in SPSS for Windows. All the ranges were found to be plausible given the variables' construction and the missing values were seen to be randomly distributed throughout the sample and the variables.

The dichotomous variable *cue to action* was checked for equal split between the two categories. The split was 75-25% which was not deemed to be extreme according to Tabachnik and Fidel (1989, p. 67). So there was no need to delete this variable.

All the other variables (continuous and ordinal) were examined to see if they fulfilled the assumptions of normality required for the use of parametric statistical tests. SPSS FREQUENCIES provided skewness and kurtosis values and their respective standard error scores for each of these variables. By calculating z scores by dividing the skewness and kurtosis values by their respective standard error scores, it was possible to see if the variables differed significantly from the normal distribution. Variables which fulfilled the assumptions of normality were: *number of benefits, perceived susceptibility, internal, powerful others* and *chance locus of control*. Variables which violated the assumptions of normality were *intention, subjective norm: colleagues (1), subjective norm: colleagues (2), subjective norm: family, efficacy of screening, health value, self-efficacy, health status* and all the *knowledge* variables.

Choice of statistical tests

Parametric and non-parametric tests were used. Non-parametric tests were chosen for the dichotomous variable *cue to action* and all the continuous/ordinal variables which did not conform to the assumptions of normality as listed above.

These non-parametric tests employed were: Chi-square (χ^2) to examine differences in proportions and Mann-Whitney U to look for differences between means. Parametric tests were chosen for all the other variables since they fulfilled the requirements necessary for parametric tests as shown above. Parametric tests used were t-tests to look for differences between means.

Multivariate analyses techniques were used to assess relationships between one dependent variable and several independent variables. The techniques used were Discriminant function analyses and Multiple Regression.

The main technique used in this study was Discriminant Function Analyses chosen because of its ability to assess the predictive relationship between several independent variables and one dichotomous dependent variable. It was thus ideal to test the models' power to discriminate between attenders and non-attenders. Moreover, Discriminant Function Analyses is robust to failures of normality if violation is caused by skewness (Tabachnik and Fidel, p. 511). Thus it was not necessary to transform or delete the variables used in this study which were found to have skewed distributions. However Discriminant Function Analyses is highly sensitive to the inclusion of outliers (Tabachnik and Fidel, p. 511). For attenders and non-attenders separately, SPSS REGRESSION was run to look for any multivariate outliers. With the use of a $p<.001$ criterion for Mahalanobis distance, five outliers among the attenders were identified. Close inspection of these cases showed that they all had very low *intention to attend* and yet had subsequently attended. Due to reduced sensitivity of Discriminant Function Analyses these cases were deleted from all the Multivariate Analyses.

Multiple regression analyses was used to predict *intention* from the combination of the other variables in the TRA and the combination of other significant health belief variables. Variables intended for use in these multiple regressions were examined for multivariate normality and linearity. This was done using SPSS REGRESSION which examines residuals. Scatterplots of predicted values of the DVs (*intention* and *behaviour change index*) against residuals showed that the assumptions of linearity were met in both cases. A normal probability plot of

residuals showed that the multivariate distributions were more or less normal - the points fell along an approximately straight diagonal line.

All the data were analysed using SPSS for Windows on the PC. Throughout this section there are different numbers given for the total sample. This can be explained by missing data due to different questionnaire items being omitted by subjects.

2.4.2 Worker participation in the study

Of the 852 available workers across the 3 worksites, 425 (50%) participated in the study (i.e. returned a completed questionnaire). However, this participation rate differed across the three worksites: 43%, 93% and 50% at worksites 1 to 3 respectively (Table 2).

The mean age of all participants was 42.4 years (sd = 11.04). and there were 172 (40.4%) females and 247 (58.1%) males in the sample.

2.4.3 What is the rate of uptake at a worksite screening and counselling programme for cardiovascular disease?

Of the 425 study participants, 265 (62.4%) subsequently attended the screening unit. However, there was a significant difference between the three different worksites in terms of uptake rates: 59%, 28% and 81% at Worksites 1 to 3 respectively (χ^2=56.4, df=2, p=.000) (Table 2).

Table 2: Number of workers approached, questionnaire response rate and rate of uptake of screening for the entire sample and for each worksite separately

	Total	Worksite 1	Worksite 2	Worksite 3
Number of workers	852	483	69	300
Questionnaire				
responders	425 (50%)	210 (43%)	64 (93%)	151 (50%)
Screening (responders only)				
attenders	265 (62.4%)	124 (59%)	18 (28%)	123(81.5%)
non-attenders	160 (37.6%)	86 (41%)	46 (72%)	28 (18.5%)

2.4.4 Which individual variables (derived primarily from social cognition models) distinguish between attenders and non-attenders? (univariate analyses)

The questionnaire responses of attenders and non-attenders were compared using chi-square tests, independent samples t-tests and Mann-Whitney U tests (for the different types of variables as described above in the section on Data Analyses). Results are presented for the overall sample and for each individual worksite. The results are presented in Table 3.

2.4.4.1 Differences between attenders and non-attenders in the sample overall

Demographic Factors

Attenders were found to be significantly older (mean = 43.3 (10.71) than non-attenders (mean = 40.8 (11.44), (t (421) = -2.22, p = .027). A higher proportion of females (71%) than males (56%) were attenders (χ^2 = 10.05, df = 1, p = .002).

There were no significant differences between attenders and non-attenders in marital or educational status (Table 3).

Social Cognition Variables

A number of the individual social cognition variables were found to discriminate between attenders and non-attenders (Table 3).

Considering variables from the HBM, attenders were more likely to know of the availability of screening at their workplace than non-attenders (*cue to action*) (83% vs. 64%, χ^2 = 18.45, df = 1, p = .000) and to have <u>less</u> *perceived susceptibility* to disease (mean =8.41(2.49)) than non-attenders (mean = 9.17 (2.65)), (t(391) = 2.84, p = .005). Attenders perceived a smaller *number* of barriers (mean rank = 177.2) than non-attenders (mean rank = 231.3) (Mann Whitney U = 13406, p=.000) and a greater *number* of benefits (mean = 3.67 (1.69) than non-attenders (mean = 3.28 (1.86), (t (305.38)= 2.17, p = .031). Looking at each individual benefit separately, attenders were significantly more likely to think that the benefits of screening for them would be: *reassure me about*

my health ($\chi^2 = 10.8$, df = 1, p = .001), *give me the chance to improve my health* ($\chi^2 = 8.9$, df = 1, p = .011) and *learn something about heart disease and its causes* ($\chi^2 = 16.05$, df = 1, p = .000). Non-attenders were significantly more likely to think that screening would be beneficial because it would: *get me to stop smoking* ($\chi^2 = 5.54$, df = 1, p = .02).

Table 3: Comparing the demographic and social cognition variables of attenders and non-attenders (univariate analyses): values of t-tests^{t}, Mann-Whitney U-tests^{mw}, and Chi-square tests$^{\chi 2}$

Variables	**Statistical test result**[16]			
Demographic variables	**Overall (N=425)**	**Worksite 1 (N=210)**	**Worksite 2 (N=64)**	**Worksite 3 (N=151)**
Age	**2.22** ^{t} *	0.72 ^{t}	1.83 ^{t}	0.93 ^{t}
Sex	**10.05**$^{\chi 2}$ **	0.48$^{\chi 2}$	invalid - only 1 female	1.31$^{\chi 2}$
Marital Status	2.32$^{\chi 2}$	2.16$^{\chi 2}$	2.68$^{\chi 2}$	0.35$^{\chi 2}$
Education	0.22$^{\chi 2}$	0.29$^{\chi 2}$	**4.24**$^{\chi 2}$*	0.25$^{\chi 2}$
HBM (core variables)[17]				
Number of benefits	**2.17** ^{t} *	0.30 ^{t}	**2.33** ^{t} *	0.58 ^{t}
Number of barriers	**13406** ^{mw} ***	**3919.5** ^{mw} ***	215.5	1318.5
Perceived susceptibility	**2.84** ^{t} **	1.62 ^{t}	1.16 ^{t}	0.72 ^{t}
Cue to action	**18.45**$^{\chi 2}$ **	0.61$^{\chi 2}$	**9.09**$^{\chi 2}$**	0.00$^{\chi 2}$
TRA				
Intention (to attend)	**12626.5** ^{mw} **	**3341** ^{mw} ***	**120** ^{mw} **	**1248** ^{mw} **
Subjective norm:colleagues(1)	**17123.5** ^{mw} *	4648.5 ^{mw}	272 ^{mw}	1482 ^{mw}
Subjective norm:colleagues(2)	**15702.0** ^{mw} **	3949.5 ^{mw}	326 ^{mw}	1571 ^{mw}
Subjective norm: family	**16905.5**^{mw} **	4649 ^{mw}	264 ^{mw}	1591 ^{mw}
Attitudes: Efficacy of screening	**17478.5** ^{mw} *	4605 ^{mw}	264 ^{mw}	1418.5 ^{mw}
Attitudes: Health value	19454.0 ^{mw}	4817.5 ^{mw}	313.5 ^{mw}	1600.5 ^{mw}
TPB[a]				
Self-efficacy (PBC)	**17834.5**^{mw} **	**4247.5** ^{mw} *	364 ^{mw}	1595 ^{mw}
SLT[b]				
Internal	1.51 ^{t}	1.59 ^{t}	0.39 ^{t}	0.01 ^{t}
Powerful Others	0.16 ^{t}	0.48 ^{t}	0.70 ^{t}	1.13 ^{t}
Chance	1.56 ^{t}	0.44 ^{t}	0.32 ^{t}	0.07 ^{t}
Other variables				
Knowledge:				
Main Causes	16334.5 ^{mw}	5160.0 ^{mw}	**148.0** ^{mw} *	1387.5 ^{mw}
Specific Behaviours	17724.5 ^{mw}	5161.0 ^{mw}	193.0 ^{mw}	1245.5 ^{mw}
Unalterable Causes	17029.5 ^{mw}	5078.0 ^{mw}	196.0 ^{mw}	1303.5 ^{mw}
Number Correct	19808.5 ^{mw}	4982.0 ^{mw}	395.5 ^{mw}	1531.5 ^{mw}
Number of Misconceptions	19000.5 ^{mw}	5023.0 ^{mw}	384.0 ^{mw}	1655.5 ^{mw}
Number of Uncertainties	20863.0 ^{mw}	5197.5 ^{mw}	374.5 ^{mw}	1633.0 ^{mw}
Health status	**18260.0** ^{mw} *	4510.5 ^{mw}	397 ^{mw}	1549 ^{mw}

*p<.05 **p<.01 ***p<.001

[16] significant results are shown in bold type

[17] The additional variables which are added to the HBM to create the 'extended HBM' are *health value* and *health locus of control factors.*

Within the list of possible barriers to screening, non-attenders were more likely to see possible barriers as *fear of the results of screening - of what they may find* (χ^2 = 9.83, df = 1, p = .002), *don't want anyone to tell me how to live my life* (χ^2 = 7.62, df = 1, p = .006), *couldn't give up smoking* (χ^2 = 4.55, df = 1, p = .03), *I don't know enough about it* (screening) (χ^2 =5.43, df = 1, p = .02), *I already feel healthy* (χ^2 = 5.79, df = 1, p = .02), and *already know my risks* (χ^2 = 8.76, df = 1, p = .003).

With regard to the variables of the TRA, attenders had a higher *intention* to attend the mobile screening unit (mean rank = 230.7) than non-attenders (mean rank = 159.5) (Mann-Whitney U = 12626.5, p = .000). Attenders were also more likely to report that their *family* approved of screening (mean rank = 195.8) than non-attenders (mean rank = 229.9) (Mann-Whitney U = 16905.5, p = .003), that their *colleagues* would support them (attenders mean rank = 196.1; non-attenders mean rank = 224.1, Mann-Whitney U =17123.5, p=.013) and that a high proportion of their *colleagues* would want to be screened (Attenders mean rank = 190.9, non-attenders mean rank = 224.7, Mann-Whitney U = 15702.5, p = .003). Moreover, attenders believed more in the *efficacy of screening* (mean rank = 217.2) (Mann-Whitney U = 17478.5, p = .015) than non-attenders (mean rank = 190.3). The additional variable which turns the TRA into the TPB, *self-efficacy(PBC)*, was found to distinguish between attenders (mean rank = 221.43) and non-attenders (192.38), with attenders having the stronger *self-efficacy* beliefs (Mann-Whitney U = 17834.5, p = .009).

As regards the other variables investigated, attenders perceived themselves to have a higher health status (mean rank = 201.7) than non-attenders did (mean rank = 225.5) (Mann-Whitney U = 18260.0, p = .04). There were no significant differences between attenders and non-attenders on any of the knowledge variables.

2.4.4.2 Differences between attenders and non-attenders within each separate worksite

Demographic factors

Comparing the demographic variables of attenders and non-attenders at each separate worksite, there was found to be only one significant difference: at Worksite 2, attenders were more likely to have continued their education after school (29%) than non-attenders (7.3%), $\chi^2 = 4.24$, df = 1, $p<.05$.

Social cognition variables

Looking at the individual social cognition variables at each worksite separately there were very few differences found between attenders and non-attenders (Table 3). The only variable which was able to differentiate between attenders and non-attenders consistently (i.e. at all three worksites) was *intention to attend*. In Worksite 1, *barriers* and *self-efficacy* also differed significantly between attenders and non-attenders. In Worksite 2, *benefits, cue to action* and *knowledge of main causes* were significant. However, in Worksite 3, there were no significant differences between attenders and non-attenders apart from *intention to attend.*

2.4.5 What power do the four social cognition models have to discriminate between attenders and non-attenders? (multivariate analyses)

Variables of each of the social cognition models investigated in this study were entered into discriminant function analyses (direct method) in order to determine:

(1) if the specific set of variables as defined by the model could reliably predict attendance behaviour (the smaller the value of Wilk's Lambda, the more reliable are the set of variables in predicting behaviour. Chi-square is used to test the significance of Wilk's Lambda).

(2) which variables in each model were most important in predicting attendance behaviour (correlations between the predictors and the function indicate the importance of each variable within the function. Those variables which have a correlation of greater than .3 with the discriminant function are regarded as

important. Thus, such correlations are indicated in bold in the following tables of results.)

(3) how well the model could classify subjects as attenders and non-attenders given their scores on the model's discriminant function. (Tabachnik & Fidel, 1989, p. 507)

2.4.5.1 The Health Belief Model (HBM) : core and extended versions

As shown in Table 4, the variables of the core HBM (i.e. *number of benefits, number of barriers, perceived susceptibility* and *cue to action*) were found to discriminate significantly between attenders and non-attenders (Wilk's Lambda = .91, $\chi^2 = 34.48$, df = 4, p = .000). As indicated by their correlation with the discriminant function, the variables most important for predicting attendance were *number of barriers, cue to action* and *perceived susceptibility (NB. attenders had lower perceived susceptibility).* The model was able to correctly classify 68.6% of attenders and 56.4% of the non-attenders. Overall, 63.9% of the subjects were correctly classified.

Table 4: Discriminant function analyses: discriminating between attenders and non-attenders using variables from the core HBM

Variables entered (direct method)	Pooled within-group correlations between variables and the discriminant function
Number of Barriers	**.68**
Cue to action	**-.60**
Perceived Susceptibility	**.43**
Number of Benefits	-.27
Wilk's lambda	.91
Significance of overall discrimination (χ^2) (df=4)	34.48**
Correct classification of attenders (N=226)	68.6%
Correct classification of non-attenders (N=140)	56.4%
Overall correct classification	63.9%

** = p<.001

As shown in Table 5, the variables of the extended HBM[18] (i.e. *number of benefits, number of barriers, perceived susceptibility, cue to action, internal, chance and powerful others locus of control, health value*) were found to discriminate significantly between attenders and non-attenders (Wilk's Lambda =.89 χ^2 =37.6, df =8, p <.001). As indicated by their correlation with the discriminant function, the variables most important for predicting attendance were the same as for the core HBM, i.e. *number of barriers, cue to action* and *perceived susceptibility*. The model was able to correctly classify 65.7% of attenders and 56.7% of the non-attenders. Overall, 62.3% of the subjects were correctly classified.

[18] *Intention to attend* was not included in the extended version of the HBM although it has been added to the HBM in some previous studies. It was used in previous studies as a possible mediator (and often measured as the dependent variable) between the health beliefs of the HBM and behaviour and not just as an additional variable of the HBM.

Table 5: Discriminant function analyses: discriminating between attenders and non-attenders using variables from the extended HBM

Variables entered (direct method)	**Pooled within-group correlations between variables and the discriminant function**
Number of barriers	**-.68**
Cue to action	**.47**
Perceived susceptibility (1)	**-.42**
Number of benefits	.29
Health value	.25
Internal locus of control	.24
Chance locus of control	.17
Powerful others locus of control	.05
Wilk's lambda	.89
Significance of overall discrimination (χ^2) (df=8)	37.6*
Correct classification of attenders (N=210)	65.7%
Correct classification of non-attenders (N=127)	56.7%
Overall correct classification	62.3%

** = p<.001

2.4.5.2 The Theory of Reasoned Action (TRA)

As shown in Table 6, the variables of the TRA were found to discriminate significantly between attenders and non-attenders (Wilk's Lambda = .84, χ^2 = 60.39, df = 8, p = .000). The variables most important for predicting attendance were *intention to attend, number of barriers, subjective norm: colleagues(2)* and *subjective norm: family.* The model was able to correctly classify 84.4% of

attenders and 53% of the non-attenders. Overall, 72.4% of the subjects were correctly classified.

Table 6: Discriminant function analyses: discriminating between attenders and non-attenders using variables from the Theory of Reasoned Action

Variables entered (direct method)	**Pooled within-group correlations between variables and the discriminant function**
Intention to attend	**.88**
Attitudes: number of barriers	**-.58**
Subjective norm: colleagues (2)	**-.38**
Subjective norm: family	**-.35**
Attitudes: number of benefits	.23
Attitudes: efficacy of screening	.22
Attitudes: colleagues (1)	-.20
Attitudes: health value	-.19
Wilk's lambda	.84
Chi-square	60.39 (df = 8)*
Correct classification of attenders (N=218)	84.4%
Correct classification of non-attenders (N=134)	53%
Overall correct classification	72.4%

* = p<.001

The TRA postulates that *intention to attend* mediates the effect of the other variables. To investigate this, two further discriminant function analyses were performed following a similar methodology to that used by King (1982). The first included all the variables except *intention to attend* in order to find out the importance of the other variables in predicting behaviour. The Discriminant Function Analyses was therefore performed in a stepwise manner to see which, if any, of the other variables were important in predicting behaviour. The two

variables *number of barriers* and *subjective norm: family* emerged as significant predictors of attendance behaviour, together forming a significant discriminant function (Wilk's Lambda = .94, $\chi^2 = 23.59$, df = 2, p = .000) which was able to correctly classify 69% of attenders, 58% of non-attenders and 64.8% of the subjects overall (Table 7). So, without *intention to attend* this group of variables is less successful.

Table 7: Discriminant function analyses: discriminating between attenders and non-attenders using variables from the TRA except intention

Significant Discriminating Variables (stepwise method)	**Pooled within-group correlations between variables and the discriminant function**
Step 1: Number of barriers	**.83**
Step 2: Subjective norm:family	**.62**
Wilk's lambda	.94
Chi-square (df=2)	23.59 *
Correct classification of attenders (N=239)	69%
Correct classification of non-attenders (N=150)	58%
Overall correct classification	64.8%

*p<.001

The second further analyses investigated *intention to attend* alone and its ability to classify subjects. It was expected that the overall percentage of cases correctly classified would be similar to the original analyses if *intention to attend* was explaining most of the variance in attendance behaviour. This was indeed found to be the case, *intention to attend* alone classifying 72.4% of the cases correctly (Table 8). It was also found that *intention to attend* was more accurate in classifying attenders compared to non-attenders, 90% and 43.9% respectively.

Table 8 : Classification of cases: predicting from intention to attend alone

Correct classification of attenders (N=251)	90.0%
Correct classification of non-attenders (N=155)	43.9%
Overall correct classification	72.4%

Multiple regression analysis was performed to determine the predictors of *intention to attend* since the TRA predicts that *intention* is a mediating variable between other beliefs and behaviour. All the significant univariate variables except *intention to attend* were regressed using a stepwise method onto *intention to attend* as the dependent variable. Three significant predictors emerged which together explained 22% of the variance in *intention to attend* - these were *subjective norm: family, number of barriers* and *health value.* (Table 9).

Table 9 : Stepwise multiple regression analyses of health beliefs from the TRA with intention as the dependent variable

Predictor variables	**Adjusted r^2 change**	**sig. F**	**B**	**β**	**sig. t**
Subjective norm: family	.15	.0000	-.20	-.32	.0000
Attitudes: number of barriers	.05	.0000	-.14	-.22	.0000
Attitudes: health value	.02	.0000	-.07	-.13	.01
Total variance explained	22%				

2.4.5.3 The Theory of Planned Behaviour (TPB)

As shown in Table 10, the variables of the TPB were found to discriminate significantly between attenders and non-attenders (Wilk's Lambda = .84, χ^2 = 61.14, df = 9, p = .000). The variables most important for predicting attendance

were *intention to attend, number of barriers, subjective norm: colleagues(2)* and *subjective norm: family.* The variable which distinguishes the TPB from the TRA, *self-efficacy,* was not found to be an important variable in the function. The model was able to correctly classify 83.9% of attenders and 51.5% of the non-attenders. Overall, 71.6% of the subjects were correctly classified.

The TPB model predicts that both intention and self-efficacy (PBC) will be the primary determinants of behaviour. Thus a further, stepwise, Discriminant Function Analyses was performed with only *self-efficacy* and *intention to attend* as the independent variables. The result was that only *intention to attend* emerged as a significant predictor. *Self-efficacy* did not enter the equation.

Table 10: Discriminant function analyses: discriminating between attenders and non-attenders using variables from the TPB

Variables entered (direct method)	**Pooled within-group correlations between variables and the discriminant function**
Intention to attend	**.88**
Attitudes: number of Barriers	**-.58**
Subjective norm:colleagues (2)	**-.38**
Subjective norm: family	**-.34**
Self-efficacy (PBC)	.28
Attitudes:number of benefits	.22
Attitudes: Efficacy of screening	.21
Subjective norm:colleagues (1)	-.20
Attitudes: Health value	-.19
Wilk's lambda	.84
Chi-square(df = 9)	61.14*
Correct classification of attenders (N=218)	83.9%
Correct classification of non-attenders (N=134)	51.5%
Overall correct classification	71.6%

* = p<.001

2.4.5.4 Social Learning Theory (SLT)

As shown in Table 11, the variables of SLT were not found to discriminate significantly between attenders and non-attenders (Wilk's Lambda = .97, χ^2 = 12.36, df = 6, NS).

Table 11: Discriminant function analyses: discriminating between attenders and non-attenders using variables from Social Learning Theory

Variables entered (direct method)	
Self-efficacy	
Efficacy of screening	
Health value	
Internal	
Chance	
Powerful others	
Wilk's lambda	.97
Chi-square (df=6)	12.36 NS

2.4.5.5 Group of Univariately Significant Variables

The next step in the analyses was to examine the predictive power of those variables which significantly discriminated between attenders and non-attenders at the univariate level. As these variables were not derived from a specific model, a stepwise Discriminant Function Analyses was performed to reduce the number of predictors in the function and to determine the most powerful predictors of attendance behaviour (Table 12).

The variables entered were *intention to attend, number of barriers, number of benefits, subjective norm: colleagues(1), subjective norm: colleagues(2), subjective norm: family, self efficacy, efficacy of screening, health status, perceived susceptibility, knowledge of main causes, cue to action* and *number of misconceptions.* Only three of the variables emerged as significant discriminating variables, *intention to attend* at step 1, *number of barriers* at step 2 and *cue to action* at step 3. Together these three variables formed a significant discriminant function (Wilk's Lambda = .85, $\chi^2 = 50.2$, df = 3, p = .0000) which was able to correctly classify 81.1% of attenders, 60.1% of non-attenders and 72.9% of the subjects overall.

Table 12 : Discriminant function analyses: discriminating between attenders and non-attenders using all variables significant at the univariate level.

Significant Discriminating Variables (stepwise method)	**Pooled within-group correlations between variables and the discriminant function**
Step 1: Intention to attend	**.86**
Step 2: Number of barriers	**.59**
Step 3: Cue to action	**-.34**
Wilk's lambda	.85
Chi-square	50.2 (df = 3)*
Correct classification of attenders (N=229)	81.1%
Correct classification of non-attenders (N=148)	60.1%
Overall correct classification	72.9%

* = p<.001

Intention to attend

Intention to attend was again the most important predictor in the set of variables. Since *intention* alone has been found to be able to classify 72.4% of subjects correctly (Table 8), and the overall correct classification using all these variables was 72.9%, it seems that *intention to attend* alone was explaining the greatest proportion of variance in attendance behaviour. To investigate the explanatory power of the other variables in this set, a further stepwise discriminant function analyses was performed without *intention to attend.* The variables *number of barriers, subjective norm: colleagues(2)* and *knowledge of main causes* were the three variables which emerged in the stepwise analyses. These variables formed a significant discriminant function (Wilk's Lambda = .93, χ^2 = 28.82, df = 3, p = .000) which was able to correctly classify 72.6% of attenders, 52.7% of non-

attenders and 65.3% of the subjects overall (Table 13). So, without *intention to attend* this group of variables is less successful, particularly in the classification of attenders and different variables (except *number of barriers*) are the important predictors.

Table 13: Discriminant function analyses: discriminating between attenders and non-attenders using all variables significant at the univariate level except intention

Significant Discriminating Variables (stepwise method)	**Pooled within-group correlations between variables and the discriminant function**
Step 1: Number of Barriers	**.74**
Step 2: Subjective norm:colleagues (2)	**.57**
Step 3: Knowledge of main causes	**-.49**
Wilk's lambda	.93
Chi-square (df=3)	28.82 *
Correct classification of attenders (N=229)	72.6%
Correct classification of non-attenders (N=148)	52.7%
Overall correct classification	65.3%

*p<.001

Following this, it was decided to perform multiple regression analyses to determine the predictors of *intention to attend* from this set of variables. All the significant univariate variables except *intention to attend* were regressed using a stepwise method onto *intention* as the dependent variable. Only two significant predictors emerged which together explained 19% of the variance in *intention*: these were *subjective norm: family* and *number of barriers* (Table 14).

Table 14 :Stepwise multiple regression analyses of the group of significant variables with *intention* as the dependent variable

Predictor variables	**Adjusted r^2 change**	**sig. F**	**B**	**β**	**sig. t**
Subjective norm: family	.13	.0000	.21	.33	.0000
Attitudes: number of barriers	.06	.0000	.16	.25	.0000
Total variance explained	**19%**				

2.4.5.6 Comparison of the models

Table 15 shows how the different models compare in their ability to reliably predict attendance behaviour (Wilk's Lambda) and to correctly classify subjects as attenders and non-attenders. The TRA was the most successful of the social cognition models, with the lowest value for Wilk's Lambda and the highest number of subjects correctly classified (72.4%). The addition of *self-efficacy* to the latter model did not improve its discriminating ability. The HBM produced a significant discriminant function but did less well in classifying the groups (63.4%). SLT was the least successful model. The combination of variables derived from this theory did not significantly predict attendance behaviour. Finally, the combination of univariately significant variables produced a significant discriminant function. Overall, this function was no more successful than the TRA in classifying subjects.

The variable, *intention* itself was able to classify as many subjects correctly as all of the variables of the TRA and more subjects correctly than all of the variables in either the TPB or the HBM (core or extended versions). It should be noted, however, that *intention* was much less successful in the classification of non-attenders (43.9%) than in the classification of attenders (90%).

Table 15: Comparison of the models

Model	TRA	TPB	HBM (core)	HBM (extended)	SLT	Combination #	*Intention*
Wilk's Lambda	.84*	.84*	.91*	.89*	.97 NS	.85*	—
Overall Correct Classification	72.4%	71.6%	63.9%	62.3%	—	72.9%	72.4%
Correct classification of attenders	84.4%	83.9%	68.6%	65.7%	—	81.1%	90.0%
Correct classification of non-attenders	53%	51.5%	56.4%	56.7%	—	60.1%	43.9%

* Chi-square significance, $p < .001$

This refers to the combination of variables significant at the univariate level.

The only combination of variables which worked slightly better than *intention* alone was that consisting of *intention, number of barriers* and *cue to action* (see Table 12).

2.4.6 Are there any differences between worksites concerning the variables and models which are predictive of attendance?

There were fairly striking differences found between the worksites in terms of the models' predictive power and the variables most useful for discriminating between attenders and non-attenders (Table 16).

At Worksite 1, all the social cognition models applied in this study except SLT were able to significantly discriminate between attenders and non-attenders. The TPB was the best overall predictor of attendance behaviour for this worksite. However the group of significant univariate variables was slightly more effective in classifying subjects. Overall, *intention to attend* followed by *number of barriers* were the most important discriminating variables for this worksite.

Table 16: Summary of Discriminant Function Analyses for each separate worksite

Model		Worksite 1	Worksite 2	Worksite 3
HBM (core) (direct method)	**Lambda** **Total correct classification** **Important Discriminators**[19]	.93** 63.4% number of barriers, susceptibility	.78 * 72.6% cue to action, number of benefits	.99 NS — —
HBM (extended) (direct method)	**Lambda** **Total correct classification** **Important Discriminators**	.91* 65.2% number of barriers susceptibility	.59* 78.57% number of benefits cue to action internal locus health value	.94 NS — —
TRA (direct method)	**Lambda** **Total correct classification** **Important Discriminators**	.83*** 71.7% intention, number of barriers	.54** 90.2% number of benefits, health value, intention, number of barriers, colleagues (2)	.93 NS — —
TPB (direct method)	**Lambda** **Total correct classification** **Important Discriminators**	.83*** 72.2% intention, number of barriers, self-efficacy	.53** 90.2% number of benefits health value, intention, number of barriers, colleagues (2)	.92 NS — —
SLT (direct method)	**Lambda** **Total correct classification** **Important Discriminators**	.96 NS — —	.89 NS — —	.97 NS — —
All univariate (stepwise)	**Lambda** **Total correct classification** **Important Discriminators**	.85*** 72.8% intention, number of barriers	.44*** 79.3% cue to action number of benefits number of misconceptions number of barriers	.94* 78.1% intention
Intention to attend	**Lambda** **Total correct classification**	.85*** 70.7	.87** 63.6%	.95** 78.1%

* chi-square significance, p<.05 ** chi-square significance, p<.01; ***chi-square significance p < .001

[19] Important discriminators are those which are correlated with the discriminant function by >.3. The variables have been listed in order with strongest correlations first.

At Worksite 2, again all the social cognition models, except the SLT, formed significant discriminant functions. The TRA and the TPB were equally the most successful models and able to discriminate between and classify attenders and non-attenders much more successfully than in Worksite 1. At this worksite these models were also more successful than the group of significant univariate variables. Several important discriminating variables emerged across the analyses, i.e. *cue to action, number of benefits, health value, intention, number of barriers,* and *subjective norm:colleagues, number of misconceptions* and *internal locus of control*. *Intention,* surprisingly, did not appear as a significant predictor in the stepwise analyses of the combination of univariate variables, and it was less important than *number of benefits* and *health value* in both the TRA and the TPB.

At Worksite 3, none of the models formed reliable discriminant functions. Of the group of significant univariate variables, only *intention* emerged in the stepwise analyses. It was thus surprising that neither the TRA or TPB were predictive at this worksite considering the inclusion of *intention* in these models. This is probably explained by the fact that the variables of the TRA and TPB were entered in a direct manner (all together) in the discriminant function for this analyses. The <u>combination</u> of variables of the TRA/TPB were not predictive, <u>only</u> *intention*. Of the three worksites, *intention* alone was able to classify more of the subjects as attenders or non-attenders at Worksite 3. *Intention* alone was least effective at Worksite 2.

2.5 Discussion

2.5.1 The rate of uptake

The overall uptake rate across the three worksites (62.4%) was similar to previous studies in general practice settings (cf. Norman, 1993). So the hypothesis that the rate of uptake would be higher, due to greater convenience in worksite settings, was not supported. However the uptake rates varied widely across worksites with the rate being particularly high at Worksite 3 (81%) and particularly low at Worksite 2 (28%), suggesting that convenience of attending may vary across worksites.

Klesges *et al* (1989) speculated that the success of worksite screening programmes may be affected by the nature of the worksite in terms of the socio-economic level of the workers, management/worker relations and the size of the worksite. There were thus three possible explanations for the difference in uptake rates to be investigated.

First, comparison of demographic data across worksites confirmed that there were differences in the social composition of the workforces: the three worksites differed in mean age ($F(2,420) = 4.38$, $p = .013$), sex ratios ($\chi^2 = 47.76$, $df = 2$, $p = .000$)) and education levels ($\chi^2 = 111.72$, $df = 22$, $p = .000$). Worksite 2 (which had the lowest uptake rate) had the youngest mean age, the least number of females (N=1!) and the lowest proportion of workers educated beyond school.

Second, observation of the system used to inform workers of the presence of the screening unit indicated that management/worker relations in terms of communication were different across the three worksites. Workers at Worksites 1 and 3 worked in a fixed location and were personally informed via their mailing system of the availability of screening, whereas workers at Worksite 2 were a mobile workforce who only received general advertising (i.e. posters in their canteen) about the screening unit. Comparing the variable *cue to action* across the three worksites confirmed that Worksite 2 were less well informed of the availability of screening: at the three worksites, 80.4%, 38% and 86% respectively

knew that their workplace planned to have a screening programme ($\chi^2 = 61.82$, df = 2, p = .000).

Third, the sizes of the three worksites differed. Moreover, questionnaire response rates differed across worksites which was probably a result of the methodological problem of researchers not gaining the same access to workers at each worksite. The response rate was much higher in Worksite 2 (93%) where researchers were able to give questionnaires to the workers personally and collect completed questionnaires immediately. The low uptake rate of this group may reflect the rate of a less biased sample. Those who completed the questionnaires at the other two worksites may have done so because they had an interest in health and screening and thus were more likely to attend the screening unit anyway.

2.5.2 Comparing attenders and non-attenders with individual variables

Attenders were found to be older, as found in previous studies (Greenlick *et al*, 1979; Pill *et al*, 1988), and more likely to be female than non-attenders.

In the overall sample (taking the three worksites together), there were several significant differences in social cognitions. As hypothesised, these cognitions were generally in line with models' predictions of who will act. Notable exceptions were *health value* and the three health locus of control components, *internal, powerful others* and *chance*. These variables did not distinguish between attenders and non-attenders. Moreover, the *perceived susceptibility* relationship was the reverse of that expected, i.e. those who perceived themselves to be more susceptible to disease were *less* likely to attend. The HBM predicts that perceived susceptibility will be a predictor of behaviour, not that perceived susceptibility will be a predictor of <u>not</u> acting as has been found in this study. Seydal *et al* (1990) found a similar result for cancer screening. Marteau (1993) has argued that attenders may have a lower perceived susceptibility because attenders know that they are about to undergo an action likely to reduce the threat. A possible explanation for why <u>non-attenders</u> have a <u>higher</u> perceived susceptibility is that the perceived barriers to screening (e.g. finding out that you

are at risk of heart disease) may be too great for those who feel susceptible which subsequently prevents their attending.

Across the three worksites there was found to be inconsistency in the beliefs predictive of attendance. The only belief which was consistently predictive in each of the three worksites was *intention to attend.* This is in line with the TRA and TPB models in which *intention* is the important link in the pathway between beliefs and behaviour. Marteau *et al* (1992) stated that attendance at screening should be viewed as a heterogeneous behaviour, which suggests that different beliefs will be predictive of attendance for different people in different situations. As shown above, the three worksites have different social compositions and thus might be expected to have different predictors of attendance. It seems plausible from these results that *intention to attend* may be determined by different beliefs in the three worksites, but is a common mediating route between diverse beliefs and behaviour.

2.5.3 The power of the models to discriminate between attenders and non-attenders

It should be acknowledged at this point that the operationalisation of some of the variables limits the extent to which this study can be an adequate test of the theories. The most powerful comparison of the different theories would require that each theory was operationalised exactly as proposed by the original authors. However, due to the nature of this study and previous research findings in this area, some of the variables were not operationalised in the traditional manner, i.e. *subjective norm* from the TRA/TPB and *perceived behavioural control* from the TPB. Reasons for these operationalisations have been given on pages 75 and 68 respectively. Moreover, the component of *severity* was completely missing from the HBM, as explained on page 67. So although it is important to compare and contrast the models and test their predictive power, the extent to which this can be generalised to studies with different outcome health behaviours is limited.

TRA, TPB and HBM (core and extended versions) were all able to discriminate between attenders and non-attenders as indicated by the significance of the discriminant functions formed by their component variables.

It should be noted at this point that five outliers had to be removed before the discriminant function analyses was carried out in order to prevent reduced sensitivity of the statistical method. These outliers were found to have a low intention to attend and yet had subsequently attended. This behaviour counteracts the flow of the TRA/TPB and these five subjects were obviously different from the majority of the other subjects. To provide a predictive function for the majority of the subjects, it was important that this group of five were removed. However, in an attempt to explain their behaviour it could be proposed that factors such as pressure from their employer to attend may have been relevant in this situation.

For each of the models, not all the variables included were important predictors of attendance, and thus may be said to be less important components of the models. In particular, although the *number of barriers* was an important predictive component of the HBM (core and extended), the TRA and the TPB, the number of *benefits* was much less important. Also, *self-efficacy,* (or PBC) the extra component added to the TRA to create the TPB was not found to be an important variable in the model. This result may have been due to the operationalisation of the variable in this study. First, it was a single-item measure which is likely to be less reliable than a multiple item scale. Second, the wording of the question stressed confidence in being able to make behaviour changes. This may have overstepped the behaviour assessed in this study in that this form of confidence may have little in common with the behavioural control required to attend a screening appointment, although previous research showed that the latter form of behavioural control was not predictive of attendance either (Conner and Norman, 1992). Third, confidence in one's ability to make behaviour changes may have an ambiguous effect in that for some people it may encourage their attendance whereas for others it may defeat the purpose of attending.

The TPB did not have greater power than its predecessor as hypothesised, possibly due to the lack of influence of *self-efficacy* (PBC) as pointed out above. The joint components of the TRA formed the most successful discriminant function for predicting attendance behaviour. Further testing of the model itself

confirmed the model's structure. *Intention* alone was just as successful in classifying the whole group of subjects as all the variables put together. Yet, the correct classification of attenders was much higher than the correct classification of non-attenders. Having knowledge of someone's *intention* alone may allow one to predict whether they will attend, but other variables will be needed to predict whether they will not attend. Twenty-two per cent of the variance in *intention* was explained by *attitudes* and *subjective norm*. So, the model's claims that *attitudes* and *subjective norm* will predict *intention* which will subsequently predict behaviour have been supported by this data.

As hypothesised, the TRA was superior to the HBM, possibly due to the omission of *intention* in the latter. Moreover, the TRA contained more of its original components, while the HBM had *severity* missing. Although an 'extended' version of the HBM has been used in previous studies of attendance at health checks, this study also tested the 'core' HBM as a valuable comparison with the other social cognition models and as a means of assessing the usefulness of the recent additions. Both versions formed significant discriminant functions, but the core version was actually able to classify as many of the subjects correctly as the extended version. Thus the addition of extra variables to the HBM may not add to its predictive power.

SLT was the least successful of the social cognition models assessed, as was hypothesised. Its component variables were unable to form a significant discriminant function either in the overall sample or in each separate worksite. Although variables from SLT, especially *self-efficacy* have been useful in explaining a range of health behaviours as detailed in the introduction, they have not been found to be predictive of attendance at health checks (Norman, 1991). Norman (1991) has criticised SLT for being 'too narrow' a theory. Perhaps it just cannot extend to such a wide range of health behaviours as can the other social cognition models.

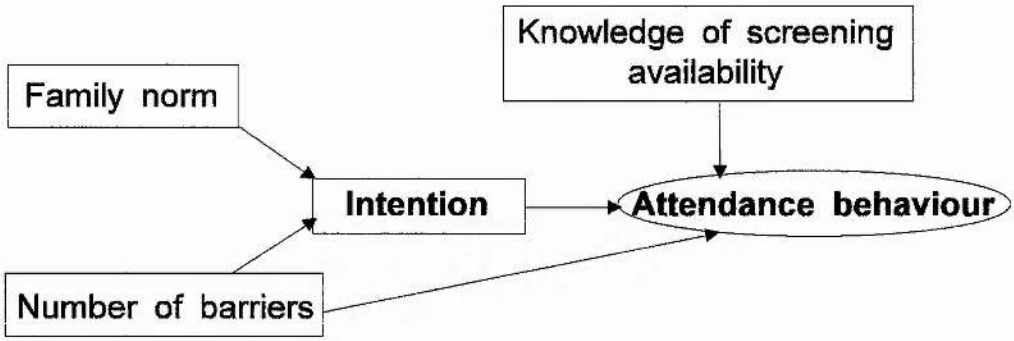
It might have been expected that the group of significant univariate variables, which were all, individually, able to distinguish between attenders and non-attenders would form the best 'model' to predict attendance behaviour. The

stepwise analyses of these variables found that only three predictors (out of 13) emerged, and were able to classify 72.9% of the subjects correctly, i.e. only 0.5% better classification than the best of the social cognition models, the TRA. The limited set of variables of the TRA was able to classify at least as many of the subjects correctly as the more extensive set of univariate significant variables. This result stresses the importance of the use of theoretical models as opposed to long lists of useful variables. It also emphasises the importance of the use of multivariate analyses. When the 13 significant univariate variables were entered into multivariate analyses, only three emerged as significant discriminating variables.

2.5.4 The model that fits the data

Figure 1 gives a pictorial representation of the model which fits this data. Notably, the variables, *number of barriers* and *cue to action* were found to predict behaviour in addition to *intention*. This model could be described as a successful mixture of certain components of the HBM and the TRA. Alternatively, this finding may reflect current thinking in the field of health behaviour change. Schwarzer (1992) has stressed the importance of the concept of *self-efficacy* in the health action process as a predictor of both *intention* and behaviour. Perhaps, the operationalisation of *perceived barriers* as used in this study could be another way of operationalising *self-efficacy*. Indeed, it has been suggested that the concept of *perceived barriers* may be similar to the concept of *self-efficacy* (Conner, 1993). Similarly, the success of the *cue to action* construct may reflect recent conceptualisations of the intention-behaviour gap. The *cue to action* of the HBM is seen as a factor influencing health threat, but not as a factor influencing actual behaviour. However, Weinstein (1988) and Schwarzer (1992) have emphasised the importance of situational factors (or external cues) in the enactment of behaviour once intention is reached.

Figure 1: The model that fits the data



2.5.5 Differences in the models across worksites

As hypothesised, there were differences across the three worksites, both in terms of the variables significant at the univariate level and the models' power in predicting attendance behaviour.

From the univariate analyses, it was found that there were five variables which distinguished between attenders and non-attenders at Worksite 2, three at Worksite 1 and only one (*intention*) at Worksite 3.

Although all the models (except SLT) formed significant discriminant functions at both Worksites 1 and 2, the functions were more successful in classifying attenders and non-attenders and more of the variables within the models were important predictors at Worksite 2. At Worksite 3, none of the models (all variables entered together) was able to predict attendance behaviour. Only *intention* was a significant predictor, but was able, single-handedly (!) to classify 78.1% of subjects correctly.

Moreover, important predictors varied across worksites. Notably, *intention* was less important in Worksite 2. Also, where *number of barriers* was meaningful in Worksite 1, *number of benefits* was more predictive at Worksite 2.

Two possible explanations for these differences across worksites are outlined below. First, communication at the three worksites was very different. These

communication differences are reflected in the uptake rates as discussed previously but they may also have had an effect on the differences in predictive models and variables. The variable *cue to action* was only predictive of attendance at Worksite 2 where the workers had not generally been informed of the availability of screening. Less individual health beliefs and models were predictive at Worksite 3 which may be a reflection of the workers being organised to attend, rather than making their own decision.

Second, a stage model approach, such as the Precaution Adoption Process (PAP) (Weinstein, 1988; Weinstein & Sandman, 1992) might explain the differences in predictive variables across worksites. As explained in Section 1.3.2 of Chapter 1, according to the PAP, people can be at different stages in the process towards adopting a precaution (or carrying out a health behaviour, such as attending screening). It is postulated that when people move towards making the decision to act they do not have increasing levels of the same beliefs (e.g. number of benefits) as would be predicted by the social cognition models applied in this study. Instead they have different beliefs at each stage. The model predicts that as someone moves towards making an *intention* to act, the other social cognition variables would be expected to become less predictive.

At Worksite 2, *intention* was less important as a predictor of attendance and <u>more</u> of the other cognitive variables were important at this worksite than at the other two worksites. At Worksite 3, only *intention* was predictive of attendance and none of the other health belief variables distinguished between attenders and non-attenders. It could therefore be suggested that the worksites were at different stages of the PAP. Worksite 2 was perhaps at an earlier stage of the process where social cognition variables are likely to be predictive. Worksite 3 on the other hand was likely to be at a later stage where social cognition variables are less likely to be predictive. Further analyses of the social cognition variables across the worksites showed that, of the three worksites, the workers in Worksite 2 had the least *knowledge of main causes* ($F(2,390) = 20.42$, $p = .000$) and the least *intention to attend* (kruskal wallis $\chi^2 = 15.91$, $df = 2$, $p = .0004$).

Nevertheless, the data across worksites on *perceived susceptibility* does not fit in with the hypothesis that Worksite 2 is at an earlier stage of the PAP model. The PAP predicts that those at the later stages of the model will have acknowledged their personal susceptibility, while those at the earlier stages may not have done so. Worksite 2 was, however, found to have the highest level of *perceived susceptibility*, $F(2,390) = 7.39$, $p=.0007$.

Furthermore the results obtained in this study would suggest that an additional stage may be necessary in Weinstein's model before the stage 'deciding to act', i.e. 'being aware that a precautionary action is available'. In the Discriminant Function Analyses of the group of significant univariate variables (Table 12), *cue to action* (i.e. being aware that the screening unit was available to them) was found to be the most significant predictor for Worksite 2. At the other two worksites *intention to attend* was the most significant predictor, so *intention to attend* was only predictive where the majority of workers knew that screening was available. This additional stage may have been an implicit part of Weinstein's theory, but the results of this study suggest that it should be made an explicit stage.

2.5.6 Conclusions and Implications

Despite the various methodological problems of this study concerning response rates, access to workers and operationalisation of some of the variables, it is possible to draw some important conclusions and implications for future work.

- The social cognition models applied in this study (apart from SLT) provide some explanation of uptake of screening in a worksite setting. Using this particular operationalisation of variables from the models, the TRA has performed particularly well. It is apparent, however, that certain construct operationalisations within the TRA could be attributed to different constructs. That is, the success of the variables *barriers* and *cue to action*, (beyond *intention*) in predicting uptake behaviour could be accounted for in the manner of more recent conceptualisations of the factors within the intention-behaviour gap.

- The differences shown across worksites in the predictive power of the models and their constituent variables suggest that a stage model approach may be a useful theoretical tool to guide future research and should be tested further in screening research.

- Considering the probable effect of different methods of promoting the screening unit and organising appointments, etc. on uptake rates, these factors should be examined in more detail in controlled studies.

- The collection of variables found predictive of attendance include beliefs which could be addressed in communication to influence attendance at screening. For example, if workers are made aware of the availability of screening they are more likely to attend.

3. The Health Action Process Approach, the Precaution Adoption Process and the Prediction of Behaviour Change Before and After CVD Risk Factor Screening in General Practice

3.1 Abstract

This prospective study investigated the impact of CVD screening in terms of subsequent health behaviour change at a general practice location. A sample of patients due to attend a screening clinic were sent questionnaires, once before and twice after screening (N=86 (at time 1); N=71 (at time 2); N=59 (at time 3)). The applied aims were to investigate which health belief and action plan variables were related to behaviour change following screening and whether screening itself had an impact on health beliefs and action plans. Two relatively recent theories of behaviour change, the HAPA (Schwarzer, 1992) and the PAP (Weinstein, 1988, Weinstein & Sandman, 1992) were used as the theoretical frameworks in this study. The motivation phase of the HAPA was evaluated in terms of its power to predict attendance behaviour and in terms of its internal structure. The 'stage' structure of the PAP was examined, as was its ability to predict at what stage subjects would be most likely to change their behaviour. Results indicated that perceived threat, outcome expectancies and certain action plans were related to behaviour change, but intention was not associated with behaviour change. Being screened increased intention to change behaviour and the formation of action plans. The data supported the cumulative nature of the stage model, the PAP. Moreover, those at the post-decision/action stage were the most likely to change their behaviour. The motivation phase of the HAPA was able to classify 78.6% of all subjects correctly as changers or non-changers, but its internal structure was questioned due to the unexpected predominance of perceived threat and the lesser importance of intention and self-efficacy. However, the additional 'action phase' in this model showed promise.

3.2 Introduction

As highlighted in Chapter 1(Section 1.3) and in the worksite study as detailed in the preceding chapter, social cognition models have been useful frameworks in health behaviour research, but they also have several shortcomings. Thus the theoretical aim of the present study was to test some of the more recent theories which have attempted to tackle some of these shortcomings.

Again, screening for risk factors for cardiovascular disease (CVD) was the focus of study, but in this study the setting was a general practice in a city centre. Uptake of screening was the health behaviour investigated in the previous study, whereas in the present study the focus of research was health behaviour changes which may occur following screening such as quitting smoking, changing one's diet or taking more exercise. As mentioned in Chapter 1, Section 1.2.4.2, there has been little psychological research on the impact of risk factor screening in terms of health behaviour change. Thus the main applied aim of this study was to provide an understanding of why people may or may not change their health-related behaviour in relation to the risk of CVD and to look at the effect of screening within this process.

The theories which have attempted to tackle some of the problems with social cognition models have been outlined in Chapter 1, Sections 1.3.2 and 1.3.3. The Health Action Process Approach (HAPA) (Figure 6) was proposed by Schwarzer (1992) to refine and extend the earlier social cognition models. It consists of two phases: a motivation followed by an action phase, and, according to Schwarzer (1992), the HAPA is designed to predict preventive actions, change of risky habits and maintainance of health-beneficical behaviours. It can thus extend to the prediction of behaviour change following screening, an outcome for which the previous models are not explicitly designed. However, Schwarzer does not clarify how the components of the motivation phase should be operationalised if the outcome is whether someone has changed their behaviour as opposed to whether someone has acted or not. If the outcome is behaviour change, the operationalisations of all components of the model should reflect this directly.

For example, where '*I intend to attend a health check*' would be expected to predict whether someone had attended or not, '*I intend to make a change to my lifestyle to reduce my risk of heart disease*' would be expected to predict whether or not they had changed their behaviour to protect their health.

Schwarzer (1992) identified the similarities between the constructs of the different models and put together what he proposed were the main predictors of *intention*: *threat, outcome expectancies* (including social outcome expectancies) and *self-efficacy*. These three variables, plus *intention* form the motivation phase of the HAPA.

His recognition of the problem of the intention-behaviour gap led to the proposal of an action phase following on from the motivation phase, dependent particularly on *intention* and *self-efficacy*. Schwarzer hypothesised that *intention* is translated into action plans and that *self-efficacy* has a major influence on the number of scenarios (or means to an end) that can be envisaged, the amount of effort that will be invested and the commitment to carrying out the behaviour.

In addition to this proposal of a process of behaviour change (from motivation to action planning to behaviour change), the HAPA stresses, as do other social cognition models, that these variables do not act to their full potential in isolation; they have a joint effect on behaviour. The model should therefore be tested in terms of whether the supposed process can be supported and how well the variables act jointly to predict behaviour change.

The action phase of the model contains ideas for possible important variables and proposals for how the various variables may be linked. However, as discussed in section 1.3.3.2., the work of Bagozzi (1992) and Gollwitzer (1993) provides further elaboration of how the action phase could be operationalised. Bagozzi's Volitional Model of Goal Directed Behaviours (Chapter 1: Figure 7) involves a process which concerns the elaboration of intentions. The model proposes that the route to action includes devising different ways of achieving the goal (referred to as 'means'), appraising these means and making a commitment to carrying out these means. (As described earlier, Schwarzer's concept of self-efficacy initiates a

similar process, although in his model it is less clearly operationalised.) In the area of CVD risk factor modification, this process may be more complicated because the main goal of changing behaviour to reduce the risk of CVD may have to be broken down into subsidiary goals such as stopping smoking. Perhaps only then can further detailed means on how to achieve this subsidiary goal be formed, such as buying nicotine patches, etc.

Gollwitzer (1993) proposed that if an individual elaborates their intention in terms of when, where and/or how to put it into action (implementation intention), they will be more likely to execute that action. However, an implementation intention is unlikely to be effective unless it is associated with a detailed mean as to how to achieve a goal. In other words, someone who decides when they are going to 'change their diet' may be less likely to change their diet than someone who decides when they are going to 'start eating fruit for breakfast'. So it is important to investigate the effect of implementation intentions attached to detailed means.

The action phase is more a collection of ideas at present rather than an empirically supported model. Thus at this exploratory stage it may be more important to determine which if any of the variables influence behaviour than to 'test' the joint effect of this part of the model.

The study described in the previous chapter concluded that a stage model such as Weinstein's Precaution Adoption Process (PAP) (Chapter 1, Figure 5) may be a useful framework for explaining the results, considering the differences found between worksites in the variables predicting uptake of screening. It was suggested that different worksites may have been at different stages of the PAP. The PAP proposes that individuals go through a cumulative series of cognitively distinct stages towards precaution adoption (which could include behaviour change to reduce CVD risk). Therefore the model implies that those who are at the "planning to act" or "acting" stage will be more likely to act than those at earlier stages or at the final maintenance stage (Weinstein & Sandman, 1992). Moreover, what predicts behaviour will depend on the stage reached. For example, according to Weinstein (1988), those who have reached the "planning to act" stage will be less affected by their health beliefs in the enactment of their

plans. As pointed out in Chapter 1, Section 1.3.4, there is a need to test the PAP in the field of health risk behaviour change as it has only been tested for the adoption of precautions against the lesser known hazard of radon gas (Weinstein & Sandman, 1992).

CVD risk factor screening may be expected to influence progress through the HAPA and the PAP. Within the HAPA, giving the patient an idea of their level of risk during a screening appointment is likely to increase or decrease their perceptions of threat, particularly the susceptibility component, if not the severity component. Providing information on what a patient can do to reduce their risk may increase their outcome expectancies (in terms of believing that changing their behaviour may change their risk) and action plans (in terms of making a decision to change a particular behaviour). Encouraging a patient to change may increase their intention and self-efficacy. Thus, experiencing screening could have an effect on the variables of the motivation and action phases in the HAPA model. It is also possible that screening may move patients along the stages of the PAP; from stage 1 (unaware of the issue) to 2 (aware of the issue but not personally engaged) by increasing their knowledge and awareness of cardiovascular disease; from stage 2 to 3 (engaged and deciding what to do) by increasing their personal engagement in the issue; from 3 to 4 (planning to act but not yet having acted) by providing information to help them decide what to do; from 4 to 5 (acting) by providing counselling on how to change.

It could also be suggested that experiencing screening might affect the <u>relationship</u> between beliefs/action plans and behaviour. If, as described above, screening tends to move people forwards through the process and stages of the HAPA and PAP respectively, then it would follow that health beliefs should become <u>less</u> important predictors of behaviour following screening. Thus it is important to examine the effects of beliefs/action plans both before and after screening on subsequent behaviour change.

3.2.1 Research Questions

1. Do single social cognition variables and action plans predict behaviour change before and after screening? Which beliefs/action plans are predictive?

2. Is the HAPA a useful predictive and explanatory model for behaviour change?

A. In the motivation phase, do *threat, outcome expectancies* and *self-efficacy* predict *intention* as predicted by the model?

B. Does the combination of the variables in the motivation phase predict behaviour? Which beliefs are predictive?[20]

C. Are there links between the motivation and action phases?

3. How useful is the PAP in helping to explain behaviour change?

A. Can the distinct stages and the cumulative nature of the PAP be identified within the sample?

B. Are those at the planning/acting stages of the PAP more likely to make behaviour changes?

C. Do different beliefs predict behaviour change for those at different stages of the PAP?

4. Is there an effect of screening on the variables in the motivation and action phases of the HAPA and on the stages of the PAP?

[20] The HAPA would suggest that the motivation phase would predict behaviour via the action phase. However, several social cognition models go directly from beliefs (HBM) or from intention (TRA/TPB/PMT) to behaviour. Since the HAPA is suggested to be a refined version of these earlier social cognition models, it was decided to test the motivation phase as a predictor of behaviour with the hypothesis that it, in itself, would be more successful than the individual social cognition models from which it is derived.

3.3 Method

The methodology of this study was approved by the Tayside Committee on Medical Research Ethics (April, 1994).

3.3.1 Design

The study had a prospective design. It consisted of three questionnaires, one being sent to the subjects at each of three time-points which were as follows:

Time 1: one or two days before screening

Time 2: approx. 2 weeks following screening

Time 3: 10 -12 weeks following screening

The initial questionnaire (Appendix 3) was a baseline measure and was sent out shortly before screening to ensure a high response rate. That is, subjects were expected to be more likely to return a questionnaire to the health centre at their appointment time if they had received the questionnaire just prior to their appointment. The questionnaire measured health beliefs, action plans and health behaviour practices.

The second questionnaire (Appendix 4) was designed to measure the early cognitive response to screening so was sent up to two weeks following screening. Health beliefs and action plans were measured.

The third questionnaire (Appendix 5) was designed to measure a longer term impact on behaviour, but was kept within three months following screening due to time constraints of the study. Only health behaviour practices were measured at this time-point.

There was some variance in the lengths of time after screening before the mailing of questionnaires, at time (2), due to subjects changing their screening appointments without informing the investigator who discovered only later that they had done so, and at time (3), due to differences in the rates that subjects returned the second questionnaire.

The independent variables were health beliefs and action plans, measured at both time (1) and time (2). Behaviour change was the main dependent variable, measured as the change between time (1) and time (3). However health beliefs and action plans at time (2) also acted as dependent variables as a means of investigating the effect of screening, i.e. whether there was a change in the level of health beliefs and action plans from time (1) to time (2).

3.3.2 Subjects

The sample consisted of patients at a health centre in Dundee, Scotland with a list size of 8250 patients. Subjects were chosen on the basis that they already had an appointment to attend the CVD clinic which was run on one and a half days per week. This appointment had been made for them as part of a systematic invitation programme in the health centre, which invited males aged between 15-74 for cardiovascular risk factor screening and females (aged over 20) for a cervical smear followed by cardiovascular risk factor screening if they had never attended or had not attended within the previous three years. However, the screening clinic was not devoted to these patients; many appointments in the clinic were for follow-up consultations. So, although it was not ideal to include both males and females since the screening procedure was different (females also had a cervical smear), it was necessary to include both to achieve adequate numbers for the proposed design. It was therefore important to check that there were no major sex differences in the results. The target sample size of 100 (at time 1) was based on the fact that approximately 25 weeks were available to carry out the study. It was also based on estimations [using information from the health centre's appointment book and patient notes and data from a previous study carried out in this health centre (see Chapter 4 for details)] that 10 patients would have a first screening appointment each week, that the uptake rate would be about 55% and that the questionnaire response rate would be about 70% (higher than in study reported in Chapter 4 due to convenience of returning questionnaire to health centre in person).

3.3.3 Procedure

Participants were selected by checking the appointments book at the health centre for the list of patients due to attend the screening clinic. Using this list, the patients' notes were found and checked to find out those patients who were eligible for inclusion in the study, i.e. those who had not been screened within the previous three years and therefore were not attending for a follow-up consultation. Addresses were then noted for those patients as well as the date of their screening appointment.

Over a period of 25 weeks, 215 questionnaires were sent to patients to arrive one or two days before their appointment at the clinic. A letter introducing the study plus a patient information sheet and consent form (Appendix 6) plus an addressed envelope were sent with the questionnaire. The letter instructed the subjects, if they wished to participate in the study, to bring back the completed consent form and questionnaire 1 to the health centre when they attended for their screening appointment. The second and third questionnaires were also sent to the patients with a covering letter reminding them of the study and which stage they were at. They both included a stamped addressed envelope to return the completed questionnaire to the investigator at the health centre.

The Screening Clinic

The screening clinic was run by a practice nurse (20 minute session) who recorded information on a standardised form (see appendix 1) about cardiovascular risk factors including: age occupation, family history of premature cardiovascular disease and diabetes, consumption of tobacco, alcohol and salt, exercise participation and relevant history of chest pain. Blood pressure, height and weight were measured. Some counselling on reducing risk factors was given unless the risk factors were very low. Cholesterol measurement was arranged for a later date for some of the subjects.

3.3.4 Measures

The health beliefs described below were derived mainly from the HAPA motivation phase (Schwarzer, 1992) (Chapter 1, Figure 6).

Appendix 3 is a copy of the full baseline questionnaire which includes all the questions measured at all three time points. The measures described below thus give references to this questionnaire by giving the section and numbers where each variable is situated in the questionnaire, e.g. (S2: 1,4) refers to Section 2, items 1 and 4.

3.3.4.1 Independent variables

Motivation Phase

Name of variable	Description / examples of items	No. of items	Response Scale	Range of possible scores	Internal Reliability Cronbach α
Threat:				8-392	
Perceived susceptibility (S2: 1,4) ×	*My physical health makes it likely that I will have a heart attack*	2	7-point		.72
Perceived Severity (S2: 2,3,5,7)	*Having a heart attack would ruin my chances of future happiness*)	4	7-point		.69
Outcome expectancies^ (S3:1,3,5,6,7,8, 10,11,12)	*Making some changes to my lifestyle would help protect me from heart disease* *My family and close friends would encourage me to make some changes to my lifestyle* *Making some changes to my lifestyle would help me feel better and more alive*	9	7-point	9-63	.73
Self-efficacy^ (S3: 2,9)	*I am confident that I would be able to make changes to my lifestyle if I wanted to*	2	7-point	2-14	.87
Intention^ (S3:13,14)	*I intend to make a change in my lifestyle in the next two months to reduce my risk of heart disease*	2	5-point	2-10	.95

^ indicates reverse coding of variable, i.e. high score indicates low extent of variable

Action Phase

The action plans described below have been developed using the concepts of Schwarzer (1992), Bagozzi (1992) and Gollwitzer (1993).

Name of variable	Description / examples of items	No. of items	Response Scale	Range of possible scores	Internal Reliability Cronbach α
Decision to change (S3: 18)	*Have you actually made a decision to make one or more changes in your lifestyle in the next two months to reduce your risk of heart disease?*	1	yes/no	0-1	—
Wrote change (S3: 20)	Subjects asked to write down what particular change they would like to make in the next two months. This variable rated whether they wrote something or not	1	yes/no	0-1	—
Evaluation of decision (S3: 21-27)	Thinking of the above decision to change, subjects were asked to rate how they felt about doing it: *How easy would this be for you to do? How much effort are you prepared to put into doing this,* etc.	7	5-point	7-35	.74
Number of means (S3: 28, 1-3)	Thinking of their decision to change, subjects were asked to write down as many means as they could think of for making this change. 3 blanks were provided.	—	—	0-3	—
Specific means relating to a) exercise, b) diet and c) smoking	a computed variable - did any or all of the subject's *means* (see above) relate to the specific behaviour change or not?[21]	1	yes/no	0-1	—
No. of implementation intentions (S3: 28, 1-3)	Thinking of each of the means to change, subjects were asked if they had decided when they were going to start doing it. The number of yes's were totalled.	3	yes/no	0-3	—
Specific implementation intentions relating to a) exercise, b) diet and c) smoking	Computed variable - did the subject make implementation intentions for means relating to the specific behaviour change[22]	1	yes/no	0-1	—

[21] There were three separate specific means variables computed, one for each of the outcome behaviours; diet, exercise and smoking. Each was a dichotomous variable relating to whether the subject did or did not write down something in the *means* section relating to the specific outcome behaviour.

[22] There were three separate specific implementation variables computed, one for each of the outcome behaviours; diet, exercise and smoking. Each was a dichotomous variable relating to whether the subject did or did not make (an) implementation intention(s) for means which were related to the specific outcome behaviour.

Precaution Adoption Process (PAP) Stages (see Appendix 3, Section 1, 1-6)

Subjects were assessed as to which stage they had reached in the PAP by asking them to agree or disagree with each of six statements relating to the stages of the model as shown in Chapter 1, Figure 5. The model implies that each stage leads on from the one before, e.g. if a subject agrees to statement 5, they should also have agreed to statements 1-4. Therefore, a new variable was computed called 'stage' which gave each subject a stage number from 1-7[23]. A subject was allocated to a particular stage if they had agreed to the statement referring to that stage and all the preceding stages, but not to any subsequent stages.

3.3.4.2 Dependent Variables: Measures of health behaviour change

The measures of health behaviour change covered three main areas: diet, exercise and smoking which together encompass most of the behaviours which are suggested to alter risk of cardiovascular disease.

Behaviour change index (Appendix 3, Section 6)

Subjects were asked to respond to a list of questions relating to each of smoking (4 items), food and drink (12 items) and exercise (4 items). The questions were based on items used in the Scottish Heart Health Study (see Smith *et al*, 1987). All the questions referred to the past week in order to help focus the subject and to be sensitive to change within the relatively short three-month period of the study.

Smokers were asked three different questions relating to how many cigarettes they smoked in a day (Section 6: A. 1-3). Two of the questions had 5-point (A2) and 7-point (A3) response scales respectively relating to different levels of smoking. The response to question A1b related to the actual number of cigarettes smoked, i.e. *During the past week how many did you smoke a day?* The inter-correlations between these three items were high ($r=.94$, $p<.001$; $r=.72$, $p<.001$ and $r=.74$, $p<.001$) which suggested that the measure was reliable. Only

[23] Although the PAP only has 6 stages as shown in the introduction, there were 7 stages defining this sample, allowing for an extra stage where a subject may be aware and personally engaged (e.g. may feel susceptible), but have not yet thought about what they could do to reduce their risk. This point will be discussed later in a theoretical vein.

one of the three questions was therefore used as the measure of **extent of smoking**, A1b, which was chosen for its greater sensitivity to change. This was decided to be more meaningful than a scale developed by adding the three items together, or taking an average of the three items.

The food and drink items consisted of three sections (Section 6, B):

1. The **extent of consumption of 'health' foods** (B 1, 8) (fruit and vegetables, cereals, whole grain breads, oily fish) (2 items)
2. The **extent of consumption of 'unhealthy' foods** (B2-7, 9-10) (high-fat foods and salt) (9 items)
3. The **extent of alcohol consumption** (B11,12) (2 items).

Three scores were derived by adding up the items in each of sections 1 and 2[24] and by multiplying the items in section 3 (*how often did you drink alcohol in the past week? × how much, on average, did you drink on each occasion?*).

There were four exercise items (Section 6, C), two relating to how active the subjects perceived themselves to be, at work (including work around the home) (C1) and in their leisure time (C3), added together to create an **'active' score**, and two relating to how much physical activity they did in the week at work (C2) and in their leisure time (C4), added together to create an **'exercise' score**. By doing this addition of 'work' and 'leisure' scores it was possible to gain an idea of overall exercise.

These six 'behaviour' scores (defined in bold above) were computed for the subjects' responses at time 1 (before screening) and at time 3 (2nd time-point after screening). By subtracting the scores at time 1 from the scores at time 3, behaviour change scores were created. The behaviour change scores were recoded into dichotomous variables. The two groups were those who changed for the better (in accordance with health promotion guidelines) and those who did not change for the better (stayed the same or changed for the worse). The scores were computed in such a manner mainly because the main point of interest was to

[24] In the 'unhealthy foods' section the amount of milk drunk was multiplied by the kind of milk drunk (i.e. skimmed, full fat, etc.) and added to the rest of the items)

predict who changed for the better and who did not, but also to maximise the sizes of the groups for analyses.

Finally, a behaviour change index was computed by adding up the six dichotomous behaviour change variables (coded 0 and 1), giving a maximum score of 6 (six changes for the better) and a minimum of 0 (no changes for the better). This index was used in the analyses as a measure of the number of different behaviour changes made.

Behaviour change ladders (Section 5, 1-3)

The second measure of behaviour change was based on work by Marcus & Owen (1992) and Booth *et al* (1993) which used the model developed by Prochaska and DiClemente (1983) (see Figure 4) to investigate the process of exercise behaviour change. Subjects were shown three sets of statements, one for exercise, one for diet and one for smoking. These statements were in the form of a ladder with 10 rungs, each rung representing a stage between not acting with no intention to change and having acted. Five of the ladder 'rungs' were labelled with statements relating to the five stages of the transtheoretical model (i.e. *I currently do not exercise and do not intend to exercise in the next 2 months; I currently do not exercise but I am thinking about starting to exercise in the next 2 months; I currently exercise a little but not regularly; I currently exercise regularly but have only begun to do so in the last 2 months; I currently exercise regularly and have done so for longer than 2 months*). However, the subjects were encouraged to circle any of the numbers from 1-10, and not to feel restricted to the five statements if they felt their response lay somewhere in-between.

In a similar manner to the development of the behaviour change scores described above, a ladder change score was created for each subject by subtracting their ladder position at time 1 from that at time 3. Again, the ladder change scores were recoded into dichotomous variables because the main point of interest was whether the subjects changed for the better or not, in order to be able to predict behaviour change, not extent of behaviour change. The two groups were: 1)

those who had moved up the ladder (towards maintenance of positive behaviour change) and 2) those who stayed where they were or moved down the ladder. The resulting dichotomous ladder change scores, one for each of exercise, dietary and smoking behaviour, were used in the analyses as measures of specific behaviour change. However, it should be pointed out that these ladder scores do not provide a definitive measure of actual behaviour change. The ladders include both cognitions (rungs 1-4) and self-reports of behaviour (rungs 5-10). So the resulting group who are reported to have changed for the better on the ladder may not actually have changed their behaviour if they have moved for example from rung 2-4. However, this does provide a measure of whether someone has moved upwards in the process of reaching the maintenance of behaviour change.

3.4 Results

Computer package

Data were analysed using SPSS for Windows on the PC.

Data screening

Prior to analysis, all the variables were examined to check for accuracy of data entry, a plausible range of the variable and missing values. This was carried out using aspects of the FREQUENCIES programme in SPSS for Windows. All the ranges were found to be plausible given the variables' construction and most of the missing values were seen to be randomly distributed throughout the sample and the variables. There was however a problem with missing values in the variables of the action phase of the HAPA. There was a shortage of numbers who completed the 'action phase of the HAPA' section (Section 3: 20-28) due to the basis of the measures of the action phase being whether or not they had made a decision to make changes in their lifestyle (Section 3: 18) and what they had decided to do (Section 3: 19). If either of these questions was answered in the negative, the subject could not fill in Questions 20 to 28 and indeed were instructed not to do so. It was however important to ask these questions (18 and 19) in order to focus the subject on the specific change they wished to make as they answered the ensuing questions about how they evaluated this decision and

how they planned to go about it. However, most of the action variables were calculated for those who had not filled in this section. Subjects in this group were given zeros for *decision to change, wrote change, number of means, number of implementation intentions, specific means* and *specific implementation intentions.*

Dichotomous variables were all checked for equal split between the two categories. There were no variables found with extreme splits, i.e. 90-10% which would have led to truncation of correlation coefficients with these and other variables. So there was no need to delete any of these variables.

Continuous/ordinal variables, i.e. *intention, outcome expectancies, threat, self-efficacy, evaluation of decision, number of means, number of implementation intentions* and *behaviour change index* were examined to see if they fulfilled the assumptions of normality required for the use of parametric statistical tests. SPSS FREQUENCIES provided skewness and kurtosis values and their respective standard error scores for each of these variables at time 1 (before screening) and time 2 (after screening). By calculating z scores by dividing the skewness and kurtosis values by their respective standard error scores, it was possible to see if the distributions differed significantly from the normal distribution. None were found to differ significantly from zero at the 1% significance level, except for *number of means* and *number of implementation intentions* which were skewed - the majority of subjects scored 0 (they had not devised any means or made implementation intentions). These variables were thus dichotomised for further analyses as it was decided that transformation would have been too difficult to interpret. The score '0' was given for no means and for no implementation intentions; the score '1' was given for one or more means or implementation intentions. All the other variables can be described as <u>not</u> deviating significantly from the normal distribution, so parametric tests were used for these variables.

<u>Choice of statistical tests</u>

Parametric and non-parametric tests were used. Non-parametric tests were chosen for dichotomous variables (*decision to change, wrote change, specific*

means, specific implementation intentions, number of means and *number of implementation intentions*). These non-parametric tests employed were: Chi-square (χ^2) and McNemar's test to examine differences in proportions and point-biserial correlation (used when one variable is dichotomous, the other continuous) to examine relationships between variables. Parametric tests were chosen for all the other variables since they fulfilled the requirements necessary for parametric tests as shown above. Parametric tests used were t-tests to look for differences between means and Pearson's product-moment (r) correlations to test for associations between variables.

Multivariate analyses techniques were used to assess relationships between one continuous dependent variable and several independent variables. Multiple regression analysis was used to predict *intention* from the combination of the other variables from the HAPA motivation phase. It was also used to predict behaviour change in terms of the number of changes made (behaviour change index). Variables intended for use in these multiple regressions were examined for multivariate normality, linearity and multivariate outliers. This was done using SPSS REGRESSION which examines residuals. Scatterplots of predicted values of the dependent variables (*intention* and *behaviour change index*) against residuals showed that the assumptions of linearity were met in both cases. A normal probability plot of residuals showed that the multivariate distributions appeared normal - the points fell along an approximately straight diagonal line. With the use of a $p<.001$ criterion for Mahalanobis distance, no outliers among the cases were identified. Correlation matrices between the variables to be entered into the equation were checked for multicollinearity and singularity. There were no highly correlated independent variables, so none of them were redundant in the analyses.

Discriminant Function Analysis was chosen to assess the predictive relationship between variables of the HAPA motivation phase and the specific behaviour change variables which were dichotomous. Previous examination of variables for parametric and multiple regression assumptions revealed no particular threat to this analysis.

3.4.1 Questionnaire Response rates

Of the 215 first questionnaires originally sent out to patients with appointments at the health centre, 112 (52%) did not subsequently attend their screening appointment, so were not eligible for inclusion in the study. Of the remaining 103 patients, 17 formally refused to take part in the study and 86 questionnaires were returned.

The response rate, i.e. the ratio of responders to all attenders (eligible for study inclusion) is therefore 86 out of 103 (i.e. 83.5%).

One of the 86 responders failed to attend her screening appointment so she had to be removed from the study, leaving a total of 85 subjects.

Of the 85 subjects sent Questionnaire 2, 71 (83.5%) responded. Of the 71 subjects sent Questionnaire 3, 59 (83.1%) responded. Of the 85 who responded to Questionnaire 1, 39 (46%) were male and 46 (54%) were female. Of the 71 who responded to Questionnaire 2, 33 (46.5%) were male and 38 (53.5%) were female, and for the 51 who responded to

Questionnaire 3, 28 (47.5%) were male and 31 (52.5%) were female. So the proportions of male and female responders did not change over time, i.e. the rates of attrition did not differ according to sex.

3.4.2 Behaviour change data

Table 1 shows the frequencies of subjects who changed their behaviour on each of the three behaviour change ladders. Only 20 of the subjects were smokers at Time 3 (based on answers to smoking question, 1a) (see Appendix 5, Section 2). Although 50 subjects reported no change on the smoking ladder, only 12 of these were smokers. The group of 20 smokers (<u>not</u> the entire sample) will be used in further analyses of smoking behaviour change.

Table 2 shows the frequencies of subjects who made none to five changes overall (out of a possible maximum of six) using the behaviour change index.

Gender differences in behaviour change were examined. On the exercise ladder, 15 females out of 30 increased their exercise (i.e. 50%) compared to only 7 out of 29 males (i.e. 24%), $\chi^2 = 3.84$, df = 1, p=.04. On the smoking ladder, female smokers were also more likely to change than male smokers although the numbers were too small to perform reliable statistical analysis. On the diet ladder, again females were more likely to change (12 out of 30, 40%) than males (6 out of 29, 21%), but this difference was not significant, $\chi^2 = 2.33$, df = 1, p=.13. On the behaviour change index, females (mean = 2.67, sd=1.18) were shown to make significantly more behaviour changes than males (mean = 1.76, sd=1.19), t(57)=-2.94, p=.005.

Table 1: Frequencies of subjects who changed and did not change from time 1 to time 3 on the behaviour change ladders (N=58)[25]

	number of subjects who changed for the better	number of subjects who did not change for the better
exercise ladder	22 (38%)	36 (62%)
smoking ladder	8 (40%)	12 (60%)
diet ladder	18 (31%)	40 (69%)

Table 2: Frequencies of subjects (N=59) who made different numbers of changes on the behaviour change index.

	Number of changes made (out of a possible six)						
	none	one	two	three	four	five	six
number of subjects	4	15	17	11	11	1	0

[25] Out of the 59 subjects who completed questionnaire 3, one of the subjects did not complete the ladders.

Since females and males were shown to differ on the extent of behaviour changes made, they were also compared on certain key health beliefs and action plans to check for further differences. Females were shown to have higher *intention* than males, but there were no differences in *threat, outcome expectancies, self-efficacy* or *number of means*.

Those who had responded (responders) to the final questionnaire were compared to those who did not respond , (non-responders) to this questionnaire to check for any significant differences. This was to check that the final sample were not a significantly different group from the original set of responders. Analyses showed that there were no differences in *intention, threat, outcome expectancies, self-efficacy* or *number of means* between responders and non-responders. There were also no differences in behavioural measures at time 1 between responders and non-responders.

3.4.3 Answers to research questions

3.4.3.1 Do single social cognition variables and action plans predict behaviour change before and after screening? Which beliefs/action plans are predictive?

To answer the first research question, the first step in the analyses was to look at each individual variable from the motivation and action phases of the HAPA and its relationship with the index of behaviour change, i.e. the measure of the number of behaviour changes made. The results are presented in Table 3. From the motivation phase, *threat*, both before and after screening, correlated positively with the index of behaviour change, $r=.32$, $p<.05$ and $r=.28$, $p<.05$ respectively. *Outcome expectancies* before screening were also positively associated with the index of behaviour change, $r=.31$, $p<.05$. From the action phase, none of the variables were significantly correlated with the index of behaviour change at the 5% level. However, using the Bonferroni correction (Maxwell & Delaney, 1989) to correct for the number of correlations performed and the likelihood that some will be significant by chance alone, the probability level was re-set at .003 (i.e. .05/18 where .05 is the generally accepted probability level and 18 is the number of correlations performed). At this probability level none of the variables in either

the motivation or the action phase were found to be significantly related to the index of behaviour change.

Variables relating to specific outcome behaviours were not expected to predict the overall number of behaviour changes made and so were not correlated with the index.

Table 3: Correlations between the index of behaviour change and HAPA variables before and after screening.

Motivation phase	**Before Screening**	**After Screening**
Threat **(P)**	0.32	0.28
Outcome expectancies **(P)**	0.31	0.21
Self-efficacy **(P)**	0.07	0.04
Intention **(P)**	0.20	0.17
Action phase		
Decision to change **($_{pb}$)**	0.23	0.25
Wrote change **($_{pb}$)**	0.21	0.20
Evaluation of decision **(P)**	0.14	0.17
No. of means **($_{pb}$)**	0.25	0.01
No. of implementation intentions **($_{pb}$)**	0.20	0.02

** $p<.003$ (Bonferroni correction for 18 correlations)

(P) = Pearson's r **($_{pb}$)** = point -biserial correlation

The next step was to look at the effect of individual beliefs and action plans on the other outcome measures of behaviour change, i.e. the specific behaviour changes of diet, exercise and smoking. Since these outcome variables were dichotomous, i.e. a measure of having changed (in a manner concordant with health promotion guidelines) or not, it was decided to compare those who changed and those who did not change (henceforth referred to as changers and non-changers) on the various beliefs and action plans, as presented in Table 4.

Looking first at the variables from the motivation phase, for **dietary behaviour** none of the beliefs either before or after screening were found to differentiate significantly between changers and non-changers. However, for **exercise**

behaviour, changers had a higher perceived *threat* (mean=147.1, sd=46.7) than non-changers (mean=104.8, sd=55.3) before screening (t (56) = 3.00, p<.01). Changers also had more positive perceived *outcome expectancies* before screening (mean=18.6, sd=6.6) than non-changers (mean=24.1, sd=7.8) (t(55)=2.74, p<.01) and after screening (changers mean=18.8, sd=7.0 ; non-changers mean=25.1, sd=8.9, t(55)=2.84, p<.01).
For **smoking behaviour,** using smokers only (N=20), there were no significant differences between changers and non-changers.

In the action phase, for **dietary behaviour**, changers were significantly more likely (38.9%) than non changers (15%) to have devised *specific means* before screening (χ^2=4.07, df=1, p<.05) and *specific implementation intentions* before screening (38.9% vs. 10%, χ^2=6.74, df=1, p<.01) regarding their diet. For **exercise behaviour**, changers had a significantly higher *number of implementation intentions* after screening (than non-changers (χ^2=4.16, df=1, p<.05). Changers were also more likely to have devised *specific means* to achieving exercise behaviour change both before (42.8% cf. 13.9%, χ^2=6.01, df=1, p<.05) and after screening (68.2% cf. 30.6%, χ^2=7.82, df=1, p<.01) and to have formulated *specific implementation intentions* relating to exercise both before (31.8% cf. 8.3%, χ^2=5.28, df=1, p<.05) and after screening (50.0% cf. 19.4%, χ^2=5.96, df=1, p<.05). For **smoking behaviour**, there were too few numbers (N=20) for reliable analyses of all the variables except *evaluation of decision* where there was no significant difference between changers and non-changers.

Table 4: Comparing the health beliefs and action plans of changers and non-changers, for specific health behaviours, before and after screening: results of statistical tests

	Specific health behaviour change					
	Diet		**Exercise**		**Smoking** (smokers only)	
Motivation phase	**Before Screen**	**After Screen**	**Before Screen**	**After Screen**	**Before Screen**	**After Screen**
Threat[t]	1.55	1.13	3.00**	1.8	0.77	0.11
Outcome expectancies[t]	0.68	0.30	2.74**	2.84**	0.59	0.37
Self-efficacy[t]	1.8	1.44	1.43	1.00	0.39	0.70
Intention[t]	0.01	0.88	1.47	1.9	1.06	0.97
Action phase						
Decision to change[χ]	0.48	0.14	0.25	3.07	#	#
Wrote change[χ]	0.004	0.22	1.07	2.17	#	#
Evaluation of decision[t]	0.26	0.53	0.33	0.07	0.11	0.74
No. of means[χ]	0.47	0.00	0.13	2.63	#	#
No. of implementation intentions[χ]	2.19	0.05	1.61	4.16*	#	#
Specific means[χ]	4.07*	0.03	6.01*	7.82**	#	#
Specific implementation intentions[χ]	6.74**	0.47	5.28*	5.96*	#	#

[χ] = χ^2 value [t] = independent t-test value * = p<.05 **p<.01 ***p<.001

50% cell frequencies <5

In summary, to answer the question, only *threat* and *outcome expectancies* from the motivation phase had an effect on health behaviour change, and only on exercise behaviour. *Intention* and *self-efficacy* were not related to behaviour change at all. Individual variables from the action phase, especially the *specific means* and *implementation intentions*, were related to behaviour change.

Nevertheless, the relationship between the independent measures and behaviour was different depending on the outcome measure of behaviour change used. In particular, the action phase was more useful for explaining specific behaviour changes than the number of behaviour changes (index). Moreover, the variables which distinguished between changers and non-changers depended on the specific health behaviour change in question, i.e. *threat* and *outcome expectancies* distinguished between those who changed and did not change their exercise behaviour, but neither of these variables affected dietary or smoking behaviour.

Relationships between the independent variables measured before screening and behaviour change did not always exist after screening, e.g. before screening, *threat* had an effect on who subsequently increased their exercise behaviour, but after screening *threat* had no such effect. Before screening, being able to think of *specific means* and make *specific implementation intentions* regarding diet distinguished between those who went on to make subsequent dietary changes, while they had no such effect after screening.

3.4.3.2 Is the HAPA a useful predictive and explanatory model for behaviour change?

The previous analyses looked at the effect of individual variables from the HAPA on health behaviour change. However as outlined in the introduction, these variables are not intended to work in isolation and it is their joint effect, in the process described by the HAPA, that is hypothesised to predict behaviour. This section of the analyses will therefore examine the model's hypothesised process towards behaviour and will test the power of the motivation phase to predict behaviour change.

In the motivation phase, do threat, outcome expectancies and self-efficacy predict intention as hypothesised by the model?

In the first part of the HAPA model, the beliefs of the motivational phase are hypothesised to predict intention to change health behaviours. In order to assess the supposed influence of health beliefs on intention, the health beliefs of the motivation phase were first correlated with *intention*, investigating concurrent relationships before and after screening, plus the relationship between beliefs

before screening and *intention* after screening to look at prediction over time. As shown in Table 5, *outcome expectancies* and *self-efficacy* were positively and significantly related to *intention*, both concurrently and over time. *Threat* was found to relate positively to *intention*, but this correlation was not significant either concurrently or over time.

Table 5: Correlations between health beliefs and intention

	Correlations between beliefs and intention (Pearson's r)		
Health Beliefs	**Belief T1→ Intention T1**	**Belief T2→ Intention T2**	**Belief T1→ Intention T2**
Threat	0.18	0.12	0.10
Outcome expectancies	0.60**	0.60**	0.45**
Self-efficacy	0.33**	0.39**	0.43**

** $p<.01$

The variables *threat, outcome expectancies* and *self-efficacy* were then regressed using a stepwise method onto *intention* as the dependent variable to investigate the relative predictive power of these beliefs and amount of variance explained. Multiple regression analyses were carried out, as for the correlational analyses, for beliefs and intention concurrently, before and after screening and for beliefs before screening onto intention after screening. The results are presented in Table 6. The concurrent analyses both found two significant predictors emerging, *outcome expectancies* and *self-efficacy*, together explaining 39% and 41% of the variance before and after screening respectively. *Outcome expectancies* explained most of the variance at both time-points, the unique additional variance explained by *self-efficacy* being only 3% and 5% respectively. The prospective analysis also found *outcome expectancies* and *self- efficacy* to be the significant predictors, together explaining only 30% of the variance in *intention*. Although *outcome expectancies* again explained most of the variance (20%), *self-efficacy* explained more (10%) in this analysis than for the concurrent analysis and the beta values (self-efficacy $\beta= .34$; *outcome expectancies* $\beta= .39$) suggest that the two variables were of similar importance in their explanation of *intention*. However it was subsequently realised that the predictive result could occur because the beliefs and *intention* are

correlated concurrently and that *intention* (at Time 1) is predictive of *intention* at Time 2. This possibility was investigated by including *intention* at Time 1 in the prospective Multiple Regression Analysis. This analysis confirmed the hypothesis by showing that *intention* (Time 1) was the strongest predictor of *intention* at Time 2, explaining 35% of the variance (β=.60). *Outcome Expectancies* explained none of the additional variance, but *self-efficacy* explained an extra 4% unique additional variance (β=.25).

In summary, to answer the question, *outcome expectancies* and *self-efficacy* (from the motivation phase) predicted *intention*, both concurrently and over time. However, prior *intention* was the strongest predictor of future *intention*. *Threat*, however did not predict *intention*, either concurrently or over time. *Outcome expectancies* explained most of the variance concurrently. Less of the variance was explained over time by *outcome expectancies* and *self-efficacy* (30%) than concurrently (39% and 41%)

Table 6: Stepwise multiple regression analyses of health beliefs with intention as the dependent variable

Health beliefs before screening
Intention before screening

Predictor variables	**Adjusted r^2 change**	**sig. F**	**B**	**β**	**sig t**
Outcome expectancies	.36	.0000	.17	.56	.0000
Self-efficacy	.03	.0000	.17	.21	.02
Total variance explained	39%				

Health beliefs after screening
Intention after screening

Predictor variables	**Adjusted r^2 change**	**sig. F**	**B**	**β**	**sig t**
Outcome expectancies	.36	.0000	.15	.54	.0000
Self-efficacy	.05	.0000	.21	.25	.014
Total variance explained	41%				

Health beliefs before screening
Intention after screening

Predictor variables	**Adjusted r^2 change**	**sig. F**	**B**	**β**	**sig t**
Outcome expectancies	.20	.0001	.11	.39	.0005
Self-efficacy	.10	.0000	.26	.34	.002
Total variance explained	30 %				

B. Does the combination of variables in the motivation phase predict behaviour change? Which beliefs are predictive?

The next step in the data analyses was to investigate the power of the motivation phase in predicting actual behaviour change.

First, using stepwise multiple regression analysis, the variables *intention, outcome expectancies, self-efficacy* and *threat* were regressed onto the health behaviour change index, as the dependent variable. The results are shown in Table 7. The only variable which emerged as a significant predictor of the health behaviour change index was *threat* which, measured before screening, explained 8.4% of the variance in behaviour change and, measured after screening, explained 6.3% of the variance.

Table 7: Stepwise multiple regression of motivation phase with health behaviour change index as the dependent variable

Before Screening

Predictor variables	**Adjusted r^2 change**	**sig. F**	**B**	**β**	**sig t**
Threat	.084	.016	.007	.316	.016
Total variance explained	8.4%				

After Screening

Predictor variables	**Adjusted r^2 change**	**sig. F**	**B**	**β**	**sig t**
Threat	.063	.033	.006	.282	.033
Total variance explained	6.3%				

The second set of analyses of the prediction of behaviour change by the motivation phase referred to the dichotomous measures of the specific behaviour changes of diet, exercise and behaviour as the dependent variables. The variables of the motivation phase were all entered into Discriminant Function Analysis (a technique suitable for dichotomous dependent variables) using the 'direct' method in order to determine:

(1) if the specific set of variables as defined by the model could reliably predict behaviour change (the smaller the value of Wilk's Lambda, the more reliable are the set of variables in predicting behaviour. Chi-square is used to test the significance of Wilk's Lambda).

(2) which variables in each model were most important in predicting behaviour change (correlations between the predictors and the function indicate the importance of each variable within the function. Those variables which have a correlation of greater than .3 with the discriminant function are regarded as important.

(3) how well the model could classify subjects as changers and non-changers given their scores on the model's discriminant function.

(Tabachnik & Fidel, 1989, p. 507)

As shown in Table 8, for **dietary behaviour**, the variables of the motivation phase measured before and after screening were not found to discriminate significantly between changers and non-changers.

For **exercise behaviour**, the variables of the motivation phase measured before and after screening were found to discriminate significantly between changers and non-changers (before screening, Wilk's Lambda = .78, $\chi^2 = 12.8$, df = 4, $p < .05$; after screening, Wilk's Lambda = .78, $\chi^2 = 12.2$, df = 4, $p < .05$). Before screening all of the variables in the function had a correlation coefficient of greater than 0.3 with the function and thus were all important in the prediction of exercise behaviour, although *threat* and *outcome expectancies* were more important than the other variables. After screening, *self-efficacy* became less important. The discriminant function was able to correctly classify 77.3% of changers and 79.4% of the non-changers before screening and 66.7% of changers and 76.2% of the non-changers after screening. Overall, 78.57% and 70.37% of the subjects were correctly classified by the beliefs measured before and after screening respectively.

For **smoking behaviour**, the variables of the motivation phase measured before and after screening were not found to discriminate significantly between changers and non-changers amongst the smokers.

Table 8: Discriminant Function Analysis of motivation phase onto specific behaviour changes as the dependent variables

	Pooled within-group correlations between variables and the discriminant function					
Variables entered (direct method)	**Diet**		**Exercise**		**Smoking** (smokers only)	
	Before screen N=54	After screen N=53	Before screen N=54	After screen N=53	Before screen N=20	After screen N=20
Outcome expectancies	—	—	**.71**	**.65**	—	—
Self-efficacy	—	—	**.33**	.25	—	—
Intention	—	—	**.40**	**.46**	—	—
Threat	—	—	**.84**	**.51**	—	—
Wilk's lambda	.90	.89	.78	.78	.92	.89
Significance of overall discrimination (χ^2) (df=4)	5.5 NS	5.4 NS	12.8*	12.2*	1.4 NS	1.8 NS
Correct classification of changers	—	—	77.3%	66.7%	—	—
Correct classification of non-changers	—	—	79.4%	76.2%	—	—
Overall correct classification	—	—	78.57%	70.37%	—	—

* $p<.05$

Note 1: Pooled within correlations not presented for non-significant discriminant functions
Note 2: Negative pooled within-correlations for reverse-coded variables are reported as positive

Note 3: Sample sizes are less than 59 for diet and exercise behaviours due to missing values in any of the four independent variables or the dependent variable

In summary, to answer the question, the motivation phase as a whole was not predictive of the number of behaviour changes made (i.e. the index). Only *threat* emerged as a significant predictor and it only explained a small amount of variance in the number of changes made. However, looking at the specific behaviour change outcome measures, the motivation phase was quite successful in predicting exercise behaviour change. This prediction was even more successful from the beliefs measured before screening than after. Although all four variables were important predictors, *threat* and *outcome expectancies* were the most important. On the other hand, dietary and smoking change could not be predicted by the motivation phase variables.

Are there links between the motivation and action phases?

In the HAPA there are direct links from the variables *intention* and *self-efficacy* of the motivation phase to the action phase, suggesting that *intention* and *self-efficacy* may instigate (and possibly maintain) the active behaviour change process. In order to investigate these possible relationships, correlations were performed for *intention* and for *self-efficacy* with the various measures of action plans (general and specific). Concurrent relationships were investigated before and after screening as well as the relationships, over time, between intention and self-efficacy before screening and action plans following screening. Due to the number of correlations being performed (i.e. 33), the Bonferroni correction was made which set the probability at .0015 (i.e. .05 / 33). As can be seen in Table 9, there were 15 out of 33 significant positive relationships between *intention* and general and specific action plans, concurrently and over time. The strongest positive correlations were with *decision to change.*

Table 9: The correlations between intention and the action phase

	Correlations between intention and the action phase (Pearson's r / point-biserial)		
Action phase	**Intention T1→ Action plan T1**	**Intention T1→ Action plan T2**	**Intention T2→ Action plan T2**
Decision to change ($_{pb}$)	.70**	.53**	.72**
Wrote change ($_{pb}$)	.57**	.50**	.53**
Evaluation of decision	.52**	.35	.66**
Number of means ($_{pb}$)	.45**	.19	.27
Number of implementation intentions ($_{pb}$)	.48**	.37	.51**
Specific means re. diet ($_{pb}$)	.50**	.41**	.54**
Specific means re. exercise ($_{pb}$)	.32	.30	.34
Specific means re. smoking ($_{pb}$) (N=20)	.54	.67	.48
Specific implementation intentions re. diet ($_{pb}$)	.30	.33	.48**
Specific implementation intentions re. exercise ($_{pb}$)	.32	.21	.32
Specific implementation intentions re. smoking ($_{pb}$) (N=20)	.56	.58	.40

**p<.0015 (Bonferroni correction)

(P) = Pearson's r **($_{pb}$)** = point -biserial correlation

As shown in Table 10, there were fewer significant positive relationships between *self-efficacy* and the various measures of action plans. The only action plan variable which was related significantly to *self-efficacy* at the Bonferroni corrected significance level was: the *evaluation* of the decided behaviour change, concurrently before screening (r=.64, p<.001) and after screening (r=.71, p<.001) as well as over time (r=.56, p<.001).

Table 10: The relationships between self-efficacy and the action phase

	Correlations between self-efficacy and action phase (Pearson's r / point biserial)		
Action phase	**Self-efficacy T1→ Action plan T1**	**Self-efficacy T1→ Action plan T2**	**Self-efficacy T2→ Action plan T2**
Decision to change	.14	.21	.09
Wrote change	.16	.07	.04
Evaluation of decision	.64**	.56**	.71**
Number of means	.04	.03	.02
Number of implementation intentions	.14	.17	.17
Specific means re. diet	.19	.30	.25
Specific means re. exercise	.13	.15	.11
Specific means re. smoking (N=20)	.05	.05	.38
Specific implementation intentions re. diet	.04	.20	.17
Specific implementation intentions re. exercise	.06	.16	.15
Specific implementation intentions re. smoking (N=20)	.44	.32	.08

**p<.0015 (Bonferroni correction)

In summary, to answer the question, there did seem to be link between the motivation and action phases. *Intention*, particularly, was related to many of the different aspects of the action phase. The results of the correlations suggested that there were links between *intention* and action plans in terms of making a definite decision to change, specifying that decision, evaluating the decision and being able to derive specific means. The relationship between *self-efficacy* and the action phase was less evident, but did exist. There were particularly strong relationships between *self-efficacy* and the evaluation of the decision.

3.4.3.3 How useful is the PAP in helping to explain behaviour change?

Can the distinct stages and the cumulative nature of the PAP be identified within the sample?

Having created the seven stages of the PAP (as described in the measures section, page), subjects were allocated to a particular stage if they agreed to the statement relating to that stage and disagreed to all the preceding questions. Using this technique, it was found that 70.6% and 72% before and after screening respectively of the total number of subjects who completed the questionnaire at each time point could be allocated to one of the stages and therefore fitted the model in terms of its cumulative nature. For the purposes of further analyses using the stages of the PAP to separate the sample into groups, the subjects who did not fit the model (e.g. they may have agreed to the first statement, disagreed with the 2nd and agreed with the 3rd) were allocated to the highest stage to which they agreed. This additional method of allocating subjects into stages is similar to the work of Weinstein & Sandman (1992) and Booth *et al* (1993) whose subjects were all required simply to pick out from the six stages the one which best described them.

The frequencies showed that the majority of subjects were at stage 7 (maintenance stage) both before and after screening, 54 (64%) and 46 (66%) respectively as shown in Table 11.

Due to this finding, the seven stages were recoded into three main stages, (1) combining stages 1-4 which could be described as **pre-decision** (2) combining stages 5 and 6 which could be described as **post-decision / action** and (3) stage 7 which could be described as **maintenance**, in order to classify the subjects into meaningful and large enough groups for analyses. These three stages are indicated by bold lines in Table 11.

Table 11: Frequencies of subjects at each stage of the PAP before and after screening

PAP STAGE	Number of subjects before screening	Number of subjects after screening	
(1) unaware of issue	3	1	
(2) aware, but not personally engaged	1	0	**pre-decision**
(3) aware and engaged - not yet deciding	3	5	
(4) deciding what to do	11	4	
(5) planning to act	4	4	**post-decision / acting**
(6) acting	9	10	
(7) maintenance	54 (63.5%)	46 (65.7%)	**maintenance**
Total number	85	70	

Are those at the planning/acting stages of the PAP more likely to make behaviour changes?

This analyses used the recoded stages of the PAP as detailed above. Those at the post-decision/action stage were compared with all the others, i.e. those at the pre-decision stage and those at the maintenance stage together. The chi-square statistic (χ^2) was used to test for differences in proportions of changers (as compared to non-changers) between those at the action stage and the others. The analyses was performed separately for PAP stage before and after screening and for each of the three specific health behaviour changes; diet, exercise and smoking as shown in Table 12.

For **dietary behaviour**, there was a higher proportion of changers at the post-decision/action stage (72.7%) than at the other stages (21.3%), χ^2=11.02, df=1, p<.001 before screening. This pattern remained after screening. 58.3% of those

at the post-decision/action phase changed their behaviour whilst only 24.4% of those at the other stages changed, χ^2=5.03, df=1, p<.05.

For **exercise behaviour**, there was a higher proportion of changers at the post-decision/action stage (63.6%) than at the other stages (31.9%), χ^2=3.81, df=1, p<.05 before screening. This pattern remained after screening. 66.7% of those at the post-decision/action phase changed their behaviour whilst only 31.1% of those at the other stages changed, χ^2=5.05, df=1, p<.05.

For **smoking behaviour**, the shortage of numbers of smokers (N=20) as well as splitting the sample into two PAP stage groups meant that the percentages were relatively meaningless and comparison of proportions was unreliable.

Table 12: Comparing the proportion of changers at the post-decision stage of the PAP compared to the other stages

		Percentage who changed their behaviour		
	PAP stage	**Diet**	**Exercise**	**Smoking (smokers only, N=20)**
Before Screening	**Post-decision /Action (N=11)**	72.7%	63.6%	1/3
	Others (N=47)	21.3%	31.9%	7/17
	Chi-square (df=1)	11.02***	3.81*	#
After Screening	**Post-decision /Action (N=12)**	58.3%	66.7%	2/5
	Others (N=45)	24.4%	31.1%	6/14
	Chi-square (df=1)	5.03*	5.05*	#

* p<.05 *** p<.001 # 50% of cell frequencies < 5

In summary, to answer the question, those at the post-decision /action stage did seem generally more likely to change their behaviour than the other group which

included those at the earlier, pre-decision phase and those at the maintenance stage who, in their opinion, have already made changes which they are maintaining. This result supports the PAP.

Do different beliefs predict behaviour change for those at different stages of the PAP?

The PAP model postulates that different beliefs will predict behaviour for those at different stages. Due to shortage of numbers arising from dividing the sample into the three recoded stages of the PAP, it was not possible to look at the prediction of behaviour by beliefs at each individual stage. The analyses would have been possible at the maintenance stage where there were higher numbers of subjects, but since at this stage, subjects would not be expected to change their behaviour anyway and few of them did, it made little sense to perform the analyses.

3.4.3.4 What is the effect of screening on the variables in the motivation and action phases of the HAPA and on the stages of the PAP?

The final question was whether screening had an effect on changing the beliefs and action plans which are hypothesised to promote health behaviour change. The results of within-subjects t-tests for the comparison of means and McNemar tests for the comparison of within-subjects frequencies are presented in Table 13.

From the motivation phase of the HAPA, the only belief which changed significantly after screening was *intention*, which increased after screening, $t(67)=2.61$, $p<.05$. All the other beliefs changed in the expected direction following screening, but none were significant.

There were a few more significant changes in the action phase. After screening more subjects made a *number of implementation intentions* (45% vs. 29%), more subjects made a *decision to change* (65% vs. 52%) and more subjects were able to write down a change that they would like to make (*wrote change*) (66% vs. 38%). Also, following screening, more subjects had devised *specific means* of changing their diet (52% vs. 27%) and their smoking behaviour (60% vs 30% of smokers) and more subjects had formed *specific implementation intentions* as to when they were going to change their diet (37% vs. 17%).

Table 13: The effect of screening on the motivation and action phases: comparing mean values and frequencies before and after screening.

Motivation phase	**Before Screening Mean**	**After Screening Mean**	**Within-subjects t-test**
Threat	127.71	120.43	1.12 (df=68)
Outcome expectancies^	22.04	21.98	0.07 (df=68)
Self-efficacy^	6.10	5.76	1.15 (df=69)
Health value^	2.59	2.33	1.47 (df=63)
Intention^	5.32	4.66	2.61* (df=67)
Action phase			
Evaluation of means	26.26	25.68	0.83 (df=30)
	Before Screening Percentage	**After screening Percentage**	**McNemar sig.**
No. of means	39%	49%	NS
No. of implementation intentions	29%	45%	*
Decision to change	52%	65%	*
Wrote change	38%	66%	**
Specific means re. diet	27%	52%	**
Specific means re. exercise	30%	43%	NS
Specific means re. smoking	30%	60%	*
Specific implementation intentions re. diet	17%	37%	**
Specific implementation intentions re. exercise	17%	30%	NS
Specific implementation intentions re. smoking	15%	10%	NS

[x]Mean value *p<.05

^a lower mean implies a higher value due to reverse coding of the variable

It was also of interest to examine the pattern of movement through the seven PAP stages from before to after screening, as shown in Table 14. Forty-two subjects stayed at the same PAP stage, 15 moved to a higher stage and 10 moved backwards to a lower stage. There are 17 subjects missing in this table as they did

not complete Questionnaire 2. Of these 17, the majority (i.e.14) were at stage 7 (maintenance stage) before screening.

Table 14: The pattern of movement through the stages of the PAP from before to after screening - the number of subjects at each stage, before and after screening

PAP STAGE BEFORE SCREENING	PAP STAGE AFTER SCREENING						
	1	2	3	4	5	6	7
1							1↑
2					1↑		
3			**2**				1↑
4			3↓	**1**		4↑	2↑
5					**2**	1↑	1↑
6				1↓	1↓	**2**	4↑
7				2↓		3↓	**35**

↓ indicates movement backwards to a lower stage

↑ indicates movement upwards to a higher stage

bold indicates no movement following screening

In summary, to answer the question, the effect of screening on the variables in the motivation phase was minimal, *intention* being the only variable which changed (increased) after screening. The effect of screening on variables in the action phase was more evident, affecting both general decisions to change and more specific plans. The majority of subjects stayed at the same PAP stage after screening, i.e. the maintenance stage as they had been at before screening. But more of the remainder of the subjects moved forward through the stages rather than backward.

3.5 Discussion

The present study sought to provide an understanding of why people may or may not change their health-related behaviour in relation to the risk of cardiovascular disease and to look at the effect of risk factor screening within this process. In a more theoretical vein, the study set out to test the predictive and explanatory power of two relatively recent theories of behaviour change, the HAPA (Schwarzer, 1992) and the PAP (Weinstein, 1988, Weinstein & Sandman, 1992).

3.5.1 Extent of behaviour change following screening

Information from the behaviour change ladders showed that although the majority of subjects did not change for the 'better' on each of the ladders, there was evidence of reported change for the better (38% increased their exercise; 40% of smokers decreased their smoking and 31% improved their diet). Also, information from the behaviour change index indicated that the majority of subjects (93%) reported at least one behaviour change.

3.5.2 Differences between males and females

Although there were found to be differences in the extent of behaviour change between males and females, it was unfortunately impossible to look at the prediction of behaviour change for these two groups separately due to small numbers. However, males and females were also compared on several key beliefs. Females were shown to have higher *intention* than males, but there were no differences for the key variables of *threat, outcome expectancies* or *self-efficacy*.

3.5.3 The variables which predicted behaviour change

The effect of single variables on behaviour change was examined first to provide information on the variables likely to affect behaviour change, before or after screening.

3.5.3.1 'Motivation' factors

In view of their prominent position in the HAPA model which is based on much previous research, it was a very surprising result that *intention* and *self-efficacy* did not have significant effects on behaviour change. However, the two other

health belief variables measured (i.e. *threat* and *outcome expectancies*) were found to relate to behaviour change. It was particularly surprising that *threat* was related to behaviour considering that previous research in health behaviour has often found the variables of *susceptibility* or *severity*, or both, to be redundant (e.g. Champion, 1985; Norman & Conner, 1993; Strychar *et al*, 1993) and the Health Belief Model has been criticised for its over-estimation of the direct effect of *threat* on behaviour (Schwarzer, 1992).

3.5.3.2 'Action' factors

The finding that single 'action' variables were related to behaviour change lends support to the inclusion of an action phase in Schwarzer's model (the HAPA). Furthermore, the finding that it was especially the *specific means* and *implementation intentions* which had an effect supports (at least to some extent) the theories of Bagozzi (1992) and Gollwitzer (1993) respectively. Ajzen and Fishbein (1977) have emphasised the importance of matching the specificity of measurement of attitudes and behaviour in order to be able to predict behaviour from attitudes, a view which is also supported by the latter finding.

Overall, these particular 'motivation' and 'action' factors described above affected behaviour change in some way. However, different factors were found to be important (1) before and after screening, and (2) for different outcome health behaviours.

3.5.3.3 Factors important before and after screening

It was suggested that the effect of screening may influence the relationship between health beliefs and behaviour. In particular it was predicted that health beliefs would become less important after screening, especially if subjects were shown to progress through the stages of the HAPA and the PAP. This progression was shown to some extent - *intention* increased after screening and 15 subjects moved to a higher stage of the PAP. Accordingly, *threat* was less important in the prediction of behaviour change after screening than before. Although the average level of *threat* did not change after screening (see Table 11), *threat* measured <u>before,</u> but not <u>after</u> screening was related to subsequent exercise behaviour change. Also, before screening, being able to think of *specific*

means and make *specific implementation intentions* regarding diet distinguished between those who went on to make subsequent dietary changes, while they had no such effect after screening. However, in this case, these factors did change (increase) following screening and thus it is suggested that because more subjects had ideas about how to change their behaviour and when to do so after screening, these variables may not have the same discriminatory power at this time-point.

3.5.3.4 Factors important for different outcome behaviours

Looking across previous studies, it can be noted that, to some extent when different outcome behaviours are investigated, different health beliefs are influential. For example, three studies using variables from the HBM to explain different outcome health behaviours found that different individual variables from the HBM were able to differentiate between those who acted and did not act (Vaile *et al*, 1993; Slenker Duke *et al*, 1994; Strychar *et al*, 1993[26]). The findings in the present study lend support to this suggestion with the added advantage that the different outcome behaviours were studied within the one sample, keeping subject variability to the minimum. Health beliefs from the motivation phase predicted exercise behaviour change, but not dietary or smoking behaviour change, whereas certain variables of the action phase predicted all behaviours. Norman (1995) found that smoking and exercise were related to behaviour-specific efficacy beliefs, but not dietary behaviour. Dietary behaviour seems to be a difficult behaviour to predict from health beliefs which may be due to stronger cultural and social influences on diet and dietary change.

3.5.4 The predictive and explanatory power of the HAPA

3.5.4.1 Internal structure of the motivation phase

Following on from the investigation of individual variables and their effect on behaviour, their joint effect in the process described by the HAPA was examined. Of the three variables hypothesised to predict *intention*, *outcome expectancies* and *self-efficacy* were successful in multiple regression analyses. *Threat*, however, was not found to be a predictor of *intention*. This particular finding is not in conflict with the HAPA. Although there is a link between *threat* and

intention in the HAPA, Schwarzer (1992) hypothesised that *self-efficacy* and *outcome expectancies* are the major predictors of an *intention*, with *threat* acting as a 'distal antecedent' which helps to activate *outcome expectancies*. He suggested that the link between *threat* and *intention* may, in fact, be insubstantial if *outcome expectancies* are already well established. This suggestion is echoed in the PAP which stresses that a minimum level of *threat* is necessary[27] before people can start contemplating what possible actions they could take. If they are already at the stage of thinking about acting and weighing up the pros and cons (cf. having *outcome expectancies*), then perceived *threat* becomes less important (Weinstein, 1988). Results from the analyses of the PAP data in this study suggest that a large percentage of the sample were at the maintenance stage where *threat* would not be expected to be a predictor of *intention*. However, Schwarzer (1992) also hypothesised that *self-efficacy* would dominate in the explanation of *intention*, followed by *outcome expectancies*. The results of this study did not support this hypothesis, certainly for the two concurrent analyses where *outcome expectancies* explained the majority of the variance with *self-efficacy* only adding a small percentage. The beta values were also much lower for *self-efficacy*, indicating that it was a less significant predictor. However, the analyses over time, measuring health beliefs before screening and *intention* following screening indicated a stronger effect of *self-efficacy* than in the concurrent analyses. Overall, though, the amount of variance in *intention* explained by these variables was less when measured over time. Over time, prior *intention* was the strongest predictor. This suggests that overall, health beliefs were less stable predictors of *intention* over time.

3.5.4.2 Predictive power of motivation phase

Predicting the number of behaviour changes

In terms of the prediction of behaviour by the motivation phase, it was expected, according to the model, that *intention* and *self-efficacy* would be the best

[26] For details of these studies, see chapter 1: Introduction, pages 25-26.

[27] Stage 2 of the PAP is 'aware of the issue but not personally engaged' whereas stage 3 is 'engaged and deciding what to do'. Weinstein (1988) suggests that perceived susceptibility is a predictor of becoming engaged, i.e. only once a person perceives a personal threat to their health will they start thinking about what they can do to reduce their risk.

predictors of behaviour. This was not found to be the case. Only *threat* was found to be a predictor of the number of behaviour changes made and explained only a small amount of variance. This small amount of explanation of variance in behaviour by health beliefs is greater than some studies using the earlier social cognition models (e.g. Conner & Norman (date)[28]), but less than others (e.g. Champion, 1985[29]). However, the HAPA acknowledges that the motivation phase is only the first step towards behaviour change, so it may not be expected to explain much of the variance in behaviour anyway.

Predicting specific behaviour changes

In terms of the results of the prediction of the specific behaviour changes by the motivation phase, again *intention* was not found to be the best predictor of exercise behaviour change. (Exercise was the only specific behaviour change where the motivation phase was able to discriminate between changers and non-changers). However, *intention* was found to be an important discriminator in the multivariate analyses, just less important than *threat* and *outcome expectancies*. The significant discriminant function formed by the four variables of the motivation phase was able to classify a reasonably large percentage of exercise changers and non-changers overall (78.6% before screening and 70.4% after screening). A previous study using discriminant function analyses to investigate an extension of the HBM in the prediction of attendance at screening (King, 1982) found that 82.3% of the subjects could be correctly classified by including all the variables in the function. Although many of the variables in that study were similar to those in the motivation phase of the present study, the former also included extra causal attribution variables which correlated highly with the discriminant function. However, although the overall classification rate was high in King's study, the attenders were more easily classified (87.7%) than the non-attenders (69.0%). A similar result was found in the study of worksite screening reported in Chapter two of this thesis which showed that the TRA was able to

[28] The TPB accounted for 4% of the variance in attendance at health screening in general practice

[29] The HBM accounted for 26% of the variance in BSE behaviour

classify 72.4% of the subjects overall, but 84.4% of the attenders compared to only 53% of the non-attenders. Therefore, although the HAPA motivation phase, an extended version of the TRA, used in the present study was no more successful than the TRA in the overall classification of subjects, it provided a more even classification of the two groups. Nevertheless, the outcome behaviours, the sample sizes and types of population were different between the present study and the previous two studies which questions the meaningfulness of such a direct comparison.

The HAPA's motivation phase was not found to be useful in predicting dietary or smoking behaviour change. Perhaps certain behaviours depend more heavily on the action phase of the model.

Again, differences before and after screening support the prediction that health beliefs would be less important following screening.

3.5.4.3 The link between the motivation and action phases

To test the HAPA further, the link between the motivation and action phases was investigated. The results of the correlations suggested that there were links between *intention* and action plans. Although there was less evidence of relationships between *self-efficacy* and the action phase, there were strong links with *evaluation of decision*. *Evaluation of decision* consists of questions relating to the amount of effort a subject is prepared to putting into carrying out the decision, etc. Thus this finding is in line with Schwarzer's hypothesis (1992) that *self-efficacy* has an influence on the amount of effort that will be invested and the commitment to carrying out the behaviour.

3.5.4.4 Overall summary regarding the HAPA

The research question was whether the HAPA was a useful predictive and explanatory model for behaviour change in the context of CHD screening. The study tested (1) the internal structure of the motivation phase, (2) the prediction of behaviour by the motivation phase (3) the link between the motivation and action phases and (4) the individual effect of variables suggested by the action phase on behaviour. The prediction of behaviour by the action phase was not

tested as such due to its lack of theoretical coherence (although the HAPA was used as a framework, the operationalisations of the variables were derived from the theories of Bagozzi (1992) and Gollwitzer (1993)). Furthermore there was some missing data.

First, the study found that *threat* was not a predictor of *intention*. Only *outcome expectancies* and *self-efficacy* were found to be so. This internal structure of the motivation phase was as the HAPA predicts if *outcome expectancies* are well established which is likely to be the case in this sample. However, *self-efficacy* was not as dominant as expected.

Second, the overall predictive power of the motivation phase was not much better than the TRA when compared to previous studies using the latter model. The important predictors were not as the HAPA predicts. *Intention* and *self-efficacy* were less important and *threat* most important. The effect of the variable *threat* was where there was most disagreement with the HAPA. *Threat* did not predict *intention*, but did predict behaviour and was a more important predictor of behaviour than *intention*. This seems to indicate a direct link from *threat* to the action phase, not via *intention*. Perhaps high threat predicts behaviour change because it means there is more to change. This hypothesis was tested by correlating the variable *threat* with initial health behaviour levels, i.e. behavioural ladder scores before screening. The correlations between *threat* and initial exercise score ($r=-.36$, $p=.001$) and initial dietary score ($r=-.23$, $p=.04$) were negative and significant. These results imply that, for these behaviours, high threat is related to low initial behaviour levels, thus supporting the hypothesis.

Third, there were links between *intention* and *self-efficacy* and the action phase as the HAPA predicts.

Fourth, although the action phase was not tested as a whole, the results suggest that these variables could be useful in predicting behaviour and should be further developed and tested with different populations.

Firm conclusions cannot be made about the predictive power of the HAPA based on this study because the HAPA was not tested as a whole. It is possible,

however, to question the structure of the model in terms of the importance of *threat,* a question requiring further study, particularly in this context of behaviour change following screening.

3.5.5 The power of the PAP

3.5.5.1 The stages of the PAP within this sample

The cumulative nature of the PAP was supported by this data to some extent. Seventy per cent and 72% of the subjects, at time 1 and 2 respectively, were found to respond to the PAP stage questions in a cumulative manner.

Although the PAP only has 6 stages as shown in the introduction, the results of this study indicated that there were 7 stages defining this sample, allowing for an extra stage where a subject may be aware and personally engaged (e.g. may feel susceptible), but have not yet thought about what they could do to reduce their risk. Perhaps this is an important stage in the model which has been overlooked.

The results of examining the stages of the PAP lent some support to the model, although unfortunately it was impossible to use all the stages as the majority of the subjects reported themselves to be at the maintenance stage. This may have created a general problem for the design of the study with the outcome measure being behaviour change and most subjects reporting that they had changed and were maintaining those changes. However, on the behaviour change index, 55 out of the 59 subjects reported at least one behaviour change (Table 2). The high number of subjects in the study at the maintenance phase may have been due to the requirement for participants to be attenders at the screening clinic. There is evidence that attenders are more likely to be already carrying out health behaviours than non-attenders (Pill *et al*, 1988). Moreover the PAP predicts that at the later stages of the model, health belief variables are less likely to predict who will change their behaviour. This may explain the poor prediction of diet and smoking behaviour change by health beliefs in this study.

However, it was possible to show that those at the post-decision / action stage were the most likely to change their behaviour. Although the outcome behaviour is different, this is a similar result to that found in a study by Weinstein and Sandman (1992) where the subjects who were most likely to adopt the precaution of radon gas testing in their home were those who had previously said that they planned to test.

3.5.6 The effect of screening

Experiencing screening was hypothesised to have an effect on the variables of the motivation and action phases in the HAPA model. *Intention* increased following screening as hypothesised, but none of the other variables of the motivation phase were altered. This result may be due to the subjects, who were all attenders at screening and, speculating from the evidence as noted above regarding attenders (Pill *et al*, 1988), may all have had fairly high base-line levels of *self-efficacy, outcome expectancies*, etc. compared to the general population. The design of this study cannot allow this hypothesis to be tested due to lack of a control group. However, looking at the base-line means and distributions of *self-efficacy* (mean=6.1, sd=2.87, range 2-14) and *outcome expectancies* (21.5, sd=7.8, range=9-63) suggests that the *outcome expectancies*, but not the *self-efficacy*, of the sample is in a high range[30].

The effect of screening on both general decisions to change and more specific plans suggests that screening may act as a means of helping individuals develop, not only intentions to change, but also detailed plans as to how to go about making the change. Progress through the HAPA, from intention to behaviour may be promoted by the screening process.

3.5.7 Limitations due to methodological shortcomings

There was a shortage of numbers in general due to the problem of attendance rates for screening. Otherwise, response rates to the three questionnaires were

[30] Due to reverse coding of this variable, 63 represents the most negative outcome expectancies, while 9 represents the most positive.

relatively high considering it was a postal survey. This implies that those who attend screening are also likely to respond to a questionnaire which could suggest that the sample was biased in favour of people who take an interest in their health and/or who comply with the medical profession. However, this is fully acknowledged in the interpretation of the results. The results found in this study may apply to another group of screening attenders, but not necessarily to a wider population.

There was a shortage of numbers who completed the 'action phase of the HAPA' section due to the basis of the measures of the action phase being an open-ended question as to what behaviour change the subject most wanted to make. If this question was not answered, the subject could not fill in the rest of the questionnaire and indeed were instructed not to do so. It was however important to ask this open-ended question in order to focus the subject on the specific change they wished to make as they answered the ensuing questions about how they evaluated this decision and how they planned to go about it. Following Ajzen and Fishbein's (1977) view, it was important that the subjects' evaluations, detailed plans (means) and implementation intentions were required to be related to a specific health-related behaviour they had in mind, so that these factors would be more likely to predict the actual behaviour.

Unfortunately it was impossible to have a control group (i.e. a group which was not screened) due to nature of the setting It would not have been ethical to refrain from offering screening to some patients. Also, patients who had previously been screened or who did not attend for their appointment could not be used because of their differences from the sample population. However, the screening intervention was not the main design of the study - the main design was of a correlational nature, looking at the relationships between beliefs and behaviour within individuals over time. So the lack of control group is not a major issue.

The measurement of behaviour was by self-report which may be problematic. However, a major advantage of this measure was that it specified time, e.g. '<u>in the past week</u> how much milk did you drink <u>per day</u>'; 'I do not eat healthy foods now

but I am thinking about changing my diet in the next 2 months'. This time specification helped to clarify if the behaviour change had been made since screening and was designed to help focus the subject's mind on their actual recent behaviour and not just what they generally think they do. In an attempt to maximise prediction of behaviour, this time specification was echoed in the intention and certain of the 'action phase' measures in the health beliefs section of the questionnaire, (e.g. 'have you decided yet what you are going to do to reduce your risk of heart disease in the next two months?').

This study did not look at the extent of behaviour change although this would have been possible with the ladder measures used. It would also have provided more power in the analyses of the prediction of specific behaviour changes as there would have been more variance in the outcome measure. Perhaps the model would have been found to predict more of the variance in behaviour change. However, analyses would have been more complicated, especially to account for those subjects who changed, but not in the recommended direction, i.e. those who smoked more cigarettes. The main point of interest in this study was whether there was any change at all so soon after screening, so the measure of whether they changed (for the better) or not was adequate for this purpose.

3.5.8 Applied Implications

The main applied aims of this study were to provide an understanding of why people may or may not change their health-related behaviour in relation to the risk of cardiovascular disease and to look at the effect of screening within this process.

In relation to the first aim the results implied that people who attend a screening appointment were most likely to change their health related behaviour if they felt they were at risk of CHD and if they believed the consequences were severely disrupting to their lives. Another important factor predicting behaviour change was whether people had positive expectations towards the outcome of any behaviour change (from a health and social perspective). Making specific plans to change behaviour and deciding when these plans will be carried out were also

useful in helping people change. However, exercise behaviour change was much easier to predict by these beliefs and plans than either dietary or smoking behaviour change. The results also suggested that the factors predicting intention to change were not the same as the factors predicting actual behaviour. So being able to predict what people intend to do on the basis of their beliefs will not necessarily predict what they actually do. Sex differences were shown to have an effect on the extent of behaviour change, with females more likely to make changes. Females were also more likely to have the intention to change which may explain this difference.

In relation to the second applied aim, screening was shown to have an effect on intention, general decisions to change and more specific plans to change certain behaviours. Since these factors were shown to predict behaviour change, especially for exercise behaviour, it can be concluded that screening had a positive effect on the progress towards behaviour change. Moreover, this progress occurred without increasing people's perceived risk of disease.

The finding that some people moved backwards through the stages of the PAP suggests that experiencing screening may have made some people feel they had less need to carry out health behaviours, especially if they received a 'low risk' score.

3.5.9 Conclusion

In conclusion, the HAPA and PAP were found to be useful frameworks for explaining behaviour change following CHD screening. However, the HAPA, in particular, requires further testing as the current results dispute its internal structure.

4. Organisational Factors in the Uptake and Impact of CVD Risk Factor Screening in General Practice

4.1 Abstract

The study's objectives were to determine whether organisational factors would affect patients' attendance for cardiovascular risk factor screening and their subsequent behaviour. The study took place in a five partner health centre in the city of Dundee with a list size of 8250 patients. A sample of male GP consulters (n = 210) were randomly allocated to three different methods of offering screening: 1. opportunistic, 2. letter invitation, or 3. personal invitation to a screening clinic. Screening attendance was noted. All patients received a postal questionnaire one week following screening, measuring their satisfaction with the consultation, their knowledge of risk factors and their behavioural intention for six health-related behaviours. Those patients who returned this initial questionnaire were sent a three-month follow-up questionnaire measuring whether they had tried and managed to change their behaviour. Attendance rates were significantly different: Opportunistic (100%); letter invitation (54%); personal invitation (29%). The only difference between the three groups in impact was an advantage for the opportunistic group for intention to smoke less. Further analyses showed that patients who were screened (cf. those not screened) had a significantly higher level of intention, trying and behaviour change for exercise behaviour only. The clinic method was more effective for intention to eat less fat and salt and for actually eating less fat and taking more exercise, whereas, opportunistic screening was more effective for intention to smoke less.

It was concluded that the method of offering screening affected attendance. The low rate for the personal invitation method may have been due to lack of patient motivation in making the appointment or lack of doctor motivation in making the invitation. There was, however, little difference between the three methods in overall impact of screening. Although opportunistic screening was effective for reaching smokers, and clinic screening was useful for encouraging dietary changes and exercise, this study would suggest that, overall, there is no single, optimal way to organise a screening programme.

4.2 Introduction

As detailed in Chapter 1, Section 1.2.4.1, there are factors beyond those pertaining directly to the individual which may affect their uptake of a screening programme. It has been suggested (Marteau, 1993; Orbell, 1994) that the individual's behaviour should be considered within the context of the organisational factors surrounding a screening programme. These organisational factors may add to the explanation of uptake behaviour. In the conclusions of Chapter 2 of this thesis (the study which investigated screening at worksites) it was suggested that differences in uptake rates across the three worksites were likely to have been affected by differences in management/ worker relations, especially in terms of communication about the screening unit.

Organisational factors relate to how the screening programme is carried out and how the patients are invited to attend.

Different methods of organising screening are employed across and within GP practices in terms of who carries out the screening service (see Chapter 1, Section 1.2.3.1). Many practices organise screening clinics, usually run by the practice nurse, to which patients are either selectively or systematically invited. A large percentage of GPs are involved in assessing risk factors in the routine consultation, a process referred to as opportunistic screening (Ritchie, 1984). There is some evidence of divergent opinions amongst health professionals about the relative merits of these different methods of organising screening and as yet there is no evidence as to which method might be more effective (Calnan *et al*, 1994).

As detailed in the introduction (Chapter 1, Section 1.2.4.1), in previous research looking at different methods of inviting people to a screening appointment it has been found that higher rates of uptake were generally achieved when: 1. the letter of invitation contained a fixed appointment (as opposed to an open invitation) (Norman & Conner, 1993); 2. the invitation was made in person by a health professional (Mann *et al*, 1988) and 3. when screening was offered to those already receiving care (Watson *et al*, 1991). However, it is not known which of

these methods is the most effective. Studies have often been conducted across different practices, so observed differences in screening uptake might be due to other differences between the practices. It is therefore important to compare these methods within one health centre, as in some previous studies (Norman *et al*, 1991, Norman, 1993). Comparisons made between opportunistic or personal invitation methods for those currently consulting a GP with non-consulters contacted by letter (as is the study by Norman, 1993) confound differences between consulters and non-consulters with the method of invitation. Therefore, to make a stronger comparison between these different methods, subjects could be restricted to consulters.

In Chapter 1, Section 1.2.4.2. it was noted that there has been little psychological research on the impact of risk factor screening in terms of health behaviour change following screening.

The success of a method of organising screening will depend not only on *how many* people attend a screening appointment or are screened opportunistically. It will also depend on the impact of the screening on the patient's subsequent behaviour which may be affected by several factors including the health professional's behaviour (i.e. the 'quality' of screening) as well as the patient's individual response to screening.

The quality of screening may be affected by the different ways in which screening is carried out. Calnan & Williams (1993) found that there was less chance that tests and assessment of risk factors would be carried out systematically in an ordinary consultation than in a screening clinic. Thus opportunistic screening may lead to the patient having less knowledge of risk factors. It may also lead to less satisfaction in general with their consultation. Those patients who wish to be screened may be dissatisfied with the lack of time given to screening in the consultation. Conversely, those patients who do not wish to be screened may be dissatisfied with the time given to their original problem. Less knowledge and less satisfaction, according to Ley's cognitive hypothesis (Ley, 1988), may result in poorer adherence to any advice given.

The individual's response to screening, in terms of behavioural intention and behaviour change, may also be affected by the different ways in which screening is carried out. Previous research suggests that people invited in different ways attend for different reasons. For example, in a previous study (Norman & Conner, 1993)[31], if subjects were given an open invitation, they were more likely to make the decision to attend based on whether they believed their health was controlled by themselves. If they were sent a fixed appointment they were more likely to make the decision to attend based on whether they believed their health was controlled by health professionals. Thus, if people invited in different ways come to screening with different beliefs it could be predicted that their subsequent response would differ.

4.2.1 Aims of current study

The main aims of this study were thus to determine whether organisational factors in terms of how a screening programme was run in a general practice setting, and how patients were invited would affect patients' behaviour with regard to:

1. Uptake rates

By recruiting subjects within *one* health centre who were *all* consulting their GP, this study allowed for a more effective comparison of uptake rates than previous studies. The different methods of offering screening were hypothesised to affect screening uptake which was expected to affect the subsequent overall impact of screening, i.e. the more people screened using a particular method, then the better the overall impact of that method. This hypothesis, however, was based on the underlying assumption that being screened per se would make a difference to outcome such that those screened would be more likely to intend, try and manage to change their health behaviour.

2. Impact of screening

This study looked only at the initial impact of screening with no investigation of follow-up. Its aim was to determine if there were any differences between the

[31] For more details of this study see Chapter 1, Section 3.1.3.1.

methods of offering screening which could be predictors of future behaviour change. For this reason, the impact of screening was measured not only in terms of behaviour change, but also in terms of behavioural intention and trying which have been found to be predictors of future behaviour change (Ajzen, 1988, Bagozzi, 1992). It was hypothesised that the impact of screening would be affected by the different methods of offering screening due to the different 'types' of screening offered (i.e. clinic vs. opportunistic) and the possibility of patients coming to screening with different health beliefs if invited in different ways. It was predicted that the patients' knowledge of risk factors and satisfaction with the consultation would be affected by such factors which would then affect subsequent intention, trying and behaviour (i.e. that knowledge and satisfaction would act as potential mediators in the relationship between method of offering screening and impact of screening).

The hypothesis regarding the effect of the different 'types' of screening was, however, based on the underlying assumption that being exposed to more systematic tests and measurements (at the screening clinic) would produce different screening outcomes than a very short screening session during an ordinary consultation (opportunistic screening).

4.2.2 Main research questions

1. Does the method of offering screening affect screening uptake?

2. Does the method of offering screening affect the subsequent impact of screening ?

4.2.3 Questions derived from underlying assumptions

3. Does screening *per se* affect outcome?

4. Does type of screening (i.e. opportunistic vs. clinic) affect impact?

4.3 Method

The methodology of this study was approved by the Tayside Committee on Medical Research Ethics (January, 1994).

4.3.1 Subjects

The study was conducted at a health centre in Dundee, Scotland, where there are five general practitioners with a combined list size of 8250 patients. The target group for this study was consulting male patients, aged between 15 and 74, who had not been screened in the previous three years.

The number of male patients aged 15-74 who consulted their GP over the three-month recruitment period was 581 of whom 310 (53.3%) had been screened in the previous three years. The remaining 271 patients (46.7%) were invited to take part in the study, but of those, 61 (22.5%) declined to participate. The study sample therefore consisted of 210 patients who consented to take part. The mean age of the sample was 43.7 (sd = 17.7).

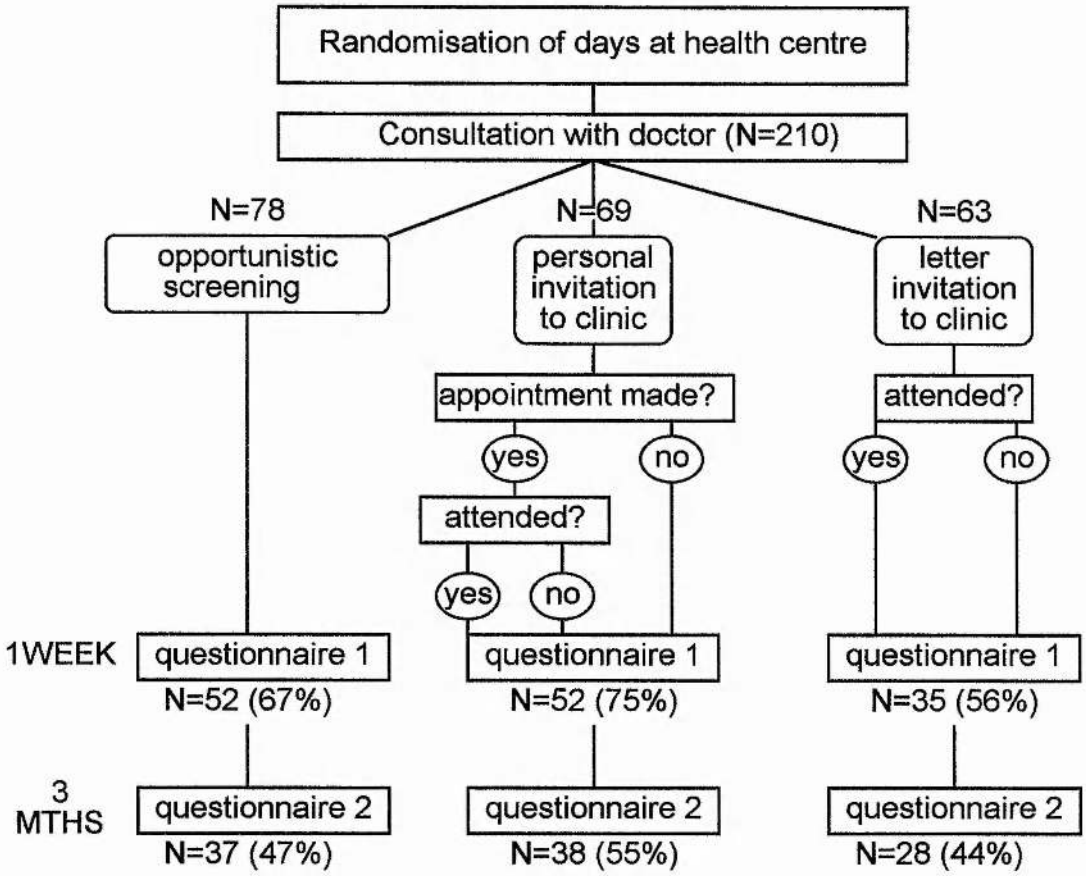
Using the subjects' postcodes, the extent of the sample's deprivation/affluence was calculated (Carstairs & Morris, 1991). Both the median and mode deprivation scores were found to be 5 (on a scale from 1-7 where 1 = most affluent; 7 = most deprived).

4.3.2 Design

As shown in figure 1, the three methods of offering screening were allocated to the subjects by the randomisation of days at the health centre. Days were randomised as opposed to subjects in order to make the research requirements easier for the GPs in their already busy schedule. The randomisation was carried out using a random number table. However, practical constraints concerning the number of available appointments at the screening clinic determined that each condition had to be represented equally each week. The study sample were assessed in terms of their uptake of screening and, in terms of the impact of screening, by two postal questionnaires. Questionnaire 1 (Appendix 7) measured

satisfaction, knowledge of risk factors and behavioural intention while Questionnaire 2 (Appendix 8) measured behavioural intention, trying and behaviour change.

Figure 1: Study design, recruitment numbers and questionnaire response rates



4.3.2.1 The three different methods of offering screening

1. Letter invitation:

This was a postal invitation (see Appendix 9) which contained a fixed appointment date and time, to a screening clinic run by a practice nurse (20 minute session) who recorded information on a standardised form (see Appendix 1) about cardiovascular risk factors including: age occupation, family history of premature cardiovascular disease and diabetes, consumption of tobacco, alcohol and salt, exercise participation and relevant history of chest pain. Blood pressure, height and weight were measured. Some counselling on reducing risk factors was

given if necessary. Cholesterol measurement was arranged for a later date for some of the subjects.

2. Personal invitation:

This was a verbal invitation made by the GP at the end of an ordinary consultation to book an appointment at the aforementioned screening clinic.

3. Opportunistic screening:

This involved the GP taking any available time during an ordinary consultation to carry out all or part of the screening procedure. This method was not monitored in any way in order to maintain as realistic a situation as possible.

4.3.3 Measures

4.3.3.1 Uptake

Attendance at the screening clinic for the two invitation groups was assessed from appointment records at the health centre. For the opportunistic group, participation in the study implied uptake of screening.

4.3.3.2 Impact

Satisfaction

The 11 questions (Appendix 7, Questions 1-11) were mostly derived from the Medical Interview Satisfaction Scale (the M.I.S.S. (21)) and were selected to cover the three aspects of satisfaction defined by Wolf *et al* (1978) (i.e. affective, cognitive and behavioural). The questions were also selected to be relatively neutral in order to apply to either screening clinic appointments (for those patients in the letter and personal invitation groups who attended the screening clinic) or ordinary consultations, with or without opportunistic screening (for those patients in the opportunistic group). A total satisfaction score was created for each subject by adding the scores for all the items (range 11-55).

[e.g. *I was given enough time with the doctor/nurse ; I understood the recommendations that were made to me*]

This scale consisted of 11 items (Cronbach's alpha = .91) scored on five-point likert-type response scales.

Knowledge

This measure consisted of 11 questions relating to risk factors for CVD, each with three possible responses: 'true', 'false' or 'don't know'. Internal reliability was measured using Cronbach's alpha[32], $\alpha = .71$, a result which was not improved by removing any of the items. (Appendix 7, Section 2, 1-11).

[e.g. You can lower your risk of CVD by improving your diet; It is possible to reduce all possible risk factors by taking drugs prescribed by the doctor]

The questions were validated by four doctors by asking the doctors to complete the questionnaire to the best of their skilled knowledge. Any question for which any of the doctors disagreed was discarded, leaving 11 questions.

Three distinct knowledge scores were created for each patient:

i. number of correct answers (i.e. the number of items to which they gave the correct true or false response)

ii. number of misconceptions (i.e. the number of items to which they gave the wrong true or false response)

iii. number of uncertainties (i.e. the number of items to which they gave a 'don't know' response.

Behavioural intention, Trying and Behaviour change (Appendix 8, 1-3)

Each of these measures consisted of six questions relating to six health behaviours [i.e. eat less fat; eat less salt; smoke less; drink less alcohol; lose

[32] For the purposes of this calculation, the 'true' and 'false' categories were recoded as either 'right' or 'wrong' depending on whether the statement was actually true or false and the 'don't know' category was recoded as 'wrong'.

weight; take more exercise] with either a 'yes'; 'no'; or 'doesn't apply' response. The questions were as follows:

Behavioural intention: In the next few weeks do you intend to:

Trying: In the past few months have you tried to:

Behaviour change: In the past few months have you managed to:

4.3.4 Procedure

At the health centre, three days each week were randomly allocated to the three different methods for a period of 13 weeks. Each doctor was given a letter explaining the study (Appendix 10), a timetable of the randomisation and a daily reminder on their patient list as to which method they were to use that day. The notes of the patients were checked before they arrived at the health centre to see if they fulfilled entrance criteria. If so, they were approached when they arrived at the health centre and given a patient information sheet and a consent form (See Appendix 11). If they consented to participate in the study they gave the consent form to the GP when they went in for their appointment. As shown in Figure 1, two questionnaires were used. Questionnaire 1 was sent out to all consenting participants. The opportunistic group were sent Questionnaire 1 one week following their consultation. The Letter invitation group were sent it one week following the proposed screening appointment, whether or not they attended screening. Those who made an appointment in the Personal Invitation Group were sent it one week after that appointment whether or not they attended, while those who did not make an appointment were sent Questionnaire 1 one week following their consultation. Those who responded to Questionnaire 1 were sent Questionnaire 2, three months following the mailing of the first questionnaire. Figure 1 gives details of the final numbers who were allocated to each method over the period of recruitment and the questionnaire response rates for each group at both time points.

4.4 Results

4.4.1 Statistical methods

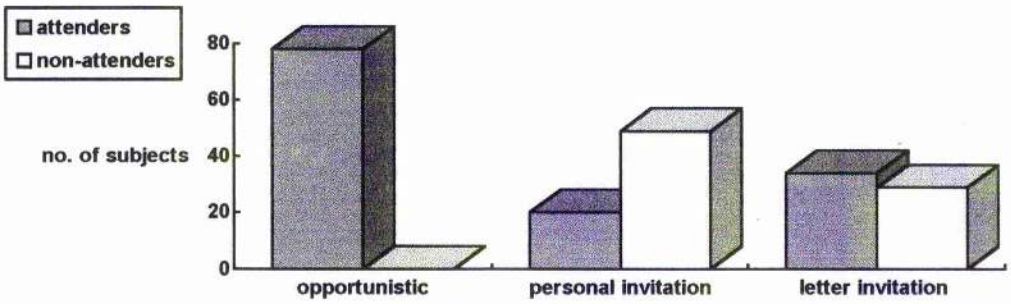
Data were analysed using SPSS for Windows. Comparisons of differences in proportions were made using chi-square tests and differences between means using between-subjects t-tests and one-way anovas. Correlations (Pearson's r) were used to look at relationships between variables. Differences were considered statistically significant if $p<0.05$.

4.4.2 Comparability of groups

There was no difference in age or in the extent of deprivation between the responders in the three groups [F (2,119) = .72, p=.49], [F(2,122) = .27, p=.77] respectively.

4.4.3 Does the method of offering screening affect screening uptake?

Figure 2: Screening attendance for the three different methods of offering screening



χ^2= 52.02, df=2, p=.000

Screening uptake for the opportunistic group was 100% as uptake was implied with participation in the study. The uptake rates for both invitation groups was poor (54% for the letter invitation group and 29% for the personal invitation group) (Figure 2). There was a significant difference between the three methods of offering screening ($p<.0001$). Personal invitations were the least effective method and significantly less effective than the letter approach ($\chi^2=7.65$, df = 1, $p=.006$).

Of the 69 patients in the personal invitation group, 28 actually made an appointment. Of this 28, 19 (68%) attended. The rate of uptake was higher for these patients who made their own appointment than for those in the letter group for whom an appointment was made (54%), but this difference was not significant.

4.4.4 Does the method of offering screening affect the subsequent impact of screening?

All patients were included in the analyses, whether or not they had attended screening (except for the analyses of the satisfaction measure, as this study was only concerned with the satisfaction of those who had attended screening) in order to ascertain the *overall* impact of each method of offering screening.

4.4.4.1 Satisfaction

Table 1: Mean satisfaction values and one-way analyses of variance for the 3 different methods of offering screening

	Opportunistic	Personal (attenders)	Letter (attenders)	F (df)	p
Satisfaction score	45.5	46.5	44.4	.58 (2,87)	ns

Comparing the attenders in the letter and personal invitation groups and those who were screened opportunistically, there was no significant difference in the mean satisfaction scores across the three groups (Table 1). Thus, the impact of screening in terms of satisfaction with the consultation was not affected by how screening was offered. Those screened opportunistically were not less satisfied.

4.4.4.2 Knowledge

Table 2: Mean knowledge scores and one-way analyses of variance for the 3 different methods of offering screening

knowledge score	Opportunistic	Personal	Letter	F (df)	p
correct	7.74	7.75	7.08	.61 (2,138)	ns
misconceptions	1.15	1.06	1.03	.12 (2,138)	ns
uncertainties	1.23	1.36	1.63	.51 (2,138)	ns

There were no significant differences when comparing the three methods of offering screening for the mean number of correct, misconception or uncertainty scores (Table 2). The impact of screening in terms of knowledge of risk factors was not affected by how screening was offered.

The most common misconceptions were found to be a 'true' response to:

You can reduce your risk of cardiovascular disease by eating regularly timed meals (28.3%)

One pint of lager is equal to one unit of alcohol (27.6%)

It is possible to reduce all risk factors by taking drugs prescribed by the doctor (17.9%)

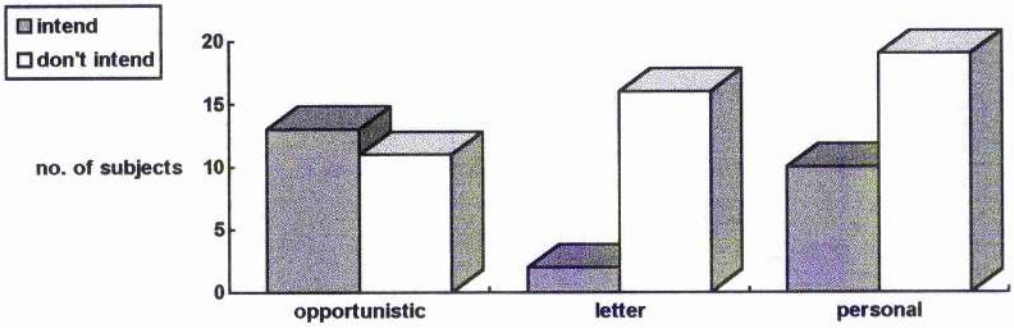
The most common uncertainties were:

You can reduce your risk of cardiovascular disease by eating regularly-timed meals (31%)

It is possible to reduce all risk factors by taking drugs prescribed by the doctor (23.4%)

4.4.4.3 Intention to change behaviour

Figure 3: Intention (at time 1) to smoke less for the three different methods of offering screening (smokers only)



$\chi^2 = 8.36$, df=2, p = .015

The method of offering screening had a significant effect on intention to smoke less at time 1 (p=.015). Using smokers only in the analyses, those in the opportunistic group were the most likely to intend to smoke less (Figure 3) (Table 3). However, doing further chi-square analyses on each of the two-way comparisons by adjusting the significance level (Brunden, 1972), the only significant difference found was between the opportunistic group and the letter invitation group (χ^2=8.3, df = 1, p=.003) with the latter showing less intention to smoke less.

Further analyses on smokers showed that those who attended the screening clinic were less likely to be smokers (10%) than those screened opportunistically (24%) or those who were invited to the clinic but did not attend (39%), ($\chi^2 = 8.87$, df = 2, p=.01).

There was no significant effect of method of offering screening on intention to change any of the other behaviours on either assessment (Table 3).

Table 3: Percentage of subjects who had the intention to change their behaviour (at time 1 and time 2) for the three different methods of offering screening

	Intention (time 1)				Intention (time 2)			
Behaviour	**Opportu-nistic**	**Personal**	**Letter**	**p ***	**Opportu-nistic**	**Personal**	**Letter**	**p ***
take more exercise	45%	45%	34%	ns	59%	48%	52%	ns
eat less fat	30%	40%	43%	ns	33%	52%	50%	ns
lose weight	23%	24%	40%	ns	30%	36%	39%	ns
eat less salt	21%	26%	37%	ns	29%	40%	42%	ns
drink less alcohol	27%	22%	21%	ns	30%	31%	35%	ns
smoke less #	54%	34%	11%	.015	50% [8/16]	26% [5/19]	25% [3/12]	too few numbers

*** indicates significance of chi-square test/ df = 2 for each behaviour**
 # smokers only

4.4.4.4 Tried to change behaviour

The method of offering screening did not have a significant effect on having tried to change, since time of screening, for any of the behaviours. The number of smokers was too small for significance testing of the 'smoke less' behaviour (Table 4).

Table 4: Percentage of subjects who had tried and who had managed to change their behaviour (at time 2) for the 3 different methods of offering screening

	Tried to change				**Managed to change**			
Behaviour	**Opportu-nistic**	**Personal**	**Letter**	**p ***	**Opportu-nistic**	**Personal**	**Letter**	**p ***
Take more exercise	41%	39%	44%	ns	31%	43%	48%	ns
eat less fat	42%	54%	58%	ns	41%	50%	60%	ns
lose weight	33%	43%	50%	ns	27%	36%	50%	ns
eat less salt	27%	45%	44%	ns	33%	42%	45%	ns
drink less alcohol	38%	28%	41%	ns	38%	32%	35%	ns
smoke less #	43% (6/14)	24% (5/21)	36% (4/11)	too few numbers	20% (3/15)	22% (5/23)	9% (1/11)	too few numbers

*** indicates significance of chi-square test/ df = 2 for each behaviour**
 # smokers only

4.4.4.5 Behaviour change

The method of offering screening did not have a significant effect on having managed to change, since time of screening, for any of the behaviours. The

number of smokers was too small for significance testing of the 'smoke less' behaviour (Table 4).

4.4.5 Does screening per se affect outcome?

To answer this question, patients who were screened, either at the clinic or opportunistically, were compared with patients who were not screened, (i.e. those who were invited, either by letter or in person, but who did not attend).

4.4.5.1 Knowledge

Table 5: Mean knowledge scores and independent t-test analyses between those screened and those not screened

Knowledge score	screened	not screened	t (df)	p
no. correct	7.47	7.64	-.31 (139)	ns
misconception	1.00	1.13	-.57 (139)	ns
uncertainty	1.13	1.50	-1.14 (139)	ns

There were no significant differences when comparing those screened and not screened for the mean number of correct, misconception or uncertainty scores (Table 5). Thus, screening *per se* did not have a significant effect on outcome in terms of knowledge of risk factors.

4.4.5.2 Intention to change behaviour

Table 6: Percentage of subjects who had the intention to change their behaviour (at time 1 and 2), comparing those screened and those not screened

	Intention (time 1)			**Intention (time 2)**		
	screened	**not screened**	**p ***	**screened**	**not screened**	**p ***
take more exercise	50%	28%	.011	61%	38%	.049
eat less fat	39%	32%	ns	48%	36%	ns
lose weight	29%	25%	ns	34%	33%	ns
eat less salt	30%	21%	ns	39%	30%	ns
drink less alcohol	26%	19%	ns	34%	28%	ns
smoke less #	38%	32%	ns	36%	28%	ns

*** indicates significance of chi-square test/ df = 1 for each behaviour**
 # smokers only

The percentage of those intending to take more exercise was significantly higher in those screened compared with those not screened at time 1 ($\chi^2 = 6.4$, df = 1, p=.011) and at time 2, ($\chi^2 = 3.85$, df = 1, p = .05). For all the other behaviours at

both time points, the percentage of subjects who intended to change was higher for those who had been screened, but none of these differences were significant (Table 6).

4.4.5.3 Tried to change behaviour

Table 7: Percentage of subjects who tried and who managed to change their behaviour (at time 2), comparing those screened and those not screened

	Tried			Managed		
	screened	**not screened**	**p ***	**screened**	**not screened**	**p ***
take more exercise	48%	25%	.043	48%	24%	.04
eat less fat	52%	47%	ns	54%	37%	ns
lose weight	43%	38%	ns	38%	36%	ns
eat less salt	39%	36%	ns	42%	35%	ns
drink less alcohol	38%	31%	ns	36%	35%	ns
smoke less #	30%	33%	ns	14% [4/29]	21% [4/19]	too few numbers

*** indicates significance of chi-square test/ df = 1 for each behaviour**
 # smokers only

The percentage of those who had tried to take more exercise since the time of screening was significantly higher in those screened compared with those not screened ($\chi^2 = 4.11$, df = 1, p=.043). For all other behaviours apart from smoking less, the percentage of subjects who tried to change was non-significantly higher for those who had been screened. The number of smokers was too small for significance testing of the 'smoke less' behaviour (Table 7).

4.4.5.4 Behaviour change

The percentage of those who had managed to take more exercise since the time of screening was significantly higher in those screened compared with those not screened ($\chi^2 = 4.07$, df = 1, p=.044). For all other behaviours apart from smoking less, the percentage of subjects who managed to change was non-significantly higher for those who had been screened. The number of smokers was too small for significance testing of the 'smoke less' behaviour (Table 7), but clearly screening did not result in greater reductions of smoking.

4.4.6 Does type of screening affect impact?

A comparison was made between those patients who attended the clinic (following either letter or personal invitation) and those who were screened opportunistically.

4.4.6.1 Satisfaction

Table 8: Mean satisfaction values and independent t-test analyses for opportunistic compared with clinic screening

	Opportunistic	Clinic	t (df)	p
Satisfaction Score	45.5	45.4	-.1 (88)	ns

There was no significant difference in the mean satisfaction scores between the two groups (Table 8). Thus, the impact of screening in terms of satisfaction with the consultation was not affected by the type of screening carried out. Those screened opportunistically were not less satisfied.

4.4.6.2 Knowledge

Table 9 : Mean knowledge scores and independent t-test analyses for opportunistic compared with clinic screening

knowledge score	Opportunistic	Clinic	t (df)	p
correct	7.74	7.51	0.38 (92)	ns
misconceptions	1.15	1.10	0.21 (92)	ns
uncertainties	1.23	1.85	1.53 (92)	ns

There were no significant differences when comparing the three methods of offering screening for the mean number of correct, misconception or uncertainty scores (Table 9). The impact of screening in terms of knowledge of risk factors was not affected by the type of screening carried out.

4.4.6.3 Intention to change behaviour

Table 10: Percentage of subjects who had the intention to change their behaviour (at times 1& 2) for those screened opportunistically compared to those screened at the clinic

	Intention (time 1)			Intention (time 2)		
	Opportun-istic	Clinic	p *	Opportun-istic	Clinic	p *
Take more exercise	45%	56%	ns	61%	62%	ns
eat less fat	30%	51%	.038	34%	67%	.011
lose weight	23%	36%	ns	28%	42%	ns
eat less salt	21%	41%	.029	30%	50%	ns
drink less alcohol	27%	26%	ns	31%	38%	ns
smoke less #	54%	13%	.007	46% [7/15]	23% [3/13]	too few numbers

*** indicates significance of chi-square test/ df = 1 for each behaviour**
 # smokers only

The percentage of those intending to eat less fat was significantly lower in those screened opportunistically than in those screened at the clinic, at time 1 (χ^2 =4.28, df = 1, p=.038) and at time 2, (χ^2 = 6.4, df = 1, p=.011). The percentage of those intending to eat less salt at time 1 was also significantly lower in those screened opportunistically (χ^2 = 4.74, df = 1, p=.029). However, the percentage of those intending to smoke less at time 1 was significantly higher in those screened opportunistically (χ^2 = 7.11, df = 1, p=.008). There were no significant differences between the two types of screening at either assessment for intention to take more exercise, to lose weight or to drink less alcohol (Table 10).

4.4.6.4 Tried to change behaviour

Table 11: Percentage of subjects who had tried and who had managed to change their behaviour (at time 2) for those screened opportunistically compared to those screened at the clinic

	Tried			Managed		
	Opportun-istic	Clinic	p *	Opportun-istic	Clinic	p *
take more exercise	39%	57%	ns	31%	63%	.015
eat less fat	43%	63%	ns	42%	69%	.04
lose weight	34%	54%	ns	28%	51%	.08
eat less salt	28%	52%	.059	34%	50%	ns
drink less alcohol	39%	36%	ns	39%	32%	ns
smoke less #	38% [5/13]	21% [3/14]	too few numbers	14% [2/14]	13% [2/15]	too few numbers

*** indicates significance of chi-square test/ df = 1 for each behaviour**
 # smokers only

There was no significant effect of type of screening on having tried for any of the behaviours (Table 11). However, there was a trend for the percentage who had tried to eat less salt since the time of screening to be higher for those who were screened at the clinic (p=.059). The number of smokers was too small for significance testing of the 'smoke less' behaviour.

4.4.6.5 Managed to change behaviour

The percentage of those who had managed to take more exercise since the time of screening was significantly higher for those screened at the clinic than for those screened opportunistically (χ^2 = 5.9, df = 1, p=.015). There was also an advantage for those screened at the clinic to have managed to eat less fat (χ^2 =4.2, df = 1, p=.04). There was no significant effect of type of screening on having managed to lose weight, eat less salt or drink less alcohol and the numbers of smokers were too small for significance testing of the 'smoke less' behaviour.

4.4.7 Managing to change without trying

It is noteworthy in Tables 4, 7 and 11 that for some of the health behaviours the percentage of those having managed to change exceed the percentage who have tried. This is the case for taking more exercise, eating less fat, eating less salt and drinking less alcohol. There is no incidence of managing without trying for stopping smoking or for losing weight.

4.4.8 Do knowledge and satisfaction act as mediators?

Table 12: Correlations between knowledge scores, satisfaction and intention, trying and behaviour

	Behaviour	correct r (pb)#	misconceptions r (pb)#	uncertainties r (pb)#	satisfaction r (pb)#
intention (time 1)	**Take more exercise**	.25 **	ns	ns	ns
	eat less fat	.24 **	ns	ns	ns
	lose weight	.18 *	ns	ns	ns
	eat less salt	.21 **	ns	ns	ns
	drink less alcohol	.21 *	ns	ns	ns
	smoke less	.32 **	ns	ns	ns
intention (time 2)	**eat less fat**	.20 *	ns	ns	ns
	all other behaviours	ns	ns	ns	ns
trying	**eat less fat**	.20 *	ns	ns	ns
	all other behaviours	ns	ns	ns	ns
behaviour change	**eat less fat**	.25 *	ns	ns	ns
	all other behaviours	ns	ns	ns	ns

** = <.01

* = <.05

Pearson's r (point biserial) correlation coefficient

The analyses shown in Table 12 gives information about the relationships between knowledge and subsequent intention, trying and behaviour change and the relationships between satisfaction and subsequent intention, trying and behaviour change. Knowledge (no. correct) was significantly related to intention (at 1 week) for all the listed behaviours. Knowledge (no. correct) was related to intention (at both time points), trying and managing to eat less fat. The knowledge scores derived from the number of misconceptions and number of uncertainties did not correlate with intention, trying or behaviour change for any of the behaviours (Table 12). However, as previously shown, the method of offering screening did not affect knowledge scores. Furthermore there were no knowledge differences between those screened and those not screened or between those screened at the clinic and those screened opportunistically. So although knowledge has an impact on intentions and to some extent also on trying and behaviour, it is not a mediator between method of offering screening and these outcome variables, i.e. it does not affect the relationship between method and

outcome. Nor is knowledge a mediator between screening per se and outcome or between type of screening (clinic vs. opportunistic) and outcome.

Satisfaction did not correlate with intention, trying or behaviour change, so satisfaction with the consultation/screening did not predict outcome. As shown previously there were also no differences in the levels of satisfaction between the different methods of offering screening, between clinic and opportunistic screening or between those screened and those not screened. Therefore, satisfaction did not act as a mediator in any of the relationships between method of offering screening, type of screening or screening per se and the outcomes.

4.5 Discussion

4.5.1 Screening uptake

Screening uptake rate was found to be affected by the method of offering screening. For the opportunistic method, uptake was 100% because the patient was not given any choice as to whether or not to attend. As this method was not monitored this result does not necessarily mean that screening took place 100% of the time, just that the opportunity for screening was there.

Both methods of invitation produced lower uptake rates in comparison with other studies using invitation methods (Norman & Conner, 1993 (70%); Mann *et al*, 1988 (**?%**); Norman, 1993 (61.2%). The majority of patients in this particular health centre had already been screened. Therefore, this may have been a fairly unusual sample who have resisted previous offers of screening.

The personal invitation method produced a particularly low uptake rate which is surprising considering the relative success of this method in previous research (Mann *et al*, 1988; Norman, 1993). It could be argued that the uptake rate of 29% was not a true measure of success of the personal invitation method since it was not established whether the doctor had actually invited the patient (cf. Norman, 1993 where the uptake rate was calculated for those who had definitely been invited). As stated above, the aim of this study was to create as natural a situation as possible, therefore it would not have been realistic to monitor the

doctors' inviting behaviour as this may have altered it. So the low uptake rate found in this study may be more reflective of the actual rate which would result in a situation where GPs agree to invite their patients during consultation, as they did in this study.

The low rate may have been due to the patients' behaviour, i.e. the fact that patients were required to make their own appointment following the invitation and therefore had to be motivated to do so. In such a manner, this method could be compared to the open invitation methods by letter which have also been shown by Norman & Conner (1993) to be less effective. Further analyses of our data showed that within the personal invitation group, uptake rates obtained by the five different doctors ranged from 0% to 67% (the significance of this difference was not calculated due to small numbers) suggesting that differences in uptake rates may have been due to the doctors' behaviour. Despite the fact that all the doctors agreed to participate in the study, their 'inviting' behaviour may have varied depending on their beliefs regarding screening, their motivation, their effort and their communication about screening. A study by Schucker *et al* (1987), which found that the doctors included in the sample lacked knowledge and were unsure of the benefits of screening, may explain why some doctors promoted low uptake rates. Marteau & Johnston (1990) have suggested that variance in the behaviour of health professionals should be taken into account when considering variance in patients' behaviour such as uptake rates. The differences shown across different doctors in this study reinforce the need for this factor to be researched in more detail; a recent study (Bekker & Marteau, 1994) found that GPs' cognitions predicted their patients' uptake of breast screening.

4.5.2 Impact of screening

It was hypothesised that, since the different methods of offering screening would result in different uptake rates and they would offer different 'types' of screening, the subsequent impact of screening would be affected. However, although there were wide differences in uptake rates of the three groups and they did offer different 'types' of screening, the method of offering screening had little effect on overall impact.

The only difference shown between methods of offering screening was for intention to smoke less at one week following screening. Using smokers only in this analyses it was found that those screened opportunistically had the highest intention to smoke less. Further analyses showed that those patients who attended the clinic were the least likely to be smokers compared to the opportunistic group and the non-attenders. So smokers were less likely to attend if invited to a screening clinic. Previous studies have shown that those who were least likely to attend for screening for cancer (Seydal *et al*, 1990) and for CHD risk factors (Worksite study, see Chapter 2) perceived themselves as more susceptible to disease. It may be that smokers perceive their susceptibility to be higher than average and thus avoid screening. Alternatively they may anticipate a more aversive screening consultation and avoid it for that reason. It seems that smokers avoid screening clinics and therefore opportunistic screening is a better way of reaching smokers.

Knowledge and satisfaction did not act as mediators between method of offering screening and impact as predicted. Nevertheless it is important to note that the 'number correct' component of knowledge predicted some aspects of impact, especially intention to change. The other aspects of knowledge, i.e. the number of misconceptions and number of uncertainties, did not affect impact which suggests that it is the amount of correct knowledge that was important - the amount of uncertainty and misconceptions the subjects had were less relevant in this study. Overall, it seems to have been relevant to divide the knowledge scoring in this way. Satisfaction, on the other hand was not related to any of the outcome variables. This suggests that responding to advice about risk factors and behaviour change does not depend on satisfaction with the consultation and may be a different process from adherence to medical advice which *has* been found to be related to satisfaction (Ley, 1988). The lack of group differences shown for satisfaction and knowledge could suggest a ceiling effect. This might be expected as the subjects are all consulters and may thus be generally satisfied with the services at the health centre and have a good knowledge of lifestyle risk factors. The satisfaction results do seem to support this suggestion as the average score was 45.5 out of a possible 55. However, knowledge scores averaged 7.5 out of

11 which may suggest some room for knowledge improvement which screening did not seem to effect. The result for knowledge was that screening did not predict knowledge but knowledge predicted impact. From an applied perspective this suggests that screening outcomes may be improved by designing interventions to increase knowledge of risk factors during the screening process.

4.5.2.1 Effects of screening per se

The assumption that screening per se would make a difference to outcome such that those screened would be more likely to have intentions, to try and to manage to change their health behaviours was hardly supported. Those patients who were screened (both at the clinic and opportunistically) were more likely than those who were not screened to intend (at both assessments), to try and to manage to take more exercise. There was, however, no effect of screening on intention, trying or managing to do any of the other behaviours measured, although all tended to be enhanced by screening. This may account for the main finding that neither the Letter invitation nor the Opportunistic methods had any overall advantage over the Personal invitation method even though their uptake rates were higher. If screening *per se* has little effect on the outcomes measured in this study, then it is not surprising that the methods which allowed more people to be screened did not show better overall screening outcomes. However, the second follow-up in the current study was only three months following screening and it is possible that screened patients would still be receiving advice from the GP or practice nurse which might have an impact at a later stage. Nonetheless, the impact would probably be affected by the type of advice given. Michie *et al* (1995) found that the type of feedback following screening affected the extent of behaviour change and Johnston (1995) argues that such feedback should be informed by current theory and evidence on factors influencing behaviour change. Unfortunately, information regarding the feedback given to patients was not available in this study. Further research on the behavioural impact of screening should investigate this issue in more detail.

Another possible reason for the lack of differences between those screened and those not screened is that patients may not have taken any advice seriously.

Previous research by Rastam *et al* (1988) showed that 30% of their sample regarded their screening results as unimportant.

It is interesting however that those screened did have a higher intention, tried more and managed to exercise more. This may be because those who are screened are more likely to have tried to exercise more before screening which may just continue following screening. It is also possible that taking more exercise is 'easier' for those who are screened if they are given a barrage of advice at their appointment and decide to choose one thing to do. This may be especially true considering the questionnaire item used which did not measure the extent of exercise by which they were increasing, but was simply a dichotomous question as to whether or not they had taken more exercise. Exercise also differs from all the other behaviours in the sense that it requires taking up a positive (health enhancing) behaviour as opposed to giving up a negative behaviour (e.g. eating less fat, smoking less, etc.). It may be easier for people to find the motivation to take up a positive behaviour than give up a negative behaviour. Or, exercise may have been stressed in the screening appointment due to a particular need for an increase in physical activity within the screened group, or because it was a priority of the health professionals involved.

4.5.2.2 Clinic vs. opportunistic screening

The underlying assumption that type of screening (i.e. clinic vs. opportunistic) would affect screening outcomes held true at least to some extent. The clinic method was certainly more effective for motivation to eat less fat and salt and for changing people's behaviour in terms of eating less fat and taking more exercise. However looking back at the main results comparing the three methods of offering screening, the two clinic/invitation groups did not have better overall outcomes than the opportunistic group, so this beneficial effect of the clinic is obviously not enough to overcome the low screening uptake rates.

More of the smokers screened <u>opportunistically</u> intended (at time 1) to smoke less than smokers screened at the clinic. This may account for the main finding, in the comparison of the three different methods of offering screening, of an advantage of opportunistic screening in terms of smoking intentions. The large-scale

OXCHECK study (1994) which was mentioned in Chapter 1 (Section 1.2.4.2) also showed that clinics run by Practice Nurses were not successful in getting smokers to stop smoking. This finding could be because smokers are less likely to attend clinics (which was found in this study) but if they do attend, they may be unusually resistant to change smoking behaviour. Perhaps they are attending due to some other motivation such as desire to avoid medical disapproval as outlined in anticipated decision regret theory (Tmystra, 1989). These data suggest that not only was opportunistic screening a better way of reaching smokers as discussed above but that the opportunistic screening process itself may have been a more effective way of persuading smokers to smoke less. It may be that smoking is the salient message that GPs manage to convey in an opportunistic consultation. In fact, the supposed disadvantage of opportunistic screening allowing for such a short time might actually be its advantage. It may enable GPs to prioritise the most important behaviour needing changed which may make that particular behaviour more salient for the patient and easier to cope with than a list of possible changes.

4.5.2.3 Managing without trying

As noted in the results section, it was evident that some people seem to have managed to change certain behaviours without trying. This indicates that some health behaviours may be easier to change than others, perhaps due to circumstantial changes. For example, a change in employment could result in an increase in exercise, without the need for trying to change their exercise behaviour on the individual's part. Or a change in diet could occur due to a partner deciding to make a change to what is eaten in the household. It is however important to note that smoking less and losing weight were not able to be achieved without trying which may indicate that these behaviours always require a more cognitive effort on the part of the individual.

4.5.3 Limitations of the study

The main limitations of the current study were the use of self-report measures, the response rates and the lack of information about the screening process.

The use of self-report measures of screening outcomes may have been influenced by social desirability biases. However, the percentages of patients who reported having intended, tried and managed to change their behaviour were generally fairly low which suggests that this bias was not present. The use of postal questionnaires resulted in a possible lack of representativeness of the responding sample; although response rates were fairly high at the one week follow-up (66%), they were reduced at three months (49%). However, interview techniques might not have resulted in better response rates and may have induced more social desirability bias. This study did not monitor what happened in the actual screening process, either at the clinic or in the opportunistic consultation. This information would have been useful as the extent of screening measurements was not clear, especially in the opportunistic method, where it is possible that for some patients no screening took place at all. However, this was an applied study, designed to measure the impact of different methods of organising screening in a normal general practice setting and thus the situation was created to be as natural as possible. If the doctor's behaviour had been monitored, this might have affected their normal behaviour.

4.5.4 Applied implications

1. Despite divergent opinions amongst health professionals about the relative merits of different methods of organising screening (Calnan *et al*, 1994), this study seems to suggest that, overall, there is no single, optimal way to organise a screening programme.

2. Opportunistic screening should certainly be regarded as an effective method, particularly for reaching smokers. Organised screening clinics seem to be of value too, especially for encouraging dietary changes and exercise.

3. Screening outcomes may be improved by designing interventions to increase knowledge of risk factors during the screening process.

4. The most frequent patients' misconceptions and uncertainties suggested first, a misunderstanding that the timing of meals is important and second, an overestimation of the role of medication in risk factor reduction.

5. The comparison of those screened with those not screened suggests that screening as currently envisaged has little *initial* impact on either behavioural intention or health behaviour change.

4.5.5 Summary of implications for further research

- Due to the possibility that this was an unusual sample who had resisted screening, uptake rates should be further examined in practices where screening is less common.
- The suggested effect of GPs behaviour on uptake rates should be examined in more detail, in terms of the rates obtained by different doctors making the invitation and whether their cognitions predict differences in uptake rates.
- It would be useful to have more information on what happens during an opportunistic consultation, but without changing its unconstrained nature.
- Studies on longer term impact using more sophisticated measures of behaviour change should be designed.

4.5.6 Conclusions

It was expected that organisational factors in the form of different ways of offering screening would affect impact, mainly due to an effect on uptake rates and because of the different types of screening offered.

First, it was found that, although the method of offering screening did indeed influence uptake rates, there were no differences in the subsequent impact of the three methods following screening, perhaps because screening itself had little effect (apart from the finding for exercise behaviour). This result would suggest that more research is required to measure the psychological impact of screening in terms of the variables which are likely to predict behaviour change, preferably measuring beliefs both *before* and after screening. Second, although different types of screening were offered there was little effect on the overall impact of the

three different methods. Clinic screening did seem to be generally more effective than opportunistic screening for those screened, but its advantages were obviously not great enough to overcome the low uptake rates of those invited to the clinic.

This study has suggested that organisational factors do play a role in determining uptake of screening, but their role in the subsequent impact of screening is less evident at this stage.

5. Discussion of all empirical studies

This section will re-state the aims of the empirical studies and summarise the main findings across the three studies in terms of the uptake rates and the factors affecting uptake and impact of screening. It will go on to discuss the main theoretical findings and implications for the development of theory. Finally, applied implications and possible further research will be highlighted.

5.1 What were the aims?

The two main aims of the empirical studies of this thesis were (1) to predict and explain health behaviour in an attempt to understand factors which may influence the way screening is practiced (applied aim), and (2) to apply and evaluate/compare the existing psychological theories in this field (theoretical aim). The health behaviour concerned was the response to screening for risk factors for CVD. The two main responses to screening were uptake (whether someone attends or not) and impact (whether someone changes their behaviour or not, subsequent to being screened).

The three empirical studies thus addressed the following topics:
Study 1 (Chapter 2) investigated the uptake of CVD screening at worksite locations. In a prospective design with a sample of workers from three worksites (overall N= 425), single health belief variables derived from the main social cognition models (i.e. HBM, TRA, TPB and SLT) were measured before the arrival of the screening unit. The applied aim was to see what differences there were between those who subsequently attended and did not attend. The theoretical aim was to compare the models with each other and evaluate them in terms of their power to discriminate between attenders and non-attenders.

Study 2 (Chapter 3) investigated the impact of CVD screening in terms of subsequent health behaviour change at a general practice location. Using a prospective design, with a sample of patients due to attend a screening clinic (N=86 (at time 1); N=71 (at time 2); N=59 (at time 3)), the applied aim was to investigate which health belief and action plan variables were related to behaviour change following screening. Two relatively recent theories of behaviour change, the HAPA (Schwarzer, 1992) and the PAP (Weinstein, 1988, Weinstein &

Sandman, 1992) were used as the theoretical frameworks in this study. The motivation phase of the HAPA was evaluated in terms of its power to predict attendance behaviour and in terms of its internal structure. The 'stage' structure of the PAP was examined, as was its ability to predict at what stage subjects would be most likely to change their behaviour.

Study 3 (Chapter 4) moved beyond the domain of social cognition models to factors external to the individual. Different methods of organising the screening programme were investigated at a general practice location with a sample of patients eligible to be screened (N=210). The predominant aim of this study, which had an applied emphasis, was to find out the most effective method of offering screening in terms of overall uptake and impact. A randomised trial was set up to test the effect of three methods of offering screening on subsequent uptake. Initial impact was also measured, not only in terms of in terms of reported behaviour change, but also in terms of factors likely to predict behaviour change: satisfaction, knowledge of risk factors, intention and trying.

5.2 What were the main findings?

5.2.1 Rates of uptake

Rates of uptake were measured in Studies 1 and 3. In Study 1 (the worksite study), the overall uptake rate was 62.4%, but it varied from 28% to 81% across the three worksites. In Study 3, the three different methods of offering screening produced different uptake rates: 54%, 29% and 100% for the letter invitation, personal invitation and opportunistic screening methods respectively.

So the overall rate of uptake, by invitation (i.e. excludes opportunistic screening), to a screening appointment was higher for screening at the worksite than for screening in general practice. This may reflect greater convenience at the worksite, one of the advantages of screening at the worksite proposed by Cohen (1985).

However, uptake rates varied considerably. From the results of Study 1, the hypothesis was derived that the worksites may have different uptake rates due to different methods of communication at the three worksites. So, different methods of communication, in terms of how screening was offered, were tested in a

randomised trial in Study 3. The results of the latter study lent support to the hypothesis that the form of communication has an effect on uptake rate.

5.2.2 Factors predicting uptake of screening

Factors predicting uptake were examined in Studies 1 and 3.

In Study 1 (the worksite study) the entire sample was used to investigate differences between attenders and non-attenders. Attenders were found to be older as found in previous studies and more likely to be female than non-attenders. There were several significant differences in health beliefs between attenders and non-attenders which were in line with the variables included within the theoretical models. In fact the only variables derived from the models which did not distinguish between attenders and non-attenders were *health value* and the three health locus of control components: *internal, powerful others* and *chance*. A different picture emerged when the single variables were investigated within each separate worksite. There was inconsistency in the beliefs predictive of attendance with *intention to attend* being the only variable which was predictive in each of the three worksites.

In Study 3, the effect of method of offering screening on uptake was examined in a randomised trial. The method of offering screening did have an effect on uptake rate as detailed above in the section on uptake rates. The opportunistic method produced an uptake rate of 100% because the patient was not given any choice as to whether or not to attend. However, this rate only reflects the opportunity for screening to take place. It does not mean that screening actually did take place. Of the two other methods which involved different methods of invitation to a screening clinic, the letter invitation resulted in a higher uptake rate (54%) than the personal invitation method (29%). However, in comparison to previous similar studies, both these rates were fairly low.

5.2.3 Factors predicting behaviour change following screening

Factors predicting the subsequent impact of screening were examined in studies 2 and 3. Very little previous research has investigated the impact of screening in terms of behaviour change and the cognitive factors predicting behaviour change.

In Study 2 (Chapter 3), the effect of variables derived from recent theoretical models (the HAPA and the PAP) on behaviour change following screening was examined. In terms of the effect of variables derived from the HAPA (a refined and developed version of the main social cognition models used in Study 1) there was a surprising finding that neither *intention* nor *self-efficacy*, both predominant parts of the model, were useful predictors of behaviour change. Instead, *threat* was the most effective predictor of change. However, the HAPA is divided into two parts, a motivation phase and, after *intention*, an action phase. Certain variables from the action phase were predictive of behaviour change. If subjects were able to devise specific *means* (subsidiary goals) of achieving a particular behaviour change and if they were able to specify when they would carry out these particular *means* they were more likely to make a health behaviour change.

In Study 3, the method of offering screening did not affect impact in terms of knowledge or satisfaction. Furthermore it was not found, in general, to predict intention to change, trying to change or reported behaviour change, apart from one finding that smokers in the opportunistic screening group had a higher intention to smoke less. However, further analyses showed that the type of screening (i.e. at a screening clinic compared to within an ordinary consultation) predicted behaviour change. Those screened at the clinic were more likely to intend to eat less fat and salt and to manage to eat less fat and take more exercise. Opportunistic screening, on the other hand, was more likely to result in smokers having the intention to smoke less. Another subsidiary finding was that being screened (either opportunistically or at the clinic) as opposed to not being screened (i.e. those who were invited but did not attend) predicted behavioural intention, trying and change, but only for exercise behaviour.

In summary, the findings showed that screening per se had an impact on exercise behaviour and, for those screened, the type of screening affected its subsequent impact for several outcome behaviours. However, in general terms, the method of offering screening to the entire sample of patients eligible for screening had very little effect on overall impact.

5.3 Main theoretical findings

Studies 1 and 2 tested the predictive power of certain theoretical models. The comparison of the main social cognition models (Study 1) in the prediction of screening uptake at the worksite was an attempt to "carry out the winnowing process that is necessary for scientific progress" which, according to Weinstein (1993) researchers, in general have failed to do. The TRA, TPB and HBM (both core and extended versions) were all able to discriminate between attenders and non-attenders in the combined sample of all three worksites. SLT was the only model which was unable to discriminate significantly between attenders and non-attenders. The TRA was found to be the most successful, correctly classifying 72.4% of the subjects as either attenders or non-attenders. The internal structure of the TRA was also confirmed by the data. Attitudes and subjective norm explained 22% of the variance in *intention*. *Intention* alone correctly classified as many of the subjects (as attenders or non-attenders) as all the variables together, thus establishing its predominant place in the model. The models worked differently, however, for each individual worksite. At one of the worksites (the Card Factory) none of the models predicted attendance behaviour. At another (the City Council Cleansing Department), all the models (except SLT) were predictive and most of the constituent variables within the models were significant predictors. It was thus hypothesised that a stage model approach such as the Precaution Adoption Process (Weinstein, 1988) might help to explain these findings, in that the worksites may have been at different stages of the process where different beliefs are predictive. In particular, the City Council Cleansing Department was hypothesised to be at an earlier stage of the process to account for the finding that <u>more</u> of the social cognition variables were predictive of behaviour at this worksite.

To predict the impact of screening in terms of health behaviour change (Study 2), the more recent HAPA (Schwarzer, 1992) was employed. The intention-behaviour gap problem is addressed in the HAPA, which as already described, includes an action phase after *intention* which incorporates variables such as action plans and action control. This part of the model is new and has not been tested empirically in previous research. In an attempt to operationalise this phase

of the HAPA, two recent theories (Gollwitzer, 1993 and Bagozzi, 1992) were employed. Although the resulting 'action phase' variables were not tested together in a multivariate fashion and certain components of the model were not included (e.g. social support), the data provided support for the inclusion of some form of an action phase in a model predicting health behaviour. First, *intention* and *self-efficacy* were related to aspects of the action phase. Moreover, some of the action phase variables were related to health behaviour change. The motivation phase of the HAPA, however, did not perform quite as expected. Taken together, the variables of the motivation phase of the HAPA were able to predict the number of health behaviour changes made and exercise behaviour change, but not dietary or smoking behaviour change. However, the model predicts that *intention* is the most important predictor, with *threat, outcome expectancies* and *self-efficacy* all working only via *intention*. The results of this study did not support this hypothesised structure. *Threat* was found to be the most important predictor of behaviour change, predicting behaviour directly, not via *intention*. This motivation phase of the HAPA is proposed as an improvement on earlier social cognition models. However its overall correct classification of changers and non-changers was only slightly better than the classification by the TRA of attenders and non-attenders in Study 1 (78.6% vs. 72.4%). Moreover, the structure of the TRA was confirmed by the data in Study 1 whereas the structure of the HAPA has not been supported. It must be pointed out, however, that the differences in outcome health behaviour (uptake vs. behaviour change), sample sizes and types of population (workers vs. attenders at a screening appointment in general practice) in the two studies questions the meaningfulness of such a direct comparison of the models. Measurement of the outcome behaviour may also be an issue. The measurement of uptake is objective, whereas the measurement of behaviour change (in this study) was subjective.

5.4 Implications for the development of theory

Intention, the main predictor of behaviour proposed by the TRA, was the strongest predictor of behaviour. However, it still left much of the variance in attendance behaviour unexplained (Study 1). This finding is in line with much

research in health behaviour which led to the debate as to what might fill this intention-behaviour 'gap'. Current conceptualisations about what might fill this gap have also been illustrated in the results of Study 1. *Self-efficacy* has been hypothesised as an important predictor of behaviour (Schwarzer, 1992). The success of the variable *number of barriers* could be a reflection of its similarity to the concept of *self-efficacy*. Moreover, the importance of external cues in the enactment of behaviour after intention is reached have been emphasised (Weinstein, 1988; Schwarzer, 1992). The success of the variable *cue to action* supports this emphasis.

The HAPA, as yet, has still to be confirmed as a useful structure in the prediction of health behaviour. In the motivation phase, *perceived threat* had a stronger influence than expected on behaviour change and *intention* was, surprisingly, not an important predictor. Comparing this finding to the success of the most successsful of the earlier social cognition models, the TRA, in the prediction of uptake behaviour, it seems that, if the motivation phase of the HAPA was used in isolation it may not be any more useful than its predecessor, even with the addition of *threat*. However in order to make this comparison, it would be necessary to investigate the power of the HAPA to predict attendance for risk factor screening and the power of the TRA to predict behaviour change following screening. Perhaps different models will be more successful for different outcome behaviours. The HAPA was designed to take a wide perspective, accounting for all aspects of health behaviour, i.e. adopting precautions, changing bad habits and abstaining from risky habits, but perhaps its complexity makes it more suited to the explanation of ongoing behaviour changes such as dietary change following advice. The simplicity of the TRA/TPB may be its advantage in the explanation of objective, one-off health behaviours such as attending a screening appointment. The main hope for the HAPA is its inclusion of an action phase. This has yet to be fully operationalised and tested in a multivariate manner, but the findings suggest that it may provide some mechanisms to help fill the intention-behaviour gap.

As previously noted, Study 1 (the Worksite study) concluded that a stage model approach might fit the data due to the differences in the predictive variables across

the three worksites. The PAP stage model which emphasises a dynamic stage process towards health behaviour change was examined in Study 2 as a possible framework for predicting behaviour change. Although, due to shortage of numbers, it was not possible to examine the health beliefs of those at different stages of the PAP, there was support for different levels of change at the different stages. Those subjects at the post-decision/action stage were more likely to change their behaviour than those at the earlier, pre-decision phase or those at the later maintenance stage. This result shows that those who had moved beyond deciding to act (or intending) are more likely to act and thus further research would be useful to determine what variables determine behaviour (or continued behaviour) when subjects have reached this stage. This stage framework should therefore be considered in the development of theories of health behaviour.

In brief, the TRA was the most useful of the five social cognition models in the classification of screening attenders and non-attenders. The stage model, the PAP, was useful for identifying those who would change their behaviour following screening. The HAPA's motivation phase could predict behaviour change following screening, but the internal structure of the predictive variables were not as the model proposed. The action phase of the HAPA was not tested fully but has provided promising additional predictors of behaviour.

5.5 Applied implications

The following section contains a list of what the results have found about health behaviour in relation to screening which may influence the way screening is practised.

5.5.1 Implications for Uptake

- If availability of screening is made clear to all those eligible, uptake rates are likely to be higher.

- In the attempt to find explanations for why people attend and do not attend screening appointments it is important to consider not only their individual beliefs and demographic characteristics, but the also the way screening is presented to them.

- Communication, not only of the availability of screening, but also of its benefits, may help to change beliefs about screening and thus increase informed uptake.

- Sending a letter with a fixed appointment time is more effective for increasing uptake than asking doctors to personally invite patients. Moreover, the former can also reach those who do not attend their doctor.

- Different doctors are likely to have different motivations and/or competence for inviting patients and carrying out screening during an ordinary consultation. These differences may affect the uptake of screening as much as the patients' motivations.

- The data showed that those who have a high perceived threat of disease were less likely to attend a screening appointment (Study 1), but were more likely to change their behaviour following screening (Study 2). Thus, it may be important to address ways of encouraging those people to attend as they are likely to benefit most from the experience.

5.5.2 Implications for impact

- There are benefits of both opportunistic and clinic methods of screening in terms of impact. Using both methods within one practice would be ideal, if possible. If not, then opportunistic screening has the slight advantage because it is more likely to reach smokers and increase their intention to quit.

- The finding that patients are more likely to change if they are at a particular stage of change suggests that interventions during or after screening should be tailored according to the individual's readiness to change.

- Subjects were found to make more specific action plans following screening and were more likely to set times for implementing these plans. Moreover, these action plans and implementation intentions were found to predict subsequent behaviour change. Thus, their incorporation into all screening consultations and follow-ups would be likely to increase behaviour change in those attending.

- Knowledge of risk factors was found to predict behaviour intention, trying and change, but was not influenced by type of screening or screening per se. Therefore it seems that screening outcomes may be improved by designing interventions to increase knowledge of risk factors during the screening process.

5.6 Implications for further research

- The structure of the HAPA requires further examination with different populations and with different outcome behaviours, e.g. uptake of screening, to provide a better comparison with the TRA.

- Doctors' and practice nurses' cognitions (e.g. knowledge, efficacy, benefits) regarding screening may be a significant predictor of uptake and subsequent behaviour change and should thus be investigated in future studies in this area.

- More information is required as to why those with high perceived threat are less likely to attend a screening appointment. Further studies could investigate their reasons for non-attendance.

- Further research on health behaviour change following screening is important in order to ascertain whether *perceived threat* is a stable predictor of behaviour change in the screened population. This has implications for the development of the HAPA and the other models in terms of whether different components of the model are predominant for different populations, especially when a certain component has been highlighted (such as *perceived threat* may have been during screening). Perhaps, for example, self-efficacy may be more important when subjects have received an intervention intending to build up their self-confidence in changing health behaviours.

6. References

Abraham, C. & Sheeran, P. (1993) Inferring cognitions, predicting behaviour: two challenges for social cognition models. **Health Psychology Update, 14**, 18-23.

Ajzen, I. (1988) **Attitudes, Personality and Behaviour.** Milton Keynes: Open University Press

Ajzen, I & Fishbein, M. (1977) Attitude-behaviour relations: a theoretical analysis and review of empirical research. **Psychological Bulletin, 84**, 888-918.

Ajzen, I & Fishbein, M. (1980) **Understanding attitudes and predicting social behaviour.** New Jersey: Prentice-Hall.

Bagozzi, R.P. (1981) Attitudes, intentions and behaviour: a test of some key hypotheses. **Journal of Personality and Social Psychology, 41**, 606-627

Bagozzi, R.P. (1992) The Self-Regulation of Attitudes, Intentions and Behaviour, **Social Psychology Quarterly, 55** (2),178-204.

Bandura, A. (1982) Self-efficacy mechanism in human agency. **American Psychologist, 37** (2) 122-147.

Bandura, A. (1995) Paper presented at the Annual Conference of the Society of Behavioural Medicine, San Diego, March, 1995.

Barratt, A., Reznik, R., Irwig, L. Cuff, A., Simpson, J.M., Oldenburg, B., Horvath, J., Sullivan, D. (1994) Work-site cholesterol screening and dietary intervention: the staff healthy heart project. **American Journal of Public Health, 84** (5) 779-782.

Becker, M. H. (1974) The health belief model and sick-role behaviour. **Health Education Monographs, 2**, 409-419.

Becker, M. H. (1974) The health belief model and personal health behaviour. **Health Education Monographs, 2**, 324-508.

Beevers, M. & Curzio, J. (1994) Pessimism is uncalled for. **British Medical Journal, 308**, 853.

Bekker, H., Modell, M., Denniss, G., Silver, A., Matthew, C., Bobrow, M., Marteau, T. (1993) Uptake of cystic fibrosis testing in primary care: supply push or demand pull? **British Medical Journal, 306**, 1584-6

Bekker, H.L. & Marteau, T.M. (1994) The role of health professionals' beliefs and attitudes in uptake of screening. Paper presented at the 1994 Annual Conference of the BPS Special Group in Health Psychology, Sheffield, England.

Bloom, J. R. & Monterossa, S. (1981) Hypertension labelling and sense of well-being. **American Journal of Public Health, 71**, 1228-32.

Booth, M.L., Macaskill, P., Owen, N., Oldenburg, B., Marcus, B.H., Bauman, A.(1993) Population prevalence and correlates of stages of change in physical activity. **Health Education Quarterly, 20**(3), 431-440.

Bradley, C. P. (1992) Opportunistic Screening. In C. R. Hart & P. Burke (Eds.) **Screening and surveillance in general practice**. Edinburgh: Churchill Livingstone.

Brunden MN. (1972) The analysis of non-independent 2x2 tables using rank sums. **Biometrics, 28**, 603-607.

Califano, J. A. (1979) **Healthy people: The Surgeon General's report on health promotion and disease prevention**. Washington DC: US Government Printing Office.

Calnan, M., Williams, S. (1993) Policies and practices for the assessment and management of risk factors for coronary heart disease prevention. **European Journal of Public Health, 3**, 274-280.

Calnan, M., Cant, S., Williams, S. & Killoran, A. (1994) Involvement of the Primary Health Care Team in Coronary Heart Disease Prevention. **British Journal of General Practice, 44**, 224-228.

Carstairs V, Morris R. (1991) **Deprivation and health in Scotland.** Aberdeen University Press.

Champion, V.L. (1985) Use of the health belief model in determining frequency of breast self-examination. **Research in Nursing & Health, 8**, 373-379.

Chrystie, I.L., Zander, L., Tilzey, A., Wolfe, C.D.A., Kenney, A., Banatvala, J.E. (1995) Voluntary named testing for HIV in a community based antenatal clinic: a pilot study. **British Medical Journal, 311**, 928-931.

Cohen, R.Y., Stunkard, A. J. & Felix, M.R.J.(1987) Comparison of three worksite weight-loss competitions. **Journal of Behavioural Medicine, 10**, (5) 467-479.

Cohen, W. S. (1985) Health Promotion in the workplace: A prescription for good health. **American Psychologist, 40,** 213-216.

Conner, M. (1993) Pros and cons of social cognition models in health behaviour. **Health Psychology Update, 14**, 24-31.

Conner, M. & Norman, P. (1992) Applying the health belief model and the theory of planned behaviour to predicting attendance at health screening. Paper presented at the British Psychology Society Special Group in Health Psychology Annual Conference, St. Andrews, September, 1992.

Conner, M. & Norman, P. (1993) Comparing the health belief model and the theory of planned behaviour in health screening. In D.R. Rutter (Ed.) **The Social Psychology of Health and Safety: European Perspectives**. Aldershot: Avebury Publishers.

Coope, J. (1992) Risk factors for ischaemic heart disease. In C. R. Hart & P. Burke (Eds.) **Screening and surveillance in general practice**. Edinburgh: Churchill Livingstone.

Department of Health. (1992) **The health of the nation: a strategy for health in England.** London: HMSO.

DiClemente, C.C., Prochaska, J.O., Fairhurst, S.K., Velicer, W.F.. Velasquez, M.M & Rossi, J.S. (1991) The process of smoking cessation: an analysis of precontemplation, contemplation and preparation stages of change. **Journal of Consulting and Clinical Psychology, 59,** 295-304.

Eiser, J.R., Gentle, P. (1989) Health behaviour and attitudes to publicity campaigns for health promotion. **Psychology and Health, 3**, 111-120.

Family Heart Study Group (FHS) (1994) Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British family heart study. **British Medical Journal, 308**, 313-20.

Fishbein & Ajzen (1975) **Belief, attitude, intention and behaviour: an introduction to theory and research**. Reading, MA: Addison-Wesley

Fruin, D.J., Pratt, C. & Owen, N. (1991) Protection motivation theory and adolescents' perceptions of exercise. **Journal of Applied Social Psychology, 22** (1) 55-69.

Gintner, G.G., Rectanus, E. F., Achord, K. & Parker, B. (1987) Parental history of hypertension and screening attendance: Effects of wellness appeal versus threat appeal. **Health Psychology, 6**, 431-444.

Godin, G., Vezina, L. & Leclerc. O. (1989) Factors influencing intentions of pregnant women to exercise after giving birth. **Public Health Reports, 104**, 188-195.

Gollwitzer, P.M. (1993) Goal achievement: the role of intentions. **European Review of Social Psychology, 4,** 142-185.

Gomel, M., Oldenburg, B., Simpson, J. & Owen, N. (1993) Work-site cardiovascular risk reduction: a randomized trial of health risk assessment, education, counselling and incentives. **American Journal of Public Health, 83** (9), 1231-1238.

Greenlick, M.R., Bailey, J.W., Wild, J. & Grover, J. (1979) Characteristics of men most likely to respond to an invitation to be screened. **American Journal of Public Health, 69** (10) 1011-1015.

Hallal, J.C. (1982) The relationship of health beliefs, health locus of control and self concept to the practice of breast self-examination in adult women. **Nursing Research, 31**, 137-142.

Harris, D.M. & Guten, S. (1979) Health-protective behaviour: An exploratory study. **Journal of Health and Social Behaviour, 20**, 17-29.

Harrison, J.A., Mullen, P.D. & Green, L.W. (1992) A meta-analysis of studies of the Health Belief Model with adults. **Health Education Research: Theory and Practice**, 7 (1) 107-116.

Hart, C. (1992) The history of screening. In C. R. Hart & P. Burke (Eds.) **Screening and surveillance in general practice**. Edinburgh: Churchill Livingstone.

Heirich, M.A., Foote, A., Erfurt, J.C. & Konopka, B. (1993) Work-site physical fitness programs: Comparing the impact of different program designs on cardiovascular risks. **Journal of Occupational Medicine, 37**, 510-517.

Hennig, P. & Knowles, A. (1990) Factors influencing women over 40 years to take precautions against cervical cancer. **Journal of Applied Social Psychology, 20** (19), 1612-1621.

Janz, N.K. & Becker, M. H. (1984) The Health belief model : a decade later. **Health Education Quarterly, 11** (1) 1-47.

Jensen, J., Counte, M. A., Glandon, G.L. (1992) Elderly health beliefs, attitudes and maintenance. **Preventive Medicine, 21**,483-497.

Johnston, M., Simpson, W., Hay, C., McEwan, S. Psychological factors predicting uptake of screening for cardiovascular disease. Paper presented at the 7th EHPS Conference, Brussels, Belgium, 1993.

Johnston, M. (1995) Health-related behaviour change. The way forward following the publication of the OXCHECK and FHS studies. In: Julian D, ed. **National Forum for Coronary Heart Disease Prevention.**

Kaplan, R. M. (1984) The correlation between health promotion and health status. **American Psychologist, 39**, 755-765.

Kasl, S. V. & Cobb, S. (1966) Health behaviour, illness behaviour and sick role behaviour: I. Health and Illness Behaviour. **Archives of Environmental Health, 12**, 246-266.

Kavanagh, D.J., Pierce, J. Kai Lo, S. & Shelley, J. (1993) Self-efficacy and social support as predictors of smoking after a quit attempt. **Psychology and Health, 8**, 231-242.

King, J.B. (1982) The impact of patients' perceptions of high blood pressure on attendance at screening. **Social Science and Medicine, 16**,1079-1091.

Kirscht, J.P. (1974) The health belief model and illness behaviour. **Health Education Monographs, 2,** 387-408.

Kittel, F. (1993) Epidemiology of coronary heart disease. In L. Sibilia & S. Borgo (Eds.) **Health Psychology in Cardiovascular Health and Disease**. Rome.

Klesges, R. C., Cigrang, J. & Glasgow, R.E.(1989) Worksite smoking modification programs: A state of the art review and directions for future

research. In T.M. Marteau & M. Johnston (Eds) **Applications in health psychology.** New Brunswick; New Jersey: Transaction Publishers.

Kristiansen, C.M. (1987) Social learning theory and preventive health behaviour: Some neglected variables. **Social Behaviour, 2**, 73-86.

Lau, R.R., Hartman, K.A. & Ware, J.E.(1986) Health as a value: methodological and theoretical considerations. **Health psychology, 5**, 25-43.

Lauver, D. & Rubin, M. (1990) Message framing, dispositional optimism and follow-up for abnormal papanicolaou tests. **Research in nursing and health, 13**, 199-207.

Lewin, K. **Resolving social conflicts**. New York: Harper, 1948.

Ley P. (1988) **Communicating with patients: improving communication, satisfaction and compliance**. London, Croom Helm.

Maiman, L.A. & Becker, M.H. (1974) The health belief model: origins and correlates in psychological theory. **Health Education Monographs, 2**, 336-353.

Mann, J.I., Lewis, B., Shepherd, J., *et al* (1988) Blood lipid concentrations and other cardiovascular risk factors: Distribution, prevalence and detection in Britain. **British Medical Journal, 296**, 1702-1706.

Marcus, B.H. & Owen, N. (1992) Motivational readiness, self-efficacy and decision-making for exercise. **Journal of Applied Psychology**, **22**, 3-16.

Marteau, T. M. (1989) Psychological costs of screening. **British Medical Journal,**
299, 527.

Marteau, T. M. (1993) Health-related screening: psychological predictors of uptake and impact. In Maes, S., Leventhal, H. & Johnston, M. (eds.). **International Review of Health Psychology.** John Wiley and Sons.

Marteau, T.M., Johnston, M., Shaw, R.W., Michie, S., Kidd, J. &New, M. (1989) The impact of prenatal screening and diagnostic testing upon the cognitions, emotions and behaviour of pregnant women. **Journal of Psychosomatic Research, 33,** (1), 7-16.

Marteau, T.M. & Johnston, M. (1990) Health professionals: A source of variance in patient outcomes. **Health Psychology, 5**, 47-58.

Marteau, T.M., Johnston, M., Kidd, J., Michie, S., Cook, R., Slack, J., Shaw, R.W. (1992) Psychological models in predicting uptake of prenatal screening. **Psychology and Health, 6**, 13-22.

Marteau, T.M., Kidd, J., Cook, R. *et al.* (1988) Screening for Down's syndrome. **British Medical Journal, 297**, 1469.

Marteau, T.M., Michie, S. & McDonald, V. (1994) Functional pessimism as a response to risk reducing information. Paper presented at the 1994 Annual Conference of the BPS Special Group in Health Psychology, Sheffield, England.

Marteau, T.M., Slack, J., Kidd, J. & Shaw, W. (1992) Presenting a routine screening test in antenatal care: Practice observed. **Public Health, 106**,131-141.

Matarazzo, J. D. (1982) Behavioural health's challenge to academic, scientific and professional psychology. **American Psychologist, 37**, 1-14.

McBride, C.M., Curry, S.J., Taplin, S. *et al* (1993) Exploring environmental barriers to participation in mammography screening in an HMO. **Cancer Epidemiology, Biomarkers and Prevention, 2**, 599-605.

McEwan, S.R., Davies, H.T.O., Allan, E., Maclean, D.& Forbes, C.D. (1993) Management and measurement of cardiovascular risk factors - is screening worthwhile? **Scottish Medical Journal, 38**, 173-177.

McEwan, S. R. & McEwen, J. (1989) Primary prevention of cardiovascular disease. **Scottish Medical Journal, 34 (1)**, 387-388.

McEwan, S.R. & Ritchie, L.D. (1989) How do we evaluate what we do? In J. Shepherd, C.J. Packard, S.R. McEwan & S. M. Brownlie (eds.) **Coronary Risk Factors Revisited. Excerpta Medica, 855**, Amsterdam: Elsevier.

Maxwell, S.E. & Delaney, H.D. (1989) **Designing experiments and analysing data: a model comparison perspective.** Wadsworth Publishing Company. Belmont, California.

Meadows, J., Jenkinson, S. Catalan, J.& Gazzard, B. (1990) Voluntary HIV testing in the antenatal clinic: Differing uptake rates for individual counselling midwives. **AIDS Care, 2**, 229-233.

Mennie, M.E., Gilfillan, A., Compton, M.E., Liston, W.A. & Brock, D.J.H. (1993) Prenatal cystic fibrosis carrier screening: factors in a woman's decision to decline testing. **Prenatal Diagnosis, 13**, 807-814.

Meyerowitz, B.E., & Chaiken, S. (1987) The effect of message framing on breast self-examination: Attitudes, intentions and behaviour. **Journal of Personality and Social Psychology, 52**(3) 500-510.

Michie, S., Johnston, M., Cockcroft, A. *et al* (1995) Methods and impact of health screening for hospital staff. **Journal of Organizational Behaviour, 16**, 85-92.

Murray, M. & McMillan, C. (1993) Health beliefs, locus of control, emotional control and women's cancer screening behaviour. **British Journal of Clinical Psychology, 32**, 87-100.

Murza, G., Anuss, R. & Dickersbach, M. (1994) 'Hab' ein herz fur dein herz' (have a heart for your heart) - a worksite health promotion programme on cardiovascular risk factors. **The Irish Journal of Psychology, 15** (1) 191-203.

Norman, P. (1991) Social learning theory and the prediction of attendance at screening. **Psychology and Health, 5**, 231-239.

Norman, P. (1993) Predicting the uptake of health checks in general practice: invitation methods and patients' health beliefs. **Social Science & Medicine, 37,** 53-59

Norman, P. (1995) Health locus of control and health behaviour: an investigation into the role of health value and behaviour-specific efficacy beliefs. **Personality and Individual Differences, 18** (2) 213-218.

Norman, P. & Conner, M. (1994) Attendance at health checks and the role of past behaviour in attitude-behaviour models. Paper presented at the 8th Annual Conference of the European Health Psychology Society, Alicante, Spain, July, 1994.

Norman, P.& Conner, M. (1993) The role of social cognition models in predicting attendance at health checks. **Psychology & Health, 8**, 447-462.

Norman P, Conner M, Willits DG *et al.* (1991) Health checks in general practice: a comparison of two invitation letters. **Br J Gen Pract, 41**, 432-433.

Norman, P.& Fitter, M. (1989) Intention to attend a health check: some implications for general practice. **Counselling Psychology Quarterly, 2,** 261-272.

Orbell, S. (1994) Psychological and social aspects of screening. In Stone, D.& Stewart, S. **Towards a Screening Strategy for Scotland.** Scottish Forum for Public Health Medicine. Glasgow.

Orbell, S., Hopkins, S. (1994) It's easy to change behaviour if you know when to:implementation intentions and behavioural enactment. Paper presented at the British Psychological Society Special Group in Health Psychology Annual conference, September 1994.

OXCHECK Study Group (1994) Effectiveness of health checks conducted by nurses in primary care: Results of the OXCHECK study after one year. **British Medical Journal , 308**, 308-12.

Pill, R., French, J., Harding, K. & Stott, N. (1988) Invitation to attend a health check in a general practice setting: comparison of attenders and non-attenders. **Journal of the Royal College of General Practitioners, 38**, 53-56.

Pill, R. & Stott, N. (1988) Invitation to attend a health check in a general practice setting: the views of a cohort of non-attenders. **Journal of the Royal College of General Practitioners, 38,** 57-60.

Prentice-Dunn, S. & Rogers, R.W. (1986) Protection motivation theory and preventive health: Beyond the health belief model**. Health Education Research: Theory and Practice, 1** (3), 153-161.

Prochaska, J. & DiClemente, C. (1983) Stages and processes of self-change of smoking: towards an integrated model of change. **Journal of Consulting and Clinical Psychology, 51**, 390-395.

Rastam, L., Russell, V., Luepker, M. D. & Pirie, P.L. (1988) Effect of screening and referral on follow-up and treatment of high blood cholesterol levels. **American Journal of Preventive Medicine, 4** (5), 244-249.

Ritchie LD. (1984) **Computers in primary care**. London: Heinemann.

Ritchie, LD. (1992) Computers in screening and surveillance. In C. R. Hart & P. Burke (Eds.**) Screening and surveillance in general practice**. Edinburgh: Churchill Livingstone.

Rogers, R.W. (1975) A protection motivation theory of fear appeals and attitude change. **Journal of Psychology, 91**, 93-114.

Rosenstock, I.M (1974) Historical origins of the health belief model. **Health Education Monographs, 2**, 328

Rotter, J.B. (1954) **Social Learning Theory and Clinical Psychology**. Englewood Cliffs, NJ: Prentice-Hall.

Sacks, G. & Marsden, R. (1989) Evaluation of a practice-based programme of health checks: financial cost and success at risk detection. **Journal of the Royal College of General Practitioners, 39**, 369-372.

Safer, M.A. (1986) A comparison of screening for disease detection and screening for risk factors. **Health Education Research: Theory and Practice, 1** (2) 131-138.

Sallis, J.F., Trevorrow, T.R., Johnson, C.C., Hovell, M.F.& Kaplan, R.M, (1987) Worksite stress management: a comparison of programs. **Psychology and Health, 1**, 237-255.

Sarafino, E.P. (1990) **Health Psychology: Biopsychosocial Interactions**. New York: John Wiley & Sons.

Schifter, D.E.& Ajzen, I. (1985) Intention, perceived control and weight loss: an application of the theory of planned behaviour. **Journal of Personality and Social Psychology, 45**, 843-851.

Schucker, B., Wittes, J.T., Cutler, J. A. *et al* (1987) Changes in physician perspective on cholesterol and heart disease: Results from two national surveys**. Journal of the American Medical Association, 258 (24)**, 3521-3526.

Schwarzer, R. (1992) Self-efficacy in the adoption and maintenance of health behaviours: Theoretical approaches and a new. model. In R. Schwarzer (Ed.), **Self-Efficacy: Thought control of action.** Washington DC: Hemisphere.

Schwarzer, R. (1993) **Measurement of perceived self-efficacy: psychometric scales for cross-cultural research.** Forschung an der Freien Universitat Berlin.

Schwarzer, R. (1994) Optimism, vulnerability and self-beliefs as health-related cognitions: a systematic overview. **Psychology and Health, 9**, 161-180.

Schwarzer, R. & Fuchs, R. (1995) Changing risk behaviours and adopting health behaviours: the role of self-efficacy beliefs. In A. Bandura (Ed.) **Self - efficacy in changing societies**. New York: Cambridge University Press.

Scott-Samuel, A. (Ed.) (1990) **Total participation, total health: Reinventing the Peckham Health Centre for the 1990s.** Scottish Academic Press.

Scottish Home and Health Department (1993) GP Contract Health Promotion Arrangements Guidelines.

Seydal, E., Taal, E. & Wiegman, O. (1990) Risk-appraisal, outcome and self-efficacy expectancies: Cognitive factors in preventive behaviour related to cancer. **Psychology and Health, 4**, 99-109.

Sharpe, P.A., & Connell, C.M. (1992) Exercise beliefs and behaviours among older employees: A health promotion trial. **The Gerontologist, 32** (4) 444-449.

Sheppard, B.H., Hartwick, J. & Warshaw, P.R. (1988) The theory of reasoned action: a meta-analyses of past research and recommendations for modifications and future research. **Journal of Consumer Research, 15**, 325-343.

Simpson, W. Johnston, M & McEwan, S. (1994) Uptake and impact of CHD risk factor screening: An evaluation of three different methods of offering screening. Paper presented at the British Psychological Society Special Group in Health Psychology Annual Conference, Sheffield, September, 1994.

Slenker Duke, S., Gordon-Sosby, K., Reynolds, K.D. & Gram, I.T. (1994) A study of breast cancer detection practices and beliefs in black women attending public health clinics. **Health Education Research: Theory and Practice, 9** (3) 331-342.

Smith, W.C.S., Crombie, I.K., Tavendale, R., Irving, J.M., Kenicer, M.B., Tunstall-Pedoe, H.D. (1987) The Scottish Heart Health Study: objectives and development of methods. **Health Bulletin (Edin), 45**, 211-217.

Sparks, P., Hedderley, D. & Shepherd, R. (1992) An investigation into the relationship between perceived control, attitude variability and the consumption of two common foods. **European Journal of Social Psychology, 22**, 55-71.

Stoate, H. (1989) Can health screening damage your health? **Journal of the Royal College of General Practitioners, 39**, 193-195.

Stone, D. & Stewart, S. (1994) Towards a screening strategy for Scotland. **Report of a Forum Working Group on Screening**. Glasgow: Scottish Forum for Public Health Medicine.

Strychar, I.M., Potvin, L., Pineault, R. *et al* (1993) Changes in knowledge and food behaviour following a screening program held in a supermarket. **Canadian Journal of Public Health, 84** (6) 382-388.

Tabachnik, B.G. & Fidel, L.S. (1989) **Using Multivariate Statistics, Second Edition**. New York: Harper Collins.

Tmystra T. (1989) The imperative character of medical terminology and the meaning of 'anticipated decision regret'. **International Journal of Technology Assessment in Health Care, 5**: 207-213.

Triandis, H.C. (1964) Exploratory factor analyses of the behavioural component of social attitudes. **Journal of Abnormal and Social Psychology, 68**, 420-430.

Triandis, H.C. (1977) **Interpersonal behaviour**. Monterey, California: Brooks/Cole.

Tversky, A. & Kahnemann, D. (1981) The framing of decisions and the psychology of choice. **Science, 211**, 453-458.

Vaile, M.S.B., Calnan, M., Rutter, D.R. & Wall, B. (1993) Breast cancer screening services in three areas: uptake and satisfaction. **Journal of Public Health Medicine, 15** (1).

Waller, D., Agass, M., Mant, D., Coulter, A. Fuller, A. & Jones, (1990) Health checks in general practice: another example of inverse care? **British Medical Journal, 300**, 1115-1118.

Wallston, K.A. (1992) Hocus-pocus, the focus isn't strictly on locus: Rotter's social learning theory modified for health. **Cognitive Therapy and Research, 16**, 183-199.

Wallston, K.A. & Wallston, B.S. (1981) Health locus of control scales. In H. Lefcourt (Ed.) **Research with the Locus of Control Construct (vol.1***)*. New York: Academic Press.

Wallston, B.S & Wallston, K.A. (1984) Social psychological models of health behaviour. An examination and integration. In A. Baum, S.E. Taylor and J. E. Singer (eds) **Handbook of Psychology and Health; Vol. 4, Social Psychological Aspects of Health.** Hillsdale, N.J.: Lawrence Erlbaum.

Watson, E.K., Mayall, E., Chapple, J.*et al* (1991) Screening for carriers of cystic fibrosis through primary health care services. **British Medical Journal, 303**, 504-507.

Weinstein, N. D. (1982) Unrealistic optimism about susceptibility to health problems. **Journal of Behavioural Medicine, 5**, 441-460.

Weinstein, N.D. (1988) The precaution adoption process. **Health Psychology, 7**, 355-386.

Weinstein, N.D. (1993) Testing four competing theories of health-protective behaviour. **Health Psychology, 12** (4) 324-333.

Weinstein, N.D. & Sandman, P.M. (1992) A model of the precaution adoption process: evidence from home radon testing. **Health Psychology, 11**, 170-180.

Wilson, D., Zenda, A., McMaster, J. & Lavelle, S. (1992) Factors predicting Zimbabwean students' intentions to use condoms. **Psychology and Health, 7**, 99-114.

Wolf M, Putnam S, James S, Stiles W. (1978) The Medical Interview Satisfaction Scale: Development of a scale to measure patients' perceptions of physicians behaviour. **J. Behav. Med.**, **1**, 391-401.

Appendix 1

SHARP

Scottish Heart and Arterial disease Risk Prevention

CARDIOVASCULAR RISK SCORE

Total Score for any one factor should not exceed 5.

						Score
FAMILY HISTORY:	Cardiovascular Disease 1st degree relative					
	Age	60-69	Score 1	Age	30-39	Score 4
		50-59	2		20-29	5
		40-49	3	Diabetes		1
SMOKING:	Average Daily Consumption					
	Cigars / Pipe		Score 1	Smokers:	< 20/day	Score 3
	Ex Smoker		2		> 20/day	5
ALCOHOL:	> 21 units/week					Score 1
	1 unit = 1 tot spirits = 1 glass wine = 1/2 pt. beer					1
BLOOD PRESSURE:	Average of 3 (Diastolic Phase V.)					
	Systolic	< 148	Score 0	Diastolic	90-94	Score 1
		148-159	1		95-104	2
		> 160	2		> 105	3
WEIGHT:	B.M.I. > 27.6					1
SALT:	Addition at table without tasting.					1
LIPIDS:						
	Cholesterol:		5.2 - 6.4 mmol/l			Score 1
			6.5 - 7.7			2
			> 7.8			3
	HDL/Chol. Ratio:		> 20%			Score -1
			<15%			+1
	Triglyceride:		> 2.3 mmol/l			Score+1
	(12 Hour Fast Necessary)					
DIABETES:						2
CHEST X-RAY:	Cardiomegaly.					5
ANGINA OR PREVIOUS M.I.:						5

Ref: McEwan, SR, Ritchie, LD. 'How Do We Evaluate What We do?' in Coronary Risk Factors Revisited, Excerpta Medica, 855, Elsevier 1989: 93-101"

CARDIOVASCULAR RISK RECORD

Date:		Number: / /
Surname:	Christian Names:	D.O.B.:
Address:		Tel. No.:
Occupation:		Years:
Previous Occupation:		Years:

FAMILY HISTORY	AGE	HIGH B.P. AGE	M.I. AGE	ANGINA AGE	STROKE AGE	DIABETES AGE	SCORE
FATHER							
MOTHER							
SIBLINGS							

SMOKING PER DAY	Present Cigs: Cigars or Pipe:	Prev. Cigs: Date Stopped:	Years of Smoking:	
ALCOHOL PER WEEK	Spirits - Measures: Wine - Glasses: Beer - Pints:	Units: Units Units:	Total units per week:	
B.P.	1st: 2nd:	3rd:	Average: Mean:	
BODY MASS	Weight: kg	Height: m. m² =	B.M.I.:	
SALT	Adds salt at table without tasting		YES NO	
URINALYSIS	Sugar	Albumin	Blood	
EXERCISE				
SYMPTOMS	Chest Pain: YES ☐ NO ☐ Other:		PEFR: Predicted PEFR:	
PAST HISTORY				
CURRENT MEDICATION				

	Potassium mmol/l	Cholesterol mmol/l	
	Urea mmol/l	Triglycerides mmol/l	
	Creatinine umol/l	HDL Cholesterol mmol/l	
	Urates mmol/l	HDL/Chol. Ratio %	
	GGT U/l	T.4 nmol/l	
	Glucose mmol/l	T.S.H. mU/l	
DIABETES	Date of Diagnosis:	Diet OHD Insulin	
C.X.R.	Date:	Result:	
E.C.G.	Date:	Result:	
		TOTAL SCORE:	

TETANUS	1st:	2nd:	3rd:	Booster:

Appendix 2

NAME_____

SEX __MALE __FEMALE

ADDRESS_____

POST CODE _____

AGE_____

MARITAL STATUS_____

DID YOU CONTINUE YOUR EDUCATION AFTER SCHOOL? __YES__NO

TICK THE JOB DESCRIPTION WHICH FITS YOU BEST:

__ADMINISTRATION __PROFESSIONAL __TECHNICAL

__CLERICAL __CHIEF OFFICER

A. KNOWLEDGE QUESTIONNAIRE

First of all we would like to find out how much you know about screening for heart disease and diseases of the circulation. We would also like to find out about your knowledge of the causes of heart and circulatory disease, called risk factors. Please answer the following questions by ticking one or more of the responses given, unless directed otherwise. **Please do not worry if you do not know the answers.**

1. Do you know that you can be screened to see if you are likely to have heart disease at some time in the future?

__YES __NO

2. Which of these possible tests and measurements, if any, do you think would be carried out during screening in the community?

__blood test
__X-ray
__eye test
__height
__blood pressure
__weight
__none of the above

3. Which, if any, of the following behaviours do you think would be asked about?

__how much you drink
__what sports you play
__your personal hygiene
__if you smoke
__what you watch on television
__what sort of food you eat
__none of the above

4.a) Some workers get the chance to have their health screened at their workplace. Does your workplace plan to do this?

__YES __NO __DON'T KNOW

b) If yes, when _____?
where _____?

c) Would you attend?

__definitely yes
__probably yes
__don't know
__probably not
__definitely not

5.a) Have you ever had your health screened before, at the workplace or elsewhere?

__YES __NO __DON'T KNOW

If yes, then answer the next three questions:

b) When were you last screened?_____

c) What were you being screened for?

_____

d) How useful was it for you?

__very useful
__fairly useful
__not very useful
__a waste of time

6. If you attended, what kind of result would you expect?

__very good
__good
__moderate
__poor
__very poor

7. If someone gets a poor result, which, if any, of the following possibilities does it mean?

__they are ill
__they can change their lifestyle and get a good result the next time
__their life will be short
__they definitely need medical treatment
__if they take any necessary drugs prescribed by the doctor they will be more likely to get a good result the next time

8. If someone gets a good result, which, if any, of the following possibilities does it mean?

__they are completely well
__they probably lead a healthy lifestyle
__they may be less likely to suffer a heart attack
__they will live to an old age
__they will never need medical treatment
__there is nothing they need to do to improve their future health

9 .Which, if any, of the following possibilities do you think are major causes of heart and circulatory diseases?

__smoking
__disco dancing
__high blood pressure
__eating a high fibre diet
__cycling
__eating fatty food
__none of the above

10. Which of these foods do you think are bad for your heart and circulation?

__boiled potatoes
__butter
__pasta
__chocolate
__cheese
__bread
__green vegetables
__crisps
__none of the above

11. Which of the following foods do you think can help lower the fat content in your blood (ie. your cholesterol level)?

__peanuts
__minced beef
__olive oil
__mackerel
__eggs

12.Exercise is good for your heart because:

__it may help to relieve stress
__it may help to build stamina
__it may help to control your weight
__it may help to lower your blood pressure
__none of the above

13.Which one of the following types of exercise do you think would be most effective in creating a healthy heart and healthy circulation?

__a weekly 5 mile jog
__a Saturday game of hockey
__cycling to work every day
__playing squash once a week

14.Which, if any, of the following possibilities do you think could cause high blood pressure?

__eating too much salt
__a stressful job
__regular exercise
__being overweight
__none of the above

15.Which, if any, of these diseases do you think might increase your risk of heart or arterial disease?

__diabetes
__appendicitis
__epilepsy
__measles
__none of the above

16.If either of your parents had heart disease which of the following statements would apply?

__The fact that they had heart disease would have no effect whatsoever on your risk for heart disease.

__You would definitely get heart disease

__You would be at higher risk of developing heart disease than you would be if your parents were free from heart disease

17. Do you think the following statements are true or false about alcohol and smoking? If you don't know just tick the last column.

	T TRUE	F FALSE	D DON'T KNOW
a Alcohol is rich in calories.	___	___	___
b Most women can drink up to 20 units of alcohol per week without damaging their health too badly.	___	___	___
c One pint of lager is equal to one unit of alcohol.	___	___	___
d Some men can drink up to 21units of alcohol per week without damaging their health too badly.	___	___	___
e Smoking is addictive.	___	___	___
f Smoking makes you put on weight.	___	___	___
g Smoking causes your heart to beat faster.	___	___	___
h Smoking damages arteries	___	___	___
i Smoking less than 10 cigarettes a day will not damage your health.	___	___	___
j Tobacco smoke is poisonous	___	___	___
k Smoking causes blood to clot	___	___	___
l Living or working with a smoker can harm the health of a non - smoker.	___	___	___

18. Finally, decide whether you think the following statements are true or false.

	T TRUE	F FALSE	D DON'T KNOW
a You can lower your risk of heart disease by improving your diet.	___	___	___
b If you are shown to be at risk of heart disease there is nothing you can do about it.	___	___	___
c Your risk of heart disease can increase if you don't exercise regularly.	___	___	___
d People who have been heavy smokers all their lives can still lower their risk of heart disease by stopping smoking now.	___	___	___
e If you smoke heavily you are at greater risk of heart disease than if you are overweight.	___	___	___
f You can reduce your risk of heart disease by eating regularly - timed meals.	___	___	___
g Thin people can eat as much fat as they like without putting themselves at risk of heart disease.	___	___	___
h It is possible to reduce all possible risk factors by taking drugs prescribed by the doctor.	___	___	___

Answer the following questions by putting a tick beside the response which you think fits best. There are no right or wrong answers.

B. YOUR HEALTH

1.How would you describe your health, compared with someone of your own age?

__excellent
__good
__fair
__poor

2.Compared with the people you work with, how would you describe your health?

__much above average
__above average
__average
__below average
__much below average

3.How often do you think about your health?

__very often
__fairly often
__sometimes
__not at all

4.How concerned are you about your health?

__very concerned
__fairly concerned
__only slightly concerned
__not at all concerned

5.How important do you think it is that people take care of their health?

__very important
__fairly important
__only slightly important
__not important at all

C. YOUR EXPECTATIONS OF YOUR HEALTH

1.How likely do you think it that you will :

live to be 75?
__not at all likely __somewhat likely __moderately likely __extremely likely

have a heart attack
before 65?
__not at all likely __somewhat likely __moderately likely __extremely likely

have a heart attack
after 65?
__not at all likely __somewhat likely __moderately likely __extremely likely

develop cancer?
__not at all likely __somewhat likely __moderately likely __extremely likely

have a stroke?
__not at all likely __somewhat likely __moderately likely __extremely likely

2.Compared with the people you work with, what do you think are your chances of :

living to be 75?

__much more than average
__more than average
__average
__less than average
__much less than average

having a heart attack
before 65?

__much more than average
__more than average
__average
__less than average
__much less than average

having a heart attack
after 65?

__much more than average
__more than average
__average
__less than average
__much less than average

developing cancer?

__much more than average
__more than average
__average
__less than average
__much less than average

having a stroke?

__much more than average
__more than average
__average
__less than average
__much less than average

D. HEALTH SCREENING CHECK-UP

Many of the causes of heart disease are known and can be changed for the better. These causes are known as risk factors and finding people who have these risk factors is called screening. We would like you to answer the following questions about what you think of screening.

1.How much benefit would screening be for you?

__very great benefit
__great benefit
__some benefit
__no benefit

2.How much difficulty would screening cause you?

__very great difficulty
__great difficulty
__some difficulty
__no difficulty

3.Here is a list of possible benefits, tick any that would be a benefit to you

__reassure me about my health
__give me the chance to improve my health
__reassure my family
__get me to stop smoking
__get me to diet
__get me to take more exercise
__could get treatment from my doctor
__get a break from work
__learn something about heart disease and its causes
__other, please specify_____

4.Here is a list of possible reasons which may stop people attending screening. Tick any that would stop you attending screening.

__fear of the results of screening-of what they might find
__don't have the time
__I'm too lazy
__already know my risks
__already have heart disease
__couldn't give up smoking
__couldn't diet
__couldn't take more exercise
__don't want anything to do with doctors
__don't want anyone to tell me how to live my life
__worried about medical examination
__it would be embarrassing
__don't want to be seen as a health freak
__I don't know enough about it
__I already feel healthy
__other, please specify_____

5.How effective do you think health screening is in reducing your chances of getting heart disease?

__very effective
__moderately effective
__only slightly effective
__not effective at all

6.How good would you be at changing your behaviour if you were told it was necessary to do so in order to reduce your risk of heart disease?

__very good
__moderately good
__only slightly good
__not good at all

E. YOUR FAMILY'S VIEWS

1.Would your family wish you to have your health screened?

__definitely yes
__yes
__unsure
__no
__definitely not

2.Would other members of your family have their health screened if screening was available?

__definitely yes
__yes
__unsure
__no
__definitely not

F. YOUR COLLEAGUES AT WORK

1.Would the people you work with wish you to have your health screened?

__definitely yes
__yes
__unsure
__no
__definitely not

2.What proportion of the people you work with would have their health screened if screening was available?

__all
__nearly all
__more than half
__half
__less than half
__just a few
__none

G. YOUR PERSONAL BELIEFS ABOUT HEALTH

The following part of the questionnaire is designed to determine the way in which different people view certain important health related issues.
Each item is a belief statement with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you agree or disagree with the statement. The more strongly you agree with a statement, then the higher will be the number you circle. The more strongly you disagree with a statement, then the lower will be the number you circle.
Please make sure that you answer every item and that you circle only one number per item. This is a measure of your personal beliefs; obviously there are no right or wrong answers.
Please answer these items carefully, but do not spend too much time on any one item. As much as you can, try to respond to each item independently. When making your choice, do not be influenced by your previous choices. It is important that you respond according to your actual beliefs and not according to how you feel you should believe or how you think we want you to believe.

strongly disagree 1	moderately disagree 2	slightly disagree 3	slightly agree 4	moderately agree 5	strongly agree 6

1. If I become ill, I have the power to make myself well again.	1 2 3 4 5 6
2. Often I feel that no matter what I do, if I am going to become ill, I will become ill.	1 2 3 4 5 6
3. If I see an excellent doctor regularly I am less likely to have health problems.	1 2 3 4 5 6
4. It seems that my health is greatly influenced by accidental happenings.	1 2 3 4 5 6
5. I can only maintain my health by consulting health professionals.	1 2 3 4 5 6
6. I am directly responsible for my health.	1 2 3 4 5 6
7. Other people play a big part in whether I stay healthy or become sick.	1 2 3 4 5 6
8. Whatever goes wrong with my health is my own fault.	1 2 3 4 5 6
9. When I am ill, I just have to let nature run its course.	1 2 3 4 5 6
10.Health professionals keep me healthy.	1 2 3 4 5 6

strongly disagree 1	moderately disagree 2	slightly disagree 3	slightly agree 4	moderately agree 5	strongly agree 6

11.When I stay healthy I'm just plain lucky.	1 2 3 4 5 6
12.My physical well-being depends on how well I take care of myself.	1 2 3 4 5 6
13.When I feel ill, I know it is because I am not taking care of myself properly.	1 2 3 4 5 6
14.The type of care I receive from other people is what is responsible for how well I recover from illness.	1 2 3 4 5 6
15.Even when I take care of myself, it's easy to become ill.	1 2 3 4 5 6
16.When I become ill, it's a matter of fate.	1 2 3 4 5 6
17.I can pretty much stay healthy by taking care of myself.	1 2 3 4 5 6
18.Following doctor's orders to the letter is the best way for me to stay healthy.	1 2 3 4 5 6

H.The following is a situation which we would like you to imagine you are in, and then answer the question as instructed.

Vividly imagine that you are afraid of the dentist and have to get some dental work done. Which of the following would you do? Tick all of the statements that might apply to you.

__I would ask the dentist exactly what he was going to do

__I would take a tranquilliser or have a drink before going

__I would try to think about pleasant memories

__I would want the dentist to tell me when I would feel pain

__I would try to sleep

__I would watch all the dentist's movements and listen to the sound of his drill

__I would watch the flow of water from my mouth to see if it contained blood

__I would do mental puzzles in my mind

THANK YOU VERY MUCH FOR YOUR TIME AND YOUR HELP

Appendix 3

Questionnaire

Your beliefs about your health and lifestyle

Psychology Department
St. Andrews University

Research funded by S.H.A.R.P.
(Scottish Heart & Arterial disease Risk Prevention)

Section 1

Please answer each of the following questions by ticking either the 'agree' or the 'disagree' box, e.g. ☑

1. I have never thought about heart disease.	agree☐	disagree☐
2. Heart disease is not relevant to me.	agree☐	disagree☐
3. I have thought about things I could do to reduce my risk of heart disease.	agree☐	disagree☐
4. I have made a decision to change my lifestyle in some way to reduce my risk of heart disease.	agree☐	disagree☐
5. I am making changes in my lifestyle just now to reduce my risk of heart disease.	agree☐	disagree☐
6. I have already made changes to my lifestyle to reduce my risk of heart disease and I'm sticking to these changes.	agree☐	disagree☐

Section 2

Please answer the following questions by circling the number on the scale which best fits your response, e.g. - ⑤ -

	much lower	**same as others**	**much higher**
1. Compared to other people of my age and sex, my risk of having a heart attack one day is:	1 - 2 - 3 - 4 - 5 - 6 - 7		
2. About how many people who have a heart attack do you think will die of it?	**almost none**		**almost all**
	1 - 2 - 3 - 4 - 5 - 6 - 7		

Section 2 (cont.)

	strongly disagree						strongly agree
3. The thought of having a heart attack scares me.	1	2	3	4	5	6	7
4. My physical health makes it likely that I will have a heart attack.	1	2	3	4	5	6	7
5 Having a heart attack would ruin my chances of future happiness.	1	2	3	4	5	6	7
6 It is unlikely that I will ever suffer a heart attack	1	2	3	4	5	6	7
7 Having a heart attack would ruin my chances of achieving what I want to do in my life.	1	2	3	4	5	6	7

Section 3

The following questions refer to your lifestyle. By 'lifestyle' we mean: what you eat and drink; whether or not you smoke; how much exercise you do, etc. (i.e. aspects of your life which may affect your health)

Please answer the following questions by circling the number which best fits your response. e.g. - ③

	definitely yes			unsure			definitely not
1. Making some changes to my lifestyle would help build up my strength against heart disease.	1	2	3	4	5	6	7
2. I would find it easy to make changes to my lifestyle if I intended to do so.	1	2	3	4	5	6	7
3. My family and close friends would encourage me to make some changes to my lifestyle.	1	2	3	4	5	6	7
4 I'm not sure that I would manage to make changes to my lifestyle even if I wanted to.	1	2	3	4	5	6	7
5 Making some changes to my lifestyle would spoil my social life.	1	2	3	4	5	6	7
6. Making some changes to my lifestyle would help protect me from heart disease.	1	2	3	4	5	6	7
7 Making some changes to my lifestyle would reassure me about my future health.	1	2	3	4	5	6	7

Section 3 (cont.)

	definitely yes				unsure			definitely not
8. My family and close friends would be pleased if I made some changes to my lifestyle.	1	- 2	- 3	- 4	- 5	- 6	- 7	
9. I am confident that I would be able to make changes to my lifestyle if I wanted to.	1	- 2	- 3	- 4	- 5	- 6	- 7	
10. Making some changes to my lifestyle would help to reduce my chances of having a heart attack.	1	- 2	- 3	- 4	- 5	- 6	- 7	
11. Making some changes to my lifestyle would make me miserable.	1	- 2	- 3	- 4	- 5	- 6	- 7	
12. Making some changes to my lifestyle would make me feel better and more alive.	1	- 2	- 3	- 4	- 5	- 6	- 7	

	very likely				unsure			not at all likely
13. How likely is it that you will make a change in your lifestyle in the next two months to reduce your risk of heart disease?	1	- 2	- 3	- 4	- 5			

To what extent do you agree or disagree with the following statements?

	strongly agree					strongly disagree
14. I intend to make a change in my lifestyle in the next two months to reduce my risk of heart disease	1	- 2	- 3	- 4	- 5	
15. I am committed to making a change in my lifestyle in the next two months to reduce my risk of heart disease.	1	- 2	- 3	- 4	- 5	
16. I intend to put a lot of effort into changing my lifestyle in the next two months.	1	- 2	- 3	- 4	- 5	
17. I have thought about what aspects of my lifestyle I could change to reduce my risk of heart disease	1	- 2	- 3	- 4	- 5	

Section 3 (cont.)

Please answer the following questions by ticking the 'YES' or the 'NO' box.

18. Have you actually made a decision to make one or more changes in your lifestyle in the next two months to reduce your risk of heart disease? YES☐ NO☐ [if NO, turn to section 4]

19. Have you decided yet <u>what</u> you are going to do to reduce your risk of heart disease in the next two months? YES☐ NO☐ [if NO, turn to section 4]

20. Write down what particular change you would like <u>most of all</u> to make in the next two months to reduce your risk of heart disease.

_____

Thinking about the lifestyle change you intend to make in the next two months which you have just written down above, please answer the following questions about it.

21.	How easy would this be for you to do?	**easy** 1 - 2 - 3 - 4 - 5	**difficult**
22.	How pleasant would this be for you to do?	**unpleasant** 1 - 2 - 3 - 4 - 5	**pleasant**
23.	How effective would this be in reducing your risk of heart disease?	**effective** 1 - 2 - 3 - 4 - 5	**ineffective**
24.	How much effort are you prepared to put into doing this?	**none at all** 1 - 2 - 3 - 4 - 5	**a great deal**
25.	How confident are you that you can succeed in doing this?	**very confident** 1 - 2 - 3 - 4 - 5	**not very confident**
26.	How much help and encouragement would you get from your family & friends to do this?	**none at all** 1 - 2 - 3 - 4 - 5	**a great deal**
27.	How committed are you to doing this in the next two months?	**very committed** 1 - 2 - 3 - 4 - 5	**not at all committed**

Section 5

This section is looking at some aspects of your lifestyle.

Please respond to <u>each of the three boxes</u> by circling the number from 1-10 which most accurately describes your current behaviour. Your answer does not have to be one of the labelled numbers if you feel your behaviour lies somewhere in between the statements given.

1.

⇒ 0	I currently do not exercise and do not intend to exercise in the next 2 months.
⇒ 1	
⇒ 2	I currently do not exercise but I am thinking about starting to exercise in the next 2 months.
⇒ 3	
⇒ 4	
⇒ 5	I currently exercise a little but not regularly*.
⇒ 6	
⇒ 7	
⇒ 8	I currently exercise regularly but have only begun to do so in the last 2 months.
⇒ 9	
⇒ 10	I currently exercise regularly and have done so for longer than 2 months.

* Regular exercise is defined as 20 minutes exercise for 3 or more times a week.

2.

⇒ 0	I do not eat healthy foods and do not intend to change my diet in the next 2 months.
⇒ 1	
⇒ 2	I do not eat healthy foods now but I am thinking about changing my diet in the next 2 months.
⇒ 3	
⇒ 4	
⇒ 5	I am currently making a few changes to my diet to eat more healthily.
⇒ 6	
⇒ 7	
⇒ 8	I have changed my diet to eat more healthily but have only begun to do this in the past 2 months
⇒ 9	
⇒ 10	I currently eat healthily and have done so for longer than 2 months.

3

⇒ 0	I am currently a smoker and do not intend to give up smoking in the next 2 months.
⇒ 1	
⇒ 2	I am currently a smoker but I am thinking about giving up smoking in the next 2 months.
⇒ 3	
⇒ 4	
⇒ 5	I have started to cut down on the number of cigarettes/ cigars/ pipes that I smoke.
⇒ 6	
⇒ 7	
⇒ 8	I have given up smoking but have only done so within the last 2 months.
⇒ 9	
⇒ 10	I am currently a non- smoker and have been a non-smoker for at least 2 months.

Section 3 (cont.)

Still thinking about the aspect of your lifestyle that you have written on the previous page, do you have any ideas for specific things you could do to go about making this change (e.g. you might have ideas about changing some of the things you buy and eat; or ideas for taking more exercise; or ideas for ways of trying to give up smoking, etc.)
Write down as many ideas as you have, but if you can't think of any just leave this part blank.

28. 1. _____ Have you decided when you are going to start doing this? YES☐ NO☐

2. _____ Have you decided when you are going to start doing this? YES☐ NO☐

3. _____ Have you decided when you are going to start doing this? YES☐ NO☐

Section 4

Different people value different things in life.
Please read the following 9 items carefully and then rate them all according to their importance in your life.
Give the most important thing **9** *and the least important* **1**.

--- Having a good social life

--- A happy relationship / family

--- The freedom to do as I please

--- Keeping myself healthy

--- An exciting life

--- Having a good job

--- Avoiding the possibility of future disease

--- Looking good

--- Having plenty money

Please answer the following question by circling the number which best fits your answer.

Compared to other things in my life, reducing my risk of heart disease is	very important to me		unsure				not at all important to me
	1	2	3	4	5	6	7

Section 6

Finally, we are interested to know about some aspects of your lifestyle. Please try to answer as accurately as you can - remember that your answers will be treated confidentially.
Put a tick in the box ☑ or an answer on the line_____ to indicate your responses.

A **smoking**

1. a) Do you smoke cigarettes?
   yes ☐
   no ☐(go to **food & drink**)

   b) During the past week how many did you smoke a day? ____ cigarettes

2. Thinking of the past week, how would you describe yourself as a smoker?
   very heavy☐ heavy☐ moderate☐ light☐ very light☐

3. Which range best corresponds to the number of cigarettes you smoked per day in the past week?
   0-5 ☐ 5-10☐ 10-15☐ 15-20☐ 20-30☐
   30-40☐ 40+☐

B **food and drink**

1. In the past week, how many 'servings' of whole grain breads (slices); cereals (bowls); raw fruit (items); vegetables (portions); bran products (items) did you eat each day, on average?
   5 or more servings☐ 3-4 servings☐ 1-2 servings☐ none☐

2. Approximately, how many eggs did you eat last week? _____ eggs

3. a) In the past week, how much milk did you drink per day, including in tea, coffee, milky drinks, custard; or with cereals, etc.
   none at all☐ half pint /less☐ 1/2 - 1 pint☐ more than 1 pint☐

   b) what kind of milk did you use last week?
   full fat milk (fresh, dried or UHT) ☐
   semi-skimmed milk (fresh, dried or UHT) ☐
   fully skimmed (fresh, dried or UHT) ☐
   other (e.g. condensed, evaporated, etc.) ☐

food and drink (cont.)

4. During the past week, which of these did you eat on your bread or toast?
   butter☐ soft margarine☐ low fat spread☐

5. During the past week how often did you eat other dairy products, (i.e. cream, cheese, yoghurt?)
   less than once☐ 1-3 times☐ 4-6 times☐ every day☐

6. During the past week how often did you eat fried foods, (including chips)
   never☐ less than once☐ 1-3 times ☐ 4-6 times ☐ every day☐

7. During the past week how many times (per week) did you eat red meat (e.g. mince, beef, steak, pork, lamb, bacon, sausages, liver, etc.)?
   never☐ less than once☐ 1-3 times ☐ 4-6 times ☐ every day☐

8. During the past week how many times a week did you eat any of the following types of fish (fresh or tinned: kippers, herrings, pilchards, tuna, sardines, mackerel, salmon)
   never☐ less than once☐ 1-3 times ☐ 4-6 times ☐ every day☐

9. During the past week how much salt was added in your cooking?
   none☐ a little☐ quite a lot☐

10. During the past week did you add salt to your meals at the table?
    no☐ yes, when food needed it☐ yes, before tasting☐

11. During the past week how often did you drink alcohol?
    never☐ once or twice☐ 3 times☐ 4 or 5 times☐ every day☐

12. During the past week when you drank alcohol, how much, on average, did you drink (1 unit = either 1 glass wine *or* half pint of beer *or* 1 measure of spirits?
    1-2 units☐ 3 units☐ 4 units☐ more than 4 units☐ doesn't apply☐

C. Exercise

1. During the past week, how would you have described yourself in your **work** (including work around the home) ?

active **inactive**

1 - 2 - 3 - 4 - 5

2. During the past week at **work** (including work around the home), how often were you physically active enough to become short of breath and perspire for at least 20 minutes?

never☐ once☐ twice ☐ three times☐ almost or definitely every day☐

3. During the past week , how would you have described yourself in your **leisure time**?

active **inactive**

1 - 2 - 3 - 4 - 5

4. During the past week, in your **leisure time**, how often did you do exercise (anything from gardening to skiing which left you feeling reasonably out of breath and perspiring) for a period of at least 20 minutes?

never☐ once☐ twice ☐ three times☐ almost or definitely every day☐

Thank you very much for completing this questionnaire.
Your answers are very important to the success of the study.

Appendix 4

Questionnaire 2

Your beliefs about your health and lifestyle

Psychology Department
St. Andrews University

Research funded by S.H.A.R.P.
(Scottish Heart & Arterial disease Risk Prevention)

Section 1

Please answer the following questions by circling the number on the scale which best fits your response, e.g. - ⑤ -

	much lower	**same as others**	**much higher**
Compared to other people of my age and sex, my risk of having a heart attack one day is:	1 - 2 - 3 - 4 - 5 - 6 - 7		
About how many people who have a heart attack do you think will die of it?	**almost none**		**almost all**
	1 - 2 - 3 - 4 - 5 - 6 - 7		
	strongly disagree		**strongly agree**
The thought of having a heart attack scares me.	1 - 2 - 3 - 4 - 5 - 6 - 7		
My physical health makes it likely that I will have a heart attack.	1 - 2 - 3 - 4 - 5 - 6 - 7		
Having a heart attack would ruin my chances of future happiness.	1 - 2 - 3 - 4 - 5 - 6 - 7		
It is unlikely that I will ever suffer a heart attack	1 - 2 - 3 - 4 - 5 - 6 - 7		
Having a heart attack would ruin my chances of achieving what I want to do in my life.	1 - 2 - 3 - 4 - 5 - 6 - 7		

Section 2

Different people value different things in life.
Please read the following 9 items carefully and then rate them all according to their importance in your life.
Give the most important thing **9** *and the least important* **1**.

--- Having a good social life

--- A happy relationship / family

--- The freedom to do as I please

--- Keeping myself healthy

--- Avoiding the possibility of future disease

--- An exciting life

--- Looking good

--- Having plenty money

--- Having a good job

Please answer the following question by circling the number which best fits your answer.

	very important to me		unsure		not at all important to me
Compared to other things in my life, reducing my risk of heart disease is	1 - 2	- 3	- 4	- 5	- 6 - 7

Section 3

Please answer each of the following questions by ticking either the 'agree' or the 'disagree' box, e.g. ☑

1. I have never thought about heart disease.	agree☐	disagree☐
2. Heart disease is not relevant to me.	agree☐	disagree☐
3. I have thought about things I could do to reduce my risk of heart disease.	agree☐	disagree☐
4. I have made a decision to change my lifestyle in some way to reduce my risk of heart disease.	agree☐	disagree☐
5. I am making changes in my lifestyle just now to reduce my risk of heart disease.	agree☐	disagree☐
6. I have already made changes to my lifestyle to reduce my risk of heart disease and I'm sticking to these changes.	agree☐	disagree☐

Section 4

The following questions refer to your lifestyle. By 'lifestyle' we mean: what you eat and drink; whether or not you smoke; how much exercise you do, etc. (i.e. aspects of your life which may affect your health)

Please answer the following questions by circling the number which best fits your response.

e.g. - ③

	definitely yes		unsure		definitely not
Making some changes to my lifestyle would help build up my strength against heart disease.	1 - 2 - 3 - 4 - 5 - 6 - 7				
I would find it easy to make changes to my lifestyle if I intended to do so.	1 - 2 - 3 - 4 - 5 - 6 - 7				
My family and close friends would encourage me to make some changes to my lifestyle.	1 - 2 - 3 - 4 - 5 - 6 - 7				
I'm not sure that I would manage to make changes to my lifestyle even if I wanted to.	1 - 2 - 3 - 4 - 5 - 6 - 7				
Making some changes to my lifestyle would spoil my social life.	1 - 2 - 3 - 4 - 5 - 6 - 7				
Making some changes to my lifestyle would help protect me from heart disease.	1 - 2 - 3 - 4 - 5 - 6 - 7				
Making some changes to my lifestyle would reassure me about my future health.	1 - 2 - 3 - 4 - 5 - 6 - 7				
My family and close friends would be pleased if I made some changes to my lifestyle.	1 - 2 - 3 - 4 - 5 - 6 - 7				
I am confident that I would be able to make changes to my lifestyle if I wanted to.	1 - 2 - 3 - 4 - 5 - 6 - 7				
Making some changes to my lifestyle would help to reduce my chances of having a heart attack.	1 - 2 - 3 - 4 - 5 - 6 - 7				
Making some changes to my lifestyle would make me miserable.	1 - 2 - 3 - 4 - 5 - 6 - 7				
Making some changes to my lifestyle would make me feel better and more alive.	1 - 2 - 3 - 4 - 5 - 6 - 7				

	very likely		unsure		not at all likely
How likely is it that you will make a change in your lifestyle in the next two months to reduce your risk of heart disease?	1 - 2 - 3 - 4 - 5				

Section 4 (cont.)

To what extent do you agree or disagree with the following statements?

	strongly agree								strongly disagree
I intend to make a change in my lifestyle in the next two months to reduce my risk of heart disease	1	-	2	-	3	-	4	-	5
I am committed to making a change in my lifestyle in the next two months to reduce my risk of heart disease.	1	-	2	-	3	-	4	-	5
I intend to put a lot of effort into changing my lifestyle in the next two months.	1	-	2	-	3	-	4	-	5
I have thought about what aspects of my lifestyle I could change to reduce my risk of heart disease	1	-	2	-	3	-	4	-	5

Please answer the following questions by ticking the 'YES' or the 'NO' box.

Have you actually made a decision to make one or more changes in your lifestyle in the next two months to reduce your risk of heart disease? YES☐ NO☐ [if NO, stop here]

Have you decided yet <u>what</u> you are going to do to reduce your risk of heart disease in the next two months? YES☐ NO☐ [if NO, stop here]

Write down what particular change you would like <u>most of all</u> to make in the next two months to reduce your risk of heart disease.

_____

Section 4 (cont.)

Thinking about the lifestyle change you intend to make in the next two months which you have just written down on the previous page, please answer the following questions about it.

How easy would this be for you to do?	**easy**					**difficult**
	1	- 2	- 3	- 4	- 5	
How pleasant would this be for you to do?	**unpleasant**					**pleasant**
	1	- 2	- 3	- 4	- 5	
How effective would this be in reducing your risk of heart disease?	**effective**					**ineffective**
	1	- 2	- 3	- 4	- 5	
How much effort are you prepared to put into doing this?	**none at all**					**a great deal**
	1	- 2	- 3	- 4	- 5	
How confident are you that you can succeed in doing this?	**very confident**					**not very confident**
	1	- 2	- 3	- 4	- 5	
How much help and encouragement would you get from your family & friends to do this?	**none at all**					**a great deal**
	1	- 2	- 3	- 4	- 5	
How committed are you to doing this in the next two months?	**very committed**					**not at all committed**
	1	- 2	- 3	- 4	- 5	

Still thinking about the aspect of your lifestyle that you have written on the previous page, do you have any ideas for specific things you could do to go about making this change (e.g. you might have ideas about changing some of the things you buy and eat; or ideas for taking more exercise; or ideas for ways of trying to give up smoking, etc.)
Write down as many ideas as you have, but if you can't think of any just leave this part blank.

1. _____ Have you decided when you are going to start doing this? YES☐ NO☐

2. _____ Have you decided when you are going to start doing this? YES☐ NO☐

3. _____ Have you decided when you are going to start doing this? YES☐ NO☐

Thank you very much for completing this 2nd questionnaire

Appendix 5

Questionnaire 3

Your health and lifestyle

Psychology Department
St. Andrews University

Research funded by S.H.A.R.P.
(Scottish Heart & Arterial disease Risk Prevention)

Section 1

This section is looking at some aspects of your lifestyle

Please respond to <u>each of the three boxes</u> by circling the number from 1-10 which most accurately describes your current behaviour. Your answer does not have to be one of the labelled numbers if you feel your behaviour lies somewhere in between the statements given.

⇒ 0	I currently do not exercise and do not intend to exercise in the next 2 months.
⇒ 1	
⇒ 2	I currently do not exercise but I am thinking about starting to exercise in the next 2 months.
⇒ 3	
⇒ 4	
⇒ 5	I currently exercise a little but not regularly*.
⇒ 6	
⇒ 7	
⇒ 8	I currently exercise regularly but have only begun to do so in the last 2 months.
⇒ 9	
⇒ 10	I currently exercise regularly and have done so for longer than 2 months.

* Regular exercise is defined as 20 minutes exercise for 3 or more times a week.

⇒ 0	I do not eat healthy foods and do not intend to change my diet in the next 2 months.
⇒ 1	
⇒ 2	I do not eat healthy foods now but I am thinking about changing my diet in the next 2 months.
⇒ 3	
⇒ 4	
⇒ 5	I am currently making a few changes to my diet to eat more healthily.
⇒ 6	
⇒ 7	
⇒ 8	I have changed my diet to eat more healthily but have only begun to do this in the past 2 months
⇒ 9	
⇒ 10	I currently eat healthily and have done so for longer than 2 months.

⇒ 0	I am currently a smoker and do not intend to give up smoking in the next 2 months.
⇒ 1	
⇒ 2	I am currently a smoker but I am thinking about giving up smoking in the next 2 months.
⇒ 3	
⇒ 4	
⇒ 5	I have started to cut down on the number of cigarettes/ cigars/ pipes that I smoke.
⇒ 6	
⇒ 7	
⇒ 8	I have given up smoking but have only done so within the last 2 months.
⇒ 9	
⇒ 10	I am currently a non- smoker and have been a non-smoker for at least 2 months.

Section 2

Finally, we are interested to know about some aspects of your lifestyle. Please try to answer as accurately as you can - remember that your answers will be treated confidentially

Put a tick in the box ☑ or an answer on the line ____ to indicate your responses.

smoking

1. a) Do you smoke cigarettes?
   yes ☐
   no ☐(go to **food & drink**)

   b) During the past week how many did you smoke a day? ____ cigarettes

2. Thinking of the past week, how would you describe yourself as a smoker?
   very heavy☐ heavy☐ moderate☐ light☐ very light☐

3. Which range best corresponds to the number of cigarettes you smoked per day in the past week?
   0-5☐ 5-10☐ 10-15☐ 15-20☐ 20-30☐
   30-40☐ 40+☐

food and drink

1. In the past week, how many 'servings' of whole grain breads (slices); cereals (bowls); raw fruit (items); vegetables (portions); bran products (items) did you eat each day, on average?
   5 or more servings☐ 3-4 servings☐ 1-2 servings☐ none☐

2. Approximately, how many eggs did you eat last week? _____ eggs

3. a) In the past week, how much milk did you drink per day, including in tea, coffee, milky drinks, custard; or with cereals, etc.
   none at all☐ half pint /less☐ 1/2 - 1 pint☐ more than 1 pint☐

   b) what kind of milk did you use last week?
   full fat milk (fresh, dried or UHT) ☐
   semi-skimmed milk (fresh, dried or UHT) ☐
   fully skimmed (fresh, dried or UHT) ☐
   other (e.g. condensed, evaporated, etc.) ☐

food and drink (cont.)

4. During the past week, which of these did you eat on your bread or toast?
   butter☐ soft margarine☐ low fat spread☐

5. During the past week how often did you eat other dairy products, (i.e. cream, cheese, yoghurt?)
   less than once☐ 1-3 times☐ 4-6 times☐ every day☐

6. During the past week how often did you eat fried foods, (including chips)
   never☐ less than once☐ 1-3 times ☐ 4-6 times ☐ every day☐

7. During the past week how many times (per week) did you eat red meat (e.g. mince, beef, steak, pork, lamb, bacon, sausages, liver, etc.)?
   never☐ less than once☐ 1-3 times ☐ 4-6 times ☐ every day☐

8. During the past week how many times a week did you eat any of the following types of fish (fresh or tinned: kippers, herrings, pilchards, tuna, sardines, mackerel, salmon)
   never☐ less than once☐ 1-3 times ☐ 4-6 times ☐ every day☐

9. During the past week how much salt was added in your cooking?
   none☐ a little☐ quite a lot☐

10. During the past week did you add salt to your meals at the table?
    no☐ yes, when food needed it☐ yes, before tasting☐

11. During the past week how often did you drink alcohol?
    never☐ once or twice☐ 3 times☐ 4 or 5 times☐ every day☐

12. During the past week when you drank alcohol, how much, on average, did you drink (1 unit = either 1 glass wine *or* half pint of beer *or* 1 measure of spirits?
    1-2 units☐ 3 units☐ 4 units☐ more than 4 units☐ doesn't apply☐

Exercise

1. During the past week, how would you have described yourself in your **work** (including work around the home) ?

active **inactive**
1 - 2 - 3 - 4 - 5

2. During the past week at **work** (including work around the home), how often were you physically active enough to become short of breath and perspire for at least 20 minutes?

never☐ once☐ twice ☐ three times☐ almost or definitely every day☐

3. During the past week , how would you have described yourself in your **leisure time**?

active **inactive**
1 - 2 - 3 - 4 - 5

4. During the past week, in your **leisure time**, how often did you do exercise (anything from gardening to skiing which left you feeling reasonably out of breath and perspiring) for a period of at least 20 minutes?

never☐ once☐ twice ☐ three times☐ almost or definitely every day☐

Thank you very much for completing this final questionnaire.
Your answers are invaluable to the success of the study.

Appendix 6

Patient Information Sheet

A study to investigate the effect of beliefs about health and illness on the impact of health promotion advice.

You have an appointment at the clinic at Hillbank Health Centre. We would like to take this opportunity to invite you to take part in a study. The study involves asking you questions about what you think about your health, to see if your beliefs have any effect on how you respond to any advice given at your appointment. This will give the staff at the health centre useful information on how to improve the service they provide.

If you agree to participate in the study:

1. We would like you to complete the enclosed questionnaire before you attend the health centre for your appointment at the clinic.

2. We will send you a similar questionnaire after your appointment for you to fill in at home and return to the health centre by post.

3. A further questionnaire will be sent to you 3 months later asking you about what you do to keep healthy and what you intend to do for your health.

We will provide you with stamped addressed envelopes to return your questionnaires.

Consent and withdrawal

You may refuse to take part in this study without stating reasons and without in any way affecting your normal medical care.

Confidentiality

Your confidentiality will be maintained at all times. Your name will not be used in any publication that may arise from this study.

Please fill in the consent form overleaf ➔

Consent Form

PLEASE FILL IN THIS FORM WHETHER OR NOT YOU WISH TO PARTICIPATE IN THE STUDY.

Please tick the box next to the answer you wish to make.

Have you read the patient information sheet? Yes☐ No☐

Have you received enough information about the study? Yes☐ No☐

Do you understand that participation is entirely voluntary? Yes☐ No☐

Do you understand that your normal medical treatment will not be changed in any way for the purposes of this study? Yes☐ No☐

Do you understand that you are free to withdraw from the study:

- at any time? Yes☐ No☐
- without having to give a reason? Yes☐ No☐
- without this affecting your future medical care? Yes☐ No☐

Do you agree to take part in this study? Yes☐ No☐

SIGNED: DATE:

NAME (BLOCK LETTERS):

CONTACT ADDRESS/PHONE NUMBER:

PLEASE PUT THIS CONSENT FORM IN THE ENVELOPE WITH YOUR QUESTIONNAIRE AND RETURN IT TO THE HEALTH CENTRE WHEN YOU COME IN FOR YOUR APPOINTMENT

Appendix 7

Questionnaire

Firstly, we are interested to know how you feel about the most recent visit you have made to your health centre.
On your most recent visit, with whom did you have an appointment?
Please tick the relevant box.
Practice nurse ☐ Doctor ☐
Below are a few statements relating to how you may feel about your most recent visit to the health centre. Please tick the box ☑ which indicates the extent to which you agree or disagree with each statement.

1. The doctor/nurse told me all I wanted to know about my health.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

2. I had the chance to say what was on my mind.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

3. I was given a thorough check-up.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

4. I was given enough time with the doctor/nurse.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

5. I think the doctor/nurse listened to what I said.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

6. I think the doctor/nurse cares for me as a person.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

7. I think my feelings and concerns were considered when/if recommendations were made.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

8. I understood the recommendations that were made to me.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

9. I was given a clear indication of what to do about my health.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

10. The doctor/nurse was friendly towards me.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

11. I was satisfied in general with my appointment.
strongly agree☐ agree☐ uncertain☐ disagree☐ strongly disagree☐

Section 2

Now we are interested to know your beliefs about cardiovascular disease, i.e. heart disease, heart attack, stroke and other diseases of the arteries - what you think causes it, how to avoid it and what it means if you are found to be at risk of developing it.
Do you think the following statements are true or false? If you don't know, just tick the 3rd box.

1. You can lower your risk of cardiovascular disease by improving your diet.

   True ☐ False ☐ Don't know ☐

2. If you are found to be at risk of cardiovascular disease, there is nothing you can do about it.

   True ☐ False ☐ Don't know ☐

3. Your risk of cardiovascular disease can increase if you rarely exercise.

   True ☐ False ☐ Don't know ☐

4. People who have been heavy smokers all their lives can stilll lower their risk by quitting now.

   True ☐ False ☐ Don't know ☐

5. Thin people can eat as much fat as they like without putting themselves at risk of cardiovascular disease.

   True ☐ False ☐ Don't know ☐

6. It is possible to reduce all possible risk factors by taking drugs prescribed by the doctor.

   True ☐ False ☐ Don't know ☐

7. One pint of lager is equal to one unit of alcohol.

   True ☐ False ☐ Don't know ☐

8. Smoking damages arteries.

   True ☐ False ☐ Don't know ☐

9. Smoking less than 10 cigarettes per day will not damage your health.

True ☐ False ☐ Don't know ☐

10. You can reduce your risk of cardiovascular disease by eating regularly timed meals.

True ☐ False ☐ Don't know ☐

11. Living or working with a smoker can harm the health of a non-smoker.

True ☐ False ☐ Don't know ☐

Section 3

Finally we are interested to know about some aspects of your lifestyle. Put a tick in the box ☑ to indicate your responses.

In the next few weeks do you **intend** to:

	yes	no	doesn't apply
lose weight	☐	☐	☐
eat less fat	☐	☐	☐
eat less salt	☐	☐	☐
drink less alcohol	☐	☐	☐
smoke less	☐	☐	☐
take more exercise	☐	☐	☐

Thank you very much for taking the time to answer this questionnaire. Your answers are very important to the success of the study.

Appendix 8

Questionnaire 2

We are interested to know about some aspects of your lifestyle.
Put a tick in the box ☑ to indicate your responses.

1. Over the past 3 months, have you **tried** to:

	yes	no	doesn't apply
lose weight	☐	☐	☐
eat less fat	☐	☐	☐
eat less salt	☐	☐	☐
drink less alcohol	☐	☐	☐
smoke less	☐	☐	☐
take more exercise	☐	☐	☐

2. In the past 3 months have you **managed** to:

	yes	no	doesn't apply
lose weight	☐	☐	☐
eat less fat	☐	☐	☐
eat less salt	☐	☐	☐
drink less alcohol	☐	☐	☐
smoke less	☐	☐	☐
take more exercise	☐	☐	☐

3. In the next few weeks do you **intend** to:

	yes	no	doesn't apply
lose weight	☐	☐	☐
eat less fat	☐	☐	☐
eat less salt	☐	☐	☐
drink less alcohol	☐	☐	☐
smoke less	☐	☐	☐
take more exercise	☐	☐	☐

Thank you very much for taking the time
to answer this questionnaire.
Your answers are very important to the success of the study.

Appendix 9

HILLBANK HEALTH CENTRE
1A CONSTITUTION STREET
DUNDEE. DD3 6NF
TEL: 26673

MO/PW

Date as postmark

Dear Patient,

We are writing to ask for your help to both try to keep you fit and well and at the same time reduce Scotland's dreadful record of premature illness and death from disease of the heart and blood vessels.

We now know a lot about the risk factors associated with cardiovascular disease and by screening you for these factors we can help you to avoid them.

There is now a special clinic for screening at Hillbank Health Centre on Mondays from 9.00 a.m. to 5.30 p.m. and Thursdays from 1.00 p.m. to 5.30 p.m. where a trained nurse will see you.

We have allocated you an appointment as detailed below and would ask you to bring a specimen of urine with you. If this day or time is not suitable, please let us know by telephoning 26673 so that someone else may have the appointment and we can offer you an alternative one.

APPOINTMENT: Thursday 9th February

Yours sincerely,

P. Whyte

pp. **Mrs. M. Ogilvie**
PRACTICE NURSE

Appendix 10

Friday, 4th March

Dear

PSYCHOLOGY STUDY ON THE IMPACT OF DIFFERENT METHODS OF OFFERING CARDIOVASCULAR SCREENING

Since I spoke to you at your Practice meeting on Tuesday 25th January, I have been held back in starting my study due to a few problems with the design of the study according to Tayside Ethical Committee. Now, however, I have finally been given approval to start the study, having made a few changes to the patient information sheet and consent form. I would therefore like to get started as soon as possible - next week - as long as you don't have too many questions or foresee too many problems.

I'd like to say, first of all, how grateful I am to have your co-operation with this study and I do hope you will not find that it puts constraints on your valuable time with your patients. Please do let me know if you have any problems with anything about the study which I'll do my best to sort out.

Due to the Ethical Committee's concerns about patients not being given enough time to ask about the study before they give their consent, I have been required to add a section into the consent form which will allow the patient to ask you, their GP, questions about the study. We are hoping that few patients will wish to ask you any questions and, if they seem unsure, that you will give them your support in not participating. I hope that you will inform me if patients' questioning is taking up too much of your time.

I would now like to go over the main aims and methods of the study again so that: 1) you are sure what you are required to do, 2) you know what the study will expect of the patients and 3) you understand what I am trying to achieve, at least to some extent!

Background:
Since the recent General Practitioner contract which has put a greater emphasis on the provision of health promotion services, **different methods have been used across GP practices to offer screening for risk factors for cardiovascular disease.** It is important to evaluate the impact of these different methods, **within one practice**, especially in terms of patients' **risk factor modification**.

Aim:
To investigate the impact of different methods of offering risk factor screening (i.e. opportunistic screening during ordinary consultation; personal and letter invitations to screening clinic) on patients' subsequent uptake of screening; satisfaction; knowledge of risk factors and, most importantly, their risk factor modification.

[You might expect that the screening clinic would be more successful, considering the shortage of time that can be given to screening if it is done opportunistically. However, uptake rates for the opportunistic screening group are going to be 100%

compared to possibly much lower rates in the groups who have been invited to the screening clinic. As I will be comparing each complete set of subjects allocated to each method, (i.e. whether they attended the clinic or not) there should be a fair comparison of the overall effect of each method of offering screening.]

Subjects:
250 men (approx.) aged between 15-74.

Design:
A randomised, controlled trial of 3 methods of offering screening: (*see procedure for more detail*)
a. opportunistic screening
b. personal invitation
c. letter invitation

Outcomes:
1. uptake of screening, i.e. do they attend screening clinic?
Postal questionnaire assessment of:
2. satisfaction with screening/consultation
3. knowledge of risk factors
4. risk factor modification / health-related behaviour

[2,3 and 4 will be measured 1 week after screening
4 will be measured again 3 months later]

Procedure:

1. Male patients will be given a patient information sheet and consent form at the reception desk prior to their GP appointment. Only those patients who sign their consent form should be included in the study - they will bring this form to you when you call them in for their consultation and you should collect these and give them to reception at the end of each day. If you think for some reason that a patient who has signed a consent form should not be involved in the study, then let them know, do not include them in the procedure and make a note on their consent form for me.
NB the patient must understand that they are very welcome as a subject in the study even if they have no intention of attending a screening clinic, and that if they do not attend the screening clinic they will still be sent the follow-up questionnaires as we are very interested in non-attenders' responses.

2. GP surgeries will be randomly allocated to one of the three conditions. Each GP will be given information as to which method of allocation to screening they will be using each day. The receptionists will put a note on your patient list to tell you which method you will be using. You will not be given the whole timetable beforehand as your prior knowledge may affect the randomisation.

You will be asked to either:
a) proceed with opportunistic screening during the consultation [OPP*]
I am not giving you specific guide-lines for this method as I just want you to do whatever you would generally do, and whatever you can fit into the time available. If you have no time, then do and say nothing about health promotion. Don't invite them to attend the screening clinic.
NB You will not have to give me any information on what or how much screening took place.

b) invite the patient personally to attend a screening clinic [PER*]
Again, I do not want to give you any specific guide-lines for this - just do it in the way you might normally suggest the clinic to the patient. I will, however provide

you with a set of cards saying "cardiovascular clinic" on them which I would like you to give to the patient to help them remember the name of the clinic at reception, if they wish to make an appointment. Remember, there is no requirement for them to make an appointment to be included in the study.

c) (this is the easy one!) say nothing about screening or health promotion [NOT*]
I will send out a letter to these patients inviting them to the screening clinic.

* The starred items will be the abbreviations used by the reception staff on your patient lists.

I will provide you with a card to put on your desk to remind you of the above three conditions.

The study will run on Mondays, Tuesdays and Fridays for approximately 12 weeks (the length of study depends on number of 'eligible' men consenting to participate). [Dr. McEwan will also be involved on Wednesday mornings to keep her time equal to the other partners.]
On Wednesdays and Thursdays you should act as any normal day - you don't have to keep quiet about the screening clinic, (although we'll have to make sure we don't overbook it) and you can screen opportunistically as much as you like!

As I said earlier, I would like to start next week, but will hold off till Tuesday to allow you to ask me any questions on Monday when I will be in the health centre and will try to have a word with you.
I would also be grateful for any comments you may have.
Of course, I will also be available to answer queries as the study proceeds.

Thanks very much for taking the time to read this and for your cooperation with this study.

Yours sincerely

Wendy Simpson

Appendix 11

Patient Information Sheet

NB Please return these forms to reception without reading them or answering the questions if: EITHER

1. you have attended the cardiovascular (healthy heart) clinic at Hillbank Health Centre within the past 3 years OR

2. you are younger than 15 years or older than 74 years

PLEASE READ THE FOLLOWING CAREFULLY
AND THEN ANSWER THE QUESTIONS ON THE ATTACHED
CONSENT FORM

A study to investigate the impact of different ways of offering health promotion advice given to patients

Several patients attending Hillbank Health Centre today are being invited to take part in a study to compare different ways of offering health promotion to patients.
Before deciding to take part in the study you should have read this information sheet, and thought about it carefully.

Purpose of the study

The purpose of the study is to look at different ways of offering health promotion to see if this affects your response. Results from the study will help your GP to decide on the best way to provide you and others with such a service.

If you agree to participate in the study, your GP may speak to you today about health promotion, he/she may invite you to come to the cardiovascular clinic or you may be invited to this clinic by letter at a later date.
Agreeing to participate in the study does not mean that you have to take up the invitation to come to the clinic.

If you agree to participate in the study you will also be sent a questionnaire to complete and return by post within the next few weeks and again in three months time.
The questionnaire will ask you what you know about ways to keep healthy; about how satisfied you are with the way health promotion advice was given to you and about what you actually do to keep healthy.

Consent and withdrawal

You may refuse to take part in this study without stating reasons and without in any way affecting your normal medical care.

Confidentiality

Your confidentiality will be maintained at all times. Your name will not be used in any publication which may arise from this study.

NOW TURN OVER THE PAGE AND ANSWER THE QUESTIONS ON THE CONSENT FORM

Consent Form

PLEASE HAND THIS FORM TO YOUR GP WHETHER OR NOT YOU HAVE GIVEN YOUR CONSENT TO PARTICIPATE

Please tick the box next to the answer you wish to make.

Have you read the patient information sheet? yes☐ no☐

Have you received enough information about the study? yes☐ no☐
[If you wish more information about the study before you give your consent please speak to your GP.]

Do you understand that participation is entirely voluntary? yes☐ no☐

Do you understand that your normal medical treatment will not be changed in any way for the purposes of this study? yes☐ no☐

Do you understand that you are free to withdraw from the study:

- at any time? yes☐ no☐
- without having to give a reason? yes☐ no☐
- without this affecting your future medical care? yes☐ no☐

Do you agree to take part in this study? yes ☐
no ☐

I'd like to discuss the matter further with my GP before making my decision☐

SIGNED: DATE:

NAME (BLOCK LETTERS):

CONTACT ADDRESS/PHONE NUMBER:

REMEMBER TO DETACH THIS FORM AND HAND IT TO YOUR GP WHEN YOU GO IN FOR YOUR APPOINTMENT