Weight-Control Behaviours and Beliefs of Adults

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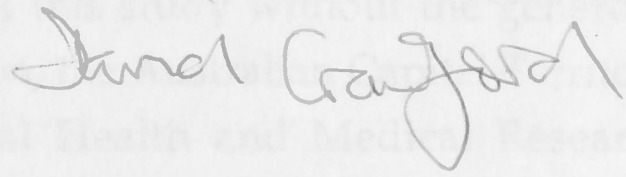
Except where otherwise indicated, the work in this thesis is my own, and is based on original research performed at The Australian National University.



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ABSTRACT

Although obesity is recognised as a significant public-health problem in industrialised countries and health authorities are concerned with promoting healthy weight control, there is a paucity of population-representative data regarding weight-control behaviours. This thesis examines weight-control behaviours and related beliefs in a population-based sample of 1342 adults living in rural Victoria, Australia, focusing particularly on the application of the Prochaska and DiClemente Stage of Change Model in order to understand weight control.

The subjects in this study were selected at random from the electoral rolls and in 1992 had participated in a cardiovascular risk factor screening. Participants in the cardiovascular risk factor screening were recontacted in 1993 and surveyed by mail about their weight-control behaviours and beliefs, and those who provided useable data were surveyed again one year later. The 1993 and 1994 studies form the centre-piece of this thesis. In addition, a study of 210 undergraduate students was conducted to examine the reliability and concurrent validity of two measures of stage of change for weight control.

This 1993 survey showed that, in addition to the considerable number of men and women who were attempting to lose weight at any time, a substantial proportion of adults were actively trying to maintain their present weight or avoid weight gain. Those taking action for their weight most often did so for health-related reasons, and although most of the strategies they employ are those recommended by health authorities, some adults did adopt potentially unhealthy weight-control practices. In addition, there was evidence that many men had a weight goal higher than that which is currently considered acceptable.

As well as demonstrating that weight-control behaviours are common, the 1993 survey showed that many adults not taking action for their weight intended to do so over the coming year. A supplementary study of undergraduate students demonstrated that variables included in the 1993 survey which assessed current behaviours and future intentions reliably classified subjects in terms of their stage of change for weight control. Those who were not taking any action to lose or maintain weight were classified into the precontemplation stage; those who were considering taking action were classified into the

contemplation stage; and those who were actively trying to lose or maintain weight were classified into the action stage.

More than two-thirds of the subjects in the 1993 survey were taking action or considering taking action for their weight. However, the findings suggest that, in order to reduce the prevalence of overweight and obesity, future public-health initiatives will have to target men specifically. Forty per cent of men had no intention of taking steps to control their weight, including almost one-third of men who were overweight. Multivariate analyses revealed that decisional balance differentiated men and women in the three stages of change, and self-efficacy distinguished women in the different stages.

The 1994 follow-up study examines the dynamics of weight-control behaviour. As well as describing movement from one stage to another by individuals over the one year follow-up period, it confirms the value of the Stage of Change Model in understanding population weight-control behaviours. It provides data which corroborates the validity of the stage measure used in this study, and demonstrates the utility of the Model in examining transitions between the different stages of change for weight control.

The thesis concludes with a consideration of its public-health implications of this study, and highlights priorities for future research.

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CHAPTER 1

INTRODUCTION

In this thesis I consider the issue of weight control from a behavioural epidemiology perspective. Whereas "epidemiology is concerned with the patterns of disease occurrence in human populations and of the factors that influence these patterns" (Lilienfeld & Lilienfeld, 1980; p3), a behavioural epidemiology perspective focuses upon the behaviours of interest, rather than on the disease or condition itself (Mason & Powell, 1985). At one level behavioural epidemiology is concerned with the identification of behaviours that are causally related to a disease; at another "it is the epidemiological study of the health-related behavior and its psychosocial and social ecological antecedents" (Raymond, 1989; p284). Behaviours such as cigarette smoking and physical activity have been usefully examined from such a perspective (Hill, White, & Gray, 1991; Owen & Bauman, 1992; Owen, Wakefield, Roberts, & Esterman, 1992; Sallis, Hovell, & Hofstetter, 1992), and the approach adopted in that research provides a working model for the study of weight control. This thesis is therefore not concerned with obesity per se, but with the distribution and determinants of weight-control behaviours in the population.

In adopting an approach which focuses strongly upon behaviours I do not deny the importance of other factors in understanding weight control. I recognise, for example, that body weight is influenced by genetic factors (Bouchard, Despres, & Tremblay, 1991). Furthermore, I acknowledge that behaviours are not solely a matter of personal choice and discretion. For example, there are cases to be made that dietary choices are influenced by food availability and food delivery systems (Rozin, 1980), and that opportunities to exercise are influenced by the availability of facilities and resources (Owen & Lee, 1989). A disciplinary focus which emphasises environmental determinants is therefore also important (Ewart, 1991; Jeffery, 1989; Stokols, 1992). However, while behavioural epidemiology may not provide a complete understanding of weight control, such an approach will yield detailed data on the distribution of weight-control behaviours and of related beliefs and concerns in the population. From a public-health perspective such information is likely to be valuable in the development of

strategies, programs and services designed to increase the proportion of people whose weight falls within the 'healthy' range.

In a broad sense this thesis examines how behavioural epidemiology may be applied to the analysis of what has so far been an intractable public-health problem. In particular, I focus on the application of the Stage of Change Model (Prochaska & DiClemente, 1983) in order to examine weight-control behaviours. Using population-representative data, and drawing upon a well-developed theoretical model from health psychology, I will demonstrate how an analysis of a particular complex of health-related behaviours can generate new knowledge which may be used to guide public-health action. The specific aims of this thesis are to determine the distribution of weight-control behaviours, to examine the strategies employed to lose and maintain weight, and to establish the weight goals of the population. In addition, the thesis will examine the utility of the Stage of Change Model in understanding population weight-control behaviours and intentions, using cross-sectional and prospective survey data.

In the following chapter I review data which highlight the extent of obesity as a public-health problem and I discuss the role that information on population weight-control behaviours might play in developing strategies to reduce the prevalence of obesity. I review research on community weight-control beliefs and behaviours, demonstrating the limited nature of the information which is currently available, and I explore the potential value of the Stage of Change Model in understanding weight-control behaviour. The methodological details of the cross-sectional and prospective studies which form the centre-piece of the thesis are presented in Chapter 3. I report on the response to the Weight Control Survey, a population study conducted in a rural area, in Chapter 4, and investigate response bias by comparing the characteristics of survey participants with those of non-participants, and examining the socio-demographic profile of the participants and the distribution of body weight in the sample. Chapter 4 concludes with a discussion of the generalisibility of the survey findings.

The descriptive epidemiology of weight control is reported in Chapter 5. Data are presented on self-reported past and current weight-control behaviours, weight-loss and weight-maintenance strategies, weight-control intentions, and weight goals. I discuss the assessment of stage of change for weight control in Chapter 6, and present data from a study of undergraduate

students on the reliability and concurrent validity of two stage-of-change measures. Chapter 7 presents data on the prevalence and distribution of the stages of change among participants in the Weight Control Survey, and examines the association between stage of change and weight and fatness perceptions, body attitudes, weight locus of control, decisional balance for weight loss, and self-efficacy for weight control. The results of the prospective study I have conducted, the Weight Control Follow-up, are included in Chapter 8 which describes the dynamics of the stages of change over a one-year follow-up period, and examines predictors of movement through the stages. In the final chapter I discuss the public-health implications of these findings and identify areas for further research.

CHAPTER 2

LITERATURE REVIEW[1]

2.1 Introduction

In order to address the issue of weight control in a public-health framework, I begin by briefly discussing the association between excess weight and ill-health. This association becomes salient in light of data which show that a large proportion of the adult population are overweight or obese, and that average weights are increasing. I describe national health goals and targets for obesity, and discuss the potential role that information on population weight-control behaviours and beliefs can play in developing strategies to reduce the prevalence of obesity.

I define weight-control behaviour, and examine its prevalence and distribution in the population. Given that this thesis is concerned with weight control as a public-health issue, this review will focus on studies which have examined population weight-control behaviours. Since the examination of weight control from a public health perspective is a relatively new area of research, few population-based data exist. Much of the available data on weight-control behaviours is therefore derived from university-based treatment programs (Brownell, 1993). However, only a small proportion of those who have a weight problem seek treatment, and those who do, differ from overweight individuals who do not seek such assistance (Brownell & Rodin, 1994a). As such, the findings of these studies provide little insight into the weight-control behaviours of overweight people who 'self-treat', nor do they assist us to understand the approaches employed by those in the population who are not overweight.

This chapter concludes with a discussion of the potential value of the Prochaska and DiClemente Stage of Change Model in understanding population weight-control behaviour.

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[1] Aspects of this chapter have been published in the Australian Journal of Public Health 1994; 18: 143-148, a copy of which is included in Appendix 1.

2.2 Weight control as a public health issue

2.2.1 Body weight, mortality and morbidity

Australian health authorities have for some years recommended that the prevalence of overweight and obesity (defined as a Body Mass Index of greater than 25 kg/m^2) should be reduced in the population (Commonwealth Department of Community Services and Health, 1987; Commonwealth Department of Human Services and Health, 1994; Langsford, 1979). These recommendations are based on substantial evidence which demonstrates that higher relative weights are associated with greater risk of mortality and morbidity for a range of common conditions. This evidence was reviewed in the 1980s by expert groups in the United Kingdom (Royal College of Physicians, 1983), the United States (Burton, Hirsch, & Van Itallie, 1985), and Canada (Health and Welfare Canada, 1988a), and as a consequence reports or statements were released identifying associations between excess weight and mortality and/or morbidity from conditions including non-insulin dependent diabetes mellitus, coronary heart disease, hypertension, hyperlipidemia, and certain types of cancers.

In a more recent review of the literature, Pi-Sunyer (Pi-Sunyer, 1991; p1600S) concluded that there was "ample evidence to suggest that obesity increases both morbidity and mortality", although debate continues concerning the strength of the independent risk of obesity versus its effect on other risk factors, and where in the excess-weight spectrum specific risks begin. Similarly, an expert group in the United Kingdom recently concluded that "obesity is an important health hazard both independently and in association with other diseases", and they argued that "the true adverse consequences of obesity are underestimated, particularly for those who are only moderately overweight" (Kopelman, Finer, Fox, Hill, & MacDonald, 1994; p189). Recent research has also shown that increased upper body or abdominal fat is associated with greater risk of premature mortality and morbidity, although the epidemiological evidence relating differences in body fat distribution to health is far less extensive than the data concerning excess weight (Pi-Sunyer, 1991).

2.2.2 The distribution of weight in the adult population

A brief examination of the distribution of weight in the Australian population is important for two reasons. First, it provides a picture of the current extent of the problem of excess weight in adults, as well as recent trends. Second, it allows us to identify those socio-demographic groups within the population which are worst affected, and who should therefore be targeted in health promotion initiatives. Because my study is based on a rural sample, I also consider data available on urban and rural differences in overweight and obesity.

Two major sources of data are available on weight in the Australian adult population. These data are derived from the National Heart Foundation's Risk Factor Prevalence Study, conducted between 1980 and 1989, and from the 1989-90 National Health Survey. The method used for characterising body fatness in these studies was Body Mass Index (BMI=weight in kilograms/height in metres^2). Although it is recognised that BMI may give an inaccurate indication of obesity in special groups, such as elite athletes or body builders (Garrow & Webster, 1985; Pi-Sunyer, 1988), it is nonetheless regarded as a practical and cost-effective measure of body fatness for population studies, as it correlates well with other more sophisticated measures (Garrow & Webster, 1985; Willett, 1990).

A classification system derived from research findings on the health risks associated with varying levels of BMI has been adopted by Australian health authorities (National Health and Medical Research Council, 1985), and has been used to classify adults in the population studies described below. Under this classification system, 'underweight' is defined as a BMI of less than 20 kg/m^2; a BMI in the range of 20 to 25 kg/m^2 inclusive is classified as an 'acceptable weight'; 'overweight' is defined as a BMI of greater than 25 and up to and including 30 kg/m^2; and a BMI of greater than 30 kg/m^2 is defined as 'obese'. These categories apply to adults regardless of age (National Health and Medical Research Council, 1992). The use of a BMI of 25 kg/m^2 to define the upper limit of the healthy weight range, regardless of age, is consistent with recent recommendations from the United States (Dietary Guidelines Advisory Committee, 1995).

The 1989-90 Australian National Health Survey

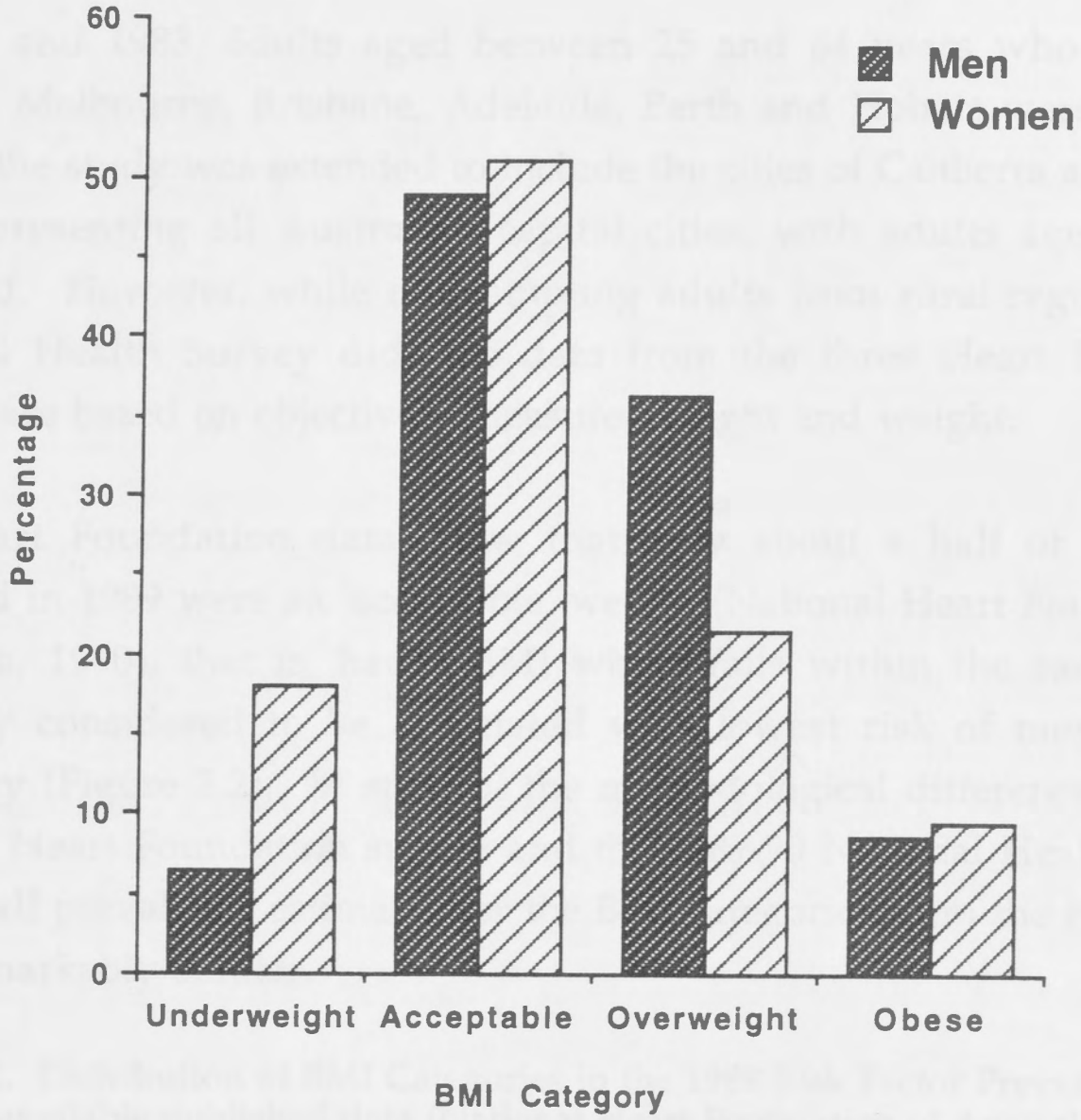
Approximately 22,000 households in rural and urban areas of all Australian States and Territories were sampled in the 1989-90 National Health Survey, with each person aged 15 years or more in the household invited to participate in an interview (Australian Bureau of Statistics, 1992). A total of almost 55,000 persons, or 96 per cent of those eligible, completed the interview. While the National Health Survey provides extensive information on the health of Australians in all regions of the country, it did not include any physical or biomedical measurements. As part of the interview participants were asked for their height and weight.

These self-reported heights and weights were used to calculate BMI for persons aged 18 years and over, and to classify them into one of the four BMI categories described above. There are, however, problems associated with the validity of such self-report data, which are likely to result in the misclassification of subjects into BMI categories (Kuskowska-Wolk, Bergstrom, & Bostrom, 1992; Kuskowska-Wolk, Karlsson, Stolt, & Rossner, 1989; Nieto-Garcia, Bush, & Keyl, 1990; Stewart, Jackson, Ford, & Beaglehole, 1987; Waters, 1993). In spite of the limitations of the National Health Survey data, they have been used as the baseline for Australia's National Health Goals and Targets for overweight (Commonwealth Department of Human Services and Health, 1994), and they will be used to monitor trends in BMI and to evaluate the effectiveness of future initiatives.

The National Health Survey data suggest that, based on BMI, only half of the adult population have an acceptable weight (Figure 2.1). Almost three times as many women as men were underweight, and slightly more women than men were in the obese category. However, men were more likely than women to be classified as overweight, and overall more men had a BMI greater than that which is currently considered acceptable.

The proportion of men classified as overweight or obese (defined as a BMI> 25 kg/m^2) increased until the age of 55, rising from 26 per cent of men aged 18-24 to 55 per cent of the men aged 45-54, before falling in the older age groups. Among women, the prevalence of overweight or obesity increased from 15 per cent in the youngest age group, to 45 per cent in women aged 55-64, before beginning to fall. The prevalence of underweight was highest for men aged under 25 and for men 75 years and over, while for women underweight decreased as age increased, until the age of 55.

Figure 2.1. Distribution of BMI Categories in the 1989-90 National Health Survey, based on available published data (Australian Bureau of Statistics, 1992).



Although the published data from the National Health Survey include prevalence estimates for BMI categories for different statistical divisions, some of which are essentially urban and others mainly rural, it is not possible to make valid comparisons of the distribution of BMI categories between urban and rural regions. This is because no age-specific data are available from the published data, and given that BMI varies with age, any differences observed might be due to different age distribution in urban and rural regions.

The Risk Factor Prevalence Study

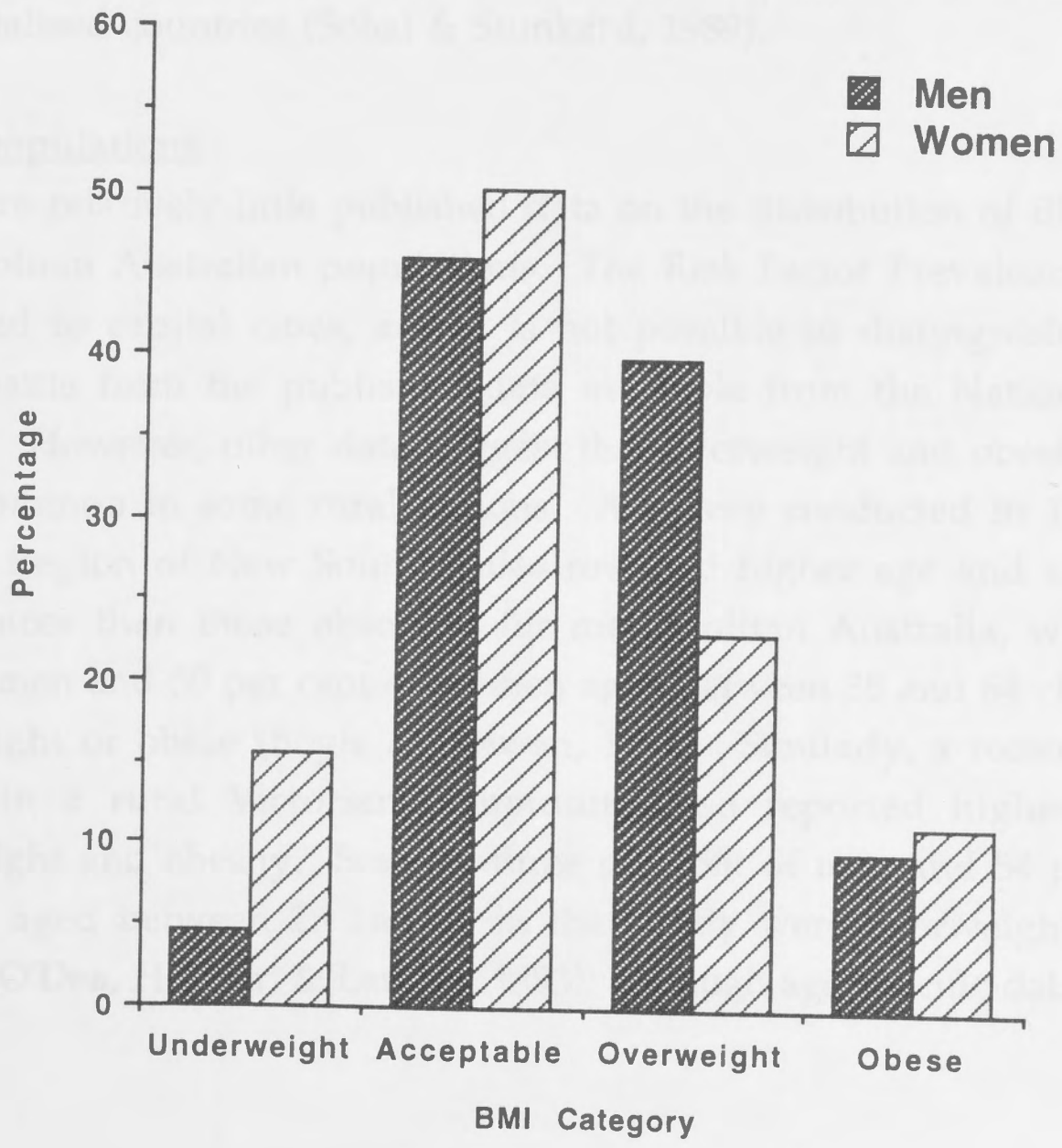
During the 1980s the National Heart Foundation of Australia conducted three independent cross-sectional risk factor prevalence surveys, each of which employed essentially the same methods (Bennett & Magnus, 1994). In these surveys a systematic probability sample of adults was selected from the federal electoral rolls of major urban centres (registration on the

electoral rolls is compulsory for all citizens aged 18 years and over), and those selected were invited to attend a free cardiovascular risk factor screening at a local survey centre.

In 1980 and 1983, adults aged between 25 and 64 years who resided in Sydney, Melbourne, Brisbane, Adelaide, Perth and Hobart were surveyed. In 1989 the study was extended to include the cities of Canberra and Darwin, thus representing all Australian capital cities, with adults aged 20 to 69 surveyed. However, while not sampling adults from rural regions (as the National Health Survey did) the data from the three Heart Foundation surveys are based on objectively measured height and weight.

The Heart Foundation data show that only about a half of the adults surveyed in 1989 were an 'acceptable' weight (National Heart Foundation of Australia, 1990), that is, had a BMI which falls within the range that is currently considered to be associated with lowest risk of mortality and morbidity (Figure 2.2). In spite of the methodological differences between the 1989 Heart Foundation survey and the 1989-90 National Health Survey, the overall prevalence estimates for the BMI categories from the two studies were remarkably similar.

Figure 2.2. Distribution of BMI Categories in the 1989 Risk Factor Prevalence Study, based on available published data (National Heart Foundation of Australia, 1990).



As Figure 2.2 shows, three times as many women as men were classified as underweight. Although obesity was also more common among women than men, a greater proportion of the men were overweight or obese, with almost one in two men affected, compared to approximately one in three women. The prevalence of overweight or obesity was found to increase from 25 per cent in men aged 20 to 24, levelling out at approximately 60 per cent in men aged 45 years or more. In women, the proportion who were overweight or obese increased from 17 per cent in the youngest group, to slightly less than 60 per cent of women aged 65 to 69.

The prevalence of overweight or obesity also varied by other socio-demographic characteristics . An analysis of the 1989 NHF survey data revealed that the odds of being overweight or obese were higher among persons born in Southern Europe compared to Australia; for persons with a low level of education compared to those with tertiary qualification; for married men compared men who have never married; for plant/machinery operators compared to professional men; for labourers and related workers compared to professional women; and, for women in the two lowest socio-economic categories compared to those in the highest category (Waters & Bennett, 1995). The differences by social status confirm earlier findings from the Heart Foundation's 1980 survey (English & Bennett, 1985), and are generally consistent with those reported for other industrialised countries (Sobal & Stunkard, 1989).

Rural populations

There are relatively little published data on the distribution of BMI in non-metropolitan Australian populations. The Risk Factor Prevalence Study is restricted to capital cities, and it is not possible to distinguish the rural participants from the published data available from the National Health Survey. However, other data suggest that overweight and obesity may be more common in some rural regions. A survey conducted in 1989 in the Hunter Region of New South Wales revealed higher age and sex-specific prevalences than those observed for metropolitan Australia, with 70 per cent of men and 50 per cent of women aged between 35 and 64 classified as overweight or obese (Boyle & Dobson, 1991). Similarly, a recent study of adults in a rural Victorian community also reported higher rates of overweight and obesity. Seventy-three per cent of men and 54 per cent of women aged between 25 and 64 in that study were overweight or obese (Guest, O'Dea, Hopper, & Larkins, 1993), although age-specific data were not

reported. Surveys of adults aged 20-69 have also found higher mean BMIs among rural Tasmanians, compared to those living in the capital of that state, although estimates of the prevalence of overweight and obesity were not reported (Thomson, Watts, Rundle, Sexton, Singh, & Woodward, 1995).

2.2.3 Recent trends in weight

The Risk Factor Prevalence Study has been analysed to examine trends in BMI in the adult population over time (Bennett & Magnus, 1994). In order to compare prevalence estimates from the 1980, 1983 and 1989 surveys these comparisons have been restricted to data derived from persons aged 25-64 years living in Sydney, Melbourne, Brisbane, Adelaide, Perth and Hobart. These analyses showed there has been an increase in the average weight of adults, with no significant changes in height during the 1980s. In 1989, women were an average of three kilograms heavier than their counterparts in 1980, while among men average weight increased by just over one and a half kilograms. As a result of the increase in average weight, there has been an increase in the prevalence of overweight and obesity among men and women, and a decrease in the prevalence of those of an acceptable weight and those classified as underweight (Table 2.1).

Table 2.1. Proportions in each BMI category by sex and year, and adjusted prevalence odds ratios for 1989 relative to 1980 within sex and BMI categories. (Adapted from Bennett and Magnus, 1994).

BMI Category	Crude proportion (%)			Prevalence odds ratio (95% confidence interval)
	1980	1983	1989	1980-1989
Men				
Underweight	4.8	4.7	3.1	0.72^{+} (0.53-0.96)
Acceptable	45.4	46.2	41.3	0.86* (0.76-0.96)
Overweight	40.6	40.0	44.1	1.13^{+} (1.01-1.27)
Obese	9.3	9.1	11.5	1.24^{+} (1.02-1.50)
Overweight or obese	49.8	49.1	55.6	1.23* (1.09-1.38)
Women				
Underweight	16.7	14.1	11.8	0.69* (0.59-0.82)
Acceptable	55.0	53.4	49.8	0.81* (0.72-0.91)
Overweight	20.2	22.0	25.1	1.32* (1.15-1.51)
Obese	8.0	10.5	13.2	1.70* (1.40-2.06)
Overweight or obese	28.3	32.5	38.3	1.58* (1.39-1.79)

Odds ratios are adjusted for age and survey design factors. $^{+}p<0.05$; $^{*}p<0.01$.

Similarly, data derived from the 1989-90 National Health Survey and the 1994 Australian Bureau of Statistics Population Survey Monitor, although relying on self-report height and weight data, suggest that among men and women aged 25-64 years the prevalence of overweight and obesity has continued to increase (Abraham, d'Espaignet, & Stevenson, 1995).

2.2.4 National health goals and targets for obesity

For many years Australian health authorities and other health and professional organisations have promoted the virtue of an acceptable weight, focussing on the perils of excess weight and the benefits of weight loss. In addition to these activities and initiatives, commercial weight-loss centres, special diet foods and diet plans proliferate (Australian Consumers' Association, 1993; Consumer Advocacy and Financial Counselling Association of Victoria (Inc), 1992), and information on weight control is common in the print media (Radimer, 1995; Reilly, 1985; Reilly, Yann, & Cumming, 1987). Despite the activities of public- and private-sector organisations over many years, excess body weight is more common now than it was at the beginning of the last decade. This trend of increasing average weights is not unique to Australia, having also been observed in other industrialised countries, including the United States (Kuczmarski, Flegal, Campbell, & Johnson, 1994), the United Kingdom (Gregory, Foster, & Tyler, 1990), Sweden (Kuskowska-Wolk & Bergstrom, 1993a; Kuskowska-Wolk & Bergstrom, 1993b), and Germany (Hoffmeister, Mensink, & Stolzenberg, 1994).

In response to the high prevalence of overweight and obesity, and the disturbing trend of increasing average weights, Australian health authorities, like those of other countries (Garrow, 1991; New Zealand Department of Health, 1991; U.S. Department of Health and Human Services, 1991), have recently identified health goals relating to overweight and obesity (Table 2.2). These targets are based on a recognition that the problem is a population phenomenon, and that a small reduction in the population's mean weight can lead to significant change in the prevalence of overweight (Jeffery & Forster, 1987; Rose, 1992).

Table 2.2. Australia's Health Goals and Targets relating to overweight. (Adapted from Commonwealth Department of Community Services and Health, 1994).

Health goals for adults relating to overweight	Year 2000 target	Baseline level
Increase proportion with an acceptable body weight		
Men	60%	48.8%(b)
Women	60%	51.0%(b)
Reduce the prevalence of overweight (a)		
Men	40%	44.2%(b)
Women	25%	30.6%(b)
Reduce the prevalence of abdominal obesity		
Men	38%	41.5%(c)
Women	18%	22.9%(c)

(a) Although this goal uses the term 'overweight' it actually refers to the combined overweight and obese BMI categories; (b) Based on self-report data from the 1989-90 National Health Survey; (c) Based on the 1989 National Heart Foundation Risk Factor Prevalence Study which included objective waist and hip measures.

However, while it is acknowledged that there is a need to promote individual and structural change to improve dietary habits and increase levels of physical activity in the population (Commonwealth Department of Human Services and Health, 1994), a comprehensive strategy to deal with overweight is not yet available. Given this, the Year 2000 targets obesity for must be viewed as optimistic, especially in light of the recent trends in weight. In order to develop a more effective public-health response to the problem of overweight it will be important to have a detailed understanding of the nature, extent and distribution of weight-control behaviours in the population, and of the beliefs associated with them. Such information may allow us to determine who is taking action or ready to take action for their weight and how we can best assist them to do so. For those who are not intending to take control of their weight, an awareness of their beliefs may help us to establish what some of the barriers to weight control are and how these can be overcome.

An understanding of population weight-control behaviours and beliefs is also important because there is some evidence that, in trying to control their weights, individuals may put their health at risk. Although primarily concerned with reducing the prevalence of obesity among adults,

Australian health authorities have also identified certain aspects of weight-control behaviour that may themselves be potentially unhealthy. These relate to the health effects of specific weight-control strategies, the cult of thinness among young women, and the possible health consequences of weight cycling (Commonwealth Department of Human Services and Health, 1994; National Health and Medical Research Council, 1992). However, evidence that unsuccessful dieting can lead to weight cycling, which in turn poses a risk to health, is contentious. While there appears to be consensus that weight cycling increases the risk of cardiovascular and all-cause mortality, because of methodological shortcomings, it remains unclear whether the weight variability is due to voluntary attempts at weight control (Brownell & Rodin, 1994b; French & Jeffery, 1994; National Task Force on the Prevention and Treatment of Obesity, 1994; Wing, 1992).

In spite of some concerns about the potential negative health effects of certain weight-control behaviours, the high and increasing prevalence of obesity, its socio-demographic distribution, its health and psychosocial consequences, its resistance to treatment, the associated economic costs, and the population's concerns about weight combine to make excess body weight a major public-health problem (Brownell & Rodin, 1994a). The challenge facing health authorities is to reduce the prevalence of overweight and obesity without exacerbating the problems of low body weight or unhealthy weight control. In order to achieve this objective, health authorities in the United States have recently recommended that weight guidelines for the public be revised, so that there is an increased focus on weight maintenance (regardless of current weight), with less emphasis placed on weight loss. This shift in emphasis recognises the importance of weight control as "the essential first step toward a reduction in the prevalence of obesity in the population" (Dietary Guidelines Advisory Committee, 1995; p23).

2.3 The prevalence of weight control

2.3.1 A definition of weight control

The definition of weight control has varied in different studies (French & Jeffery, 1994). French and Jeffery suggest that it is important to distinguish between a simple desire to lose weight or concern about weight, and dieting

behaviours that may lead to weight loss. They further argue that dieting to lose weight and dieting to maintain current weight should be distinguished, and that other weight-loss methods such as fasting and diet pill use should be considered. There is a variety of potential strategies which can be employed to control weight, ranging from dietary restriction and increased physical activity, through to behaviours such as the use of laxatives and diuretics, smoking, vomiting and purging (National Institutes of Health Technology Assessment Panel, 1992).

Most research on weight control is based on studies of weight loss among overweight individuals, or follow-up studies of participants in weight-loss programs (Brownell, 1993). In this context the term weight control is used to describe the actions that the overweight take to lose weight and to maintain weight loss. However, weight control in the general population may well involve more aspects. Anyone can attempt weight loss, regardless of their weight status. There may also be some overweight individuals who do not try to lose weight, but who actively try to avoid an increase in weight. Finally, some people who have never had a weight problem may take preventive action to avoid becoming overweight.

Data from the United States demonstrate that weight-loss behaviour among adults is common. For example, recent studies have shown that 23-25 per cent of men and 41-44 per cent of women were attempting to lose weight (Horm & Anderson, 1993; Stephenson, Levy, Sass, & McGarvey, 1987; Williamson, Serdula, Anda, Levy, & Byers, 1992), and 16-26 per cent of adults were dieting to lose weight (Jeffery, Adlis, & Forster, 1991; Rand & Kuldau, 1990). Data are available from other countries where obesity is also prevalent, including Canada (Health and Welfare Canada, 1991), Britain (Blaxter, Fenner, & Whichelow, 1987; Gregory, et al., 1990), and the Netherlands (Seidell, Bakx, Deurenberg, Burema, Hautvast, & Huygen, 1986), and these studies also show that a substantial proportion of adults engage in some form of weight-loss behaviour. Many of these studies have also found that weight-loss behaviour is common regardless of weight status (Blaxter, et al., 1987; Forman, Trowbridge, Gentry, Marks, & Hogelin, 1986; Gregory, et al., 1990; Health and Welfare Canada, 1991; Jeffery, et al., 1991; Jeffery, Bjornson-Benson, Rosenthal, Lindquist, Kurth, & Johnson, 1984; Seidell, et al., 1986; Serdula, Williamson, Anda, Levy, Heaton, & Byers, 1994; Stephenson, et al., 1987).

The data regarding weight-maintenance behaviour is less extensive than that for weight loss. However, the Behavioral Risk Factor Surveillance System (BRFSS) in the United States indicates that a significant number of adults engage in such behaviour. Data collected between 1981 and 1983 showed that 10 per cent of men and 20 per cent of women were currently on a diet to lose or maintain weight (Forman, et al., 1986), although it was not possible from this study to distinguish those practising weight maintenance from those attempting weight loss. More detailed data from the 1989 BRFSS showed that, in addition to the 38 per cent of women and 24 per cent of men who were trying to lose weight at the time of the survey, about 28 per cent of men and women were attempting to maintain their current weight or avoid gaining weight (Serdula, et al., 1994; Williamson, et al., 1992).

As I described in Section 2.2.4, much greater emphasis is now being placed on promoting weight maintenance, regardless of current weight status (Dietary Guidelines Advisory Committee, 1995). There are, however, no good data regarding the prevalence and distribution of weight-maintenance behaviours among adults who have not had a weight problem. It seems likely that at least some of those adults in the 1989 BRFSS who were attempting to avoid weight gain may have been practising 'preventive' weight-control behaviour, given that weight maintenance behaviour was common even among those people whose weight was 'below average'. Thirty-six per cent of women and 28 per cent of men whose BMI fell below the 50th percentile were actively attempting to maintain their present weight (Serdula, et al., 1994). It may be, of course, that these people had previously lost weight and were attempting to maintain this loss, although it seems more likely that at least some of them were taking action to avoid becoming overweight.

In considering population weight-control behaviour it may therefore be necessary to extend French and Jeffery's definition to include not only weight loss and weight maintenance, but also 'preventive' weight control. Further, the practise of these behaviours is not restricted to the overweight; even subjects whose weight is below average may take action to control their weight. In addition, weight control involves more than the changes to dietary habits and physical activity patterns recommended by health authorities.

2.3.2 Australian studies of weight control

The data described in the previous section provide an indication of the nature and extent of weight-control behaviour among adults. However, since average BMIs and the prevalence of obesity differs between countries (Australian Institute of Health and Welfare, 1992; Millar & Stephens, 1987; Seidell, 1989), and the relative importance placed body weight and on weight control differs between cultures (Ley, 1979; Schwartz, 1986; Tiggemann & Rothblum, 1988), it is important to focus on those studies which have examined weight control in the Australian population.

There is good evidence that the Australian public is concerned about weight and weight control. Studies have shown, for example, that one in five adults perceived obesity to be the country's major nutritional problem (Crawford, Worsley, & Syrette, 1987), that one in ten adults believed that reducing weight was the single most important step they could take for their health (Crawford & Baghurst, 1990), and that amongst women excess weight was identified as the health problem with which they would most like help (Redman, Hennrikus, Bowman, & Sanson-Fisher, 1988). The fact that there is a thriving weight-loss industry in Australia (Consumer Advocacy and Financial Counselling Association of Victoria (Inc), 1992) confirms that many adults are concerned about weight control.

However, despite excess weight being such a significant problem among adults, a review of the Australian research which has examined community weight perceptions, desired weights, or weight-control practices and beliefs revealed that much of the research has concentrated on adolescents and young women (Crawford & Owen, 1994). In fact, an examination of the relevant literature revealed only twenty Australian studies which have examined these issues among adults. These studies fall into three broad groups. The first comprises studies of university students (Table 2.3), the second includes studies which surveyed the adult population using other 'convenience' samples (Table 2.4), and the final group is made up of studies based on randomly-selected population samples (Table 2.5).

Slightly more than half of all of the Australian studies have been based on university students or other convenience samples, and most of these involved fewer than two hundred subjects. In addition, only a few of the population-based studies provide details of community weight perceptions

and concerns, or weight-control beliefs and behaviours. Furthermore, few studies have examined these issues among men. In considering the Australian data regarding weight perceptions, desired weights, and weight-control beliefs and behaviours, it is therefore important to recognise that much of the information available is based upon small and unrepresentative samples.

Table 2.3. Australian studies of adults' weight perceptions and concerns, and weight-control behaviours and beliefs based on samples of university students.

Study and description of sample	Summary of issues examined
Abraham et al (1983)	
A combined sample of school and university students aged 15-27 years (n=106 females)	Desire to lose weight; perception of body shape; prevalence of weigh-loss behaviour; weight-loss strategies attempted
Tiggemann & Rothblum (1988)	
Undergraduate psychology students; mean age 23 years (n=72 males; 157 females)	Perception of present weight; desired weight; prevalence of past and current dieting; dietary restraint; body consciousness; assessment of weight as social interference; perceived aetiology of obesity; stereotypes about the obese
Tiggemann & Pennington (1990)	
Undergraduate students; mean age 23 years (n=40 males; 52 females)	Ratings of their own figure in relation to nine silhouettes of body figures of different fatness; ratings of their ideal, and the most attractive body figure
Huon et al (1990)	
Undergraduate psychology students (n=40 males; 40 females)	Estimates from photographs of their own ideal female body sizes, that they believed men would prefer, and that they believed women would prefer

Table 2.4. Australian studies of adults' weight perceptions and concerns, and weight-control behaviours and beliefs based on convenience samples.

Study and description of sample	Summary of issues examined
Lord et al (1987)	
Senior public servants and members of parliament attending routine health check-ups in a Sydney hospital 1978-85 (n=267 males)	Perception of present weight; desired weight; perception of overweight as a health risk
Huon et al (1988)	
Adults sampled from two shopping malls and from various offices/sections of a university (n=50 males; 150 females)	Beliefs about how common and how normal a series of eating behaviours and weight concerns are among women
Ben-Tovim & Morton (1989)	
Persons attending an Adelaide shopping centre; one in six invited to participate (n=75 males; 312 females), and a consecutive sample of women attending a General Practice (n=220 females)	Perception of present weight; beliefs about a series of eating and weight-control behaviours
Craig & Truswell (1990)	
Couples announcing their engagements in a Sydney newspaper in 1982 (n=60 males; 60 females)	Perception of present weight; prevalence of weight loss by those perceiving themselves to be overweight, beliefs about weight-loss strategies
Craig & Caterson (1990)	
Friends and relatives of subjects attending a Sydney weight control clinic, but who had no weight problem themselves (n=40 males; 50 females)	Estimates from photographs (distorting camera technique) of own and preferred body sizes, and those representing the most healthy and most attractive body size for their own and the opposite sex
Bunyan & Harvey (1990)	
Selected adults drawn from a rural Queensland town who participated in focus-group research (n=unknown; but a maximum of 32 males and 32 females)	Beliefs about the causes, health risks, and other consequences of obesity; beliefs about the effectiveness of weight-loss strategies and barriers to weight loss
Egger & Mowbray (1993)	
Blue-collar men aged 30-55 years, randomly selected from 5 industrial sites in one region of rural New South Wales who participated in focus-group research (n=86 males)	Beliefs about the prevalence, causes, and health risks of obesity; beliefs about the effectiveness of weight-loss strategies; desire to lose weight and reasons for this; sources of information

Table 2.5. Australian studies of adults' weight perceptions and concerns, and weight-control behaviours and beliefs based on randomly-selected population samples.

Study and description of sample	Summary of issues examined
National Heart Foundation (1981)	
Random sample of residents aged 25-64 years of all capital cities (excluding Canberra and Darwin) drawn from the electoral rolls; response rate=76% (n=2770 males; 2847 females)	Prevalence of current dieting to control weight
National Heart Foundation (1985)	
Random sample of residents aged 25-64 years of all capital cities (excluding Canberra and Darwin) drawn from the electoral rolls; response rate=75% (n=3740 males; 3875 females)	Prevalence describing a weight reduction diet as their 'usual way of eating'
Worsley & Crawford (1985)	
Adelaide residents aged 18 years or more randomly selected from the electoral rolls; response rate=76% (n=339 males; 391 females)	Prevalence of current dieting for slimming purposes
Crawford & Worsley (1987)	
Adelaide and Melbourne residents aged 18 years or more randomly selected from the electoral rolls; response rate=76-78% (n=624 males; 725 females)	Perception of present weight; desired weight
Crawford & Worsley (1988)	
Adelaide women aged 18 years or more randomly selected from the electoral rolls; response rate=62% (n=406 females)	Dieting history; weight-loss strategies attempted in past year; prevalence of current weigh-loss behaviour; reasons for attempting to lose weight; current weight-loss goals; sources of advice; perception of body shape
National Heart Foundation (1990)	
Random sample of residents aged 20-69 years of all capital cities (including Canberra and Darwin) drawn from the electoral rolls; response rate=75% (n=4552 males; 4727 females)	Prevalence describing a weight reduction diet as their 'usual way of eating'

Continued...

Table 2.5. (Continued)

Study and description of sample	Summary of issues examined
Ben-Tovim & Walker (1991)	
Random sample Adelaide households, with one woman aged 15 years or more from each household invited to participate; response rate=70% (n=504 females)	Assessment of body attitudes using the Body Attitudes Questionnaire
Australian Bureau of Statistics (1992)	
Random sample of households in rural and urban areas of all States and Territories, with each person aged 15 years of more in the household invited to participate; response rate=96% (n=56,803)	Prevalence reporting they had changed their diet in the past two years in order to lose or control weight
Paxton et al (1994)	
Random sample of households drawn from high and low socioeconomic areas of Melbourne, with one male and one female aged over 18 years in each household invited to participate; response rate=67% (n=437 males; 502 females)	Perception of present weight, desire to lose weight; prevalence of past, recent (last 12 months) and current weight-loss behaviour; weight-loss strategies attempted in past year and perceived effectiveness of these; beliefs about the health risks of obesity

2.3.3 Weight perceptions and desired weights

More than half of the Australian studies which were reviewed have collected some details of community weight perceptions, weight satisfaction, or desired weights. These show that a significant proportion of adults (more women than men) perceive themselves to be overweight or fat, or to be dissatisfied with their bodies (Craig & Caterson, 1990; Huon, Morris, & Brown, 1990; Tiggemann & Pennington, 1990). A recent population-based study of body attitudes concluded that subjective feelings of fatness are 'predominant' concerns of women, regardless of actual weight status (Ben-Tovim & Walker, 1991). That study did not, however, assess men's body attitudes. While weight concerns and weight dissatisfaction appear to be common in the groups studied, it is difficult to determine the extent of these concerns in the population or the relationship between such concerns and weight-control behaviour.

Several larger studies suggest that as much as half of the population perceive themselves to be overweight. In a survey of women, fewer than one in ten described themselves as overweight (Ben-Tovim & Morton, 1989). However, in a study of university students, half judged themselves to be overweight, even though only one-fifth actually were, and the women were significantly more likely than were men to perceive themselves as overweight (Tiggemann & Rothblum, 1988). Similar findings were reported from a small study of young newly-married couples (Craig & Truswell, 1990), and the results of two much larger and more representative studies of adults confirm these findings. Slightly less than half of the men and approximately 60 per cent of the women surveyed perceived themselves to be overweight (Crawford & Worsely, 1987; Paxton, Sculthorpe, & Gibbons, 1994). Almost one-half of the women whose weight was acceptable, compared to about one-third of the men in the acceptable weight range, described themselves as overweight. Other population-based data showed that, regardless of weight status, more than fifty per cent of the women described their stomach, hips, midriff, waist, thighs and buttocks as too fat (Crawford & Worsely, 1988).

In contrast to weight perceptions, little research has considered whether adults want to reduce their weight. A study of young women found that 94 per cent wished to weigh less, particularly wishing to lose weight from their thighs, bottom and waist (Abraham, Mira, Beumont, Sowerbutts, & Llewellyn-Jones, 1983). Two other small studies of men (Egger & Mowbray, 1993; Lord, Ovedoff, & Webster, 1987), and qualitative work with men and women (Bunyan & Harvey, 1990) also found that significant numbers wanted to weigh less. Research in Melbourne and Adelaide showed that more women than men wanted to lose weight, and that the desire for weight loss increased according to current weight status (Crawford & Worsely, 1987). Other population-representative data showed that two-thirds of the women, compared to just less than half of the men actually wished to lose weight (Paxton, et al., 1994). This study also found that the more overweight a person perceived themselves to be, the greater the desire to lose weight, and that adults who were overweight or obese were most likely to want to lose weight.

2.3.4 Weight-loss behaviours and beliefs

As well as being more concerned with weight and losing weight than are men, women are far more likely to take steps to reduce their weight. A survey of university students found that 59 per cent of the women had ever been on a diet for two weeks, compared to only 24 per cent of the men (Tiggemann & Rothblum, 1988). A population-based survey of adults found that nine per cent of women, compared to three per cent of men, were on a slimming diet at the time of the survey (Worsley & Crawford, 1985).

The Australian Bureau of Statistics estimated that in 1989-90, among adults aged 25 to 64 years, 10 per cent of women, compared to six per cent of men, had changed their diet for weight-related reasons, although these findings refer to a long-term change in food intake rather than short-term dieting behaviour (Australian Bureau of Statistics, 1992). Similar data are available from the National Heart Foundation's Risk Factor Prevalence Study which found that among adults 12 per cent of women, compared to seven per cent of men, had been on a 'weight diet' (National Heart Foundation of Australia, 1982), and seven per cent of women, compared to between two and three per cent of men, reported a 'weight reduction diet' to be their 'usual way of eating' (National Heart Foundation of Australia, 1985; National Heart Foundation of Australia, 1990).

Apart from dieting or dietary change, the studies discussed above provide no information regarding other weight reduction behaviours which may be tried during attempts at weight loss. Although a number of the Australian studies have examined community beliefs about other weight-loss behaviours and about weight loss generally (Ben-Tovim & Morton, 1989; Bunyan & Harvey, 1990; Craig & Truswell, 1990; Egger & Mowbray, 1993; Huon, Brown, & Morris, 1988; Paxton, et al., 1994), relatively few have examined the range of weight-loss behaviours that adults may practise. Several small-scale studies confirm that adults employ a number of different strategies in attempting to lose weight, including some which may be potentially harmful (Abraham, et al., 1983; Bunyan & Harvey, 1990; Craig & Truswell, 1990; Egger & Mowbray, 1993). However, representative data on the prevalence and correlates of these behaviours in the Australian adult population is limited to only two studies (Crawford & Worsely, 1988; Paxton, et al., 1994).

A survey of a randomly selected sample of 400 adult women in Adelaide found that weight-loss behaviour was common (Crawford & Worsely, 1988). In the twelve months preceding the survey, 68 per cent of the women had exercised and 38 per cent had dieted in order to reduce their body weight. Some of the diets which the women had followed were likely to be nutritionally inadequate, and many of the women had also engaged in other potentially harmful weight reduction behaviours including fasting (15 per cent), use of slimming tablets (10 per cent), diuretics (six per cent), laxatives agents (three per cent) and cigarette smoking (four per cent). At the time of the survey 43 per cent of the women were attempting to lose weight.

Weight-loss behaviour was associated with current weight status in the Adelaide study, with 60 per cent of the overweight women, compared to about one-third of the women who were not overweight, attempting to reduce their weight. Among women who were not overweight, those who were trying to lose weight were twice as likely as those not attempting weight loss to perceive themselves as too fat. Generally the weight-loss goals of the women appeared to be consistent with current health recommendations, although some overweight women were attempting to shed weight more quickly than is considered healthy, and about one-third of slim women were attempting to lose weight.

A recent survey of one thousand adults from two socio-economically distinct areas of metropolitan Melbourne provides the only population-based data which has examined both men's and women's weight-loss behaviours in detail (Paxton et al, 1994). Strictly-speaking, this sample was not randomly selected, since the household rather than the individual was the unit of randomisation. Nevertheless, the study provides the most complete data on Australian adults' weight-loss behaviours and related beliefs, confirming that weight-loss behaviours are common. Sixty-eight per cent of those surveyed had ever tried to lose weight, 47 per cent had attempted weight loss in the previous year, and at the time of the survey 24 per cent were trying to lose weight. This survey also confirms that a range of different methods are employed in attempts to achieve weight loss. The methods used over the past year included increasing exercise and eating less (32%), eating less alone (18%), increasing exercise alone (10%), eating a more balanced diet (9%), going on a calorie-controlled diet (8%).

The Melbourne study showed that several socio-demographic variables, as well as weight status, were associated with weight-loss behaviours in the population (Paxton, et al., 1994). Women were more likely than men to have ever tried to lose weight, to have attempted weight loss in the previous year (recent weight-loss), and to be trying to lose weight at the time of the survey. Those who had attempted weight loss recently were more likely to be younger, however age was not associated with current or past weight-loss behaviour. Men and women from the higher socio-economic study area were more likely than those from the lower socio-economic area to have ever attempted weight loss, but socio-economic status was not associated with recent or current behaviour. Overweight and obese subjects were more likely than those whose weight was acceptable or underweight to have ever, or to have recently attempted weight loss.

Although the Melbourne study also examined weight perceptions and desired weights, the relationship between these variables and actual weight-loss behaviour was not reported. However, data relating to dieting beliefs were collected in the Melbourne study, using the Dieting Beliefs Scale (DBS) developed by Stotland and Zuroff (1990), and these beliefs were shown to be associated with weight-loss behaviour (Paxton, pers. comm.). Most subjects believed their weight was under their own control, and that chance or genetic factors and environmental factors were relatively unimportant. However, those people who had recently lost weight were more likely to believe that they had control over weight and to see environmental influences as important, and were less likely to believe in the effects of chance, fate or genetics. Among subjects who were overweight, weight-control beliefs were not found to be strong determinants of recent dieting behaviour.

2.4 Understanding weight-control behaviour

2.4.1 Behavioural epidemiology and the application of theory

The studies reviewed in the previous section demonstrate that a substantial proportion of the population is concerned about weight, that weight-loss behaviours are common, and that a significant number of adults (regardless of weight) may actively try to avoid weight gain. While these studies show

that weight control varies with sex, age, weight status and perception of weight, they provide little insight into the determinants of weight-control behaviours in the whole population. The Australian studies, like much of the population-based research conducted elsewhere (French & Jeffery, 1994), have primarily been concerned with describing the prevalence and distribution of weight-loss behaviours, and are essentially atheoretical.

Treatment-based studies of obesity have shown that a range of behavioural and psychosocial factors predict program completion or weight loss (see for example: Blair, Booth, Lewis, & Wainwright, 1989; Brownell, 1984; Cooke & Meyers, 1980; Forster & Jeffery, 1986; French, Jeffery, Forster, McGovern, Kelder, & Baxter, 1994; Jeffery, et al., 1984; Lavery & Loewy, 1993; Pratt, 1990; Pratt, Gaylord, & McLaughlin, 1992; Schifter & Ajzen, 1985). However, the findings of such studies are unlikely to be applicable to the general population. As I discussed in section 2.1, relatively few overweight individuals are involved in treatment (Brownell, 1993), and there is evidence that people in treatment differ from overweight individuals who do not seek treatment (Brownell & Rodin, 1994a). As a consequence, this research provides little insight into the determinants of weight control in overweight people who do not seek treatment, or in the majority of the population who do not have a significant weight problem. Furthermore, because they are limited to those already attempting weight loss, treatment-based studies do not provide us with an understanding of the factors that influence people to take action to control their weight in the first place.

To develop initiatives which address obesity from a public-health perspective, an understanding of the determinants of weight-control behaviour in the whole population is important (National Institutes of Health Technology Assessment Panel, 1992; Rossi, in press). It has been noted, for example, that:

> Although considerable data have accumulated about the prevalence of dieting in different segments of the population, additional research is needed to identify social psychological factors that contribute to the phenomenon. At present, causal explanations for secular trends in dieting and subgroup differences are highly speculative (French & Jeffery, 1994; p198).

As well as describing the prevalence and sociodemographic distribution of weight-control behaviours, a key element of the behavioural epidemiology

approach I have adopted in this thesis involves better understanding the cognitive determinants of weight control in order to help plan more effective public-health strategies (Raymond, 1989). Therefore, as well as employing epidemiological concepts and methods, behavioural epidemiology draws upon models and theories of behaviour from health psychology, and involves testing these in a population context and applying these findings to the development of public-health interventions. However, in attempting to integrate theories and models of behaviour into a population context, it is important to recognise that many of these have been applied and tested only in clinical or other restrictive contexts, where people are already involved in some form of action to change their behaviours (Jeffery, 1989).

The examination of weight control in a public-health framework, rather than from a clinical perspective, is a new area of research. In attempting to understand weight-control behaviours within this context, it therefore seems logical to apply psychological theories or models which have already been found in population-based research to perform well in predicting health-related behaviours. One recent theoretical advance that has begun to achieve some prominence in public health analyses of health behaviours, and which been identified as potentially useful in understanding weight-control behaviours (Brownell & Wadden, 1992), is the Stage of Change Model[2]. Although only a few studies have used this model to explain weight-control behaviours, it has been extensively used to examine other behaviours that are relevant to the issue of weight control.

As I will describe in the following section, one major advantage of the Stage of Change Model over other theories of behaviour is that it allows us to examine weight control across the whole population, and to classify people in terms of their stage of readiness to change their behaviour. In addition, the model provides a larger structure within which components of other behavioural theories can be integrated. Therefore, as well as allowing us to determine the prevalence of the different stages of change for the behaviour of interest, the model provides an opportunity to examine the role of cognitive factors in distinguishing the various stages. As such, the model is

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[2] The stage of change construct is the core element of the Transtheoretical Model, which is therefore commonly described as the Stage of Change Model. In this thesis I have referred to the model as the Stage of Change (SOC) Model.

likely to be useful in guiding the development of public-health interventions aimed at reducing the prevalence of overweight and obesity.

2.4.2 The Stage of Change Model

The Stage of Change (SOC) Model, proposes that there is a series of specific stages in the acquisition and maintenance of a behaviour (DiClemente, Prochaska, Fairhurst, Velicer, Velasquez, & Rossi, 1991; Prochaska & DiClemente, 1983). The SOC Model focuses on current behaviour as well as future behavioural intentions, and provides a framework which reflects motivational readiness for behaviour change (Abrams, 1993; Marcus, Eaton, Rossi, & Harlow, 1994; Rossi, Rossi, Velicer, & Prochaska, 1995). Under the SOC Model behaviour change is not considered to be an all or nothing phenomenon (Marcus, Selby, Niaura, & Rossi, 1992c), or a state of action versus inaction (Abrams, 1993). From a public-health perspective, this dynamic quality is important, since it allows the targeting of specific segments of the population, the aim being to accelerate movement through the stages of behaviour change toward action (Abrams, 1993).

The concept that there are discrete identifiable stages of change, reflecting varying degrees of readiness to modify behaviour, has been proposed by others (Brownell, Marlatt, Lichtenstein, & Wilson, 1986). However, a distinctive feature of the SOC Model is its recognition of the importance of all stages in the behaviour change process, including the early stages of change (Rossi, et al., 1995). The five stages of behaviour change identified under the SOC Model include: pre-contemplation, in which change is not being considered; contemplation, in which change is considered; preparation, in which an individual takes small steps towards change; action, involving modification of habits; and maintenance, when the change is sustained over time (DiClemente, et al., 1991). Under the SOC Model the change process is viewed as a continuum, with individuals leaving and re-entering at different points (Abrams, 1993).

The SOC Model was initially applied to smoking cessation (DiClemente & Prochaska, 1982), and has been widely used in that domain (Biener & Abrams, 1991; Borland, Owen, Hill, & Schofield, 1991; DiClemente, et al., 1991; Goldberg, Hoffman, Farinha, Marder, Tinson-Mitchem, Burton, et al., 1994; Kristeller, Rossi, Ockene, Goldberg, & Prochaska, 1992; Owen, et al., 1992; Prochaska & DiClemente, 1983; Prochaska, Velicer, DiClemente, &

Fava, 1988; Velicer, DiClemente, Prochaska, & Brandenburg, 1985). However, the Model has also been employed to examine a range of other health behaviours such as quitting cocaine, safe sex, sun screen use, mammography screening, and delinquent behaviour. These include behaviours which are addictive and non-addictive, which differ in terms of their frequency of occurrence, which are legal and illegal, socially-acceptable and unacceptable, and which involve the cessation of negative behaviours as well as the acquisition of positive behaviours (Prochaska, Velicer, Rossi, Goldstein, Marcus, Rakowski, et al., 1994). Since recommendations to control weight stress the importance of changing dietary habits and increasing physical activity, a brief consideration of these studies is warranted.

Many of the studies which have applied the SOC Model to dietary and physical activity behaviours are based on population samples (Booth, Macaskill, Owen, Oldenburg, Marcus, & Bauman, 1993; Curry, Kristal, & Bowen, 1992; Greene, Rossi, Richards-Reed, Willey, & Prochaska, 1994; Laforge, Greene, & Prochaska, 1994; Lee, 1993; Rossi, 1993; Rossi, Greene, Reed, Prochaska, Velicer, & Rossi, 1993; Rossi, Greene, Reed, Rossi, Prochaska, & Velicer, 1994a; Rossi, Greene, Reed, Rossi, Prochaska, & Velicer, 1994b; Rossi, Rossi, Prochaska, & Velicer, 1993) or worksite samples (Emmons, Marcus, Linnan, Rossi, & Abrams, 1994; Glanz, Patterson, Kristal, DiClemente, Heimendinger, & Linnan, 1994; Marcus, Banspach, Lefebvre, Rossi, Carleton, & Abrams, 1992; Marcus, et al., 1994; Marcus, Rakowski, & Rossi, 1992a; Marcus, Rossi, Selby, Niaura, & Abrams, 1992b; Marcus, et al., 1992c; Sporny & Contento, 1995). These studies extend earlier stage of change research, much of which was based on individuals in treatment (eg smoking cessation programs), demonstrating that the Model can be used to examine the distribution of health behaviour change in the general population. However, as well as identifying those who are ready to modify behaviour, a key feature of the Model is its emphasis on examining transitions between the various stages, by integrating components of other theories (Rossi, et al., 1995).

Two theoretical constructs which have been found to be useful in this respect are of self-efficacy and decisional balance. According to self efficacy theory, confidence in the ability to perform a particular behaviour is strongly associated with the actual ability to perform that behaviour (Bandura, 1977). Self efficacy beliefs have been shown to be associated with

the performance of a diverse range of health-related behaviours (O'Leary, 1985; Strecher, McEvoy-DeVellis, Becker, & Rosenstock, 1986), including successful weight loss and completion of weight-loss programs (eg Bernier & Avard, 1986; Clark, Abrams, Niaura, Eaton, & Rossi, 1991; Forster & Jeffery, 1986; Glynn & Ruderman, 1986; Jeffery, et al., 1984; Mitchell & Stuart, 1984; Stotland & Zuroff, 1991). The notion of decisional balance is based on the conflict theory of decision making (Janis & Mann, 1977). Janis and Mann argued that, in making a sound decision, all relevant considerations are entered into a decisional 'balance sheet' where the potential gains (pros) and losses (cons) resulting from the behaviour to the individual and to others are evaluated, along with other factors such as self-esteem and the approval of others.

A number of studies of physical activity and dietary behaviours have shown that, compared to those in the later stages, individuals in the early stages of change had little confidence in their ability to exercise (Booth, Owen, Bauman, & Gore, 1995; Marcus, et al., 1994; Marcus & Owen, 1992; Marcus, et al., 1992c) or to change their diets (Glanz, et al., 1994; Rossi, et al., 1994b; Sporny & Contento, 1995). Other data show that in moving from the precontemplation stage to the action stage, the perceived benefits of the change (the pros) increase, the perceived costs of the change (the cons) decrease, and overall decisional balance (pros-cons) increases (Marcus, et al., 1994; Marcus & Owen, 1992; Marcus, et al., 1992a; Rossi, et al., 1993; Rossi, et al., 1994a; Rossi, Rossi, Prochaska, & Velicer, 1992; Rossi, et al., 1993). These relationships between self efficacy and decisional balance with stage of change for physical activity and dietary behaviours are generally consistent with those observed for other behaviours (DiClemente, et al., 1991; DiClemente, Prochaska, & Gibertini, 1985; Prochaska, et al., 1994; Schorling, 1995).

2.4.3 Application of the SOC Model to weight control

The studies which have used the Stage of Change Model to examine weight-related behaviours have shown that, as well as those actually taking action to lose weight, many individuals were trying to maintain their weight, and many were contemplating taking action. In a sample of college students only 18 per cent were taking action for their weight, however a further 15 per cent were trying to maintain their weight, and just over half were contemplating weight loss (O'Connell & Velicer, 1988). Similarly,

among participants in a smoking cessation study, 51 per cent were taking action for their weight, with 27 per cent attempting to maintain their weight, and another 19 per cent contemplating weight loss (Rossi, et al., 1995). Consistent with the findings of previous research (Prochaska, et al., 1994), the study of college students also found that the perceived costs of behaviour change (cons) were significantly greater than the perceived benefits (pros) for those in the precontemplation stage, while individuals in the action stage showed the greatest imbalance in favour of the pros (O'Connell & Velicer, 1988).

The SOC Model therefore appears to provide a theoretical framework within which to examine weight control using the broader definition proposed earlier, by encompassing both weight-loss and weight-maintenance behaviours (Rossi, et al., 1995). However, the two studies which have applied the SOC Model were concerned with weight-loss behaviour, not with weight-control behaviour. In classifying the college students into one of the stages of change, for example, a minimum weight loss criterion of at least 10 pounds was set (O'Connell & Velicer, 1988). Therefore, individuals classified into the maintenance stage were those who had a minimum 10 pounds weight loss in the past and were successfully taking action to avoid regaining the weight (but with no goal of further weight loss). Individuals who were actively trying to avoid weight gain, but who had not previously lost more than 10 pounds, were not classified into one of the stages of change.

Health authorities are now encouraging people to take steps to maintain their weight, even if they do not have a weight problem. Therefore, in considering weight-control behaviours from a public health perspective, it is important that we have data on population-wide weight-control behaviours, not just on weight-loss among those who already have a weight problem. However, measurement of the stages of change for weight control is potentially problematic in a number of areas. One key issue is that weight control is not a discrete behaviour (Rossi, et al., 1995). Unlike cigarette smoking, the problem to which the SOC Model was initially applied, weight control potentially involves a number of different strategies (French & Jeffery, 1994). It would not be feasible to examine each of the specific strategies employed to control weight. Another potential problem arises from the fact that weight-control includes weight-loss and weight-maintenance behaviours, and can be practised regardless of weight status. It

would not be sensible from a public-health perspective to use a single arbitrary weight standard to define stage of change for weight control and apply this to every individual. To do so would be to ignore that there are many individuals who are not overweight but who actively try to lose or maintain weight.

The challenge is to assess stage of change for the range of behaviours that are employed to control weight across the whole population. In this regard, the application of the SOC Model to weight control poses similar challenges to an examination of dietary behaviour change. In that domain, classifying individuals in terms of their stage of change for each component of the diet is considered to be impractical, and there are also problems in trying to apply a strict criterion to define stage of change (Sporny & Contento, 1995). Several of the studies which have examined dietary fat behaviour have, therefore, used a 'global' measure to define stage of change (Curry, et al., 1992; Glanz, et al., 1994; Rossi, et al., 1993; Sporny & Contento, 1995). For example, in a recent worksite study, individuals were asked to report whether they had deliberately changed the way they eat to reduce the amount of fat and fatty foods (Sporny & Contento, 1995). Subjects were classified into the precontemplation stage if they were not eating a reduced-fat diet and not considering doing so, contemplators were those who were not eating a reduced-fat diet but were considering doing so, subjects in action were those who reported eating a reduced-fat diet for less than two years, and those who had eaten such a diet for more than two years were considered to be in maintenance.

It may therefore be possible to classify subjects in terms of their stage of change for weight control using a similar measure. If so, this would allow us to distinguish those who are not taking any form of action to lose or maintain weight, those who are at least considering taking action, and those who are actively trying to lose weight or to maintain their weight.

2.5 Summary

Although obesity is a significant and growing public-health problem in industrialised countries, and health authorities are concerned with promoting healthy weight control, there is a paucity of data regarding population-wide weight-control behaviours. Much of the previous

research has focussed on weight-loss, with few studies having examined weight maintenance behaviours. Although weight control has been shown to vary with sex, age, weight status and perception of weight, we have little understanding of the determinants of weight-control behaviours. In Australia, the available data are particularly poor. Weight-control behaviours and related beliefs have been examined in a number of mostly small-scale and unrepresentative studies, and in spite of the fact that more men than women are overweight or obese, studies which address men's weight-control behaviours are limited.

In this thesis I use population-based data to examine the distribution of weight-control behaviours, the strategies used to control weight, and men's and women's weight goals. I focus particularly on the application of the Stage of Change (SOC) Model to describe and understand population-wide weight-control behaviours and intentions. I examine the relationship between the stages of change and cognitive factors that have been found to be associated with weight-control behaviour. Previous research has shown that the decision to engage in weight control behaviour is not determined solely by current weight status. An individual's perception of their weight, their belief that weight is influenced by internal, chance or environmental factors, their views on the pros and cons of trying to control their weight, and their confidence in their own ability to successfully control weight, are all potentially important in determining stage of change. I use multivariate modelling techniques to examine the relative importance of body attitudes, weight locus of control, decisional balance and self efficacy in predicting stage of change for weight control.

In the following chapter I describe the cross-sectional and prospective studies which form the centre-piece of this thesis.

CHAPTER 3

METHODS

3.1 Overview of study design

In 1992, the National Heart Foundation's Centre for Social and Preventive Research in Melbourne undertook a cardiovascular risk factor screening study in a rural community (the Rural Risk Factor Prevalence Study). The subjects in that study were randomly selected from the electoral rolls of the Loddon-Campaspe region of the State of Victoria. As part of a collaborative agreement, I had the opportunity to include some questions (described below) which were administered during the 1992 study. In addition, participants were asked whether they would be willing to take part in a follow-up study.

In September 1993 I surveyed those participants who had agreed to be recontacted about a range of issues relating to weight and weight control (the Weight Control Survey). As a part of my survey, respondents were asked for their permission to link the 1993 data I had collected with their 1992 risk factor screening data. (In addition, some questions were included in my 1993 survey on behalf of my collaborators at the National Heart Foundation Centre for Social and Preventive Research). Following-up individuals who had been through a cardiovascular screening, rather than selecting a random sample from the population, offered several potential benefits, as well as some disadvantages. The major advantage was that it allowed the linkage of detailed behavioural information with objective, population-representative biomedical data (particularly measured heights and weights) which, because of the costs involved, could not normally be collected in a study such as this.

In October 1994, I recontacted those subjects who had provided useable data in 1993 and surveyed them about their current weight-control behaviours and intentions, and about their recent actions in relation to their weight (the Weight Control Follow-up). Other information on eating, drinking, smoking and exercise behaviours and intentions (not a part of this thesis) was also collected in the 1994 survey.

In addition to the Weight Control Survey and the Weight Control Follow-up, a small methodological study was conducted on a student population to examine

the reliability and concurrent validity of two measures of stage of change for weight control. The details of that study are presented in Chapter 6.

3.2 The 1992 Rural Risk Factor Prevalence Study

3.2.1 Overview of the study

In 1992, the National Heart Foundation Centre for Social and Preventive Research (later to become the Heart Research Centre) initiated a cardiovascular risk factor screening study of adults in a rural region of the State of Victoria. The major aims of the study were to establish the extent and distribution of major risk factors for cardiovascular disease in a rural region, to identify the most prevalent risk factors among specific target groups, and to investigate attitudes toward behavioural change. Ethical clearance for this study (the Rural Risk Factor Prevalence Study, or RRFPS) was provided by the Australian Institute of Health and Welfare Ethics Committee. All of the data from the RRFPS were collected and processed by the Heart Research Centre. The protocol employed in the RRFPS was essentially the same as that used in the 1989 National Heart Foundation Risk Factor Prevalence Study (National Heart Foundation of Australia, 1990), although some extra questions (described below) relating to health concerns and behavioural intentions were also included in the RRFPS.

3.2.2 Sample selection and survey procedure

The RRFPS was conducted in the Loddon-Campaspe region of Victoria, during the period July-November 1992. This region was chosen essentially for logistic reasons, being only a few hours travel by road from the Heart Research Centre's offices in Melbourne, the capital of Victoria. The Loddon-Campaspe region is in north-central Victoria, covering an area of just under two million hectares, or approximately eight per cent of the land area of the State of Victoria (Australian Bureau of Statistics, 1991). This region is essentially rural, although there are a number of country towns throughout the region, the largest being Bendigo with a population of approximately 30,000 persons. The estimated total population of the Loddon-Campaspe region is just under 170,000 persons, which represents slightly less than four per cent of Victoria's population (Australian Bureau of Statistics, 1991).

A sample of 3185 persons was randomly selected from the federal electoral rolls of twelve of the local government areas that comprise the Loddon-Campaspe region (registration on the electoral rolls is compulsory for all citizens aged 18 years and over). It was necessary to restrict the study to particular areas of the Loddon-Campaspe region for logistic reasons, since it was necessary for participants to attend a clinic as part of the study. However, the local areas were selected so as to be representative of the whole region. Therefore, two densely-settled urban areas, two heavily-populated but essentially rural areas, two circumscribed towns, two shires which surround these towns, two largely rural shires which each include a town of significant size, and two sparsely-populated rural shires were selected.

Subjects received a letter inviting them to attend a clinic for a free check for heart disease risk factors. Six clinic centres throughout the region operated as required during the study. The letter of invitation included a provisional appointment time, and was mailed approximately two weeks before the appointment date. As well as including information on how the subject should prepare for the clinic visit (particularly details of fasting requirements), those invited were asked to inform the clinic whether or not they would attend by telephoning or returning a tear-off sheet. Considerable efforts were made to locate and recruit all potential subjects to the survey. Attempts were made by telephone or by letter to contact subjects who did not respond to the letter of invitation.

At the clinic subjects completed a questionnaire which was checked and coded while the subject was still in the clinic. Upon completion of the questionnaire a nursing sister then took physical and blood pressure measurements and collected a blood sample. Subjects were asked whether they wished the results of their examination and risk assessment to be sent to their own medical practitioner and/or to themselves.

3.2.3 Summary of variables

Weight, height, waist and hip circumferences, and blood pressure were measured in the physical examination. In addition, a blood sample was collected and analysed for total cholesterol, HDL cholesterol and triglycerides. A copy of the RRFPS questionnaire that subjects completed is included in Appendix 2. The questionnaire sought information on subjects' demographic and socio-economic characteristics, medical conditions and treatment, oral

contraceptive use, pregnancy status, alcohol use, and smoking, dietary and exercise behaviours, as well as their beliefs and intentions regarding these behaviours. Questions regarding perception of weight, desired weight, weight-control intentions, and confidence in their own ability to control their weight were included in the RRFPS questionnaire on my behalf (see questions 59-62, Appendix 2), as was a question asking subjects whether they were willing to be re-contacted regarding future studies.

3.2.4 Response rate

Of the 3185 subjects invited by letter to participate in the RRFPS, contact was made with, or reliable information attained about 2936 (92 per cent). However, 218 of these subjects were found to be ineligible, having died, left the area, or were confirmed to be absent during the study period. Of the remaining 2718 subjects, 2158, or 79 per cent of the total, participated in the RRFPS. This response rate is similar to those which have been achieved by the National Heart Foundation for their Risk Factor Prevalence surveys conducted in Australian capital cities (Bennett & Magnus, 1994). Ninety-six per cent of the RRFPS participants indicated they were willing to be re-contacted about future studies.

3.3 The 1993 Weight Control Survey

3.3.1 Questionnaire development

The development of the 1993 Weight Control Survey involved a qualitative phase and a pilot questionnaire. Ethical approval to develop the survey questionnaire and conduct the 1993 Weight Control Survey was obtained from the Australian National University Ethics in Human Experimentation Committee.

<u>Qualitative phase</u>

Semi-structured interviews were conducted with adult men and women to assist with the development of a survey questionnaire. The people who participated in these interviews were recruited from a variety of sources including community service clubs, government departments and other workplaces, social and sporting clubs, and community health centres. Letters and posters which included a contact telephone number were sent to a number

of these organisations seeking assistance with the study and calling for volunteers to participate in a 45-minute interview. Contact sheets seeking the volunteer's name and address and reply-paid envelopes were also distributed to each of the organisations contacted.

Interviews were arranged by telephone with the volunteers, and held at a time and place convenient for them. A total of 16 men and 21 women volunteered to be interviewed. All but three participants gave their written permission to tape-record the interview session; brief notes were made of the discussions held with the three who refused tape recording. An additional 10 men and 32 women who were not available for an interview did complete a questionnaire which included a series of open-ended questions addressing many of the issues that were covered in the interviews. These questionnaires were returned in a pre-paid envelope. While the 79 people who participated in this qualitative phase were in no way representative of the adult population, they came from a range of backgrounds and were therefore likely to have diverse views and experiences regarding weight and weight control.

Several issues were discussed during the interview or included in the questionnaires to encourage the participants to think about their weight and about weight control. These included their beliefs about the causes and consequences of overweight, views about the prevalence of overweight, the perceived benefits of weight control, problems encountered in attempting to lose or control weight, beliefs about the quality of various sources of information on weight control, past weight problems, concerns about body shape, knowledge of appropriate and inappropriate weight-control methods, intentions regarding body weight, and details of current weight-control behaviour, strategies and goals.

Pilot phase

Based on a review of the literature, as well as the findings of the qualitative work described above, a survey questionnaire was developed and administered to a convenience sample of fifteen adults to assess its clarity and comprehensibility. The most common concerns of the respondents related to the length of the questionnaire, as well as to the response scales for some of the questions. As a result of this initial pilot testing, the questionnaire was revised and administered to a second group of ten adults who expressed very few reservations about the instrument.

3.3.2 The survey questionnaire

The final version of the survey questionnaire was produced as a 20-page booklet and was designed to be completed by most subjects in approximately 30 minutes. The questionnaire included the name of the Heart Research Centre on its cover in order to maintain continuity with the RRFPS. A copy of the questionnaire is included in Appendix 3. The variables included in the questionnaire are briefly described below, although not all the data are discussed in this thesis.

Background information (Q.1-Q.13)
Details of sex and age were collected in order to verify that the person responding to the postal questionnaire was the same person who had participated in the 1992 risk factor screening. Questions from the 1992 risk factor screening on marital status, living arrangements, number of children and young adults in the respondent's care, employment status and occupation were repeated, since a respondent's status may have changed since the 1992 study. Subjects were also asked to provide consent for their 1992 risk factor data to be linked to their weight-control survey data.

Physical activity habits (Q.14-Q.17)
Four questions regarding vigorous exercise, less vigorous exercise, walking and vigorous activity patterns over the previous two weeks were repeated from the 1992 risk factor screening. The data derived from these variables are not a part of this thesis.

Shopping, meal preparation and eating style (Q.18)
Four items were included which asked subjects how often they were involved with shopping and meal preparation decisions, and how often they actually undertook these tasks. Eighteen items drawn from the Dutch Eating Behaviours Questionnaire (Van Strein, Frijters, Bergers, & Defares, 1986) were also included in the questionnaire. Like the data on physical activity, the data from these variables are not discussed in this thesis.

Past weight and weight loss (Q.19-Q.33)
Questions were included on highest (non-pregnant) and lowest adult weights, the number of weight fluctuations of more than 6 kilograms, weight-related problems, number of weight-loss attempts, the greatest amount of weight previously lost, and whether they had ever had any problems with their

weight. A series of questions were also included to determine how many times respondents had ever attempted to lose weight, how many times they had tried to lose weight since the 1992 RRFPS, how many weeks they had spent trying to lose weight, how much support they received from various sources while attempting to lose weight, which strategies they had attempted and which they felt were effective, whether they perceived their weight to have changed, how much it had changed by, and whether relatives or friends were also trying to lose or maintain weight.

Weight, and weight perceptions and concerns (Q.34-Q.40, and Q.42-Q.47)
Respondents were asked how often they weighed themselves, their current height and weight (recorded in metric or imperial units), perception of current weight and of overall level of body fatness, level of concern about current weight and body fatness, self-reported ideal weight (recorded in metric or imperial units), confidence in being able to achieve their ideal weight, self-reported maximum weight at which they would not feel overweight, confidence they could avoid gaining too much weight over the next two years, level of concern about a weight gain of 3 kilograms, confidence they could lose 3 kilograms if they were to gain that amount.

Body attitudes (Q.41)
An abbreviated 29-item version of the Body Attitudes Questionnaire (BAQ) (Ben-Tovim & Walker, 1991) was included in the questionnaire. The full 44-item BAQ was developed to assess a range of women's attitudes toward their bodies. Ben-Tovim and Walker (1991) generated an initial item pool of 215-items and administered these to a convenience sample of over 300 women in South Australia, and on the basis of this work the item pool was reduced to 44-items. Ben-Tovim and Walker surveyed 500 women randomly selected from the community, and factor analysed their responses to the 44 item questionnaire. This yielded six interpretable factors which assess feelings of fatness, body disparagement, strength and fitness, salience of weight and shape, attractiveness and lower body fatness. Ben-Tovim and Walker (1991) have shown the internal consistency of the 44-item scale to be good (Cronbach's alpha=0.87), its split-half reliability to be high (Kuder Richardson correlation-coefficient=0.92), and its test-retest reliability to be good (0.83). They also found that the BAQ had good convergent validity with other instruments. The 29 items chosen for inclusion in the present study were those relating particularly to feelings of fatness, since this was an issue raised by many men and women in the qualitative phase.

Weight-control behaviours, intentions and goals (Q.48-Q.75)
Respondents were asked whether they were actively doing things to try to gain weight, avoid gaining weight, to lose weight, or not doing anything for their weight. On the basis of their response to this question, subjects skipped to a particular section of the questionnaire and completed specific questions relevant to their weight-control status on issues such as their weight goals, their reasons for attempting to gain, maintain, or lose weight, and their confidence in achieving their goal.

Dieting beliefs (first sixteen items of Q.76)
A modified version of the 16-item Dieting Beliefs Scale (DBS) which is designed to measure weight locus of control (Stotland & Zuroff, 1990) was included in the questionnaire. In a preliminary study of 100 undergraduate women, principal components analysis of this scale yielded three interpretable factors; one internal and two external (Stotland & Zuroff, 1990). In the same study, the construct validity of the scale was assessed and the scale was shown to have moderate internal consistency (Cronbach's alpha=0.68) and high test-retest reliability (0.81). The DBS has also been administered to a sample of 1,000 Australian men and women, confirming the factor structure of the scale (Paxton, pers. comm.). For the present study, as a result of the pilot testing, the response scale was changed from a 6-point scale (ranging from 0 which represented 'Not at all descriptive of my beliefs' to 5 which represented 'Very descriptive of my beliefs') to a 5-point Likert scale (Strongly disagree; Disagree; Neutral; Agree; Strongly agree). During the pilot phase this format was found to be far more acceptable to subjects.

Benefits and barriers to weight loss (last twenty items of Q.76)
The 20-item Decisional Balance Inventory (DBI) developed by O'Connell and Velicer (1988) to measure the pros and cons of losing weight was included in the study, with minor amendments . The DBI has been used with a sample of 264 undergraduate students where principal components analysis yielded two clear components reflecting the pros and cons of losing weight, with each scale having high internal consistency (Cronbach's alpha>0.84) and the construct validity of the instrument being established (O'Connell & Velicer, 1988). On the basis of the pilot testing of the questionnaire one of the items in the scale was modified for use in the present study. 'I would feel sexier if I lost weight' was altered to read 'I would feel more attractive if I lost weight'. A second item: 'My self-respect would be greater if I lost weight'; was replaced with 'If I

lost weight I would reduce my chance of getting heart disease'. In addition, the 5-point Likert response scale which was used throughout the questionnaire was employed (Strongly disagree; Disagree; Neutral: Agree; Strongly agree). Response scales of this type have been previously used to measure decisional balance among mammography screening subjects (Rakowski, Dube, Marcus, Prochaska, Velicer, & Abrams, 1992), and in a population-based study of physical activity behaviours (Booth, et al., 1995).

3.3.3 Survey procedure

A modified version of Dillman's mail survey technique was used to conduct the 1993 Weight Control Survey (Dillman, 1978; Dillman, 1983; Worsley, 1994). This technique has been successfully employed in several Australian studies which have surveyed various randomly selected population groups about a number of different health and nutrition issues (Baghurst, Crawford, Worsley, Syrette, & Baghurst, 1988; Crawford & Baghurst, 1991; Horwath, 1988; McConaghy, 1989; Worsley & Crawford, 1985a; Worsley & Crawford, 1987). The response rates achieved in these studies have ranged from 60 to 80 per cent.

In September 1993 a cover letter was prepared for each of the 2060 participants in the Rural Risk Factor Prevalence Study who had agreed to participate in follow-up work. This letter was mailed along with a survey questionnaire which included a unique identifier and a pre-addressed, reply-paid envelope. In order to maintain continuity with the RRFPS all correspondence regarding the Weight Control Survey and the Weight Control Follow-up was produced on Heart Research Centre letterhead and signed by the Director of that Centre. The letter briefly explained the purpose of the study, identified the institutions involved in the research (the Australian National University as well as the Heart Research Centre), guaranteed confidentiality and invited subjects to call a toll-free telephone number if they had any questions about the study. A copy of the cover letter is included in Appendix 4.

For ethical reasons I travelled to Melbourne to prepare and mail all of the survey material from the Heart Research Centre's offices. This was necessary because the Heart Research Centre had provided an undertaking to study participants at the time of the 1992 RRFPS that their names and addresses would not be released. Respondents returned the questionnaires directly to the Australian National University. As completed surveys were returned, the

subjects' identification numbers were marked off a mailing list. Subjects who returned blank questionnaires or expressed unwillingness to participate, or were reported as dead or living elsewhere or overseas for an extended period were also marked off the mailing list, with the appropriate details recorded. For those subjects whose questionnaires were returned as undeliverable, their 1992 Rural Risk Factor Survey questionnaires were checked for details of a friend or relative and an effort was made to trace a new address for the subject.

Three weeks after the initial mailing, non-respondents were sent a reminder in the form of a postcard which stressed the importance of their participation to the overall success of the study (refer to Appendix 4). Subjects were asked to call the toll-free telephone number if their questionnaire had been lost or destroyed, so that a replacement could be forwarded to them. A further three weeks later, or six weeks after the initial mailing, the remaining non-respondents received a replacement questionnaire and reply-paid envelope, as well as a letter which again stressed the importance of their participation to the overall outcome of the study (refer to Appendix 4).

3.4 The 1994 Weight Control Follow-up

3.4.1 Questionnaire development

Ethical approval to develop the survey questionnaire and conduct the 1994 Weight Control Follow-up was obtained from the Australian National University Ethics in Human Experimentation Committee. Based on a review of the literature, as well as the experience gained during the development and conduct of the 1993 Weight Control Survey, a questionnaire was developed and administered to a convenience sample of eight adults to assess its clarity and comprehensibility. Minor modifications were made to some sections of the questionnaire based on this pilot testing.

3.4.2 The survey questionnaire

The final version of the survey questionnaire was produced as an 18-page booklet and was designed to be completed by most subjects in approximately 30 minutes. The questionnaire included the name of the Heart Research Centre on its cover in order to maintain continuity with the RRFPS and the Weight-Control Survey. A copy of the first section of the questionnaire which includes

those questions which form a part of this thesis is included in Appendix 5. Details of sex, age, as well as other background details were collected in order to verify that the person responding to the postal questionnaire was the same person who had participated in the 1992 RRFPS and the 1993 Weight Control Survey (see Q.1 - Q.6, Appendix 5). Information was collected about subjects' actions in relation to their weight since the 1993 survey (see Q.7 - Q.10, Appendix 5), and details of the subjects' current weight control behaviours and intentions were gathered using identical questions to those administered in the 1993 Weight Control Survey (see Q.20 - Q.30, Appendix 5). In addition, a series of 17 questions developed in Australia (Dobson, Blijlevens, Alexander, Groce, Heller, Higginbotham, et al., 1993) to assess fat-intake behaviour was included (see Q.31 - Q.47, Appendix 5).

3.4.3 Survey procedure

The survey was administered using essentially the same procedure as that described above for the 1993 Weight Control Survey. Each subject received a personalised letter on Heart Research Centre letterhead (see Appendix 6), a copy of the survey questionnaire and a reply-paid envelope. Three weeks later non-respondents were sent a reminder postcard (see Appendix 6), and after a further three weeks a replacement questionnaire and letter (see Appendix 6) was also sent. When mail was returned as undeliverable, an effort was made to trace a new address for the subject and to contact them.

3.5 Data management

3.5.1 Checking, coding and data entry

As questionnaires were returned during the Weight Control Survey and the Weight Control Follow-up they were checked for completeness. In cases where sections appeared to have been inadvertently missed, those sections of the questionnaire were returned to the subject with a request that the missing section be completed.

All questionnaires were hand-checked for consistency and all questions were coded to facilitate data entry. Open-ended questions regarding occupation and spouse's occupation were coded according to the Australian Standard Classification of Occupations (Australian Bureau of Statistics, 1990), which

incorporates information on the title of the occupation as well as the tasks normally performed into a single 4-digit classification code. Responses to questions in which respondents were asked to report their weight were converted to metric units, recorded to the nearest tenth of a kilogram. For those questions in which respondents were required to record the amount of time they had spent doing things for their weight, or the time they expected to take to reach a weight goal, their responses were recorded in weeks.

The data were entered by a commercial company which had experience dealing with numeric data from large-scale surveys. A program was written which automatically performed a series of range and logical checks on the data as they were entered. In addition, all of the survey questionnaire data were entered twice, either by the same operator on two separate occasions, or by different operators. During the conduct of both surveys any data problems were referred back to me for resolution, and all were dealt with on a single occasion.

3.5.2 Data processing

An SPSS system file (SPSS Inc., 1988) was created which contained the data from the 1993 Weight Control Survey, missing value assignments, value and variable labels, and new computed variables (eg age-group etc). As an initial step, frequencies were tabulated to permit an inspection of the distribution of all of the variables. For cases which had values which were out of range, or which were considered to be high or low, the individual questionnaires and raw data were inspected, and the data file amended as appropriate. In addition, logical checks were performed on groups of variables and, where necessary, the raw data were inspected and appropriately edited.

The identification numbers of those cases who consented to linkage of their 1992 RRFPS data with their 1993 Weight Control Survey data were written to a file. Using this unique identifier Dr Graeme Oliver, who was responsible within the Heart Research Centre for the original processing and management of the 1992 RRFPS data, produced a file containing all of the risk factor screening data for the subjects in the 1992 study, with a 'flag' variable which identified whether a subject had consented to linkage. For ethical reasons the unique identifier of those subjects who had not consented to linkage was deleted from the file (to ensure that individual cases could not be identified). Using this file I linked the 1993 Weight Control Survey data with the 1992

RRFPS data. To ensure that the individuals who completed the 1993 Weight Control Survey were in fact the same individuals who had participated in the 1992 study, the 1992 and 1993 variables relating to sex and age were compared for each individual.

The data from the 1994 Weight Control Follow-up was processed in the same manner as that for the Weight Control Survey. Using a unique identifier the 1994 Weight Control Follow-up data was linked to the data file containing the linked 1992 and 1993 data, and details of sex and age were checked for each individual.

In the following chapter I report on the response to the Weight Control Survey, investigate response bias, examine the socio-demographic profile of the participants and the distribution of body weight in the sample.

CHAPTER 4

THE WEIGHT CONTROL SURVEY: SAMPLE CHARACTERISTICS

4.1 Introduction

In the previous chapter the methodological details of the Rural Risk Factor Prevalence Study, the Weight Control Survey and the Weight Control Follow-up were presented. This chapter examines the response to the 1993 Weight Control Survey and the characteristics of the participants. The response to the Weight Control Follow-up and the characteristics of participants in that survey will be presented and discussed separately in Chapter 8.

4.2 Aims

To describe the response to the Weight Control Survey.

To examine response bias in the survey sample.

To examine the generalisibilty of the survey's findings.

4.3 Methods

The data which are presented in this chapter are derived from the Rural Risk Factor Prevalence Study and the Weight Control Survey, the methodological details of which were described in Chapter 3.

Response bias is examined by comparing the socio-demographic and cardiovascular risk profiles, weight distribution, weight concerns, and weight-control intentions of survey participants with those of non-participants. These data are analysed using the logistic procedure in SPSS (SPSS Inc., 1988).

The generalisibilty of the survey's findings is examined by comparing the socio-demographic profile of the survey participants with relevant census data,

as well as by comparing the distribution of body weight in the sample with relevant national data.

4.4 Results

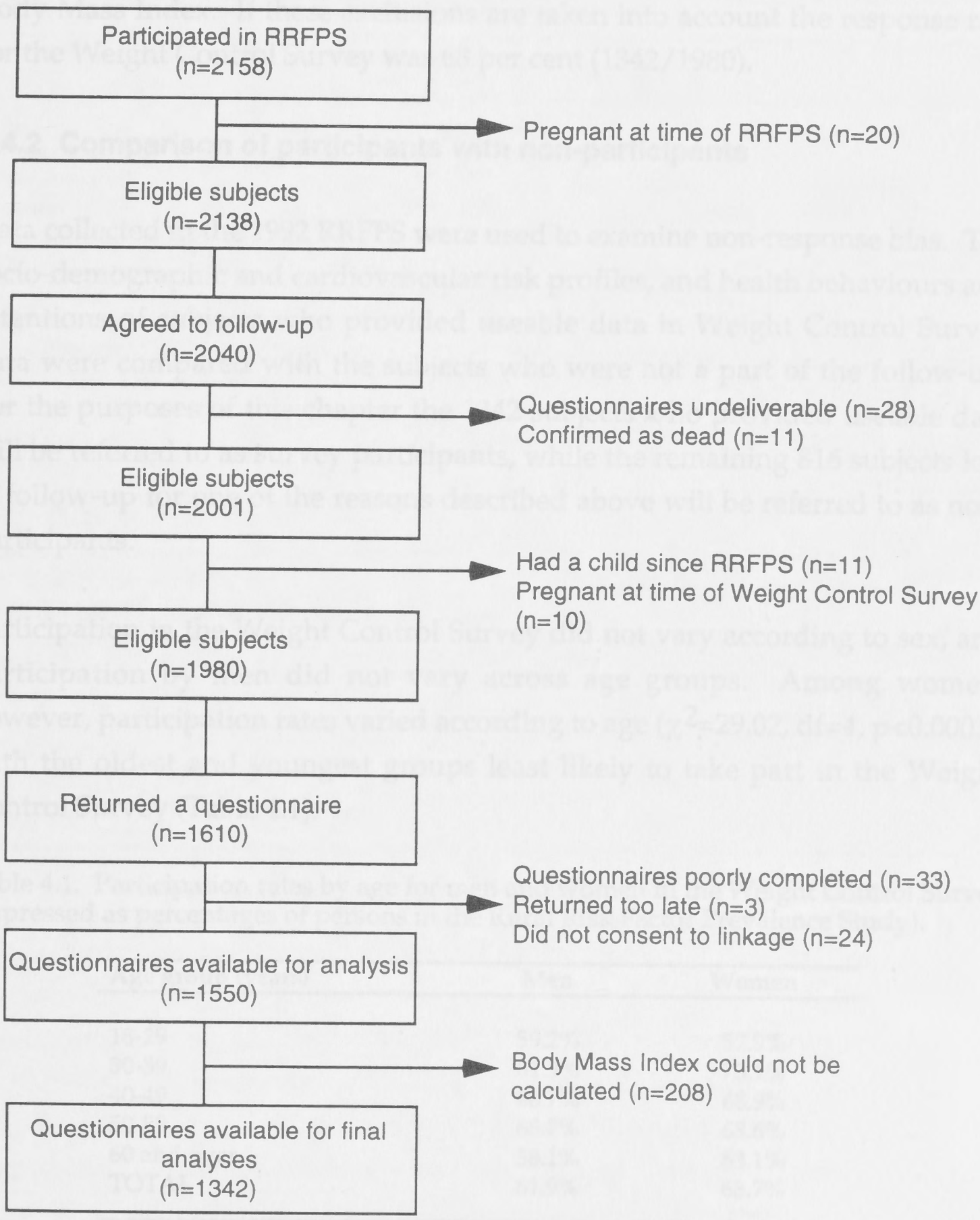
4.4.1 Response to the Weight Control Survey

The response to the Weight Control Survey is summarised in Figure 4.1. This shows that a total of 2158 subjects participated in the Rural Risk Factor Prevalence Study (RRFPS). However, 20 of the participants reported they were pregnant at the time of the study and they were excluded on that basis. Of the 2138 eligible subjects, 2040 agreed to follow-up. However, relatives or friends confirmed that 11 subjects had died, and a further 28 survey questionnaires were returned as undeliverable and a new address could not be traced for the subject. Therefore only 2001 of the 2040 eligible subjects who consented to follow-up were actually available at the time of the Weight Control Survey.

An inspection of the Weight Control Survey questionnaires revealed that 10 women were pregnant at the time of that survey and another 11 had had a child since the RRFPS one year earlier. These 21 women were classified as ineligible for the study, leaving 1980 eligible subjects. Of the remaining 1610 completed or partially-completed Weight Control Survey questionnaires, 33 were considered to be too poorly completed or to lack critical data, 24 were excluded on the grounds that the respondent did not provide consent to allow linkage of their 1992 RRFPS data with their 1993 Weight Control Survey data, and a further three were returned too late to be included in the study.

As a result of these exclusions 1550 respondents were available for analysis. It was not possible, however, to predict Body Mass Index for 208 of these subjects, because of missing data in the 1992 RRFPS or 1993 Weight Control Survey (see Appendix 7). Since Body Mass Index was such an important variable in this study, these cases were also excluded. The analyses which are reported in Chapters 5 and 7 are therefore based on data derived from 1342 subjects.

Figure 4.1. Response to the Weight Control Survey



If the response rate is defined as the proportion of eligible subjects who participate (Armstrong, White, & Saracci, 1992), the Weight Control Survey achieved a response rate of 81 per cent (1610/1980). However, a number of the respondents were excluded from the analyses, mainly due to non-response to particular key survey items, especially those relevant to the estimation of their Body Mass Index. If these exclusions are taken into account the response rate for the Weight Control Survey was 68 per cent (1342/1980).

4.4.2 Comparison of participants with non-participants

Data collected in the 1992 RRFPS were used to examine non-response bias. The socio-demographic and cardiovascular risk profiles, and health behaviours and intentions of subjects who provided useable data in Weight Control Survey data were compared with the subjects who were not a part of the follow-up. For the purposes of this chapter the 1342 subjects who provided useable data will be referred to as survey participants, while the remaining 816 subjects lost to follow-up for one of the reasons described above will be referred to as non-participants.

Participation in the Weight Control Survey did not vary according to sex, and participation by men did not vary across age groups. Among women, however, participation rates varied according to age (χ^2=29.02, df=4, p<0.0001), with the oldest and youngest groups least likely to take part in the Weight Control Survey (Table 4.1).

Table 4.1. Participation rates by age for men and women in the Weight Control Survey (expressed as percentages of persons in the Rural Risk Factor Prevalence Study).

Age group (years)	Men	Women
18-29	59.2%	57.9%
30-39	61.3%	73.1%
40-49	66.7%	68.9%
50-59	66.7%	68.6%
60 and over	58.1%	53.1%
TOTAL	61.9%	63.7%

In order to examine the relationship between other socio-demographic, cardiovascular risk factor, and weight-related variables and the likelihood of participation in the Weight Control Survey, separate logistic regressions were performed which included sex, age, and a sex/age interaction term. After

accounting for age, widowed subjects, those of primary (elementary school) level educational attainment, those who were not employed, and those with personal incomes of $19,000 per annum or less, were less likely to participate in the Weight Control Survey (Table 4.2).

Table 4.2. Adjusted odds ratios[(a)] and 95 per cent confidence intervals for socio-demographic variables significantly related to participation in Weight Control Survey.

Independent variables	Adjusted Odds Ratio	95% C.I..
Marital status *		
Never married	1.00	
Now married	1.12	(0.84 - 1.50)
Separated or divorced	0.79	(0.52 - 1.21)
Widowed	0.55	(0.34 - 0.89)
Level of education ***		
Never attended/primary school	1.00	
Some high school	1.74	(1.30 - 2.34)
Completed high school	2.54	(1.78 - 3.62)
Tertiary	2.82	(1.92 - 4.14)
Occupation *		
Professional	1.00	
Manager/administration/para-professional	1.22	(0.82 - 1.81)
Clerk/sales/personal services	0.88	(0.64 - 1.20)
Trades/labourer/machinery operator	1.12	(0.77 - 1.63)
Not employed (full or part-time)	0.69	(0.50 - 0.93)
Income **		
Less $11,000	1.00	
$11,001-$19,000	0.95	(0.76 - 1.18)
$19,001-$30,000	1.68	(1.26 - 2.24)
Over $30,000	1.57	(1.12 - 2.20)

[(a)]Logistic regressions were performed for each of the variables in turn. Sex and age (18-29 years, 30-39 years, 40-49 years, 50-59 years, 60 years or more) were included in each of the models. Significance levels are indicated thus: $^{+}$ $p<0.05$; * $p<0.01$; ** $p<0.001$; *** $p<0.0001$.

The cardiovascular risk factor variables which were significant predictors of participation are presented in Table 4.3. Subjects defined as hypertensive, and those who had previously been told they had angina were less likely to participate. However, subjects who had ever had their cholesterol measured, those who had previously been told they had high cholesterol, and told they had high triglycerides were more likely to participate in the Weight Control Survey. With regards to their behaviours, those who drank alcohol, engaged in physical activity, in vigorous activity, and subjects who were considering changing their eating habits were more likely to participate.

Table 4.3. Adjusted odds ratios[(a)] and 95 per cent confidence intervals for cardiovascular risk factor variables significantly related to participation in Weight Control Survey.

Independent variables	Adjusted Odds Ratio	95% C.I.
Last cholesterol measure **		
Within last year	1.00	
1-3 years ago	1.02	(0.76 - 1.18)
More than 3 years ago	1.01	(0.70 - 1.45)
Never	0.65	(0.51 - 0.83)
Don't know	0.60	(0.41 - 0.89)
Told have high angina +		
No	1.00	
Yes	0.61	(0.41 - 0.90)
Told have high cholesterol +		
No	1.00	
Yes	1.41	(1.07 - 1.86)
Told have high triglycerides +		
No	1.00	
Yes	2.11	(1.17 - 3.82)
Hypertensive *		
Yes	1.00	
No	1.40	(1.10 - 1.78)
Smoking status **		
Never smoker	1.00	
Ex-smoker	1.02	(0.82 - 1.28)
Current smoker	0.64	(0.51 - 0.80)
Alcohol drinking status *		
Non-drinkers	1.00	
Drinkers	1.38	(1.12 - 1.70)
Engage in physical activity ***		
No	1.00	
Yes	1.93	(1.50 - 2.48)
Engage in vigorous activity ***		
No	1.00	
Yes	1.61	(1.33 - 1.96)
Physical activity behaviour/intentions ***		
No exercise and no intention to start	1.00	
Should exercise but not ready	2.05	(1.37 - 3.07)
Actively thinking how to start exercising	2.55	(1.75 - 3.71)
Taking action to start exercising	2.88	(1.90 - 4.37)
Already exercise regularly	2.41	(1.74 - 3.36)
Don't know	1.21	(0.77 - 1.91)
Diet/eating habits behaviour/intentions +		
No intention of changing	1.00	
Should change but no intention	0.98	(0.67 - 1.45)
Should change and thinking how	1.06	(0.74 - 1.52)
Actively looking at ways of changing diet	1.43	(1.07 - 1.91)
Don't know	1.15	(0.78 - 1.70)

[(a)]Logistic regressions were performed for each of the variables in turn. Sex and age (18-29 years, 30-39 years, 40-49 years, 50-59 years, 60 years or more) were included in each of the models. Significance levels are indicated thus: + $p<0.05$; * $p<0.01$; ** $p<0.001$; *** $p<0.0001$.

Current smokers, and subjects who reported having no intention of taking up exercise or who had never thought about it were less likely to participate in the Weight Control Survey (Table 4.3).

In terms of the weight-related variables, Body Mass Index (BMI), BMI category, and the difference between current weight and self-reported ideal weight were not significant predictors of participation in the Weight Control Survey. Perception of current weight status and weight-control behaviour/intentions were, however, significant predictors of participation (Table 4.4).

Table 4.4. Adjusted odds ratios[(a)] and 95 per cent confidence intervals for weight-related variables significantly related to participation in Weight Control Survey.

Independent variables	Adjusted Odds Ratio	95% C.I.
Weight perceptions **		
Underweight	1.00	
About the right weight	1.17	(0.83 - 1.66)
Overweight	1.37	(0.98 - 1.93)
Very overweight	1.20	(0.80 - 1.82)
Never thought about it	0.31	(0.15 - 0.62)
Weight-control behaviour/intentions **		
Don't need to do anything	1.00	
Should do something, but no intention	0.67	(0.44 - 1.05)
Currently think about how to control weight	1.16	(0.91 - 1.49)
Already doing things for weight	1.45	(1.15 - 1.82)
Other	1.52	(0.82 - 2.84)

[(a)]Logistic regressions were performed for each of the variables in turn. Sex and age (18-29 years, 30-39 years, 40-49 years, 50-59 years, 60 years or more) were included in each of the models. Significance levels are indicated thus: $^{+}$ $p<0.05$; * $p<0.01$; ** $p<0.001$; *** $p<0.0001$.

As Table 4.4 shows, subjects who had never thought about their weight status were less likely to participate, while those who reported they were already doing things for their weight at the time of the RRFPS were more likely to participate in the Weight Control Survey. Overall, four per cent of non-participants, compared to one per cent of participants, had never thought about their weight, and 36 per cent of non-participants, compared to 43 per cent of participants, were doing things for their weight at the time of the RRFPS.

4.4.3 A socio-demographic profile of participants

A socio-demographic profile of the survey participants is presented in Table 4.5. This shows that the sample included participants from all age groups, and across the range of educational backgrounds, and occupational and income groups. A majority of the participants were married at the time of the survey, and almost all were Australian-born.

Table 4.5. Percent distribution of selected socio-demographic characteristics of participants in the Weight Control Survey.

	Men	Women	Total
Age (years)			
18-29	15.2	14.5	14.8
30-39	21.9	21.6	21.8
40-49	21.3	24.9	23.1
50-59	16.5	15.1	15.8
60 and over	25.1	24.0	24.5
Country of birth			
Australian-born	93.2	94.7	94.0
Overseas-born	6.8	5.3	6.0
Marital status			
Never married	15.4	15.7	15.6
Now married	77.5	67.1	72.2
Separated or divorced	4.9	8.8	6.8
Widowed	2.3	8.5	5.4
Education			
Never attended/primary school	11.3	8.1	9.7
Some secondary school	53.8	55.2	54.5
Completed secondary school	20.2	18.3	19.2
Tertiary qualification	14.7	18.3	16.6
Occupation			
Managers/administrators	22.5	8.5	15.3
Professionals	7.1	5.8	6.6
Para-professionals	5.4	3.5	4.4
Trades persons	14.9	1.9	8.2
Clerks	3.5	12.9	8.3
Sales/service workers	4.2	10.1	7.2
Plant operators and drivers	7.8	1.6	4.6
Labourers/related workers	7.3	5.6	6.4
Not currently employed	27.4	50.0	39.0
Personal income (per annum)			
No income	1.4	11.9	6.6
$1-7000	10.3	21.0	15.6
$7001-13000	18.7	28.2	23.4
$13001-19000	14.5	17.5	16.0
$19001-30000	31.2	13.6	22.4
$30001-40000	13.9	4.5	9.2
$40001-50000	5.9	2.3	4.1
Over $50000	4.1	0.9	2.5

Table 4.6 presents a comparison of selected socio-demographic variables between participants in the Weight Control Survey with 1991 census data (Australian Bureau of Statistics, 1991) on the source population and on the Australian population.

Table 4.6. Comparison of the percent distribution[a] of selected demographic variables between participants in the Weight Control Survey with Australian Bureau of Statistics data for the Loddon-Campaspe Statistical Division and the Australian population[b].

	Men			Women		
	Weight Control	Loddon-Campaspe	Australia	Weight Control	Loddon-Campaspe	Australia
Age[c]						
18-29	15	23	27	15	22	26
30-39	22	22	22	22	22	21
40-49	21	19	18	25	18	17
50-59	17	13	13	15	12	12
60 and over	25	22	19	24	26	23
Country of birth[d]						
Australian-born	93	92	77	95	93	78
Overseas-born	7	8	23	5	7	22
Marital status[e]						
Never married	9	14	18	9	9	11
Now married	83	74	70	73	68	65
Separated or divorced	5	9	9	10	10	10
Widowed	2	4	3	9	14	14
Occupation[f]						
Managers/administrators	23	14	11	9	5	4
Professionals	7	7	9	6	6	7
Para-professionals	5	5	5	4	4	4
Trades persons	15	14	14	2	2	2
Clerks	4	3	4	13	10	14
Sales/service workers	4	5	6	10	9	9
Plant operators and drivers	8	7	8	2	2	1
Labourers/related wkrs.	7	8	9	6	4	6
Not currently employed	27	37	33	50	58	54

(a) Percentages rounded to whole numbers. (b) Australian Bureau of Statistics (ABS) data on age, country of birth, marital status and occupation are derived from the 1991 Census of Population and Housing. (c) Percentages calculated for population aged 18 and over. (d) ABS data based on population aged 15 years and over. (e) Data based on population aged 25 years and over. (f) Data based on population aged 20 years and over.

Ideally, the socio-demographic profile of Weight Control Survey participants would be compared with census data for men and women aged 18 years or more living in the Loddon-Campaspe Statistical Division, and with similar data for the Australian population aged 18 years and older. Unfortunately, however, at the level of Statistical Division many of the variables of interest are

aggregated by age group in the census data. It has therefore been necessary to restrict comparisons to particular age ranges, depending on the census data available.

Table 4.6 shows that, in spite of the high proportion of Australian-born participants, they were in fact only slightly over-represented in the survey compared to the source population. However, compared to the population of the Loddon-Campaspe region, more of the survey participants were aged 40 years and over, with men and women aged under 30 years notably under-represented in the survey sample. This is consistent with the finding that participants were also more likely to be married, although it should be noted this comparison has been restricted to persons aged 25 years or more. It is also evident that, compared to the source population, the survey participants were more likely to have been employed at the time of the study, particularly in higher status occupations. Among men, managers and administrators in particular were over-represented in the survey sample, although this finding is not surprising given that this was a rural population and, under the occupational classification scheme used, farmers are classified as managers. For women managers and administrators, and clerks appeared to be over-represented in the sample.

Compared to census data for the Australian population (age-restricted as discussed above), the survey participants were more likely to be older, to be Australian-born, to currently be married, and to be employed in higher status occupations.

4.4.4 Distribution of Body Mass Index among participants

Since it was likely that a person's weight may have changed during the period between the 1992 RRFPS and the 1993 Weight Control Survey, it was considered inappropriate to simply use the RRFPS data on Body Mass Index (BMI) to classify Weight Control Survey participants into BMI categories. Furthermore, while data on self-reported weight were available for participants at the time of the Weight Control Survey, it was likely that a significant number of subjects would be misclassified if their BMI category were calculated on the basis of self-reported weight (see Appendix 7). In order to improve the classification of subjects into BMI categories the RRFPS data were used to develop regression equations to predict actual weight, using self-reported

weight and other variables that were common to the RRFPS and Weight Control Survey. The details of these analyses are included in Appendix 7.

Predicted weight in 1993 and measured height (which was available from the RRFPS) were used to calculate 1993 BMI. It was only possible to calculate a 1993 BMI for 666 men and 676 women and the analyses that follow are restricted this group. The distribution of BMI by age-group and sex is presented in Table 4.7. Mean BMI was higher among men than women, and tended to be higher among older age-groups than younger.

Table 4.7. Body Mass Index (BMI) based on predicted weight in 1993 within sex and age-groups.

	Age (years)					Total
BMI (kg/m^2)	18-29	30-39	40-49	50-59	60 and over	sample
Men						
(n)	(101)	(146)	(142)	(110)	(167)	(666)
Mean	24.4	26.0	26.5	27.0	27.1	26.3
5th centile	19.1	21.2	21.7	21.6	22.2	21.2
Median	24.2	25.6	26.4	26.7	27.1	26.0
95th centile	29.8	31.8	32.6	32.5	32.8	32.4
SE mean	0.31	0.27	0.29	0.31	0.25	0.13
Women						
(n)	(98)	(146)	(168)	(102)	(162)	(676)
Mean	23.7	24.4	26.1	27.3	26.4	25.6
5th centile	17.5	19.1	19.3	20.0	20.1	19.3
Median	22.6	23.5	24.7	26.3	25.2	24.6
95th centile	33.2	33.3	37.8	35.9	37.9	36.0
SE mean	0.42	0.36	0.44	0.51	0.44	0.20

Using the classification scheme which has been adopted by Australian health authorities (National Health and Medical Research Council, 1985) participants were classified as 'underweight', 'acceptable', 'overweight', or 'obese' on the basis of their predicted BMIs. Table 4.8 shows that only about one-third of the men and slightly less than half of the women had a BMI which is considered acceptable. There were proportionally four times as many women as men who were underweight, and slightly more women than men who were obese. Men were, however, more likely than women to be classified as overweight, and overall proportionally more men than women had a BMI higher than that which is considered acceptable.

Younger women were more likely than other women to be underweight, with more than one in ten women aged under 50 so classified (Table 4.8). The

prevalence of overweight and obesity was higher at older ages in men, with the proportion of men overweight or obese rising sharply at 30 years. The proportion of women who were overweight or obese was also higher at older ages, with a sharp increase in the prevalence of obesity at age 40. At all ages there were proportionally more men than women who were overweight or obese (BMI>25 kg/m^2), although obesity (BMI>30 kg/m^2) appears to be more common among women in all age groups except those over 60 years.

Table 4.8. Percent distribution of Body Mass Index (BMI) category in 1993 within sex and age-groups.

	Age (years)					Total
BMI category	**18-29**	**30-39**	**40-49**	**50-59**	**60 and over**	**sample**
Men						
(n)	(101)	(146)	(142)	(110)	(167)	(666)
Underweight	7.9	2.1	1.4	0.9	0.6	2.3
Acceptable	55.4	37.0	31.7	26.4	26.9	34.4
Overweight	32.7	51.4	51.4	54.5	52.1	49.2
Obese	4.0	9.6	15.5	18.2	20.4	14.1
Women						
(n)	(98)	(146)	(168)	(102)	(162)	(676)
Underweight	17.3	11.6	10.7	4.9	3.7	9.3
Acceptable	51.0	56.2	42.3	34.3	43.8	45.7
Overweight	23.5	21.9	24.4	33.3	33.3	27.2
Obese	8.2	10.3	22.6	27.5	19.1	17.8

Logistic regressions were performed separately for men and women to examine the association between socio-demographic variables and the likelihood of being overweight or obese. These analyses showed that for both men and women, after accounting for age, the likelihood of being overweight or obese did not vary by marital status, presence of children in the household, education, occupational status, personal income, or whether the subject lived in town or out of town (in a more rural setting).

Crosstabulations of BMI category by age-group were performed for each sex restricted to the ages 20-69 years to allow comparison with data from the Risk Factor Prevalence Study (National Heart Foundation, 1990). Figures 4.2 and 4.3 present, respectively, the proportion of male and female participants classified as overweight or obese by age group (restricted to the ages 20-69 years) along with comparative data from the 1989 Risk Factor Prevalence Study (National Heart Foundation of Australia, 1990). These show that the age-specific prevalence of overweight and obesity was higher in the Weight Control Survey.

Figure 4.2. The proportion of men in different age groups classified as overweight or obese in the Weight Control Survey and the 1989 Heart Foundation Risk Factor Prevalence Study.

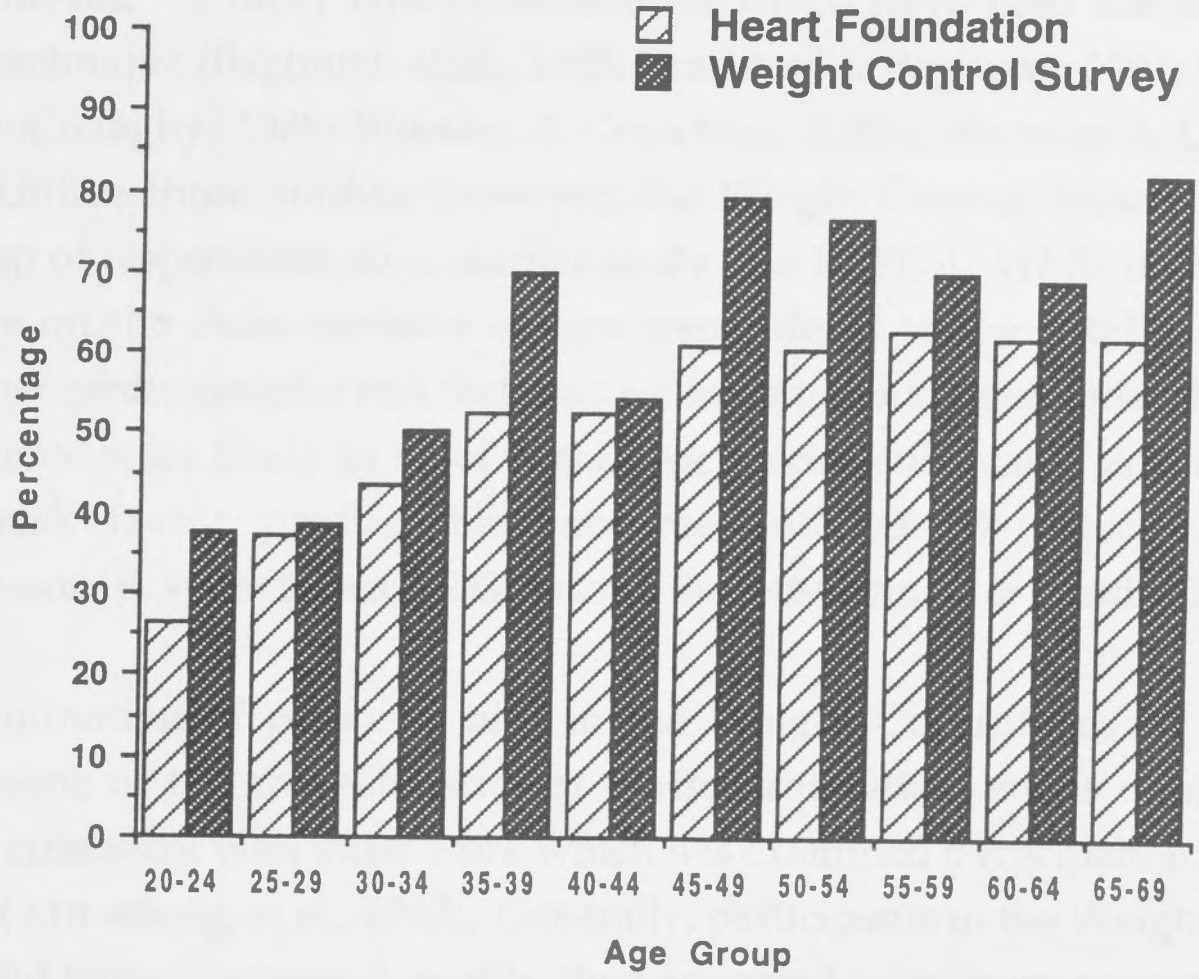
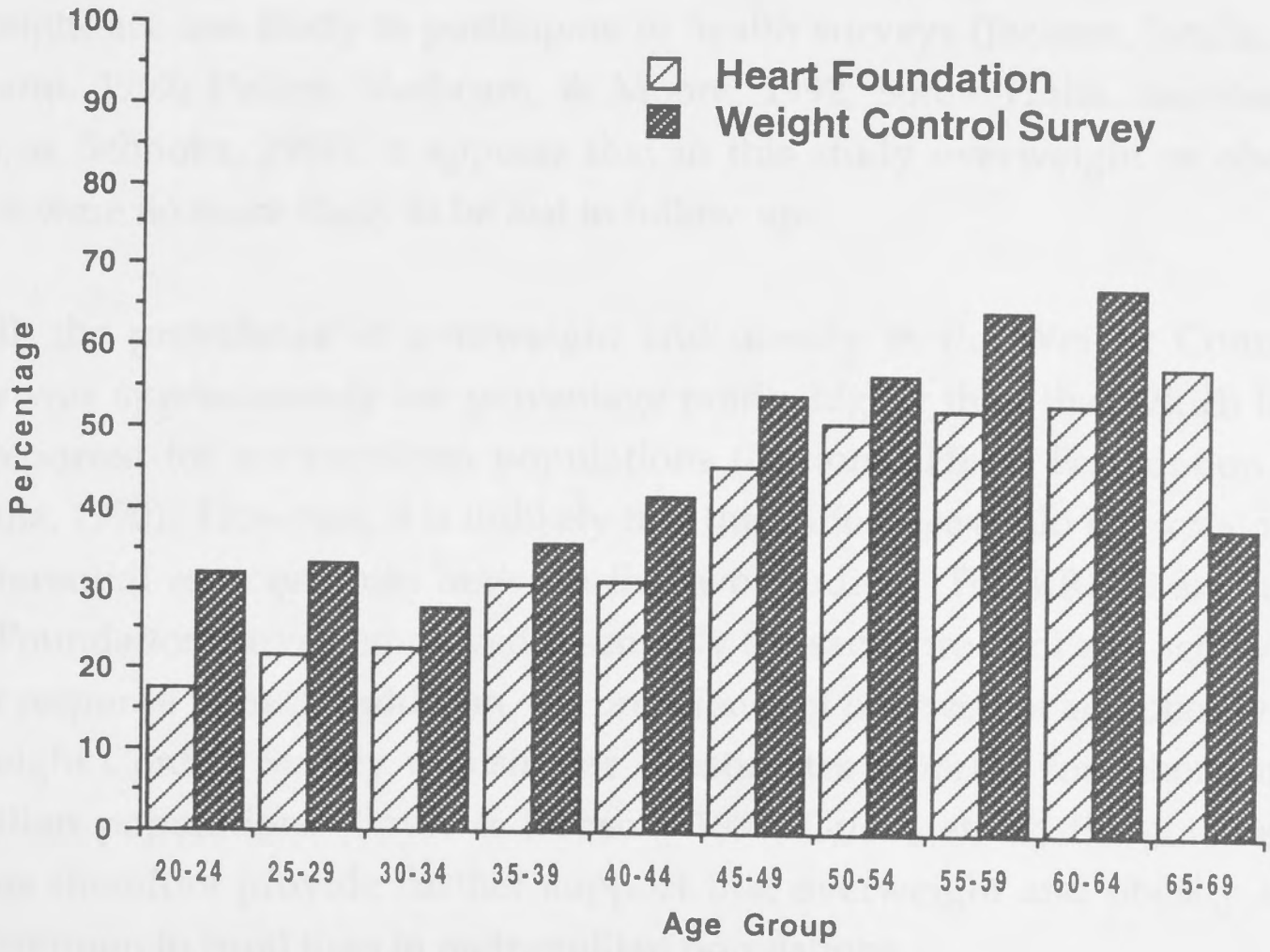


Figure 4.3. The proportion of women in different age groups classified as overweight or obese in the Weight Control Survey and the 1989 Heart Foundation Risk Factor Prevalence Study.



4.5 Discussion

The response rate for the Weight Control Survey is within the range that has been achieved for other Australian studies which have used the same mail survey technique (Baghurst, et al., 1988; Crawford & Baghurst, 1991; Horwath, 1988; McConaghy, 1989; Worsley & Crawford, 1985a; Worsley & Crawford, 1987). Unlike those studies, however, the Weight Control Survey involved follow-up of respondents to an earlier study (the RRFPS). While no data were available on the characteristics of non-respondents to the RRFPS, evidence from other cardiovascular risk factor screening studies suggests that the RRFPS respondents were likely to be of higher socio-economic status and to have a better risk factor profile than non-respondents (Bergstrand, Vedin, Wilhelmsson, & Wilhelmsen, 1993; Criqui, Barrett-Connor, & Austin, 1978).

The examination of response bias in the Weight Control Survey and the comparisons of the characteristics of participants with census data yielded findings consistent with other work which has examined participation in health surveys (Armstrong, et al., 1992). Generally, participants in the Weight Control Survey did have a better risk profile, they appeared to be more concerned with their health, they tended to be older, and were likely to be working in higher status occupations. While survey participants had a more favourable cardiovascular risk profile, the distribution of their BMIs did not differ from that of non-participants. Therefore, although there is evidence that the overweight are less likely to participate in health surveys (Jackson, Jatulis, & Fortmann, 1992; Pullen, Nutbeam, & Moore, 1992; Sonne-Holm, Sorensen, Jensen, & Schnohr, 1989), it appears that in this study overweight or obese subjects were no more likely to be lost to follow-up.

Overall, the prevalence of overweight and obesity in the Weight Control Survey was approximately ten percentage points higher than that which has been reported for metropolitan populations (National Heart Foundation of Australia, 1990). However, it is unlikely that this difference could be explained by differential response bias between the two studies. The RRFPS and the Heart Foundation survey employed essentially the same protocol and achieved similar response rates. In addition, the prevalence of overweight and obesity in the Weight Control Survey was similar to estimates reported for other rural Australian populations (Boyle & Dobson, 1991; Guest, et al., 1993). These findings therefore provide further support that overweight and obesity are more common in rural than in metropolitan populations.

While the response rate for the Weight Control Survey was good, it will be necessary to be cautious in generalising the results of this study to other Australian populations. There were some biases in the socio-demographic profile of the sample, the participants were slightly more likely to be taking some kind of action for their weight or to have thought about their weight, and overweight and obesity were more common in the sample than in other population groups. In spite of these caveats, however, the sample does provide a useful opportunity to examine weight-control behaviours and beliefs among adults from a range of socio-demographic backgrounds, and across the weight spectrum.

CHAPTER 5

THE DESCRIPTIVE EPIDEMIOLOGY OF WEIGHT CONTROL

5.1 Introduction

Although overweight and obesity are recognised as important issues by the Australian public, by commercial interests, and by those interested in health promotion, the review presented in Chapter 2 revealed that relatively little is known about population weight-control behaviours. Most of the studies which have been conducted in Australia have been based on small-scale and unrepresentative samples of women, particularly younger women.

The research which has been conducted suggests that a significant proportion of the population perceive themselves to be overweight and want to weigh less, and although there is some evidence that weight-loss behaviours may be common, the available data, particularly regarding men, are limited. Findings were also presented in Chapter 2 from a recent study in the United States which showed that, in addition to those trying to lose weight, many adults may be attempting to maintain their present weight. To date, this issue has not been examined in the Australian population. However, data on population weight-maintenance behaviours is important, given that there is a growing recognition of the need to prevent weight gain as an essential first step toward the reduction of overweight and obesity in the population.

I have argued that in order to develop a more effective public-health response to overweight and obesity, it is necessary to have detailed population-representative data regarding the nature, extent and distribution of weight-control behaviours. This chapter therefore examines the prevalence and socio-demographic distribution of weight-control behaviours and intentions, of specific weight-control strategies, and of the weight goals of the subjects in the Weight Control Survey.

5.2 Aims

To determine the prevalence of weight-control behaviours, and to examine their socio-demographic distribution, and their association with weight status.

To describe subjects' reasons for attempting to lose weight and maintain their weight (avoid weight gain).

To describe the specific strategies employed to lose weight and to maintain weight, and examine their association with weight status.

To determine the prevalence of behavioural intentions regarding weight control.

To determine the weight goals of the sample, and examine their socio-demographic distribution.

5.3 Methods

The data presented in this chapter are derived from the Weight Control Survey, the methodological details of which were described in Chapters 3 and 4. Since the primary purpose of this chapter is to describe weight-control behaviours, intentions and weight goals in the Weight Control Survey sample, descriptive statistics (eg frequency counts, crosstabulations, etc) are mainly used. The data were analysed using SPSS (SPSS Inc., 1988).

5.4 Results

5.4.1 Weight-control behaviours

Past weight-loss behaviour

Table 5.1 shows that slightly over half of the subjects reported they had ever tried to lose weight, and approximately one-third had attempted weight loss during the past year (recent weight-loss). Proportionally more women than men had ever tried to lose weight, and women were also more likely than men to have attempted weight-loss over the previous year . The proportion of men who had ever or recently tried to lose weight did not vary with age. Among

women, however, those aged sixty years or more were significantly less likely to have ever tried to lose weight, or to have tried in the past year. Past weight-loss behaviour was significantly associated with BMI category for both sexes. The proportion of subjects who had attempted weight loss increased with BMI category, with slightly more than one quarter of all the men classified as overweight or obese at the time of the Weight Control Survey having attempted weight loss during the past year, compared with almost two-thirds of women who were overweight or obese.

Table 5.1. Percent distribution of past and recent weight-loss behaviour within sex, age group, and BMI category.

	(n)	Have ever attempted weight loss	P value*	Have attempted weight loss in the past year	P value*
Total sample**	(1317)	55.4	-	37.1	-
Sex					
Men	(653)	40.1		23.3	
Women	(664)	70.5	<0.0001	50.6	<0.0001
Age group - men					
18-29	(101)	33.7		23.8	
30-39	(142)	50.0		28.2	
40-49	(141)	38.3		23.4	
50-50	(109)	37.6		21.1	
60 and over	(160)	38.8	0.09	20.0	0.5
Age group - women					
18-29	(98)	76.5		61.2	
30-39	(146)	74.7		50.7	
40-49	(168)	75.0		52.4	
50-50	(100)	75.0		58.0	
60 and over	(152)	54.6	<0.0001	36.8	0.001
BMI category - men					
Underweight	(15)	6.7		0.0	
Acceptable	(224)	18.8		10.7	
Overweight	(324)	47.5		26.9	
Obese	(90)	72.2	<0.0001	45.6	<0.0001
BMI category - women					
Underweight	(63)	33.3		14.3	
Acceptable	(306)	62.4		42.2	
Overweight	(177)	83.1		63.3	
Obese	(118)	92.4	<0.0001	72.9	<0.0001

*χ^2 test of significance; **A small number of cases had missing data for these variables.

Among the subjects who had tried weight loss over the past year, women reported making more attempts than men. Of those who had recently tried to lose weight, 66.7 per cent of men, compared to 51.7 per cent of women had

tried only once, 19.5 per cent of men and 30.6 per cent of women had tried twice, and 13.8 per cent of men and 17.7 per cent of women had tried three or more times (χ^2=8.01, df=2, p=0.02). However, among men and women who had tried to lose weight, there was no significant difference in the total amount of time they had invested in this effort over the past year. Thirty-four per cent (34.4%) of those who attempted weight loss estimated they had spent 1-6 weeks trying, 34.5 per cent had tried for 7-20 weeks, and 30.1 per cent for more than 20 weeks. The amount of time men spent trying to lose weight did not vary according to BMI category. Among women, however, proportionally more of those classified as overweight or obese (38.8%), than those who were acceptable or underweight (20.8%), had spent more than 20 weeks over the past year trying to lose weight (χ^2=9.16, df=2, p=0.01).

Current weight-control behaviour

Approximately one in five subjects were attempting to lose weight at the time of the survey, with a slightly greater proportion actively trying to avoid weight gain. Relatively few men or women reported they were trying to gain weight, and just over half of the subjects reported doing nothing in particular for their weight (Table 5.2). Proportionally more men than women reported doing nothing in particular for their weight, while the women were more likely to be trying to lose weight. Current weight-control behaviour varied with age among men and women. There was a tendency for more men in the younger age groups to be trying to lose weight, with older men, particularly those 60 years and over, more likely to be trying to maintain their current weight. Among women, the relationship between weight-control behaviour and age was more complex, although it is clear that proportionally more women aged under 30 were doing something for their weight. Weight-control behaviour was also significantly associated with BMI category for both sexes. The proportion of subjects who were trying to do something for their weight (maintain weight or lose weight) increased with BMI category.

In order to examine the association between socio-demographic variables and the likelihood of taking action to maintain or lose weight (compared to doing nothing for weight), logistic regressions which included BMI category were performed separately for men and women for each of the variables in turn. After accounting for BMI, the likelihood of taking action for weight among men did not vary by age, marital status, presence of children in the household, education, occupational status, personal income, or whether the subject lived in town or out of town. The results for the women were similar, except that the

women aged 60 years and over were significantly less likely than other women to be trying to maintain or lose weight at the time of the survey (Odds ratio=0.57, 95% CI=0.34-0.96).

Table 5.2. Percent distribution of current weight-control behaviour within sex, age group, and BMI category.

		Current weight-control behaviour				P value*
	(n)	Trying to gain	Doing nothing	Trying to maintain	Trying to lose	
Total sample**	(1340)	1.8	55.6	22.2	20.4	-
Sex						
Men	(666)	2.7	67.6	18.5	11.3	
Women	(674)	0.9	43.8	26.0	29.4	<0.0001
Age group - men						
18-29	(101)	8.9	62.4	12.9	15.8	
30-39	(141)	2.7	71.9	14.4	11.0	
40-49	(137)	2.1	68.3	16.2	13.4	
50-50	(107)	0.9	70.9	19.1	9.1	
60 and over	(155)	0.6	64.1	26.9	8.4	0.0007
Age group - women						
18-29	(95)	0.0	37.8	24.5	37.8	
30-39	(142)	0.0	50.0	16.4	33.6	
40-49	(167)	1.2	44.6	26.8	27.4	
50-50	(96)	0.0	36.6	29.7	33.7	
60 and over	(145)	2.5	45.3	32.3	19.9	0.005
BMI category - men						
Underweight	(15)	13.3	86.7	0.0	0.0	
Acceptable	(224)	5.7	77.3	13.1	3.9	
Overweight	(316)	0.9	62.5	21.6	14.9	
Obese	(86)	0.0	58.5	23.4	18.1	<0.0001
BMI category - women						
Underweight	(62)	7.9	69.8	14.3	7.9	
Acceptable	(299)	0.3	46.1	28.9	24.7	
Overweight	(169)	0.0	34.8	26.6	38.6	
Obese	(115)	0.0	37.8	23.5	38.7	<0.0001

*χ^2 test of significance; **Two cases had missing data for this variable.

Among the subjects who were actively trying to avoid weight gain (to maintain their weight) at the time of the Weight Control Survey, a substantial number had not tried to lose weight over the past year (70.1% of the men and 53.9% of the women). In fact, 44.4 per cent of the men and 28.1 per cent of the women who were trying to maintain their weight reported they had never tried to lose weight. If the subjects who were trying to maintain their weight were divided into two groups on the basis of whether they had ever tried to lose weight, 14.1 per cent of the total sample would be classified as trying maintain their present

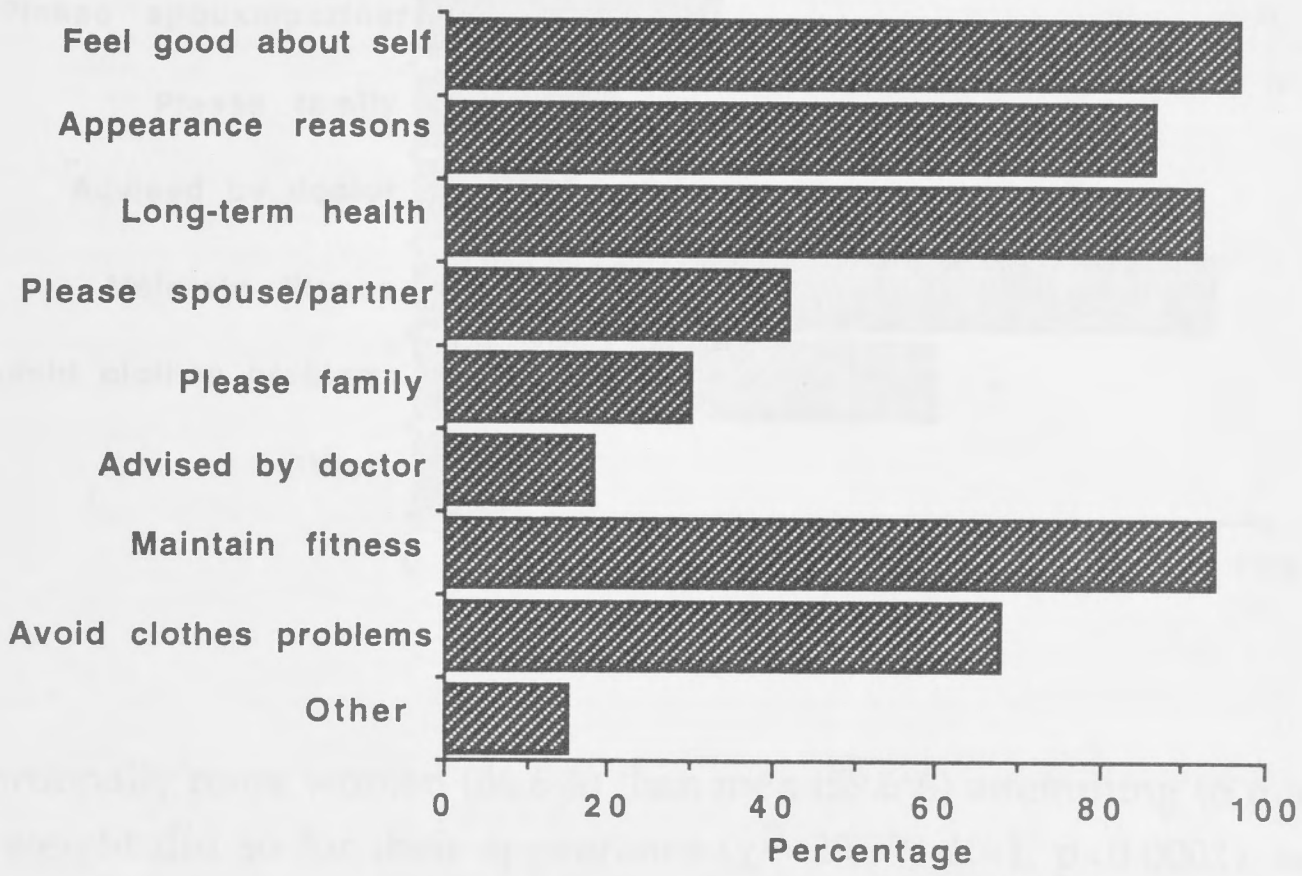
weight having attempted weight loss at some time in the past, and 7.5 per cent would be classified as trying to maintain their present weight having never attempted weight loss (one per cent could not be classified due to missing data). Due to the relatively small number of subjects trying to maintain their weight having never tried to lose weight, they were not distinguished as a separate group in subsequent analyses.

5.4.2 Reasons for attempting weight control

Reasons for trying to lose weight

Among those who were attempting to lose weight at the time of the Weight Control Survey, the reason most commonly cited was to feel good, with fitness and long-term health also important (Figure 5.1).

Figure 5.1. The reasons nominated by subjects for attempting to lose weight.



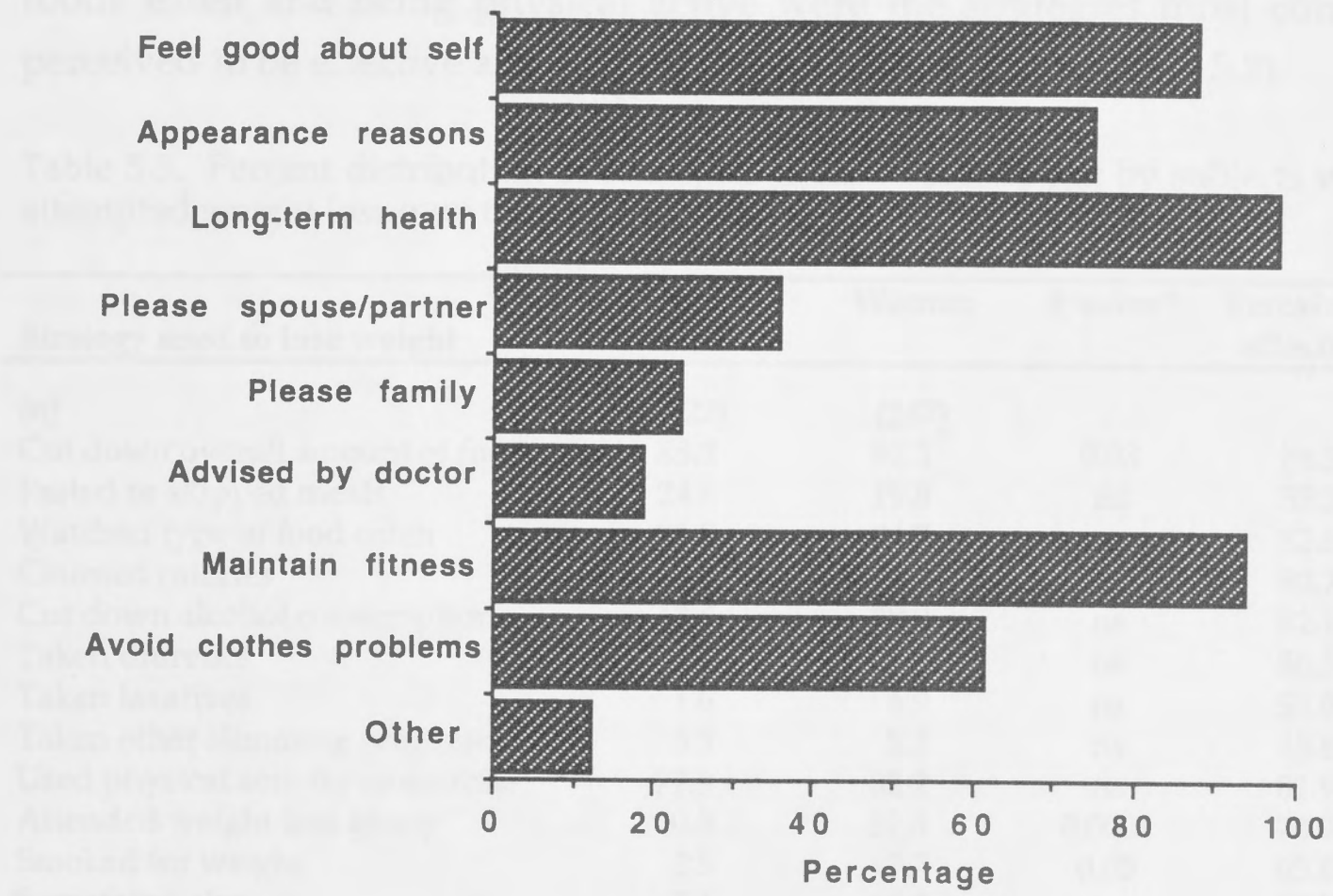
Proportionally more of the women (91.1%) than the men (73.1%) cited appearance as a reason for trying to lose weight (χ^2=13.29, df=1, p=0.0003), and more women (75.6%) than men (47.8%) cited problems with clothes as a reason (χ^2=17.34, df=1, p=0.0003). Men were significantly more likely than women (55.2% versus 36.7%; χ^2=6.92, df=1, p=0.009) to report they were trying to lose weight to please their spouse or partner. Proportionally more of the

overweight or obese women (21.5%) than non-overweight women (9.6%) were attempting to lose weight because they had been advised to by their doctor (χ^2=4.43, df=1, p=0.04). There were no differences between overweight/obese and non-overweight men.

Reasons for trying to maintain weight

More than 90 per cent of the subjects who were trying to maintain their present weight nominated long-term health and fitness as reasons for taking action (Figure 5.2).

Figure 5.2. The reasons nominated by subjects for attempting to maintain weight.



Proportionally more women (84.6%) than men (59.6%) attempting to maintain their weight did so for their appearance (χ^2=20.59, df=1, p<0.0001), so they would not have problems with clothes (75.6% versus 40.4%; χ^2=32.77, df=1, p<0.0001), and to feel good about themselves (94.2% versus 76.9%; χ^2=16.87, df=1, p<0.0001). Proportionally more of the overweight or obese subjects than the non-overweight subjects cited doctor's advice as a reason for taking action to maintain their weight (29.5% versus 7.7% among men; χ^2=5.07, df=1, p<0.02; 30.9% versus 2.3% among women; χ^2=24.98, df=1, p<0.0001).

5.4.3 Weight-control strategies

Weight-loss strategies used over the past year

Among subjects who had recently attempted to lose weight (over the past year), the strategies employed most commonly were to watch the type of foods eaten, to reduce the overall amount of food consumed, and to exercise (Table 5.3). There were no significant differences in the proportions of men and women who used the various weight-loss strategies, except that men were slightly less likely than women to have reduced food intake or to have smoked for weight-loss, and much less likely to have attended a weight-loss group. For those strategies they had used, respondents were also asked to report whether they felt it had worked for them. Reducing alcohol intake, watching the type of foods eaten and being physical active were the strategies most commonly perceived to be effective among those who had tried them (Table 5.3).

Table 5.3. Percent distribution of strategies used to lose weight by subjects who had attempted weight loss over the past year within sex.

Strategy used to lose weight	Men	Women	P value*	Perceived as effective**
(n)	(122)	(247)		
Cut down overall amount of food	85.2	92.3	0.03	74.5
Fasted or skipped meals	24.6	19.8	ns	55.3
Watched type of food eaten	91.0	94.7	ns	82.6
Counted calories	23.8	24.3	ns	80.7
Cut down alcohol consumption	42.6	38.9	ns	82.9
Taken diuretics	4.1	7.7	ns	56.5
Taken laxatives	1.6	4.9	ns	53.8
Taken other slimming preparations	3.3	5.3	ns	43.8
Used physical activity or exercise	77.9	82.2	ns	81.9
Attended weight loss group	0.8	17.8	0.0001	70.5
Smoked for weight	2.5	7.7	0.05	63.6
Something else	7.4	10.9	ns	85.7

*χ^2 test of significance, ns indicates difference not significant ($p>0.05$); **Perceived as effective by those who used it.

Among the women who had tried to lose weight over the past year, proportionally more of those who were overweight or obese than those who were not overweight had tried to cut down on the amount of food consumed (97.1% versus 86.1%; $\chi^2=10.38$, df=1, $p=0.001$), to have attended a weight-loss group (25.2% versus 8.3%; $\chi^2=11.78$, df=1, $p=0.0006$), or to have taken diuretics or fluid pills (10.8% versus 3.7%; $\chi^2=4.30$, df=1, $p=0.04$). Men who were overweight or obese were more likely than other men to report they had fasted

or skipped meals during the past year to assist with weight loss (28.3% versus 8.7%; χ^2=3.86, df=1, p=0.05).

Weight-loss strategies currently used

The strategies employed most commonly by subjects who were trying to lose weight were those recommended by health authorities: watching the types of foods eaten, reducing food intake, exercising or being physically active, and reducing alcohol intake (Table 5.4). Men were more likely than women to reduce their alcohol intake as a means of losing weight, while women were more likely to report they had cut down on the amount of foods they ate, and to have attended a weight-loss group. Proportionally more of the men who were overweight or obese, than men who were not overweight reported they watched the amount of foods they ate to help them lose weight (89.1% versus 55.6%; χ^2=6.59, df=1, p=0.01). Among the women, only those who were overweight or obese used diuretics to assist with weight loss.

Table 5.4. Percent distribution of strategies being used to lose weight within sex.

Strategy used to lose weight	Men	Women	P value*	Total
(n)	(64)	(170)		(234)
Cutting down amount of food	84.4	94.1	0.02	91.5
Fasting or skipping meals	12.5	8.2	ns	9.4
Watching type of food eaten	90.6	94.7	ns	93.6
Counting calories	14.1	24.1	ns	21.4
Cutting down alcohol consumption	46.9	32.4	0.04	36.3
Taking diuretics	3.1	4.1	ns	3.8
Taking laxatives	0.0	1.8	ns	1.3
Taking other slimming preparations	1.6	2.4	ns	2.1
Using physical activity or exercise	89.1	88.8	ns	88.9
Attending weight loss group	0.0	9.4	0.01	6.8
Smoking for weight	1.6	5.3	ns	4.3
Doing something else	21.9	31.2	ns	28.6

*χ^2 test of significance, ns indicates difference not significant (p>0.05).

Most subjects attempting weight loss used a variety of different strategies. Only one per cent employed a single weight-loss strategy, 11.1 per cent used two, 39.3 per cent used three, and 48.3 per cent employed four or more different strategies to lose weight. The number of strategies used did not vary by sex or by BMI category. Men and women, and overweight or obese and non-overweight subjects were equally likely to have used at least one 'less desirable' strategy (laxatives, diuretics, slimming preparations, or smoking) to lose

weight. Overall, 8.5 per cent of subjects used only one of these, with 1.3 per cent trying more than one of these less desirable strategies to lose weight.

Weight-maintenance strategies currently used

The strategies commonly used to help maintain weight were similar to those used by subjects trying to lose weight. Women were more likely than men to report they had reduced their food intake, and that they watched the type of foods they ate (Table 5.5). Proportionally more of the overweight and obese women, than the women who were not overweight reported they watched the amount of foods they ate (98.3% versus 83.3%; χ^2=4.24, df=1, p=0.004). Among the men, those who were not overweight or obese were more likely than those who were to use physical activity to maintain their weight (96.6% versus 80.2%; χ^2=6.59, df=1, p=0.04).

Table 5.5. Percent distribution of strategies being used to avoid weight gain within sex.

Strategy used to avoid weight gain	Men	Women	P value*	Total
(n)	(110)	(137)		(247)
Cutting down amount of food	80.0	89.8	0.03	85.4
Fasting or skipping meals	8.2	8.8	ns	8.5
Watching type of food eaten	79.1	94.2	0.0004	87.4
Counting calories	8.2	9.5	ns	8.9
Cutting down alcohol consumption	40.0	34.3	ns	36.8
Taking diuretics	5.5	4.4	ns	4.9
Taking laxatives	2.7	1.5	ns	2.0
Taking other slimming preparations	0.9	0.7	ns	0.8
Using physical activity or exercise	84.5	78.1	ns	81.0
Attending weight loss group	0.9	4.4	ns	2.8
Smoking for weight	4.5	7.3	ns	6.1
Doing something else	19.1	19.7	ns	19.4

*χ^2 test of significance, ns indicates difference not significant (p>0.05).

Seven per cent of subjects used only one of the strategies listed in the questionnaire to maintain their weight, 13.8% used two, 40.9% used three, and 38.5% employed four or more. There was no difference in the number of strategies used to maintain weight by men and women. Proportionally more of the women who were overweight or obese, than women who were not overweight used four or more different strategies to maintain their weight (50.8% versus 30.8%; χ^2=5.67, df=1, p=0.02). The likelihood of using one of the less desirable strategies (laxatives, diuretics, slimming preparations, or smoking) to maintain weight did not vary by sex or by BMI category. One in

ten subjects used one of these strategies, and only one per cent used at least two of the less desirable strategies to maintain their current weight.

5.4.4 Weight-control intentions and weight goals

Weight-control intentions

Subjects who were not doing anything in particular for their weight, and those attempting to avoid weight gain (maintain their weight) at the time of the Weight Control Survey were asked about their weight-control intentions over the following year. About half of the subjects who were not doing anything for their weight intended to do something about it over the next twelve months (Table 5.6). Among subjects who were actively attempting to maintain their weight, two in three planned to try to lose weight in the following twelve months (Table 5.6). In both groups, significantly fewer men than women intended to do something for their weight.

Table 5.6. Percent distribution of weight-control intentions among subjects currently doing nothing for their weight and subjects currently trying to maintain their weight within sex.

Weight-control intentions over next 12 months	Men	Women	P value*
Subjects currently doing nothing			
(n)	(442)	(293)	
No intention of doing anything	58.8	39.2	
Should avoid weight gain	14.7	14.7	
Thinking how to avoid weight gain	5.2	10.2	
Should lose weight	15.2	19.5	
Thinking how to lose weight	6.1	16.4	<0.0001
Subjects currently trying to maintain			
(n)	(118)	(167)	
No intention of losing weight	36.4	30.5	
Should lose weight	45.8	37.7	
Thinking how to lose weight	17.8	31.7	0.03

*χ^2 test of significance.

Among the subjects who were not doing anything for their weight, those who were overweight or obese were more likely than others to intend to do something (versus nothing) in the next year (57.6% versus 18.7% among men; χ^2=67.51, df=1, p<0.0001; and 88.1% versus 44.6% among women; χ^2=54.34, df=1, p<0.0001). Similarly, among those trying to maintain their weight, overweight or obese subjects were significantly more likely than others to intend to lose weight, than to not intend to (74.2% versus 31.0% among men;

χ^2=17.56, df=1, p<0.0001; and 90.1% versus 54.2% among women; χ^2=24.90, df=1, p<0.0001).

Weight goals over the following year

Subjects who were attempting to gain weight were asked to report how much they wanted to gain over the next year, and those who believed they should lose weight, who were thinking about how to lose weight, or who were currently attempting to lose weight were asked about their weight-loss goals over the next year. Among those who were attempting to, or who intended to alter their weight, only three per cent (3.3%) wanted to gain weight, with weight-gain goals ranging between two and 12.7 kilograms. Just over one in four subjects (27.8%) who wished to change their weight wanted to lose less than five kilograms, 45.2 per cent wanted to shed between five and ten kilograms, and 23.7 per cent wished to reduce their current weight by more than ten kilograms.

These weight goals were used to adjust current weight to calculate a 'BMI goal' for all subjects (for those who wished to alter their weight and those who had no intention of losing or gaining weight). For subjects who wished to lose or gain weight their goal weight was determined by adjusting their current weight by the amount they wish to change. For subjects who did not intend to do anything over the next year or intended to maintain their current weight, their goal weight was assumed to be the same as their current weight. The goal weight was used to calculate a 'goal' BMI category (underweight, acceptable, overweight, or obese) for each subject, representing their BMI classification if they were to achieve their goal weight. Table 5.7 shows that if subjects were able to achieve their weight goals, less than four in ten adults would be classified as overweight or obese.

Proportionally more women than men had a weight goal which was in the acceptable or underweight category, while twice as many men as women had a goal which would have them classified as overweight or obese (Table 5.7). The proportion of men with a weight goal in the acceptable range decreased with age, while the proportion of men with a goal in the overweight range increased with age. Like men, the proportion of women with a weight goal in the overweight range also decreased with age, but unlike the men, the younger women tended to have goals which, if they achieved them, would make them underweight (Table 5.7). As would be expected, a subject's goal BMI category was strongly associated with their current BMI category. However, while

almost two-thirds of women currently overweight wished to reduce their weight so as to be classified as acceptable, only one in five men had such a goal (Table 5.7).

Table 5.7. Percent distribution of goal BMI category for all subjects within sex, age group, and BMI category (at time of Weight Control Survey).

		Goal BMI category				P value*
	(n)	Under-weight	Acceptable	Over-weight	Obese	
Total sample**	(1292)	7.8	53.3	33.3	5.6	-
Sex						
Men	(648)	2.0	44.3	48.0	5.7	
Women	(644)	13.7	62.4	18.5	5.4	<0.0001
Age group - men						
18-29	(98)	6.1	63.3	29.6	1.0	
30-39	(146)	2.1	48.6	44.5	4.8	
40-49	(140)	1.4	42.1	50.7	5.7	
50-50	(109)	0.9	39.4	51.4	8.3	
60 and over	(155)	0.6	33.5	58.1	7.7	<0.0001
Age group - women						
18-29	(97)	27.8	66.0	5.2	1.0	
30-39	(139)	16.5	67.6	14.4	1.4	
40-49	(162)	15.4	59.9	18.5	6.2	
50-50	(99)	7.1	59.6	24.2	9.1	
60 and over	(147)	4.1	59.9	27.2	8.8	<0.0001
BMI category - men						
Underweight	(15)	86.7	13.3	0.0	0.0	
Acceptable	(223)	0.0	98.7	1.3	0.0	
Overweight	(321)	0.0	19.6	80.4	0.0	
Obese	(89)	0.0	2.2	56.2	41.6	<0.0001
BMI category - women						
Underweight	(61)	96.7	3.3	0.0	0.0	
Acceptable	(298)	8.4	91.6	0.0	0.0	
Overweight	(179)	1.7	62.0	36.3	0.0	
Obese	(106)	0.9	15.1	50.9	33.0	<0.0001

*χ^2 test of significance; **A small number of cases had missing data for this variable.

Logistic regressions were performed separately for men and women to examine the association between marital status, presence of children in the household, education, occupational status, personal income, or whether the subject lived in town or out of town, and the likelihood of having a BMI goal which was overweight or obese. These analyses showed that, after accounting for age, the likelihood having a weight goal in the overweight or obese range did not vary by any of these socio-demographic variables, except in the case of income for women. Those with a personal income of more than $19000 per annum were

significantly less likely than women earning $11000 or less to have a weight goal in the overweight or obese range (Odds ratio=0.50, 95% CI=0.29-0.88).

Ideal weight

Subjects were asked to report how much how much they ideally like to weigh. This information was used to calculate each subject's 'ideal' BMI category (underweight, acceptable, overweight, or obese), representing their BMI classification if they were to achieve their ideal weight (Table 5.8).

Table 5.8. Percent distribution of ideal BMI category for all subjects within sex, age group, and BMI category (at time of Weight Control Survey).

		Ideal BMI category				P value*
	(n)	Under-weight	Acceptable	Over-weight	Obese	
Total sample**	(1275)	7.7	61.0	29.3	2.0	-
Sex						
Men	(634)	1.3	53.0	43.4	2.4	
Women	(641)	14.0	69.0	15.4	1.6	<0.0001
Age group - men						
18-29	(96)	0.0	69.8	30.2	0.0	
30-39	(140)	2.1	57.9	39.3	0.7	
40-49	(137)	1.5	50.4	45.3	2.9	
50-50	(103)	1.9	48.5	46.6	2.9	
60 and over	(158)	0.6	43.7	51.3	4.4	0.01
Age group - women						
18-29	(96)	29.2	65.6	5.2	0.0	
30-39	(138)	15.9	75.4	7.2	1.4	
40-49	(160)	18.8	65.0	15.0	1.3	
50-50	(95)	4.2	70.5	23.2	2.1	
60 and over	(152)	3.9	68.4	25.0	2.6	<0.0001
BMI category - men						
Underweight	(14)	50.0	50.0	0.0	0.0	
Acceptable	(222)	0.0	93.7	6.3	0.0	
Overweight	(308)	0.3	38.6	61.0	0.0	
Obese	(90)	0.0	2.2	82.2	15.6	<0.0001
BMI category - women						
Underweight	(53)	84.9	15.1	0.0	0.0	
Acceptable	(297)	14.5	85.5	0.0	0.0	
Overweight	(181)	1.1	79.6	19.3	0.0	
Obese	(110)	0.0	32.7	58.2	9.1	<0.0001

*χ^2 test of significance; **A small number of cases had missing data for this variable.

As Table 5.8 shows, the distribution of ideal BMI category by sex, age and group was very similar to that which has been described for goal BMI category. The most noticeable difference between the distribution of these two variables was with regards to their relationship to actual BMI. Subjects who were overweight or obese had ideal weights which were lower than their goal weight for the following year. As a consequence, subjects' ideal weights more often fell into the acceptable range, whereas their goal weights were more often in the overweight range.

Logistic regressions were performed separately for men and women to examine the association between marital status, presence of children in the household, education, occupational status, personal income, or whether the subject lived in town or out of town, and the likelihood of having a ideal BMI which was in the overweight or obese range. These analyses showed that, after accounting for age, the likelihood having an ideal weight in the overweight or obese range did not vary by any of these socio-demographic variables for men or women.

5.5 Discussion

The results presented in this chapter demonstrate that a significant proportion of the population engage in some form of weight-control behaviour. As well as to those trying to lose weight, many adults actively try to avoid weight gain (to maintain their present weight). However, in addition to those who were already taking action to control their weight, many individuals reported they intended to take some type of action for their weight, regardless of their current behaviour. Weight-loss and weight maintenance behaviours, and intentions to lose or maintain weight, were common among men and women, across all age groups, and among those whose weight was within the acceptable range, as well as those who were overweight or obese.

The overall prevalence of past, recent and current weight-loss behaviours in this population is slightly lower than the estimates which have been reported from the only other Australian population study which has examined these issues in detail among both men and women (Paxton, et al., 1994). However, these differences are mainly accounted for by the men, who in Paxton's study were much more likely than men in the present study to have ever tried to lose weight (68% versus 55%), to have tried in the past year (47% versus 37%), or to be currently trying (17% versus 11%). The differences in the prevalence of

these behaviours between the women in the two studies were much less striking. Paxton's study was based on an urban population, suggesting that rural men are less likely than men living in capital cities to attempt weight loss. This is in spite of the fact that more of these rural-dwelling men were overweight or obese.

The prevalence of current weight-loss behaviour in the study population also appeared to be lower than recent estimates which have been reported for the United States (Horm & Anderson, 1993; Stephenson, et al., 1987; Williamson, et al., 1992). However, care must be taken in comparing estimates of the prevalence of weight-control behaviours derived from different studies, since the definition of weight control often varies between studies (French & Jeffery, 1994). There are even suggestions that the order in which a question regarding attempted weight loss is presented can effect estimates of the prevalence of the behaviour (Serdula, Mokdad, Pamuk, Williamson, & Byers, 1995). In spite of these caveats, the similarity of the questions regarding current weight-loss behaviour posed in this study and in the US research, and the magnitude of the differences between the prevalence in this study (11% of men and 29% of women) and recent research in the United States (23-25 per cent of men and 41-44 per cent of women), does suggest that attempts to lose weight are less common in the Weight Control Survey sample, particularly amongst the men.

The data gathered in the Weight Control Survey regarding the prevalence and distribution of weight maintenance behaviours are unique. Previous Australian research has not considered this issue, and there appears to be only one study from the United States which has examined population weight-maintenance behaviours (Serdula, et al., 1994; Williamson, et al., 1992). However, because of the recent shift in emphasis of weight guidelines for the public, an understanding of such behaviour is important. In the United States there is now less emphasis being placed on the need to lose weight, with much more focus upon the importance of maintaining weight (Dietary Guidelines Advisory Committee, 1995). The present study has shown that 22 per cent of adults were actively trying to avoid weight gain. This includes individuals who have lost weight at some time in the past and are attempting to maintain their reduced weight, as well a small group who have not previously lost weight but who are making a conscious effort to avoid any increase in weight. As with weight-loss behaviour, weight maintenance appears to be less common in this sample than in the United States.

The most common reasons for trying to lose or maintain weight related to health, fitness, and general feelings of well-being, confirming recent research which has shown that within the Australian community obesity is perceived to pose a significant risk to health (Crawford & Baghurst, 1990; Crawford, et al., 1987; Paxton, et al., 1994). However, concerns with health were certainly not the only factors motivating subjects to take action for their weight, with concerns about appearance and problems with clothes also commonly cited, particularly by women. While it has been well documented that many women come under 'cultural' pressures to control their weight for non-health reasons (Rodin, 1993), this study suggests that there are also many men who try to maintain or reduce their weight, at least in part, for the sake of their appearance. It is, however, not clear from this study how much of a role concern with appearance played in motivating each of the men to take action, but it is possible that for some men it may be an important consideration.

From a public-health perspective, it is encouraging that the strategies most commonly employed to reduce or maintain weight were those recommended by health authorities that would lead to reduced energy intake and increased energy expenditure. In addition to their potential effects on weight, there are a number of other health benefits associated with improved diet and increased physical activity (U.S. Department of Health and Human Services, 1991). The fact that a majority of the subjects who had changed their dietary habits, reduced alcohol intake and increased their activity levels in order to lose weight in the past year found these strategies effective, is also encouraging. However, it is a matter of some concern that a small but significant proportion of adults had taken laxatives, diuretics or other slimming agents for their weight, and that some adults smoked in order to help them control their weight. It is also worrying that among those who had employed such strategies in the past year, more than half considered them to be effective means of controlling weight. While the practice of such behaviours over a short-term period to achieve weight loss is unlikely to be detrimental to health (French & Jeffery, 1994), the long-term use of these type of strategies is not considered to be an appropriate or healthy means of controlling weight (National Institues of Health Technology Assessment Panel, 1992).

Many individuals attempting to lose or maintain weight may do so without the benefit of 'expert' advice. Relatively few subjects taking action for their weight had been advised to do so by their doctor, and among men almost none had attended a weight-loss group. It is also true, however, that even those who has

sought assistance from their doctors or a weight-loss centre may not have received 'sound' advice, since neither of these groups necessarily possesses the knowledge or skills to advise about weight control (Campbell & Welborn, 1994; Consumer Advocacy and Financial Counselling Association of Victoria (Inc), 1992; Crawford & Worsely, 1988; Judd, 1987). Previous research has shown that magazines rank among the most common sources of information regarding weight control (Crawford & Worsely, 1988), and there is evidence that many of the weight-reduction diets they promote are nutritionally unsound (Lissner, Nelson-Steen, & Brownell, 1992; Radimer, 1995; Reilly, et al., 1987). It is perhaps not surprising then, given these observations, that some people adopt potentially harmful weight-control strategies.

In addition to the forty per cent of adults taking action for their weight, this study has shown that many adults not currently taking action for their weight, and most of those who were attempting to maintain weight, intended to lose weight over the coming year. However, compared to women, less men were currently trying to lose or maintain weight, or intending to do something for their weight. As a consequence, more than one in two men in the survey would remain overweight or obese, even if they were able to achieve their weight goals in the coming year. The finding that so many men had a goal weight which was higher than 'acceptable' is likely to be due, in part, to their perception of what constitutes an acceptable or healthy weight. Forty-five per cent of men had an ideal weight which would put them into the overweight or obese range. Women, on the other hand, and particularly those in the younger age groups, tended to have goal weights and ideal weights in the acceptable or underweight range. It therefore appears that men's definitions of obesity may be out of step with the definitions currently used by Australian health authorities.

The data presented in this chapter confirm that weight-loss behaviours are common. It has also shown, however, that a substantial proportion of adults actively try to maintain their present weight. Those taking action for their weight most often do so for health-related reasons, although paradoxically, some of the specific strategies employed to control weight are themselves potentially unhealthy. As well as demonstrating that weight-control behaviours are common, this chapter has shown that many adults not currently taking action for their weight intend to take action. In the following chapter I examine how information regarding current behaviour and future intentions can be combined to assess stage of change for weight control.

CHAPTER 6

ASSESSING STAGE OF CHANGE FOR WEIGHT CONTROL

6.1 Introduction

The potential value of the Stage of Change (SOC) Model in understanding population weight-control behaviours was discussed in Chapter 2. The SOC Model proposes that there are discrete, identifiable stages of change, reflecting varying degrees of readiness to change behaviour. Under the SOC Model the pre-contemplation stage includes those individuals who are not considering change; the contemplation stage includes those who are considering change; individuals taking preliminary steps towards action are classified into the preparation stage; the action stage includes those who have modified their habits; and the maintenance stage includes those who have sustained the change over time (DiClemente, et al., 1991).

Based on these broad criteria, a series of questions that assess motivational readiness to control weight was included in the Weight Control Survey, to allow subjects to be classified in terms of their stage of change. The previous chapter showed that, among those subjects who were not currently trying to lose or maintain weight, a significant proportion intended to take action for their weight. It therefore appears that by combining the data on current behaviour and future intentions it may be possible to classify subjects in the Weight Control Survey in terms of their stage of change for weight control. This would allow us to distinguish those subjects who are thinking about taking action for their weight from those who have no intention of attempting weight control.

However, since the Weight Control Survey was conducted, researchers from the University of Rhode Island, who originally developed the SOC Model, have proposed a new measure which they describe as assessing stage of change for weight control. To date this algorithm has received only limited use, it has not been applied to population-based data, and its reliability has yet to be established (Rossi, et al., 1995). The questions included in the Weight Control Survey differ in several ways from those proposed by the Rhode Island

researchers. As well as addressing current weight-loss and maintenance behaviours, and intentions to lose weight, the Weight Control Survey also assesses subjects' intentions to avoid weight gain. This latter issue does not seem to be addressed by the Rhode Island measure. Furthermore, the Weight Control Survey assesses behavioural intentions over the following twelve months, whereas the Rhode Island questions are concerned with intentions over only six months.

The purpose of this chapter is to examine whether the variables included in the Weight Control Survey assessing current weight-control behaviours and future intentions can be combined to classify subjects in terms of their stage of change, and if so, to establish the reliability of this measure. Since the researchers who originally developed the SOC Model have proposed a new measure of stage of change for weight control, the Weight Control measure will be compared with their measure, and the reliability of the Rhode Island measure will also be examined.

6.2 Aims

To develop a stage of change measure based on variables included in the Weight Control survey that assess current weight-control behaviours and future intentions.

To establish the reliability of the stage of change measure, and the reliability of the Rhode Island measure.

To examine the concurrent validity of the stage of change measure with the Rhode Island measure.

6.3 Methods

The development of the stage of change measure was not undertaken as part of the Weight Control Survey. A separate study was conducted for this purpose. Undergraduate students enrolled in first, second and third year science courses were approached in class groups and invited to participate in this study. Students were asked to complete a brief questionnaire on two occasions a fortnight apart (baseline and follow-up).

Ethical approval to undertake this study was provided by the University of Canberra Human Experimentation Ethics Committee. Students who participated provided signed consent. Students were not compelled to participate.

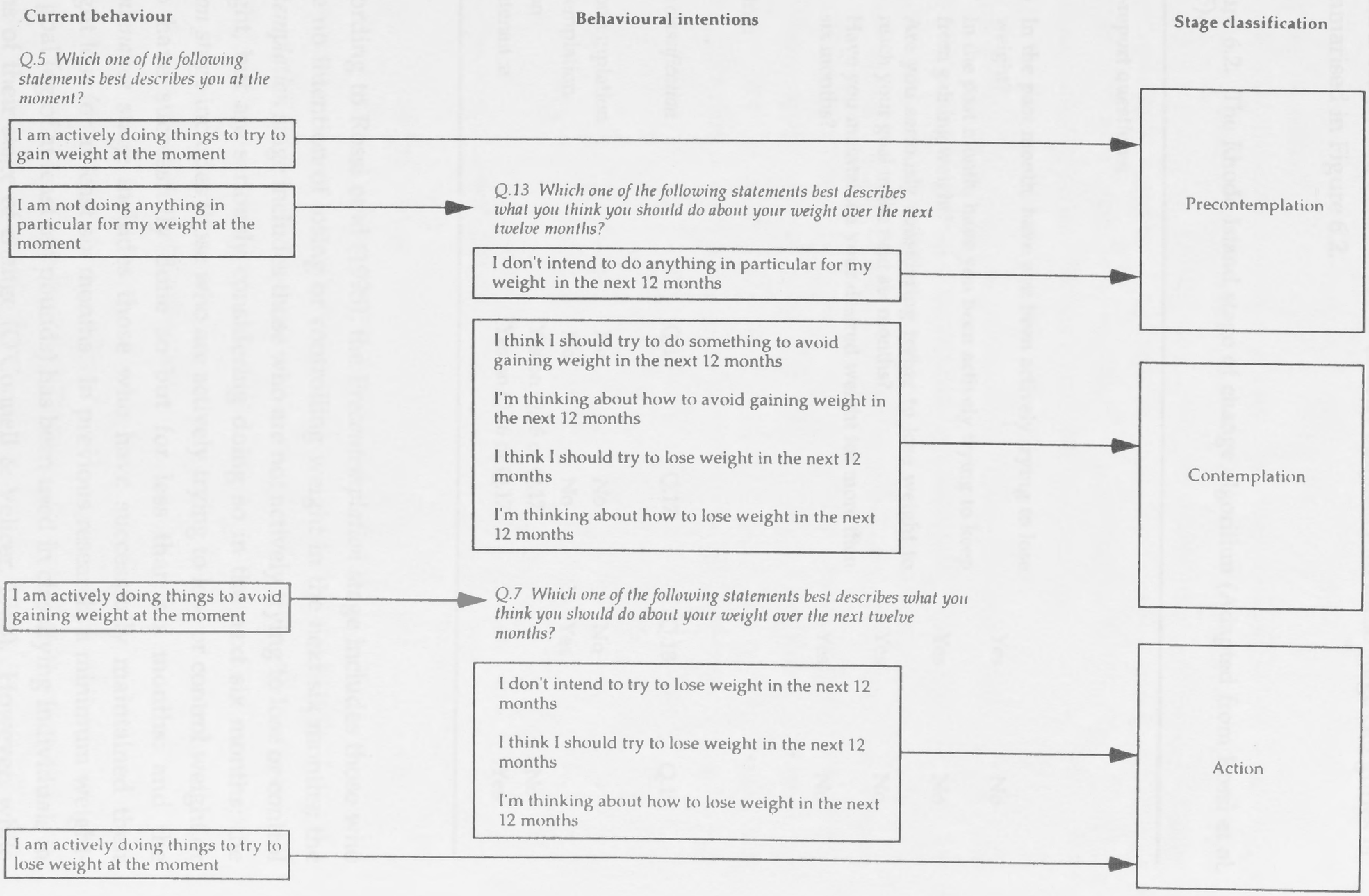
A copy of the questionnaire used in this study is included in Appendix 8. It included questions from the Weight Control Survey which were used to assess subjects' current weight-control behaviours and future behavioural intentions. In addition, four questions which have been proposed by researchers at the Rhode Island Cancer Research Center (Rossi, et al., 1995) to develop a stage of change algorithm for weight control were included. Details of each student's age, sex, weight status over the past year, and confidence in being able to maintain weight and lose weight were also sought.

Stage of change classification

Using the broad criteria described by DiClemente et al (1991) to define the various stages of change, questions drawn from the Weight Control Survey that assess current behaviours and future intentions were combined to classify subjects into one of three stages of change for weight control. The algorithm developed to classify subjects into these stage categories is summarised in Figure 6.1.

The *Precontemplation* stage included those who were currently doing nothing in particular for their weight and had no intention of doing anything for their weight over the following twelve months. In addition, since the purpose of this study was to develop a stage of change measure which could be applied to the whole population, subjects who were trying to gain weight were also included in the precontemplation stage, on the basis that they were not trying to lose weight or to avoid weight gain. The *Contemplation* stage included those who were currently doing nothing in particular for their weight but thought they should do something or were thinking how to do something to avoid gaining weight or to lose weight over the following twelve months. The *Action* stage included those who were currently doing things in order to avoid gaining weight or to lose weight. To date, no studies on weight control have defined a preparation stage, and thus no effort was made to classify subjects into this stage. In addition, subjects were not classified into a maintenance stage, because the variables included in the Weight Control Survey were not considered to be adequate to define this stage.

Figure 6.1. The Weight Control Survey stage of change algorithm.



The subjects were also classified into one of four stages of change using the four Rhode Island questions. The algorithm developed by the Rhode Island researchers (Rossi, et al., 1995) to classify subjects into these stage categories is summarised in Figure 6.2.

Figure 6.2. The Rhode Island stage of change algorithm (Adapted from Rossi et al, 1995).

Self-report questions:

Q.16	In the past month, have you been actively trying to lose weight?	Yes	No
Q.17	In the past month, have you been actively trying to keep from gaining weight?	Yes	No
Q.18	Are you seriously considering trying to lose weight to reach your goal in the next six months?	Yes	No
Q.19	Have you maintained your desired weight for more than six months?	Yes	No

Scoring:

Stage classification	Q.16	Q.17	Q.18	Q.19
Precontemplation	No	No	No	-
Contemplation	No	No	Yes	-
Action	Yes on Q.16 or Q.17		-	No
Maintenance	Yes on Q.16 or Q.17		-	Yes

According to Rossi et al (1995), the *Precontemplation* stage includes those who have no intention of losing or controlling weight in the next six months; the *Contemplation* stage includes those who are not actively trying to lose or control weight, but are seriously considering doing so in the next six months; the *Action* stage includes those who are actively trying to lose or control weight or who have successfully done so but for less than six months; and the *Maintenance* stage includes those who have successfully maintained their weight loss for at least six months. In previous research, a minimum weight-loss goal (eg of at least ten pounds) has been used in classifying individuals in terms of their stage of change (O'Connell & Velicer, 1988). However, while noting this, Rossi et al (1995) have not explicitly included this in their

algorithm. Further, since the purpose of this study was to develop a stage of change measure which could be applied to the whole population, no weight-loss criterion was imposed.

Statistical analysis

Reliability of the stage of change measures was determined by examining agreement between stage classification at baseline and at follow-up two weeks later. The concurrent validity of the Weight Control Survey stage of change measure was determined by examining the agreement at baseline between stage classification based on the Weight Control Survey (WCS) algorithm and classification based on the Rhode Island (RI) algorithm.

Rather than simply calculate the proportion of subjects classified into the same stage category on the two occasions (in the case of the reliability study), or the proportion of subjects classified into the same stage category based on the two algorithms (in the case of the concurrent validity study), the Weighted Kappa statistic was calculated (Altman, 1991). Weighted Kappa provides a superior estimate of agreement, as it takes account of the agreement that would occur by chance, as well as the degree of disagreement between the two measures. The maximum value of Kappa is one, representing perfect agreement, and a Kappa of zero represents only chance agreement between the two measures.

6.4 Results

6.4.1 Sample characteristics

Of the 260 students present at the baseline administration of the questionnaire, 210 (79 men and 131 women) completed the questionnaire at baseline. The median age of these students was 21 years, with the youngest aged 18 and the oldest aged 45 years. One hundred and sixty two of these students completed the questionnaire at follow-up two weeks later.

6.4.2 Stage of change classification

Using the WCS algorithm, 63.3 per cent of the men were classified as precontemplators at baseline, with 17.7 per cent classified as contemplators, and 19 per cent classified into the action stage. Among the women, 22.9 per

cent were precontemplators, 24.4 per cent were contemplators, and 52.7 per cent were defined as being in the action stage.

Using the RI algorithm, 63.3 per cent of the men were classified as precontemplators at baseline, with 11.4 per cent classified as contemplators, 8.9 per cent classified into the action stage, and 16.5 per cent classified into the maintenance stage. Among the women, 29 per cent were precontemplators, 13 per cent were contemplators, 33.6 per cent were defined as being in the action stage, and 24.4 per cent were classified into the maintenance stage. In order to allow comparisons between the two stage of change measures, the action and maintenance stages were combined for subsequent analyses.

6.4.3 Reliability of the measures

Table 6.1 presents the number of subjects classified into one of the three stages of change based on the WCS algorithm at both baseline and at follow-up. There was good agreement between stage of change classification on the two occasions for the total sample (Weighted Kappa=0.82, 95% CI=0.74-0.91), for men (Weighted Kappa=0.65, 95% CI=0.42-0.88) and for women (Weighted Kappa=0.86, 95% CI=0.76-0.95).

Table 6.1. The number of subjects classified into each of the three stages of change at baseline and at follow-up (two weeks later) based on the Weight Control Survey algorithm.

Classification at baseline	Classification at follow-up			Total sample
	Precontemp-lation	Contemp-lation	Action	
Precontemplation	46	3	4	53
Contemplation	3	30	7	40
Action	3	2	64	69
Total sample	52	35	75	162

Table 6.2 presents the number of subjects classified into one of the three stages of change based on the RI algorithm at baseline and at follow-up. There was also good agreement between stage of change classification on the two occasions for the total sample (Weighted Kappa=0.91, 95% CI=0.86-0.97), for men (Weighted Kappa=0.86, 95% CI=0.72-0.99) and for women (Weighted Kappa=0.93, 95% CI=0.87-0.99).

Table 6.2. The number of subjects classified into each of the three stages of change at baseline and at follow-up (two weeks later) based on the Rhode Island algorithm developed by Rossi et al (1995).

Classification at baseline	Classification at follow-up			Total sample
	Precontemp-lation	Contemp-lation	Action/ Maintenance	
Precontemplation	54	2	2	58
Contemplation	1	16	8	25
Action/Maintenance	1	0	74	75
Total sample	56	18	84	158

6.4.4 Concurrent validity of the measures

The subjects classified at baseline into each of the three stages of change as defined by the WCS algorithm and the RI algorithm are presented in Table 6.3. The Weighted Kappa statistic was 0.82 (95% CI=0.75-0.89), indicating good agreement between the two stage of change measures. This was also the case for men (Weighted Kappa=0.77, 95% CI=0.61-0.93), and for women (Weighted Kappa=0.81, 95% CI=0.71-0.90).

Table 6.3. The number of subjects classified at baseline into each of the three stages of change based on the Weight Control Survey (WCS) algorithm and based on the Rhode Island (RI) algorithm.

Classification - WCS algorithm	Classification - RI algorithm			Total sample
	Precontemp-lation	Contemp-lation	Action/ Maintenance	
Precontemplation	73	0	7	80
Contemplation	13	23	10	46
Action	2	3	79	84
Total sample	88	26	96	210

While the overall agreement between the WCS and RI measures was good, a high proportion of the subjects classified as contemplators using the WCS algorithm were classified into other stages according to the RI algorithm. In order to explore why these subjects were classified differently by the WCS and RI algorithms their responses to the individual questions that comprise the algorithms were inspected

Ten subjects classified as contemplators using the WCS algorithm were classified into the action/maintenance stage using the RI algorithm (Table 6.3). In responding to the WCS questions, these subjects all reported that they were not doing anything in particular for their weight at the time of the survey. However, in responding to the RI questions, all ten reported they had been trying to lose weight or to keep from gaining weight in the past month. Therefore, it appears that because the two measures assess weight-control behaviours over different time periods (current versus the last month), these subjects were classified into different stages by the two algorithms.

Thirteen subjects classified as contemplators using the WCS algorithm were classified as precontemplators using the RI algorithm (Table 6.3). In responding to the RI questions, all 13 reported they had not been trying to lose weight or to keep from gaining weight in the past month, and they were not considering trying to lose weight in the next six months. However, in responding to the WCS questions, five of the 13 subjects reported they should or were thinking how to lose weight in the next 12 months. It therefore appears that these five subjects were classified into different stages because the two algorithms assessed weight-control intentions over different time periods (six months versus twelve months).

The remaining eight subjects classified as contemplators using the WCS algorithm who were classified as precontemplators using the RI algorithm reported they should or were thinking how to avoid gaining weight in the next 12 months. While the RI questions assess weight-loss intentions for the following six months, subjects' intentions to avoid weight gain or maintain their present weight are not examined.

6.5 Discussion

Although studies of this type are almost always based on undergraduate students, it is important to recognise the differences between the sample used in this study, and the sample in which the stage of change measure will be applied. Compared to subjects in the Weight Control Survey, the subjects in this study were younger, better educated, and on the basis of existing population data, they were less likely to be overweight or obese. Ideally, the reliability and concurrent validity of the stage of change measures would have been examined in a sample of adults, similar in terms of key socio-demographic

characteristics to the main study population. For financial and logistic reasons, however, this was not possible.

Given these methodological limitations, the study reported in this chapter has shown that variables included in the Weight Control Survey can reliably classify individuals into a precontemplation, contemplation, or action stage of change according to the broad criteria described by DiClemente et al (1991). Although the test-retest reliability of the measure proposed by Rossi et al (1995) was slightly higher than that of the Weight Control Survey measure, the reliability of both was high and entirely acceptable. In addition, the examination of the concurrent validity of the stage of change algorithms showed that most subjects were classified into the same stage by the two measures. Some subjects were classified into different stages simply because the two measures assessed weight-control behaviours and intentions over different time periods. However, many subjects classified as contemplators by the WCS algorithm were classified as precontemplators by the RI algorithm because they were not asked about their intentions to avoid weight gain.

Although the contemplation stage is described as including "those who are not actively trying to lose or control weight, but are seriously considering doing so in the next six months" (Rossi, et al., 1995); p391), under the RI algorithm information is only sought about weight-loss intentions. The RI algorithm does not assess future intentions to maintain weight. This distinction between the RI and WCS measures is important. While the RI algorithm can be applied to the whole population (by not imposing any weight-loss criterion), it cannot be used to assess population-wide weight-control behaviours and intentions. The RI algorithm is concerned with weight loss. It ignores the fact that there are individuals thinking about taking steps to maintain their weight (to avoid weight gain). As I have argued in Chapter 2, recognition of this group is important, given the greater emphasis being placed on promoting weight maintenance regardless of weight status.

It is on this basis that those who were not taking any action for their weight and not considering taking action, were classified as precontemplators. As a consequence, even individuals who are not overweight would be classified into the precontemplation stage if they were not actively trying to maintain their weight or thinking about doing so. While it might be considered contentious to classify these people in this way, health authorities are recommending that everybody (regardless of their weight) should actively make an effort to control

their weight (Dietary Guidelines Advisory Committee, 1995). By using the WCS algorithm, we are able to examine weight-control behaviours in the whole population, and we can at least distinguish precontemplators who are not overweight from those who are overweight (who we might therefore be more concerned about). The alternative would be to apply the algorithm only to those already overweight. However, this would mean ignoring those within the population who are not overweight but who actively try to control their weight.

In this study subjects' responses to the Weight Control Survey questions were not used to classify them into a maintenance stage because the available variables were considered to be inadequate for this purpose. In a study of weight-loss, O'Connell and Velicer (1985) defined the maintenance stage as including those who had lost weight in the past and who were successfully taking action to avoid regaining the weight, but who had no goal to lose further weight. Rossi et al (1995) defined the maintenance stage (for weight loss) as including those who had successfully maintained their weight loss for at least six months, but made no reference to future weight-loss goals. The role of future intentions in relation to the maintenance stage remains to be resolved (Rossi, pers. comm.). Although these studies examined stage of change for weight loss (not weight control), they highlight some of the difficulties in measuring stage of change for this complex of behaviours. In defining a maintenance stage for weight control, it would seem to be important to have data on how long the behaviour had been maintained, how long current weight had been maintained, and possibly also on any intentions regarding future weight loss.

Despite the difficulties, the data presented in this chapter demonstrate that individuals can be reliably classified in terms of their stage of change for weight control, based on responses to questions regarding current behaviours and future intentions included in the Weight Control Survey. The stage of change measure which has been developed allows three distinct groups in the population to be distinguished; those who are not taking any form of action to lose or maintain weight; those who are at least considering taking action; and those who are actively trying to lose weight or to maintain their weight. In the following chapter this measure will be applied to the Weight Control Survey sample, to examine the prevalence and correlates of the stages of change for weight control.

CHAPTER 7

THE PREVALENCE AND CORRELATES OF THE STAGES OF CHANGE

7.1 Introduction

The data presented in Chapter 6 show that variables included in the Weight Control Survey reliably classified individuals in terms of their stage of change for weight control. As well as identifying those in the population who are already taking action for their weight, the stage measure allows us to determine who is thinking about taking action, as well as those who have no intention of attempting weight control. However, the Stage of Change (SOC) Model not only provides data on the population prevalence and socio-demographic distribution of the different stages of change for weight control; it also constitutes a framework within which to examine transitions between the various stages. In terms of a public-health approach to weight control this is important, since it allows the targeting of specific segments of the population.

A number of the studies of physical activity and dietary behaviour reviewed in Chapter 2 (many which were population based) showed that self-efficacy beliefs and decisional balance (the difference between perceived gains and losses resulting from the behaviour) increased along with stage of change. Other research that was reviewed, which examined the stages of change for weight loss among a sample of college students, also demonstrated the utility of decisional balance.

In addition to the studies which have applied the SOC Model, I reviewed population studies which showed that, as well being associated with variables such as sex, age and BMI, weight-loss behaviour varies according to perception of fatness, and weight locus of control. These studies focussed only on weight loss, and did not consider weight maintenance behaviours or future weight-control intentions. Nevertheless, they showed that attempted weight loss was associated with perceptions of fatness, that people who had tried to lose weight were more likely to believe they had control over weight and that environmental influences were important, and they were less likely to see chance factors as important.

To date, the SOC Model has not been employed to examine population weight-control behaviours. In this chapter the SOC measure developed in Chapter 6 will be applied to the Weight Control Survey sample, to examine the prevalence and socio-demographic distribution of the stages of change for weight control. Since previous research has shown that decisional balance and self-efficacy can distinguish individuals in different stages, and other population-based research has shown that perceptions of fatness and weight locus of control are associated with weight-loss behaviour, the relationship between these variables and stage of change will also be examined.

7.2 Aims

To determine the prevalence and distribution of the stages of change for weight control among participants in the Weight Control Survey.

To determine for this sample whether stage of change for weight control is associated with:

- weight and fatness perceptions and concerns, and body attitudes,
- weight locus of control,
- decisional balance, and
- self-efficacy for weight control.

7.3 Methods

The data presented in this chapter are derived from the Weight Control Survey, the methodological details of which were described in Chapters 3 and 4. Subjects were classified into the precontemplation, contemplation or action stages of change for weight control according to the algorithm described in Chapter 6.

Development of scales

Principal component analyses were performed using the factor procedure in SPSS (SPSS Inc., 1988) to examine the dimensional make-up of the Dieting Beliefs Scale (Stotland & Zuroff, 1990), the Decisional Balance Inventory (O'Connell & Velicer, 1988), and the items drawn from the Body Attitudes

Questionnaire (Ben-Tovim & Walker, 1991). Three separate analyses were undertaken. The results of these analyses are presented in Appendix 9.

On the basis of the factor analysis of the Dieting Beliefs Scale, three subscales were computed which reflect the degree to which a subject believes that weight is: under control of internal factors ('Belief in internal control', Cronbach's alpha=0.70); influenced by chance factors ('Belief in chance factors', Cronbach's alpha=0.59); influenced by environmental factors ('Belief in environmental factors', Cronbach's alpha=0.48). Based on the factor analysis of the Decisional Balance Measure, two subscales were computed which reflect the extent of an individuals' beliefs in the benefits of losing weight ('Pros', Cronbach's alpha=0.92), and beliefs that there are costs in trying to lose weight ('Cons', Cronbach's alpha=0.76). As a consequence of the factor analysis of the items drawn from Body Attitudes Questionnaire, only one subscale was computed. This assessed subjective feelings of fatness ('Feelings of fatness', Cronbach's alpha=0.91). Details of the items which comprise each of these subscales are included in Appendix 9.

The subscales which were developed were transformed to Z-scores (each with a mean of zero and a standard deviation of one) for subsequent analyses. It follows that a higher score on a subscale reflects a greater belief in the issue assessed by that subscale (eg a higher score on the Pros subscale indicates a greater belief in the benefits of weight loss). A measure of decisional balance was also calculated, reflecting the difference between the standardised scores on the Pros-Cons (the perceived benefits minus the costs). The decisional balance measure had a mean of zero, and in this case a standard deviation of 1.16.

Statistical analysis

Initial analysis involved the use of cross-tabulations and the chi-squared statistic to examine the relationship between the three stages of change and individual categorical variables, and analysis of variance to examine the relationship between stage of change and individual continuous variables. These analyses were performed using SPSS (SPSS Inc., 1988). The variables which were found to be significantly associated with stage of change in the univariate analyses among men or women were subjected to multivariate analysis. Logistic regression modelling was performed to determine the variables that distinguished subjects in the various stages of change.

Initially, ordinal logistic regression modelling was performed using the logistic procedure in SAS (SAS Institute Inc., 1990). This form of regression is an extension of the model for binary data and allows the modelling of an outcome variable that is measured on an ordinal scale (McCullagh, 1980). In this study the three stages of change were considered to represent a hierarchy of readiness to change weight-control behaviour, ranging from the subjects who were not doing anything to control their weight and who had no intention of doing anything (those in the precontemplation stage), to the subjects who were actively trying to lose weight or to avoid gaining weight at the time of the survey (those in the action stage). Ordinal logistic regression assumes that the effect of explanatory variables is the same in moving between different levels of the hierarchy. However, the proportional odds assumptions were violated when the models were fitted separately for men and for women (χ^2=60.61, df=11, p=0.0001 for men; χ^2=91.97, df=11, p=0.0001 for women).

As a result of the poor fit of the proportional odds model, the logistic procedure in SPSS (Norusis & Inc., 1990) was used to analyse the data (forced entry method). Separate analyses were performed to predict the likelihood of men being in the contemplation or action stages, compared to the precontemplation stage; and the likelihood of men being in the contemplation stage, compared to the action stage. These analyses were repeated for women.

7.4 Results

7.4.1 Prevalence of the stages of change

Thirty per cent of the Weight Control Survey subjects were in the precontemplation stage for weight control, 27 per cent were classified as contemplators, and almost 43 per cent were in the action stage. In terms of their current behaviours and their behavioural intentions, the subjects in the contemplation and action stages were quite heterogeneous (Table 7.1). For example, half of the subjects classified as contemplators intended to try to lose weight over the next year, while the other half intended to take steps to avoid gaining weight. Similarly, the action stage was evenly split between subjects who were actively trying to lose weight, and those who were actively trying to avoid weight gain. Among those subjects trying to avoid weight gain at the time of the survey, almost two-thirds were considering trying to lose weight

within the next year, while the remaining one-third had no intention of attempting weight loss.

Table 7.1. Percent distribution of current behaviours and behavioural intentions in the Weight Control Survey sample.

Stage of change category	Current behaviour (at time surveyed)	Behavioural intention (over the next year)	Proportion of sample* (n=1330)
Precontemplation			
	Actively trying to gain weight	Not applicable	2%
	Not doing anything in particular for weight	No intention of doing anything in particular	28%
Contemplation			
	Not doing anything in particular for weight	Think they should try to do something to avoid gaining weight	8%
	Not doing anything in particular for weight	Thinking about how to avoid gaining weight	4%
	Not doing anything in particular for weight	Think they should try to lose weight	9%
	Not doing anything in particular for weight	Thinking about how to lose weight	6%
Action			
	Actively trying to avoid gaining weight	Don't intend to try to lose weight	9%
	Actively trying to avoid gaining weight	Think they should try to lose weight	6%
	Actively trying to avoid gaining weight	Thinking about how to lose weight	7%
	Actively trying to lose weight	Not applicable	21%

*Percentages are rounded to whole numbers; 12 subjects could not be classified in terms of their stage of change for weight control due to missing data.

Proportionally more women than men were taking action for their weight, while men were more likely to be classified as precontemplators (Table 7.2). Stage of change for weight control varied with age among men, but not among women. Men under 30 years were more likely than other men to be in the precontemplation stage, and men aged 60 or more were less likely than younger men to be contemplating taking steps to control their weight (Table 7.2). There was no association between stage of change and marital status,

presence of children in the household, education, occupational status, personal income, or whether the subject lived in town or out of town (data not shown).

Table 7.2. Percent distribution of stage of change category within sex, age group, and BMI category.

	(n)	Stage of Change			P value*
		Pre-contemplation	Contemplation	Action	
Total sample	(1330)	30.0	27.1	42.9	-
Sex					
Men	(658)	42.2	27.7	30.1	
Women	(672)	18.0	26.5	55.5	<0.0001
Age group - men					
18-29	(101)	50.5	20.8	28.7	
30-39	(146)	40.4	34.2	25.3	
40-49	(141)	39.7	30.5	29.8	
50-50	(109)	36.7	34.9	28.4	
60 and over	(161)	44.7	18.6	36.6	0.02
Age group - women					
18-29	(98)	11.2	26.5	62.2	
30-39	(145)	17.9	31.7	50.3	
40-49	(168)	18.5	27.4	54.2	
50-50	(101)	13.9	22.8	63.4	
60 and over	(160)	24.4	23.1	52.5	0.1
BMI category - men					
Underweight	(15)	100.0	0.0	0.0	
Acceptable	(226)	67.3	15.5	17.3	
Overweight	(326)	31.6	31.6	36.8	
Obese	(91)	8.8	48.4	42.9	<0.0001
BMI category - women					
Underweight	(62)	67.7	9.7	22.6	
Acceptable	(307)	21.5	24.8	53.7	
Overweight	(184)	5.4	29.3	65.2	
Obese	(119)	2.5	35.3	62.2	<0.0001

*χ^2 test of significance.

Stage of change was associated with BMI category in men and women. Proportionally more overweight and obese subjects were taking action to control their weight at the time of the Weight Control Survey, while subjects in the acceptable and underweight categories were more likely to be in the earlier stages of change (Table 7.2). However, the pattern of association between stage of change and BMI appeared to be different between the sexes. Almost one-third of the men who were overweight were precontemplators, compared to only five per cent of overweight women. In addition, a majority of the men

whose weight was acceptable were precontemplators, while only one in five women in the acceptable BMI category were so classified.

7.4.2 Weight and fatness perceptions and stage of change

Perceptions of current weight and of overall level of body fatness, and concerns about weight and about fatness varied according to stage of change (Table 7.3). For both men and women, subjects in the contemplation and action stages were more likely than those in the precontemplation stage to perceive themselves to be slightly or very overweight, to perceive themselves to be a little or very fat, to be at least moderately concerned about their current weight, and to be at least moderately concerned about their overall level of body fatness.

Analysis of variance revealed that subjective feelings of fatness, as assessed by the scale based on items drawn from the Body Attitudes Questionnaire, also varied according to stage of change. Feelings of fatness increased along with stage of change for men ($F(2,604)=84.51$; $p<0.0001$). The mean standardised scores (Z-scores) for men were: -0.91 for precontemplators; -0.21 for contemplators; -0.15 for those in the action stage; -0.49 for men overall. Among the women, subjective feelings of fatness also varied according to stage of change ($F(2,587)=137.27$; $p<0.0001$). The mean standardised scores (Z-scores) for women were: -0.69 for precontemplators; 0.74 for contemplators; 0.75 for those in the action stage; 0.50 for women overall.

7.4.3 Weight locus of control and stage of change

Analysis of variance showed that standardised scores (Z-scores) on the three subscales derived from Dieting Beliefs Inventory differentiated subjects at different stages (Table 7.4). Among men, belief in internal control of weight did not vary by stage, nor did belief in environmental factors. However, belief in the influence of chance factors on weight did vary with stage of change. Precontemplators scored highest, indicating that more precontemplators believed that a person's weight was influenced by chance factors. Belief in internal control of weight was highest among women in the action stage and lowest among precontemplators. Conversely, women in action were least likely to have the view that weight was influenced by chance factors, while precontemplators were most likely believe this. Belief in the influence of environmental factors was highest among women in the contemplation stage, and lowest among women in the precontemplation stage.

Table 7.3. Percent distribution of weight and fatness perceptions and concerns for men and women within stage of change category.

	Stage of Change			P value*	Total sample
	Pre-contemplation	Contemplation	Action		
Men					
Perception of weight					
(n)	(278)	(182)	(198)		(658)
Underweight	15.8	4.4	2.0		8.5
About right	54.7	12.1	24.2		33.7
Slightly overweight	29.1	68.7	62.6		50.2
Very overweight	0.4	14.8	11.1	<0.0001	7.6
Concern about weight					
(n)	(278)	(182)	(198)		(658)
Not at all concerned	60.4	12.1	16.2		33.7
Not very	28.8	30.2	22.7		27.4
Moderately	8.6	46.7	49.0		31.3
Quite or very	2.2	11.0	12.1	<0.0001	7.6
Perception of fatness					
(n)	(261)	(178)	(193)		(632)
Thin	18.8	7.1	1.0		8.5
Not too fat or thin	53.6	18.5	22.3		34.2
A little bit fat	27.2	70.2	72.0		53.0
Very fat	0.4	9.6	4.7	<0.0001	4.3
Concern about fatness					
(n)	(278)	(180)	(197)		(655)
Not at all concerned	51.4	6.7	5.6		25.3
Not very	33.5	31.1	20.8		29.0
Moderately	13.3	53.3	58.4		37.9
Quite or very	1.8	8.9	15.2	<0.0001	7.8
Women					
Perception of weight					
(n)	(112)	(175)	(370)		(657)
Underweight	24.1	1.1	1.6		5.3
About right	60.7	19.4	17.8		25.6
Slightly overweight	13.4	44.0	52.4		43.5
Very overweight	1.8	35.4	28.1	<0.0001	25.6
Concern about weight					
(n)	(121)	(177)	(373)		(671)
Not at all concerned	62.8	9.6	8.6		18.6
Not very	27.3	30.5	20.1		24.1
Moderately	8.3	33.9	41.0		33.2
Quite or very	1.7	26.0	30.3	<0.0001	24.0
Perception of fatness					
(n)	(106)	(173)	(369)		(648)
Thin	32.1	0.0	0.5		5.6
Not too fat or thin	55.7	16.2	17.3		23.3
A little bit fat	12.3	60.1	61.8		53.2
Very fat	0.0	23.7	20.3	<0.0001	17.9
Concern about fatness					
(n)	(118)	(177)	(372)		(667)
Not at all concerned	44.8	4.5	3.0		10.8
Not very	41.5	27.1	19.1		25.2
Moderately	12.7	44.1	47.3		40.3
Quite or very	0.8	24.3	30.6	<0.0001	23.7

*χ^2 test of significance.

Table 7.4. Mean standardised scores (Z-scores) on the subscales derived from the Dieting Beliefs Inventory for men and women within stage of change category.

	Stage of Change			P value*	Total sample
	Pre-contemplation	Contemplation	Action		
Men					
Belief in internal control	0.01	0.02	0.11	0.5	0.04
Belief in chance factors	0.19	-0.11	-0.07	0.002	0.03
Belief in environmental factors	-0.05	-0.03	-0.08	0.9	-0.05
Women					
Belief in internal control	-0.20	-0.17	0.08	0.009	-0.04
Belief in chance factors	0.11	0.07	-0.13	0.03	-0.03
Belief in environmental factors	-0.14	0.24	0.01	0.004	0.05

*Based on analysis of variance; df=2,623 for men; df=2,631 for women.

7.4.4 Decisional balance and stage of change

Analysis of variance of the standardised scores (Z-scores) derived from the Decisional Balance Measure (the Pros of weight loss and the Cons of weight loss) and of the measure of the difference between the Pros Z-score and the Cons Z-score, revealed differences between subjects according to their stage of change. The means for the stage of change groups on the decisional balance measures are presented in Table 7.5.

Belief in the benefits of losing weight increased along with stage of change among men, with those in the precontemplation stage having the lowest Pros scores, and those in the action stage having the highest scores. Men in the contemplation stage had the highest Cons scores, indicating that they were most likely to see costs in trying to lose weight. The decisional balance score (Pros-Cons) increased with stage of change among men. The precontemplators were more likely to hold the view that the costs of weight loss outweighed the benefits, with the men in action seeing more benefits than barriers.

Among women, precontemplators had the lowest Pros scores, indicating that they saw fewer benefits in losing weight than did women in the contemplation or action stages. Women in the contemplation stage had the highest Cons scores, indicating they were most likely to see costs in trying to lose weight, while those in the precontemplation stage had the lowest Cons scores. On the decisional balance measure (Pros-Cons), women in the precontemplation stage had the lowest scores (and thus saw fewer benefits than costs to weight loss), while the women in action had the highest scores, indicating they believed there were more benefits in losing weight than costs.

Table 7.5. Mean standardised scores (Z-scores) on the subscales derived from the Decisional Balance Measure for men and women within stage of change category.

	Stage of Change			P value*	Total sample
	Pre-contemplation	Contemplation	Action		
Men					
Belief in Pros of weight loss	-0.86	0.07	0.22	<0.0001	-0.27
Belief in Cons of weight loss	-0.06	0.19	-0.02	0.03	0.02
Decisional balance (Pros-Cons)**	-0.80	-0.12	0.24	<0.0001	-0.29
Women					
Belief in Pros of weight loss	-0.75	0.44	0.50	<0.0001	0.27
Belief in Cons of weight loss	-0.29	0.27	-0.10	<0.0001	-0.03
Decisional balance (Pros-Cons)**	-0.46	0.17	0.60	<0.0001	0.30

*Based on analysis of variance; df=2,619 for men; df=2,626 for women. **Represents the difference between the Pros Z-score and the Cons Z-score.

7.4.5 Self efficacy beliefs and stage of change

Self efficacy beliefs varied according to stage of change among men and women (Table 7.6). Precontemplators were more likely than other subjects to be very confident that they could avoid gaining too much weight over the next two years, while those classified into the contemplation or action stages tended to be only moderately confident they could avoid weight gain. Similarly, proportionally more of the subjects who were contemplating or who taking action were only moderately confident they could lose three kilograms if they were to gain this amount of weight. Among women, contemplators were less

likely that those taking action to be confident they could lose weight, or maintain their weight.

Table 7.6. Percent distribution of self efficacy beliefs for men and women within stage of change category.

	Stage of Change			P value*	Total sample
	Pre-contemplation	Contemplation	Action		
Men					
Confidence can avoid too much weight gain					
(n)	(270)	(179)	(196)		(645)
Moderately or less	8.5	41.3	35.7		25.9
Quite confident	32.6	36.9	36.7		35.0
Very confident	58.9	21.8	27.6	<0.0001	39.1
Confidence could lose 3 kgs if it were gained					
(n)	(265)	(180)	(196)		(641)
Moderately or less	20.4	32.8	29.1		26.5
Quite confident	38.9	37.8	47.4		41.2
Very confident	40.8	29.4	23.5	<0.0001	32.3
Women					
Confidence can avoid too much weight gain					
(n)	(116)	(169)	(362)		(647)
Moderately or less	17.2	63.9	54.7		50.4
Quite confident	32.8	24.9	26.2		27.0
Very confident	50.0	11.2	19.1	0.001	22.6
Confidence could lose 3 kgs if it were gained					
(n)	(110)	(171)	(370)		(651)
Moderately or less	27.3	67.8	55.1		53.8
Quite confident	38.2	22.2	24.6		26.3
Very confident	34.5	9.9	20.3	<0.0001	20.0

*χ^2 test of significance.

7.4.6 Factors distinguishing subjects in different stages of change

The variables associated with stage of change in the univariate analyses among men or women were subjected to multivariate logistic regression analyses. However, prior to this the correlations between these variables were examined, since collinearity among predictor variables has been shown to affect regression coefficients (Breslow & Day, 1980). As might be expected, weight and fatness perceptions and concerns, and feelings of fatness were all highly correlated (>0.5). The categorical variables were therefore not included in the multivariate analyses, with the scale assessing feelings of fatness retained. The two self efficacy measures were also highly correlated, and so only the question

regarding confidence in ability to lose weight was retained for further analyses. Separate logistic regressions were performed for men and women to predict the likelihood of being at a later stage of change, relative to an earlier stage. The results of the logistic regression analyses are presented in Tables 7.7 - 7.10.

As Table 7.7 shows, men in the contemplation or action stages were more likely than men in the precontemplation stage to be classified as overweight or obese, to experience feelings of fatness, and to hold the view that benefits of weight loss outweighed the costs. They were also less likely to believe that chance factors influenced weight.

Table 7.7. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for the contemplation and action stages versus the precontemplation stage for variables significantly* associated with stage of change - men (n=545).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios** (95% C.I.)		P value**
Age group					
18-29	1.0		1.0		0.6
30-39	1.7	(1.0 - 3.0)	1.0	(0.5 - 2.1)	0.9
40-49	1.6	(1.0 - 2.2)	1.0	(0.5 - 2.0)	0.9
50-59	1.8	(1.0 - 3.3)	1.6	(0.7 - 3.4)	0.3
60 and over	1.3	(0.7 - 2.3)	0.9	(0.4 - 2.0)	0.8
BMI category					
Not overweight	1.0		1.0		
Overweight or obese	6.1	(4.2 - 9.0)	3.8	(2.3 - 6.2)	<0.0001
Feelings of fatness* **	5.2	(3.7 - 7.1)	3.9	(2.7 - 5.8)	<0.0001
Belief in internal control* **	1.0	(0.9 - 1.3)	1.0	(0.8 - 1.2)	0.8
Belief in chance factors* **	0.8	(0.6 - 0.9)	0.7	(0.6 - 0.9)	0.01
Belief in environmental factors* **	1.0	(0.8 - 1.2)	1.0	(0.8 - 1.2)	0.8
Decisional balance* **	2.4	(3.7 - 7.1)	2.1	(1.7 - 2.7)	<0.0001
Confidence could lose 3 kgs					
Very or quite confident	1.0		1.0		
Moderately, not very or not	1.8	(1.2 - 2.8)	0.9	(0.5 - 1.6)	0.8

*Significantly associated in univariate analyses for men or women; **adjusted for all other variables in the model; ***odds ratios relate to an increase of one standard deviation in this variable for the total data set.

Like the men, the women contemplating or taking action were significantly more likely than precontemplators to be classified as overweight or obese, to experience subjective feelings of fatness, and to hold the view that benefits of weight loss outweighed the costs (Table 7.8). Compared to women in the precontemplation stage, women in the contemplation or action stages were more likely to be only moderately or less confident they could lose three kilograms if they gained it.

Table 7.8. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for the contemplation and action stages versus the precontemplation stage for variables significantly* associated with stage of change - women (n=531).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios** (95% C.I.)		P value**
Age group					
18-29	1.0		1.0		0.3
30-39	0.6	(0.3 - 1.3)	0.4	(0.1 - 1.2)	0.09
40-49	0.6	(0.3 - 1.4)	0.3	(0.1 - 1.0)	0.04
50-59	1.1	(0.4 - 2.9)	0.3	(0.1 - 1.1)	0.07
60 and over	0.7	(0.3 - 1.7)	0.5	(0.1 - 2.1)	0.4
BMI category					
Not overweight	1.0		1.0		
Overweight or obese	9.3	(4.4 - 19.7)	2.6	(1.1 - 6.6)	0.04
Feelings of fatness* **	11.6	(6.9 - 19.5)	10.9	(5.8 - 20.1)	<0.0001
Belief in internal control* **	1.1	(0.9 - 1.4)	1.0	(0.7 - 1.4)	0.8
Belief in chance factors* **	0.9	(0.7 - 1.2)	0.8	(0.6 - 1.2)	0.3
Belief in environmental factors* **	1.3	(1.0 - 1.6)	0.7	(0.5 - 1.1)	0.1
Decisional balance* **	2.1	(1.7 - 2.7)	1.5	(1.1 - 2.1)	0.007
Confidence could lose 3 kgs					
Very or quite confident	1.0		1.0		
Moderately, not very or not	5.6	(3.2 - 9.9)	2.7	(1.3 - 5.7)	0.008

*Significantly associated in univariate analyses for men or women; **adjusted for all other variables in the model; ***odds ratios relate to an increase of one standard deviation in this variable for the total data set.

Men taking action for their weight at the time of the Weight Control Survey were more likely than men contemplating action to see the benefits of weight loss as outweighing the costs (Table 7.9).

Table 7.9. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for the action stage versus the contemplation stage for variables significantly* associated with stage of change - men (n=319).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios** (95% C.I.)		P value**
Age group					
18-29	1.0		1.0		0.04
30-39	0.6	(0.3 - 1.2)	0.6	(0.3 - 1.3)	0.2
40-49	0.8	(0.4 - 1.6)	0.8	(0.4 - 1.8)	0.6
50-59	0.6	(0.3 - 1.3)	0.6	(0.3 - 1.5)	0.3
60 and over	1.4	(0.7 - 3.2)	1.7	(0.7 - 4.1)	0.2
BMI category					
Not overweight	1.0		1.0		
Overweight or obese	1.0	(0.6 - 1.8)	0.9	(0.5 - 1.8)	0.8
Feelings of fatness* **	1.1	(0.8 - 1.5)	1.0	(0.7 - 1.5)	0.8
Belief in internal control* **	1.2	(1.0 - 1.5)	1.2	(0.9 - 1.5)	0.2
Belief in chance factors* **	1.1	(0.9 - 1.4)	1.2	(0.9 - 1.7)	0.1
Belief in environmental factors* **	1.1	(0.8 - 1.3)	1.0	(0.8 - 1.3)	0.9
Decisional balance* **	1.4	(1.1 - 1.8)	1.6	(1.2 - 2.1)	0.0005
Confidence could lose 3 kgs					
Very or quite confident	1.0		1.0		
Moderately, not very or not	0.9	(0.6 - 1.4)	0.9	(0.5 - 1.5)	0.6

*Significantly associated in univariate analyses for men or women; **adjusted for all other variables in the model; ***odds ratios relate to an increase of one standard deviation in this variable for the total data set.

Similarly, women in the action stage were significantly more likely than women classified as contemplators to hold the view that the Pros of weight loss outweighed the Cons (Table 7.10). Compared to women in the contemplation stage, women in the action stage were less likely to be only moderately or less confident they could lose three kilograms if they gained it.

Table 7.10. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for the action stage versus the contemplation stage for variables significantly* associated with stage of change - women (n=449).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios** (95% C.I.)		P value**
Age group					
18-29	1.0		1.0		0.4
30-39	0.6	(0.3 - 1.2)	0.6	(0.3 - 1.2)	0.2
40-49	0.8	(0.4 - 1.5)	0.9	(0.5 - 1.8)	0.8
50-59	1.0	(0.5 - 2.0)	1.2	(0.6 - 2.6)	0.6
60 and over	0.8	(0.4 - 1.5)	1.1	(0.5 - 2.3)	0.8
BMI category					
Not overweight	1.0		1.0		
Overweight or obese	0.8	(0.6 - 1.2)	0.8	(0.5 - 1.2)	0.3
Feelings of fatness* **	1.0	(0.8 - 1.3)	1.1	(0.8 - 1.5)	0.4
Belief in internal control* **	1.2	(1.0 - 1.4)	1.1	(0.9 - 1.4	0.2
Belief in chance factors* **	0.7	(0.6 - 0.9)	0.9	(0.7 - 1.1)	0.2
Belief in environmental factors* **	0.8	(0.7 - 1.0)	0.9	0.7 - 1.1)	0.3
Decisional balance* **	1.4	(1.2 - 1.7)	1.4	(1.1 - 1.7)	0.003
Confidence could lose 3 kgs					
Very or quite confident	1.0		1.0		
Moderately, not very or not	0.5	(0.4 - 0.8)	0.6	(0.4 - 1.0)	0.04

*Significantly associated in univariate analyses for men or women; **adjusted for all other variables in the model; ***odds ratios relate to an increase of one standard deviation in this variable for the total data set.

Each of these analyses was repeated to assess two-way interactions between age group and the other explanatory variables, with a significance level of $p<0.01$ chosen for the inclusion of interactions. None of the interaction terms were significant predictors of stage membership.

The multivariate analyses were repeated, but were restricted to those subjects classified as overweight or obese (described here simply as overweight). For the overweight women, none of the explanatory variables predicted stage (contemplation or action, versus precontemplation; action versus contemplation). Compared to overweight men in the precontemplation stage, overweight men in the contemplation or action stages were more likely to experience feelings of fatness (OR=4.9, 95% CI=2.9 - 8.2), and to hold the view

that benefits of weight loss outweighed the costs (OR=2.0, 95% CI=1.4 - 2.7). Only the measure of decisional balance differentiated overweight men in the action stage from overweight men in the contemplation stage. The logistic regression analysis showed that overweight men in the action stage were more likely than overweight men in the contemplation stage to believe that the benefits of weight loss were greater than the costs (OR=1.9, 95% CI=1.4 - 2.6).

7.5 Discussion

This data presented in this chapter provides a unique insight into population weight-control behaviours. Previous research has tended to focus exclusively on weight-loss, describing the prevalence and socio-demographic distribution of past and current weight-loss behaviour. This study shows that, in addition to those taking action for their weight at any particular time, there are many adults who are considering trying to lose weight, or to maintain their current weight. More than two-thirds of adults were currently taking action or considering taking action for their weight. In addition, this study has shown that stage of change for weight control is associated with sex, age, BMI category, as well as with a range of psychosocial variables.

More than twice as many men as women in the Weight Control Survey were classified as precontemplators. The finding that two-thirds of the men in the acceptable BMI range did not intend to take action to control their weight may not be reason for concern, since they did not currently have a weight problem. However, from a public-health perspective it is a matter of some concern that one-third of the men who were already overweight were classified as precontemplators. These men not only had no intention of trying to reduce their weight, they were not even considering taking action to avoid further weight gain. The sexes were markedly different in this regard. Less than one in five women were classified as precontemplators, with less than one in twenty women in the overweight or obese category so classified. Overweight and obese women were therefore much more liable than overweight or obese men to be taking action for their weight or thinking of doing so.

It is important to recognise, however, that even though a large proportion of women were actively trying to lose or maintain weight, or contemplating taking action, in some cases these actions may not be desirable. For example, it would not generally be considered healthy for women who were already

underweight to attempt further weight loss, or for women trying to lose or maintain weight to do so by adopting undesirable weight-control strategies. As the data presented in Chapter 5 demonstrated, a small group of women were involved in such behaviours. In spite of this, the results presented in this chapter show that a majority of women are motivated to control their weight. Many men, on the other hand, have no intention of doing anything for their weight, suggesting that, in order to reduce the prevalence of overweight and obesity, future public-health initiatives will have to target men specifically.

The univariate analyses confirmed that there were significant differences between individuals in the different stages of change in terms of their weight perceptions and concerns, feelings of fatness, weight locus of control, and decisional balance. The multivariate analyses show that, after controlling for other variables in the model, weight status (BMI category), subjective feelings of fatness, the belief that weight was influenced by chance factors and the measure of decisional balance differentiated men who were trying to lose or maintain weight, or were contemplating doing so, from those who had no intention of taking action. The findings were similar for women, with BMI category, feelings of fatness, decisional balance and self-efficacy significantly predicting the likelihood that women were contemplating or taking action. Only two variables differentiated subjects taking action, from those contemplating doing so. For men and women, the measure of decisional balance predicted membership of the action stage, and for women self efficacy was also a significant predictor.

In this study women in the precontemplation stage were more likely that those in the contemplation or action stages to be confident that they could lose weight. However, many previous studies which have examined self efficacy and stage of change for other behaviours found that self efficacy beliefs increased along with stage (Booth, et al., 1995; DiClemente, et al., 1985; Marcus, et al., 1994; Marcus & Owen, 1992; Marcus, et al., 1992c; Rossi, et al., 1994b). In interpreting the findings of the present study it is important to recognise that stage of change was examined for the whole population, and thus included individuals from across the weight spectrum. The univariate analyses show that precontemplators were less likely than those in the contemplation or action stages to actually have a weight problem, or to perceive themselves as being overweight or fat. Based on this, it is not surprising that precontemplators felt confident they could control their weight, while those contemplating or actually taking action more often lacked confidence. However, women in

precontemplation were more likely that those in the contemplation or action stages to be confident they could lose weight even after controlling for actual weight and subjective feelings of fatness.

Two recent studies which have examined self efficacy in relation to stage of change for smoking cessation (Owen, et al., 1992) and stage of change for dietary fat reduction (Sporny & Contento, 1995) have also found that confidence in the ability to perform the particular behaviour was higher among precontemplators than contemplators. In the case of the smoking study, the investigators argued that the contemplators' lower confidence may have been attributable to their past unsuccessful attempts to change their behaviour. In the present study, this may also explain the difference between the precontemplators and contemplators. It is possible that women in the precontemplation stage had made fewer attempts to control their weight in the past than the contemplators or the women taking action, and as a consequence they were more likely to be confident they could control their weight.

The association between stage of change for weight control and decisional balance observed in this study are consistent with the findings of previous studies (Prochaska, et al., 1994). The pros outweighed the cons for subjects in the action stage, while this situation was reversed for precontemplators. In their review of decisional balance and stage of change for twelve problem behaviours, Prochaska et al (1994) found that for all of the behaviours examined, the pros of changing were higher in the contemplation stage than in precontemplation, and the cons of changing were lower in the action stage than in contemplation. Based on these observations, they argued that progress from precontemplation to contemplation involves an increase in the evaluation of the pros, while progress from contemplation to action involves a decrease in the cons. The results presented in this chapter support this argument. However, among the men in this study, the increase in the pros between the contemplation and action stages was approximately the same as the decrease in the cons.

The results presented in the chapter extend our understanding of population weight-control behaviours. They show that a substantial majority of adults are taking action to lose or maintain weight, or are considering taking action. However, this study shows that as many as four in ten men have no intention of taking steps to control their weight, suggesting that men should be targeted in future initiatives aimed at reducing the prevalence of obesity. These findings

further suggest that, in promoting weight control, future public-health initiatives will need to focus particularly on the benefits associated with controlling weight, in order to move adults through the stages of behaviour change, from precontemplation to action. While the findings regarding the differences between individuals in the various stages are based on a large population-based study, they are limited by the fact that they are cross-sectional. In the following chapter the multivariate models developed in this chapter will be replicated, using prospective data collected in the Weight Control Follow-up.

CHAPTER 8

A FOLLOW-UP STUDY OF STAGE OF CHANGE FOR WEIGHT CONTROL

8.1 Introduction

The previous chapter described the prevalence and correlates of the stages of change for weight control, based on data derived from the Weight Control Survey. That study provided valuable information on the population prevalence and socio-demographic distribution of the stages of change for weight control. It also demonstrated that psychosocial variables such as decisional balance and self efficacy distinguished groups of adults in different stages of change.

However, the study described in Chapter 7 is limited by the fact that it was based on a cross-sectional sample and utilised a simple self-report measure of stage of change. The cross-sectional nature of that study means that differences in decisional balance and self efficacy observed between the groups could be attributable to other differences between the stage of change groups. A key feature of the SOC Model is that it provides a framework within which to understand the dynamic nature of behaviour change (Marcus, et al., 1992). It is therefore important to test the findings of any cross-sectional analyses in prospective studies (Prochaska, et al., 1994).

In Chapter 6 data were presented which showed that the stage of change measure used in this study is reliable and compares favourably with a similar measure. However, it remains to be determined whether subjects classified into the different stages actually differ from each other as we would predict. For example, given that health authorities recommend that people control their weight by balancing food intake with physical activity (National Health and Medical Research Council, 1992), and over 85 per cent of those taking action for their weight in this study did so by means of diet, subjects in the action stage might be expected to have 'healthier' dietary intakes than others.

The primary purpose of this chapter is to describe the dynamics of weight-control behaviour using prospective data. As well as describing movement

from one stage to another by individuals over the one year follow-up period, this chapter examines the utility of the variables identified in the previous chapter in predicting movement through the stages. A secondary aim is to establish the criterion validity of the stage of change measure used in this study.

8.2 Aims

To establish the criterion validity of the stage of change measure used in this study, by examining how dietary fat intake varies according to stage of change for weight control.

To describe movement through the stages of change for weight control by individuals one year after the Weight Control Survey.

To examine whether movement through the stages of change by individuals is associated with the variables (collected in the Weight Control Survey) which were identified from the cross-sectional analyses.

8.3 Methods

The data which are presented in this chapter are derived from the Weight Control Survey and the Weight Control Follow-up. The methodological details of these surveys were discussed in Chapter 3.

Subjects who had participated in the Weight Control Survey were recontacted one year later and surveyed by mail about their current weight-control behaviours and intentions, using the same questions which had been administered previously. On the basis of their responses to these questions, subjects were again classified into one of three stages of change according the algorithm described in Chapter 6.

Dietary behaviour was assessed by means of a 17 item instrument (the 'Short Fat Questionnaire', or SFQ) developed in Australia to assess fat-intake behaviour. The validity of the SFQ has been established by comparing scores on it with various estimates of fat intake derived from a semi-quantitative food frequency questionnaire, and scores on the SFQ have been shown to be

reproducible (Dobson, et al., 1993). Details of the scoring of the responses to the 17 items are included in Appendix 10. The maximum possible score is 63 and the minimum is zero.

Statistical analysis

Analysis of variance was performed to examine the relationship between fat-intake score and stage of change for weight-control using the anova procedure in SPSS (SPSS Inc., 1988).

Cross-tabulations and analysis of variance were performed to examine the relationship between movement through the stages of change at follow-up and variables collected in the Weight Control Survey which were shown in the previous chapter to distinguish subjects in the different stages of change (age, BMI, feelings of fatness, belief in internal control, belief in chance factors, belief in environmental factors, decisional balance, self-efficacy). These analyses were performed using SPSS (SPSS Inc., 1988).

These variables were then subjected to multivariate analysis. Separate logistic regressions (forced entry method) were performed for men and women, and for different baseline stages of change to predict the likelihood of progressing to a later stage of change at the time of follow-up (eg from contemplation to action), as opposed to staying in the same stage or relapsing to an earlier stage. Separate logistic regressions were also performed for men and women in the action stage to predict the likelihood of relapse (from action to contemplation or precontemplation), as opposed to remaining in the action stage.

8.4 Results

8.4.1 Response to the Weight-Control Follow-up

Of the 1342 participants in the 1993 Weight Control Survey, four had died by the time of the Weight Control Follow-up, nine women were pregnant at the time of the follow-up, and a further four women had had a child during the previous twelve months. These 17 subjects were classified as ineligible, leaving 1325 eligible subjects. Of these, 1140 took part in the 1994 Weight Control Follow-up, representing a response rate of 86 per cent.

For the purpose of this section, the 1140 subjects who provided useable data in the Weight Control Follow-up will be defined as participants, and the remaining 202 subjects lost to follow-up for whatever reason will be defined as non-participants. Participation in the Weight Control Follow-up did not vary by sex, 1993 Body Mass Index category, or 1993 Stage of Change category. However, proportionally fewer men (χ^2=27.45, df=4, p<0.0001) and women (χ^2=18.50, df=4, p=0.001) aged 18-29 years participated in the Weight Control Follow-up (Table 8.1).

Table 8.1. Participation rates by age for men and women in the Weight Control Follow-up (expressed as percentages of participants in the Weight Control Survey).

Age group (years)	Men	Women
18-29	70.3%	72.4%
30-39	83.6%	81.5%
40-49	89.4%	85.1%
50-59	91.8%	85.3%
60 and over	89.8%	92.0%
TOTAL	85.7%	84.2%

8.4.2 Fat intake score and stage of change

Complete data on fat-intake behaviour were available for 1115 of the 1140 participants in the Weight Control Follow-up. The mean fat-intake score for men was 25.86 (se=0.29) and for women was 22.50 (se=0.30), figures which are similar to those obtained for another Australian population (Dobson, et al., 1993). Table 8.2 presents the mean fat-intake scores for men and women within stage of change category. Analysis of variance showed that fat-intake did vary with stage of change, with subjects in the action stage having lower scores than contemplators or precontemplators. These differences remained statistically significant, after adjusting for age group and BMI category (data not shown).

Table 8.2. Mean fat-intake scores (and standard errors) derived from the Short Fat Questionnaire for men and women within stage of change category.

	Stage of Change			P value*
	Pre-contemplation	Contemplation	Action	
Men	26.8 (0.44)	27.5 (0.59)	24.0 (0.45)	<0.0001
Women	24.0 (0.71)	24.7 (0.59)	21.2 (0.34)	<0.0001

*Based on analysis of variance; df=2,555 for men; df=2,554 for women.

8.4.3 Change in stage classification since the Weight Control Survey

At the time of the Weight Control Follow-up 37.8 per cent of men and 18.7 per cent of women were classified as precontemplators, 22.8 per cent of men and 22.6 per cent of women were contemplators, and 39.4 per cent of men and 58.7 per cent of women were taking action to control their weight. These differences in the distribution of stage of change were significantly different (χ^2=57.99, df=2, p<0.0001).

A comparison of stage classification at the time of the Weight Control Survey with stage classification at the time of the Weight Control Follow-up showed that a substantial number of subjects had moved from one stage to another (Table 8.3). At follow-up, 20.6 per cent of subjects had moved from an earlier stage of change stage of change to a later stage (eg from contemplation to action), 66.7 per cent remained in the same stage, and 12.7 per cent had moved from a later stage or change to an earlier stage (eg from contemplation to precontemplation).

Table 8.3. Percent distribution of Stage of Change category at the time of the Weight Control Follow-up for men and women within Stage of Change category at the time of the Weight Control Survey.

Stage of Change (Weight Control Follow-up)	Stage of Change (Weight Control Survey)		
	Pre-contemplation	Contemplation	Action
Men			
(n)	(242)	(148)	(172)
Precontemplation	69.0	16.2	12.2
Contemplation	15.7	44.6	14.0
Action	15.3	39.2	73.8
Women			
(n)	(104)	(150)	(311)
Precontemplation	76.0	7.3	4.8
Contemplation	14.4	43.3	15.4
Action	9.6	49.3	79.7

Some subjects had progressed through the stages during the period between the surveys, but had not maintained this progress. Eighteen per cent of precontemplators and contemplators at the time of the Weight Control Survey reported they had actively tried to lose weight or avoid gaining weight during the year between the surveys, but were not doing so at the time of the Weight Control Follow-up. However, due to missing data for the whole sample

regarding behaviour between the two surveys, these variables were not subjected to further analyses.

8.4.4 Progress by precontemplators and contemplators

Since some subjects had moved from a earlier stage of change to a later stage at the time of follow-up, it was possible to compare the characteristics of those who had progressed through the stages with those who had not. Since subjects already in the action stage, by definition, could not progress, the analyses presented in this section were restricted to subjects who were in the precontemplation or contemplation stages at the time of the Weight Control Survey. Subjects who were in the precontemplation stage at the time of the Weight Control Survey and had moved to the contemplation or action stages at follow-up, and subjects in the contemplation stage who moved to the action stage were classified as having progressed.

Thirty-six per cent of subjects in the precontemplation or contemplation stages at the time of the Weight Control Survey had progressed to a later stage at the time of the Weight Control Follow-up (Table 8.4). Progress through the stages of change for weight control did not vary by sex or age group. Stage of change at the time of the Weight Control Survey was not associated with progress through the stages among men. However, among women, proportionally more of those in the contemplation stage than in precontemplation progressed as would have been expected. Progress through the stages was also associated with BMI category. The proportion of men and women who progressed through the stages increased with BMI category.

Table 8.5 shows that, compared to men who had not progressed through the stages of change at the time of follow-up, those who did progress were more likely to report feelings of fatness, to believe in the pros of weight loss, and they were also more likely to believe that the benefits of weight loss outweighed the costs. The situation for the women was essentially the same as for the men, although the women who had progressed through the stages were also less likely than those who had not to see the cons associated with trying to lose weight (Table 8.5).

Confidence in the ability to lose three kilograms if it were to be gained was not associated with progress through the stages of change for weight control for men or women (data not shown).

Table 8.4. Percent distribution of progress through the stages of change at the time of follow-up by subjects in the precontemplation or contemplation stages in 1993 within sex, age group, and BMI category in 1993.

	(n)	Progressed through stages	Did not progress	P value*
Total sample	(644)	36.0	64.0	-
Sex				
Men	(390)	34.1	65.9	
Women	(254)	39.0	61.0	0.2
Stage in 1993 - men				
Precontemplation	(242)	31.0	69.0	
Contemplation	(148)	39.2	60.8	0.1
Stage in 1993 - women				
Precontemplation	(104)	24.0	76.0	
Contemplation	(150)	49.3	50.7	<0.0001
Age group - men				
18-29	(51)	29.4	70.6	
30-39	(90)	28.9	71.1	
40-49	(88)	44.3	55.7	
50-50	(72)	36.1	63.9	
60 and over	(89)	30.3	69.7	0.2
Age group - women				
18-29	(23)	47.8	52.2	
30-39	(62)	40.3	59.7	
40-49	(66)	43.9	56.1	
50-50	(34)	35.3	64.7	
60 and over	(69)	31.9	68.1	0.5
BMI category - men				
Underweight	(12)	8.3	91.7	
Acceptable	(159)	21.4	78.6	
Overweight	(176)	43.2	56.8	
Obese	(43)	51.2	48.8	<0.0001
BMI category - women				
Underweight	(41)	14.6	85.4	
Acceptable	(123)	38.2	61.8	
Overweight	(57)	47.4	52.6	
Obese	(33)	57.6	42.4	<0.0001

*χ^2 test of significance.

Table 8.5. Mean standardised scores (Z-scores) on the subscales derived from the Body Attitudes Questionnaire, the Dieting Beliefs Inventory, and the Decisional Balance Measure for men and women in the precontemplation or contemplation stages at the time of the Weight Control Survey for those who progressed through the stages of change and those who did not.

	Progressed through stages	Did not progress	P value*
Men			
Feelings of fatness	-0.55	-0.73	0.03
Belief in internal control	0.00	0.04	0.7
Belief in chance factors	0.01	0.01	0.9
Belief in environmental factors	-0.06	-0.01	0.7
Belief in Pros of weight loss	-0.30	-0.62	0.001
Belief in Cons of weight loss	-0.07	0.07	0.2
Decisional balance (Pros-Cons)**	-0.22	-0.69	<0.0001
Women			
Feelings of fatness	0.50	-0.06	<0.0001
Belief in internal control	0.01	-0.24	0.07
Belief in chance factors	0.14	0.04	0.5
Belief in environmental factors	0.22	0.03	0.1
Belief in Pros of weight loss	0.24	-0.23	0.001
Belief in Cons of weight loss	-0.15	0.15	0.03
Decisional balance (Pros-Cons)**	0.39	-0.38	<0.0001

*Based on a two-tailed t-test; **Represents the difference between the Pros Z-score and the Cons Z-score.

Multivariate analysis showed that among men in the precontemplation stage at the time of the Weight Control Survey, those who had progressed to a later stage of change at the time of the follow-up were more likely to be overweight or obese, and to see the benefits of weight loss outweighing the costs (Table 8.6).

Table 8.6. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for progress through the stages of change versus no progress among men in the precontemplation stage at the time of the Weight Control Survey (n=201).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios* (95% C.I.)		P value*
Age group					
18-29**	1.0		1.0		0.6
30-39	1.6	(0.6 - 4.4)	1.3	(0.4 - 4.0)	0.6
40-49	2.8	(1.1 - 7.6)	1.7	(0.6 - 5.3)	0.4
50-59	1.5	(0.5 - 4.6)	1.1	(0.3 - 3.6)	0.9
60 and over	1.0	(0.3 - 2.7)	0.7	(0.2 - 2.3)	0.5
BMI category					
Not overweight**	1.0		1.0		
Overweight or obese	3.9	(2.1 - 7.3)	3.5	(1.7 - 7.0)	0.0005
Feelings of fatness* **	1.6	(1.0 - 2.5)	1.7	(0.9 - 3.1)	0.1
Belief in internal control* **	0.7	(0.5 - 1.0)	0.7	(0.4 - 1.1)	0.06
Belief in chance factors* **	0.9	(0.7 - 1.2)	1.0	(0.7 - 1.4)	0.9
Belief in environmental factors* **	0.8	(0.6 - 1.0)	0.7	(0.5 - 1.1)	0.1
Decisional balance* **	1.6	(1.2 - 2.3)	1.7	(1.1 - 2.5)	0.01
Confidence could lose 3 kgs					
Very or quite confident**	1.0		1.0		
Moderately, not very or not	2.2	(1.1 - 4.4)	2.2	(0.9 - 3.1)	0.08

* Adjusted for all other variables in the model; ** referent category; *** odds ratios relate to an increase of one standard deviation in this variable for the total data set.

Multivariate analysis showed that women who progressed through the stages from the precontemplation stage were more likely to experience feelings of fatness, and to see the benefits of weight loss outweighing the costs (Table 8.7).

Table 8.7. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for progress through the stages of change versus no progress among women in the precontemplation stage at the time of the Weight Control Survey (n=71).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios* (95% C.I.)		P value*
Age group					
18-39**	1.0		1.0		0.09
39-49	1.5	(0.5 - 5.1)	0.9	(0.2 - 4.3)	0.9
50 and over	0.5	(0.1 - 1.9)	0.1	(0.0 - 0.9)	0.04
BMI category					
Not overweight**	1.0		1.0		
Overweight or obese	0.9	(0.2 - 5.3)	0.3	(0.0 - 3.8)	0.4
Feelings of fatness* **	5.1	(1.8 - 14.4)	7.1	(1.9 - 27.1)	0.004
Belief in internal control* **	1.0	(0.6 - 1.7)	1.2	(0.5 - 2.5)	0.7
Belief in chance factors* **	1.2	(0.7 - 2.0)	2.2	(0.9 - 5.8)	0.1
Belief in environmental factors* **	1.3	(0.7 - 2.3)	0.6	(0.3 - 1.4)	0.2
Decisional balance* **	1.6	(1.0 - 2.7)	2.9	(1.3 - 6.7)	0.01
Confidence could lose 3 kgs					
Very or quite confident**	1.0		1.0		
Moderately, not very or not	2.1	(0.6 - 7.0)	2.8	(0.5 - 14.0)	0.2

* Adjusted for all other variables in the model; ** referent category; *** odds ratios relate to an increase of one standard deviation in this variable for the total data set.

For men in the contemplation stage at the time of the Weight Control Survey, the measure of decisional balance was the only significant predictor of progress to the action stage, after controlling for other variables in the model (Table 8.8).

Table 8.8. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for progress through the stages of change versus no progress among men in the contemplation stage at the time of the Weight Control Survey (n=127).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios* (95% C.I.)		P value*
Age group					
18-29**	1.0		1.0		0.4
30-39	0.5	(0.1 - 1.9)	0.3	(0.1 - 1.6)	0.2
40-49	1.0	(0.3 - 3.8)	0.8	(0.2 - 3.3)	0.8
50-59	0.6	(0.2 - 2.1)	0.4	(0.1 - 1.9)	0.2
60 and over	0.7	(0.2 - 3.2)	0.6	(0.1 - 3.7)	0.6
BMI category					
Not overweight**	1.0		1.0		
Overweight or obese	1.7	(0.7 - 4.5)	3.1	(0.9 - 10.9)	0.09
Feelings of fatness* **	1.1	(0.6 - 1.7)	0.8	(0.1 - 2.0)	0.6
Belief in internal control* **	1.1	(0.8 - 1.6)	1.2	(0.8 - 1.8)	0.4
Belief in chance factors* **	1.1	(0.7 - 1.5)	1.1	(0.7 - 1.9)	0.5
Belief in environmental factors* **	1.1	(0.8 - 1.6)	1.1	(0.7 - 1.7)	0.7
Decisional balance* **	1.6	(1.0 - 2.4)	1.8	(1.1 - 3.0)	0.02
Confidence could lose 3 kgs					
Very or quite confident**	1.0		1.0		
Moderately, not very or not	1.0	(0.5 - 2.1)	1.0	(0.4 - 2.4)	0.9

* Adjusted for all other variables in the model; ** referent category; *** odds ratios relate to an increase of one standard deviation in this variable for the total data set.

Like the men, the only significant predictor for the women who progressed to the action stage from contemplation was the difference between the perceived benefits and costs of taking action for their weight (Table 8.9).

Table 8.9. Unadjusted and adjusted odds ratios (and 95% confidence intervals) from logistic regression models for progress through the stages of change versus no progress among women in the contemplation stage at the time of the Weight Control Survey (n=131).

Independent variables	Unadjusted Odds Ratios (95% C.I.)		Adjusted Odds Ratios* (95% C.I.)		P value*
Age group					
18-29**	1.0		1.0		0.4
30-39	0.6	(0.2 - 2.0)	0.3	(0.1 - 1.2)	0.08
40-49	0.6	(0.2 - 2.0)	0.4	(0.1 - 1.6)	0.2
50-59	0.7	(0.2 - 2.8)	0.2	(0.0 - 1.3)	0.1
60 and over	0.5	(0.1 - 1.8)	0.2	(0.0 - 1.0)	0.05
BMI category					
Not overweight**	1.0		1.0		
Overweight or obese	1.2	(0.6 - 2.5)	1.5	(0.6 - 3.6)	0.4
Feelings of fatness* **	1.1	(0.7 - 1.7)	0.5	(0.3 - 1.0)	0.06
Belief in internal control* **	1.3	(0.9 - 1.8)	1.5	(1.0 - 2.5)	0.07
Belief in chance factors* **	0.9	(0.6 - 1.3)	1.0	(0.6 - 1.7)	0.9
Belief in environmental factors* **	1.1	(0.8 - 1.6)	1.4	(0.8 - 2.3)	0.3
Decisional balance* **	1.9	(1.3 - 2.9)	2.3	(1.5 - 3.6)	0.0004
Confidence could lose 3 kgs					
Very or quite confident**	1.0		1.0		
Moderately, not very or not	1.1	(0.5 - 2.3)	1.9	(0.7 - 5.2)	0.2

* Adjusted for all other variables in the model; ** referent category; *** odds ratios relate to an increase of one standard deviation in this variable for the total data set.

8.4.5 'Relapse' by subjects in the action stage

Since some of the subjects who were in the action stage at the time of the Weight Control Survey were classified as contemplators or precontemplators at the time of the follow-up, it was also possible to compare the characteristics of those who had 'relapsed' with those who had not. Twenty-two per cent (108/483) of subjects in the action stage at the time of the Weight Control Survey had relapsed, and this did not vary by sex, age or BMI category.

Table 8.10 shows that the men in the action stage who relapsed were more likely to believe that their weight was influenced by chance, while the women who relapsed were less likely to perceive the benefits of weight loss as outweighing the cons.

Table 8.10. Mean standardised scores (Z-scores) on the subscales derived from the Body Attitudes Questionnaire, the Dieting Beliefs Inventory, and the Decisional Balance Measure for men and women in the action stage at the time of the Weight Control Survey for those who had relapsed and those who had not.

	Relapsed	Did not relapse	P value*
Men			
Feelings of fatness	-0.22	-0.11	0.4
Belief in internal control	0.20	0.13	0.7
Belief in chance factors	0.27	-0.23	0.003
Belief in environmental factors	-0.24	-0.06	0.3
Belief in Pros of weight loss	0.24	0.21	0.8
Belief in Cons of weight loss	-0.10	-0.01	0.6
Decisional balance (Pros-Cons)**	0.34	0.22	0.5
Women			
Feelings of fatness	0.55	0.76	0.09
Belief in internal control	-0.01	0.10	0.5
Belief in chance factors	-0.11	-0.14	0.8
Belief in environmental factors	-0.10	0.01	0.5
Belief in Pros of weight loss	0.33	0.53	0.08
Belief in Cons of weight loss	0.11	-0.15	0.06
Decisional balance (Pros-Cons)**	0.22	0.68	0.006

*Based on a two-tailed t-test; **Represents the difference between the Pros Z-score and the Cons Z-score.

Multivariate analyses showed that, after controlling for other variables in the model, belief in chance factors remained a significant predictor of relapse among men (OR=3.2, 95% CI=1.8 - 5.9), and the measure of decisional balance significantly predicted relapse among women (OR=0.7, 95% CI=0.5 - 0.9).

8.5 Discussion

This study assessed fat-intake behaviour to determine whether individuals in the action stage for weight control had lower fat intakes than others. Although the instrument used does not assess actual fat intake, it does provide a measure which correlates with fat consumption in individuals (Dobson, et al., 1993). Ideally, other dietary components (eg total energy intake) would have also been assessed, to determine whether subjects taking action had diets which were 'healthier' in other respects, but a detailed assessment of dietary intake was not feasible in this survey. Although limited to only one aspect of diet, the data presented here support the criterion validity of the stages of change for weight control. As predicted, subjects taking action to lose or control weight had lower fat intake scores than those in the contemplation or precontemplation stage.

The prospective data presented in this chapter provide an insight into the dynamics of population weight-control behaviour. They show that over one-third of the adults who had not been taking action to control their weight at the time of the Weight Control Survey were attempting to do so at follow-up one year later. The analyses of the predictors of progress through the stages generally support the findings of the cross-sectional study reported in Chapter 7. In particular, they confirm the utility of decisional balance in differentiating men and women who moved through the stages of change for weight control from those who did not, and in predicting relapse among the women who were taking action. Subjects who saw more benefits than costs in taking action for their weight were more likely to progress toward the action stage. Among women taking action, those who perceived more costs than benefits were more likely to cease their action.

The findings of this follow-up survey provide further confirmation that weight control is a common phenomenon. However, while it is encouraging that overweight and obese individuals were more likely than others to have progressed through the stages of change for weight control, almost a half of them were not actively trying to lose or maintain weight at follow-up. It is also

disturbing that more than half of the individuals who had been contemplating taking steps to control their weight were not doing so at the time of the Weight Control Follow-up. Similarly, it is a matter of concern that one in five adults who had been taking action for their weight were not doing so at the time of follow-up, and that almost one in five adults in precontemplation or contemplation who had attempted to lose weight or avoid weight gain had not maintained this behaviour. That so many men and women were motivated to control their weight or had actually attempted to do so does suggest, however, that effective public-health initiatives in this area are likely to receive widespread community support.

One of the ultimate goals of any such initiative will be to increase the proportion of adults who successfully control their weight over the long-term. However, the data presented here suggest that many adults are unable or unwilling to maintain weight-control behaviour. Data from the United States show that the median duration of a weight loss attempt is only six weeks for men and four weeks for women (Williamson, et al., 1992). Comparable data do not exist for Australia, although a survey found that 40 per cent of women who had dieted over the previous year had spent only one month doing so (Crawford & Worsely, 1988). Unfortunately, neither study reported whether those who had attempted weight loss subsequently took action to maintain their weight. However, it seems likely that many adults who lose weight do not take steps to maintain weight, having achieved their weight goal, and that among those who try and fail, many simply give-up for some time. However, from a public-health perspective, the challenge will be to promote long-term weight-control among all adults, regardless of weight status or past weight-control behaviour.

In summary, the study described in this chapter further illustrates the value of the Stage of Change Model in understanding population weight-control behaviours. It provides data which corroborates the validity of the stage measure used in this study, and demonstrates the utility of the Model in examining transitions between the different stages of change for weight control.

CHAPTER 9

CONCLUSIONS

9.1 Public-health implications

The studies described in this thesis have important implications for the development of public-health policies and initiatives aimed at reducing the prevalence of overweight and obesity. Since many of the key issues have already been addressed in the discussion sections of earlier chapters, I will provide only a brief overview in this concluding chapter.

In this thesis I have examined weight-control behaviours and beliefs across the whole population, rather than restricting my analysis only to those already overweight/obese or those seeking treatment for a weight problem. This focus on the whole population is based on a recognition that average weights have increased over the past few decades, and that this has in turn led to a dramatic rise the proportion of adults classified as overweight or obese. In response to this, health authorities have released reports that emphasise the need to initially halt the trend of increasing weights, before overweight and obesity can be reduced. This is clearly illustrated by the following statements included in the 1995 revisions to the Dietary Guidelines for Americans:

> Overall the revised guideline places less emphasis on weight loss and more emphasis on weight maintenance. The recent well-documented increases in the prevalence of obesity emphasize that weight control represents the essential first step toward a reduction of the prevalence of obesity in the population (Dietary Guidelines Advisory Committee, 1995; p23).

> Maintenance of a healthy weight is still a major goal but is now secondary to weight maintenance at any level (Dietary Guidelines Advisory Committee, 1995; p23).

This emphasis on weight maintenance, regardless of current weight status, is also reflected in 'obesity' prevention strategies produced by health authorities in Australia (National Health and Medical Research Council, 1995) and Britain (Nutrition and Physical Activity Task Forces, 1995). In approaching overweight and obesity from a public health perspective, it is therefore

important that we not only attempt to gain an understanding of the distribution and determinants of weight-loss behaviours among those who already have a significant weight problem, but that we examine weight control (weight loss and and weight-maintenance) in the whole population.

The Weight Control Survey shows that weight loss is an issue of concern to a significant portion of the population, confirming the findings of previous Australian studies. However, as well as the substantial number of men and women attempting to lose weight at any particular time, there are many actively trying to avoid weight gain. This study consequently extends our understanding of population weight-control behaviour, which has been primarily based upon studies which have focussed on weight loss. It shows that weight-loss and weight-maintenance behaviours are common, regardless of sex, age, and current weight status. The finding that more than one in five adults already try to maintain their weight is important, since future efforts to promote weight control are likely to place more emphasis on weight maintenance. An awareness of the characteristics of those taking such action and of the strategies employed by them is likely to be helpful in planning public health initiatives that promote and support weight-maintenance behaviour.

The review of the literature I presented in Chapter 2 demonstrates that much of the research into weight-control behaviours has been atheoretical in nature, and I argued that, to develop public-health strategies to reduce the prevalence of overweight and obesity, it is important that we better understand the cognitive determinants of weight control. I stressed, however, that the examination of population-wide weight-control behaviours is a relatively new area of research, with much of the previous work having been conducted only in clinical or treatment populations, and I also highlighted that many behavioural theories that might be used to explain weight-control behaviour have themselves only been applied in clinical or treatment environments. In adopting a behavioural epidemiology perspective to examine weight control I have therefore drawn upon a well-developed theoretical model (the Stage of Change Model) that has been applied in population-based studies of other health behaviours relevant to weight control and that has been useful in understanding these behaviours in a public health context.

In Chapter 2 I suggested that the Stage of Change (SOC) Model has certain advantages over other theories of behaviour for examining population weight

control. One of the reasons that interventions have achieved disappointing results is because they applied action-oriented strategies to participants who were not yet ready for action (Rossi et al, 1995). By recognising that people are at various stages of readiness to change their weight-control behaviour, rather than only focusing on those who are ready to change their behaviour, the SOC Model provides an opportunity to examine weight control across the whole population. More importantly though, the SOC Model provides a framework within which to integrate components of other behavioural theories to examine the cognitive predictors of the different stages of change. The application of the SOC Model to understand weight control may therefore allow us to move away from action-oriented programs that focus only on a small proportion of the population, and to develop stage-specific public health intervention strategies that are relevant to individuals in every stage of change.

Using the Stage of Change Model, adults in the Weight Control Survey could be reliably classified into three distinct groups, representing their stage of readiness to change weight-control behaviour. Precontemplators were those who were not currently taking action to lose or maintain weight and who had no intention of doing so, contemplators included those considering taking action over the coming year, and those actively trying to lose or maintain weight were classified into the action stage. The validity of these stages was supported by the finding that, as predicted, those taking action to lose or control weight had lower fat-intake scores than contemplators or precontemplators. It is important to reiterate though, that the application of theory to understand population-wide weight-control behaviours is an emerging area of research, and this study is the first to examine these issues using the SOC Model. However, while additional research is required to confirm these findings, the results of this study do provide initial support for the utility of the SOC Model in understanding weight-control behaviours, and they do have important implications for the development of public health interventions.

In particular, the results of this study suggest that men need to be more aggressively targeted in the future. More than 40 per cent of men surveyed were not contemplating trying to control their weight, and of particular concern is the finding that one in three overweight men had no intention of attempting weight loss, or even of trying to avoid further weight gain. Therefore, an intervention which failed to take into account the fact that large numbers of men are not at a stage where they are ready to change their behaviour, and

focused only on providing information on appropriate weight-control methods, would be likely to meet with limited success. Because men in the precontemplation stage were less likely than others to see themselves as having a weight problem and to see benefits in trying to control their weight, a more effective intervention strategy is likely to be one which initially places an emphasis on raising their concerns about weight and increasing their awareness of the benefits associated with weight control. In the case of women, the application of the SOC Model shows that a majority of them were contemplating or already taking action. This suggests that interventions which focus on raising awareness among women are unlikely to have a major impact. For women, the major challenge is to develop strategies which move them from contemplation to action, and which assist those already taking action to successfully maintain their behaviour.

By determining stage of readiness to change behaviour, and understanding the role of cognitive factors in distinguishing the stages of change, it may therefore be possible develop better-targeted interventions. However, in attempting to increase the proportion of men and women taking action to control their weight, it will be important to promote healthy weight-control behaviour, and healthy weight goals. In this study, a small but significant number of women trying to lose or maintain weight did so by employing undesirable strategies such as laxative and diuretic abuse, and women were also more likely to have an ideal weight and weight goal that was below the acceptable range. Men, on the other hand, more often had weight goals which are heavier than is considered healthy. The mismatch between public and health authorities' definitions of what constitutes an acceptable weight poses a major challenge. It requires us to persuade many women that, in terms of their health, they can afford weight more than they desire, and to redirect their weight-control behaviour from weight loss to weight maintenance. For men, the goal will be to convince them that they are heavier than they should be, and that taking action for their weight will benefit them.

This study provides the most comprehensive information so far available on weight-control behaviours and beliefs of Australian adults. Unfortunately, few comparative data exist. For example, it is not possible to determine whether the higher rate of weight control observed among women as compared to men is a recent phenomenon, or whether weight-control behaviour has always been more common among women. Population studies reviewed in Chapter 2 show that a decade ago women were more concerned with their weight than men,

and on this basis it seems reasonable to assume that women would have also been more likely to have been taking action to control their weight. However, even though more women than men actively try to control their weight, population data show that women's weights are increasing at a greater rate than men's. While somewhat speculative, and based on population-level rather than individual-level data, this suggests that many women's efforts to control their weight have not been effective and that future public health strategies should focus on helping women to engage in sustainable weight-control behaviours.

Although the findings reported in this thesis provide valuable insights into population weight-control behaviours, it is important to recognise their limitations. The Weight Control Survey involved a follow-up of people who had participated in a cardiovascular risk factor screening. Participants in that study had been randomly selected from the population, and although the cardiovascular risk factor screening study and the Weight Control Survey achieved good response rates, there were some biases in the final sample. In addition, the sample upon which this study was based was selected from a rural population, and as such, differs in a number of respects from urban populations. In particular, overweight and obesity were more common in the study sample. However, in one sense, the fact that this study was based on a rural population is also one of its strengths. To date, there have been relatively few studies which have examined the distribution of BMI in rural populations, and weight-control behaviours and beliefs of rural Australians have not previously been assessed. As such, the data presented in this thesis are unique.

In adopting a behavioural epidemiology perspective on weight control I have focussed in this thesis on individual behaviours and cognitions. While behaviour change is important, changing the environmental context of weight-control behaviours is also a key element of policies aimed at reducing the prevalence of overweight and obesity (Commonwealth Department of Human Services and Health, 1994; Health and Welfare Canada, 1988b; U.S. Department of Health and Human Services, 1991). The importance of environmental factors in this domain is vividly illustrated by recent results from the Minnesota Heart Health Program (Jeffery, Gray, French, Hellerstedt, Murray, Luepker, et al., 1995). That study involved seven years of intervention which emphasised weight maintenance for all adults and weight loss for those with elevated risk factors, and included risk factor screening, mass media campaigns, worksite interventions, and various school-based, restaurant, home-correspondence and

point-of-sale programs. In spite of all this effort, there was a strong upward secular trend in average BMI which the investigators attributed, in part, to environmental influences.

Jeffery's conclusion regarding the disappointing results of the Minnesota Heart Health Program recognises that individual health behaviours occur within a broader social and physical environment (Stokols, 1992). In industrialised countries like Australia, energy-dense foods are heavily promoted and labour-saving devices are common. Encouraging individuals to control their weight, and providing them with information as to how do this, is unlikely to be effective in reducing obesity unless steps are taken to modify the environmental influences that contribute to obesity (Jeffery & Forster, 1987; Jeffery, et al., 1995). For example, a weight-control program that promotes consumption of low-fat foods is likely to meet with limited success if few low-fat products are available in supermarkets, if they are poorly labelled and cannot be readily identified by consumers, or if low-fat foods are not competitively priced. Similarly, a strategy which encourages people to do more physical activity as part of their daily routines is doomed to fail if common destinations like shops and workplaces are out of easy walking distance, or if there are limited facilities for physical activity outdoors.

Therefore, as well as encouraging individuals to take steps to control their weight, public-health strategies should be developed which promote environmental changes that support healthy weight-control behaviours. A variety of potential strategies have been proposed, ranging from encouraging schools to provide programs which emphasise healthy dietary and physical activity behaviour, to improving opportunities for people to be physically active through better town planning or provision of facilities at worksites, and even regulating the advertising of certain foods or altering taxation and subsidy policies relating to food products (Barr Taylor, Fortmann, Flora, Kayman, Barrett Jatulis, et al., 1991; Jeffery, 1991; St Jeor, Brownell, Atkinson, Bouchard, Dwyer, Foreyt, et al., 1993). However, to date there have been relatively few public health interventions that have attempted to promote weight loss in the population (Wiseman, 1996), and even less has been done to address the issue of weight gain prevention (Jeffery, 1993).

Ecological evidence suggests that the increase in average weights which has occurred in industrialised countries over the past few decades is due primarily to a reduction in energy expenditure, although over-consumption of dietary fat

is also recognised as an important contributor (Prentice and Jebb, 1995). Health authorities in Asutralia have also attributed the increase in the prevalence of overweight and obesity to a reduction in energy expenditure and an innapproriate level of fat consumption in the population (National Health and Medical Research Council, 1995). Approximately 20 per cent of Australian adults can be described as totally inactive with a further 33 per cent engaging in only low levels of activity (Booth et al, 1995). While few trend data on physical activity patterns exist, it is likely that the widespread technological changes that have taken place over the past twenty years have led to an increase in the proportion of the population who are sedentary or insufficiently active at work and in their leisure time. Although trend data are not available, recent Australian data suggest that more that 70 per cent of adults have a fat intake higher than is considered healthy (Baghurst et al, 1988).

In Australia, a national strategic plan has therefore been developed which focuses on changes to workplace, school, community and health care environments that should make it easier for people to control their weight by providing greater opportunities to undertake physical activity and reduce fat intake (National Health and Medical Research Council, 1995). While focussing on environmental change, the strategy also recognises the need to promote behaviour change in order to reduce the prevalence of overweight and obesity.

9.2 Directions for future research

The studies reported in this thesis demonstrate that the Stage of Change Model can provide valuable data on the prevalence and distribution weight-control behaviours and intentions, and that the Model constitutes a framework within which to examine transitions between the various stages of behaviour change. However, as I have already highlighted, this thesis represents one of the few attempts to apply the Stage of Change Model to weight-related behaviours, and the first to employ it to examine population-wide weight-control behaviours. It is therefore important that further research is conducted to establish the validity of the stage of change construct as it applies to population weight control, and to replicate the findings reported here in other population groups. In addition, the studies reported in this thesis examined the role of a only limited number of variables in distinguishing the stages of change. There was, for example, evidence that men had a distorted view of what constitutes an acceptable weight, and it may be that perceptions of body fatness and of the

associated risk are important factors in influencing men to attempt weight control. Based on data from the treatment literature, we might also hypothesise that perceived social support would be predictive of stage of change. Future research should therefore explore the role of other cognitive constructs in determining stage of change for weight control.

The Stage of Change Model is exactly that, a model of change. However, a majority of the studies which have applied the SOC Model to understand population health behaviours have employed cross-sectional designs. While cross-sectional data are useful in assessing the prevalence and socio-demographic distribution of the stages of change, prospective data are essential to properly understand the dynamics of behaviour change. It is essential that longitudinal studies are conducted in which data are collected periodically, to examine the relationship between stage of change, cognitive variables, and change in weight. Prospective data were collected in this study, although at only two points in time, one year apart. However, it is possible that weight and weight-control cognitions may cycle, and if so, it may be important to gather data on these variables at more regular intervals, in order to better understand the determinants of weight control. It is only when we have established the validity of the stage of change construct, and gathered observational data which allows us to better understand population-wide weight-control behaviours, that we will be in a position to begin designing stage-specific public health intervention strategies.

However, behaviour change is only one element of a strategy aimed at reducing the prevalence of obesity. Environmental and regulatory changes that support healthy weight-control behaviour are also recognised as important. Therefore, as well as conducting further studies to examine weight-control behaviours, a major challenge for future research will be to identify the role that environmental variables play in modifying behaviour. A better understanding of the impact of the social and physical environment on obesity and on weight-control behaviour may allow us to develop interventions that supplement behavioural and educational programs, and help to maximise their effectiveness. However, as I have already discussed, there have been relatively few public health interventions to promote weight loss or to prevent weight gain. It is therefore important that any interventions that are developed are properly evaluated, to assess whether public health strategies of the kind which have been proposed can be successfully implemented, and if so, what effect

they might have on weight gain, on the prevalence of overweight and obesity, and on the overall health status of the population.

Obesity is a key public health concern, but we have a poor understanding of population weight-control behaviours, as Byers (1995) has recently noted:

> We have pushed the limits of epidemiology to provide answers to the easy questions about body weight and mortality. We must now do more to overcome the harder behavioral and cultural barriers to healthier food choices, increased physical activity, and lifetime weight control (Byers, 1995; p724).

Further research is required to elucidate the nature, extent and distribution of weight-control behaviours, and of the beliefs associated with them. Such information is crucial to the development of a more informed public-health response to obesity.

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APPENDIX 1

THE BEHAVIOURAL EPIDEMIOLOGY OF WEIGHT CONTROL

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The behavioural epidemiology of weight control

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Abstract: Excess body weight is associated with increased health risk, but there are also risks to health related to weight-control practices. While representative population data are available on the anthropometry of body weight and its sociodemographic correlates in Australia, less is known about the population prevalence and correlates of weight-control behaviours. We examine the prevalence of overweight and obesity, and low body weight, in the Australian population, using data from studies in which height and weight have been objectively measured; we describe the sociodemographic correlates of overweight and obesity; we outline relevant aspects of Australian health-system and private-sector approaches to body weight control; and we describe the findings of Australian studies of weight-control practices and related beliefs and attitudes. These findings relate mainly to women, particularly younger women, and little is known about the weight-control practices of Australian men. We suggest research which may promote a better understanding of weight-control practices in the Australian population. (*Aust J Public Health* 1994; 18: 143–8)

Health authorities are concerned about excess body weight because it is a risk factor for a number of prevalent conditions, including hypertension, hyperlipidaemia, non-insulin-dependent diabetes mellitus, gall bladder disease and cardiovascular disease.[1] Prospective studies have shown a J-shaped relationship between body weight and risk of premature mortality, with the highest levels of body weight being associated with greatly increased risk. Long-term prospective studies have shown that degree of overweight is an independent predictor of premature mortality.[2] There are also concerns about low body weight, with individuals in this category being at increased risk.[2] Overweight people are encouraged to reduce their weight,[3] and those of low body weight to increase their weight to a 'healthier' level.[3]

In the context of these concerns and initiatives, an accurate and comprehensive understanding of the nature and extent of weight-control practices in the community is important. This is particularly so because there exists evidence that some of those attempting to alter their body weight may paradoxically put their health at risk. Many strategies to control body weight are available, ranging from dietary restriction and increased physical activity through to less desirable behaviours such as laxative and diuretic abuse, smoking for weight control, and extreme behaviours such as vomiting and purging. These strategies for weight control all have the potential, to a greater or lesser extent, to cause harm to health.[4]

Unsuccessful attempts to alter body weight (weight loss and subsequent regain) may also pose a significant long-term health risk. Large or frequent fluctuations in body weight may increase the risk of premature mortality, particularly from cardiovascular disease.[5] Perhaps the most convincing evidence on the health effects of cycles of weight change is based on the 32-year follow-up data from the Framingham study.[6] Multivariate analyses controlling for obesity, trends in weight over time, and indicators of cardiovascular disease revealed positive independent associations between weight

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variability and coronary heart disease and mortality as endpoints.

While there are risks to health (particularly cardiovascular health) associated with overweight and obesity, those who are attempting to alter or control body weight may also put their health at risk. Understanding community weight-control practices and beliefs is important because of the health consequences of excess body weight and low body weight; the potentially deleterious effects of particular weight-control practices; and, the possible health consequences of body weight fluctuations.

We describe the prevalence and distribution of overweight and obesity and low body weight in the Australian population, with reference to studies in which height and weight have been objectively measured. We outline aspects of the Australian health system and private-sector approaches to body weight control, and describe the findings of Australian studies of weight-control practices and beliefs. We also suggest a research agenda for the study of weight-control behaviours in the Australian population.

Prevalence of overweight, obesity and underweight in Australia

Classification of body weight

The method for characterising body fatness most commonly used in population studies is body mass index, which is weight adjusted for height (BMI = weight in kilograms/height in metres^2). The index is regarded as a practical and cost-effective measure of body fatness for population studies as it correlates well with other more sophisticated measures.[7] A classification system derived from research findings on the health risks associated with varying levels of BMI has been adopted by Australian health authorities.[8] Under this classification system, underweight is defined as a BMI of less than 20 kg/m^2; an acceptable weight is a BMI in the range of 20 to 25 kg/m^2 inclusive; overweight is defined as a BMI of greater than 25 and up to and including 30 kg/m^2; and obese is a BMI of greater than 30 kg/m^2.

Distribution of body mass index in Australian adults

Representative Australian population data on BMI from objectively measured height and weight are available from the series of Risk Factor Prevalence Studies (RFPS) of adults residing in capital cities, conducted by the National Heart Foundation of Australia (NHF) during the 1980s.[9-11] The NHF data show that, based on the above classification system, only about a half of the adults aged 20 to 69 years who were surveyed in the 1989 RFPS were an acceptable weight,[11] that is, having a BMI which fell within the range associated with least risk of mortality and morbidity (Table 1).

The NHF data suggest that approximately 2.5 million adults aged between 20 and 69 years living in Australian capital cities in 1989 carried excess body weight which, based on current evidence, would significantly increase their risk of ill-health. Over the adult lifespan, overweight and obesity (BMI > 25 kg/m^2) were found to increase from 25 per cent in men aged 20 to 24, levelling out at about 60 per cent in men aged 45 years or more. In women, the proportion who were overweight or obese rose steadily from 17 per cent in the youngest group, to slightly less than 60 per cent of women aged 65 to 69 (Table 1).

Table 1: Percentages of adults who were underweight,[a] and overweight or obese,[b] in the 1989 Risk Factor Prevalence Survey (n=9165)

	Men		Women	
Age	Underweight	Overweight	Underweight	Overweight
20 to 24	11.1	25.2	29.4	17.5
25 to 29	7.6	36.2	24.7	21.1
30 to 34	3.4	42.1	20.2	22.2
35 to 39	3.9	50.8	15.2	28.6
40 to 44	3.3	52.2	11.2	30.4
45 to 49	1.1	58.3	6.3	43.9
50 to 54	1.2	60.0	6.0	49.3
55 to 59	2.6	60.6	5.4	51.8
60 to 64	2.0	59.9	4.8	52.4
65 to 69	3.9	61.0	5.8	56.9
All ages	4.5	47.9	15.1	33.5

Notes: (a) BMI < 20 kg/m^2 (b) BMI > 25 kg/m^2

There are at least some regional variations in the prevalence of overweight and obesity in Australia. For example, a cardiovascular risk factor prevalence survey conducted in 1989 in the Hunter Region of NSW revealed higher age and sex-specific prevalences for overweight and obesity than did the 1989 NHF RFPS.[12] Seventy per cent of men and 50 per cent of women aged between 35 and 64 years in the Hunter study were overweight or obese.

The prevalence of overweight and obesity varies according to sociodemographic characteristics. Waters' analysis of the NHF's 1989 RFPS data revealed that the odds of being overweight or obese (BMI > 25 kg/m^2) were higher in persons born in Southern Europe compared to those born in Australia; for persons with a low level of education compared to those with tertiary qualification; for married men compared to never-married men; for plant and machinery operators compared to professional men; for labourers and related workers compared to professional women; and for women in the two lowest socioeconomic categories compared to those in the highest category (Table 2).[13] The differences according to social status confirm earlier findings from the NHF's 1980 RFPS,[14] and are generally consistent with those reported for other industrialised countries.[15]

Because the NHF risk-factor surveys were based on different populations and different cutoffs were used to calculate BMI, it is not possible to compare prevalence estimates from the published reports. Bennett has compared the 1983 and 1989 NHF surveys, based on samples in the same age range, drawn from the same cities and using the same algorithms to calculate BMI.[16] Bennett's reanalysis shows that there was an increase in the prevalence of overweight and obesity over this period. In men, there was a seven per cent increase in overweight and obesity (BMI > 25 kg/m^2), with the increase tending to be across all age groups. Although there was a similar rise in the prevalence of overweight and obesity in women (a 9 per cent increase), most of this was in women older than 45 years.

While 15 per cent of women aged 20 to 69 in the 1989 NHF survey were underweight, based on their BMI, this was mainly accounted for by women aged under 45 years, with a high proportion of the young women defined as underweight (Table 1). From these data, it may be estimated that over 190 000 women aged 20 to 29 years living in capital cities have a body weight lower than that which is considered healthy. More of the women in this age group who were surveyed in the 1989 NHF study were underweight than were overweight.

Body weight as a public health issue in Australia

The high prevalence of overweight and obesity, their biological sequelae, and (as the preceding data demonstrate) their sociodemographic distribution, make excess body weight a major public health problem. Conservative estimates of the economic costs attributable to obesity (BMI > 30 kg/m^2) are put at over $600 million per year,[17] which is roughly one-third of the estimated total costs associated with poor nutrition. In 1987, the Better Health Commission recommended that the prevalence of overweight and obesity in Australian adults should be reduced to 30 per cent by the year 1995.[18] The National Health Goals and Targets have revised this figure to a more achievable level: reductions of between 5 and 10 percentage points have been identified as desirable for most age groups.[19] The Goals and Targets also include a goal for the prevalence of underweight. As such, they deal with the notion of a healthy weight range, acknowledging that in terms of health a desirable weight is one that is neither too high nor too low.

Table 2: Adjusted odds ratios [a] and 99 per cent confidence intervals (CI) for factors significantly related to the proportion overweight and obese [b] in the 1989 Risk Factor Prevalence Study

	Men		Women	
	Odds ratio	CI	Odds ratio	CI
Region of birth				
Australasia	1.00		1.00	
United Kingdom	0.70	0.54 to 0.90	1.02	0.78 to 1.34
Northern Europe	1.52	1.02 to 2.26	1.14	0.77 to 1.69
Southern Europe	1.96	1.33 to 2.88	3.00	2.08 to 4.34
Asia	0.52	0.35 to 0.77	0.84	0.54 to 1.31
Other	0.84	0.46 to 1.54	1.63	0.85 to 3.12
Level of education				
Tertiary	1.00		1.00	
Completed high school	1.25	1.02 to 1.54	1.22	0.96 to 1.54
Some high school	1.40	1.15 to 1.71	1.56	1.25 to 1.95
Primary school/ never attended	1.48	1.06 to 2.07	2.62	1.89 to 3.65
Marital status				
Never married	1.00		1.00	
Now married	1.85	1.47 to 2.31	1.01	0.75 to 1.37
Separated	1.60	0.93 to 2.74	0.73	0.41 to 1.28
Divorced	1.62	1.07 to 2.47	0.65	0.44 to 0.97
Widowed	1.55	0.70 to 3.39	1.01	0.17 to 6.04
Occupation				
Professional	1.00		1.00	
Manager/ administration	1.81	1.37 to 2.39	1.50	0.94 to 2.39
Paraprofessional	1.19	0.85 to 1.67	1.08	0.68 to 1.71
Tradesperson	1.34	1.02 to 1.78	1.71	0.88 to 3.33
Clerk	1.15	0.82 to 1.62	1.22	0.89 to 1.66
Sales/personal services	1.34	0.94 to 1.91	1.57	1.09 to 2.27
Plant/machinery operator	1.93	1.33 to 2.80	1.30	0.59 to 2.85
Labourer	1.60	1.13 to 2.29	1.73	1.13 to 2.64
Home duties	–	–	1.45	1.07 to 1.95
Not employed	1.14	0.85 to 1.52	1.43	0.98 to 2.11
Index of socioeconomic disadvantage [c]				
Seventh (least)	1.00		1.00	
Sixth	1.20	0.89 to 1.61	1.13	0.83 to 1.55
Fifth	1.16	0.89 to 1.52	1.15	0.86 to 1.53
Fourth	1.00	0.36 to 2.77	1.57	1.15 to 2.15
Third	1.13	0.85 to 1.49	1.40	1.03 to 1.90
Second	1.07	0.78 to 1.47	1.74	1.25 to 2.43
First (most)	1.09	0.77 to 1.53	1.69	1.17 to 2.43

Notes:

(a) Logistic regressions were performed separately for men and women for each of the five variables in turn. Age (5-year age groups) and city of residence (Sydney, Melbourne, Brisbane, Adelaide, Perth, Hobart, Darwin, Canberra) were included in each of the models.

(b) BMI > 25kg/m^2

(c) From the least disadvantaged to the most disadvantaged.

Over the past decade many health authorities and organisations have produced materials promoting the notion of a 'healthy' or 'acceptable' weight, focusing on the perils of excess weight and the benefits of weight loss. However, in light of the increased prevalence of overweight and obesity observed during the 1980s, the efficacy of these education messages must be questioned. In addition, there are concerns that poorly targeted health messages about weight control may have unwittingly contributed to a cultural preoccupation with slimness for women, to unhealthy weight-control practices and to an increase in the incidence of eating disorders.[20–22] Given the number of underweight young women identified in the NHF surveys, these concerns may well have substance.

As well as the activities of health authorities, there has been a proliferation of commercial weight-loss centres, special diet foods and diet plans.[23,24] The public is also exposed to an extensive body of information on weight control via dieting books and the print media. Much of the nutrition-related information appearing in newspapers and women's magazines deals with the issue of weight reduction or maintenance,[25,26] although a review of such articles has found that more than half contained misinformation.[26] There are publications solely devoted to the topic of weight control, or which devote major aspects of their content to it. *Australian Slimming Magazine* is published ten times a year and has a circulation of about 40 000 per issue; based on these figures, approximately $1 million per annum is spent on purchasing this one publication.

Weight-control concerns and behaviours

To what extent are these anthropometric facts of overweight and obesity and the public and private sector weight-control activities matched by public concerns about body weight, and what form do these concerns take? Australian studies have shown that one in ten adults believed that reducing their weight was the single most important step they could take to improve their health and that among women, overweight was identified as the health problem with which they would most like help.[27,28] Other data have indicated that one in five adults perceived obesity to be the major nutritional problem in this country, and

that the most commonly cited reason for attempting dietary change was to lose or control weight.[29,30]

Australian research indicates that, even among children as young as eleven years, about twice as many girls as boys have a desire to be slimmer, including those who are already below the standard weight for their age.[31] Studies of high school students have also shown that girls were significantly more dissatisfied with their bodies than were boys, and were far more likely to describe themselves as overweight or fat.[32,33] These sex differences in concern about body weight and body image are not unique to adolescents. In a group of university students, half judged themselves to be overweight, even though only one-fifth actually were, and the women were significantly more likely than the men to perceive themselves as overweight.[34] Two other small-scale Australian studies of university students have also found that young women tended to be more dissatisfied with their bodies than young men,[35,36] and research involving a small group of adult men and women who had no weight problems supported these findings.[37] For both men and women in that study, the normal size range for a woman was believed to be lower than that for a man.

A study of a large representative sample of adults found that almost half of the women compared to about one-third of the men described themselves as overweight, even though their weight was acceptable based on BMI.[38] In addition, about one in seven of the younger women wished to reduce their weight to such an extent that if successful, they would be classified as underweight.

Women are not only more concerned with body weight than are men, they are also far more likely to take steps to reduce or control it. Studies of Australian high school students have found that over 50 per cent of the females have dieted to lose weight, compared to less than 20 per cent of the males.[33,39] The findings of the survey of university students described above are generally consistent with these studies; 59 per cent of the women had been on a diet for two weeks, compared to only 24 per cent of the men.[34] The 1988–90 National Health Survey findings also suggest that young women are more than twice as likely as men to report that they had changed their diet over a two-year period in order to lose or to control weight,[40] although these findings refer to a long-term change in food intake rather than short-term dieting.

Weight-control behaviours

There are few published Australian studies which have examined details of the type of diets which are tried during adults' attempts at weight loss, or about other weight reduction or weight-control behaviours. Some general prevalence data and comparisons of males' and females' weight-control practices are available from Australian population studies. The Australian Bureau of Statistics estimated that in 1989–90, among adults aged 25 to 64 years, 10 per cent of women, compared to 6 per cent of men, had changed their diet for weight-related reasons.[40] Similar data are available from the National Heart Foundation's 1989 Risk Factor Prevalence Survey, which found that 7 per cent of women aged 20 to 64 years, compared to 2 per cent of men, reported a 'weight reduction diet' to be their 'usual way of eating'.[11]

A study involving 106 female school and university students found that nearly all of the women had employed several different methods to achieve weight loss.[41] Fifty-five per cent of the women had been on a 'strict' diet lasting more than two weeks. While most of the women had used weight-loss methods which were not harmful, a small but significant proportion had engaged in other potentially dangerous weight-reduction behaviours, including excessive exercise, laxative and diuretic abuse, the use of nonprescription slimming preparations and the wearing of plastic to increase heat loss.

A survey of a randomly selected sample of 400 Adelaide women aged 18 to 86 years has provided a description of weight-control practices representative of the female population.[42] In the twelve months preceding the survey, 68 per cent of these women had exercised and 38 per cent had dieted in order to reduce or control their body weight. However, apart from the finding that approximately 3 per cent had attempted very low calorie diets, no details of the nature of the dietary manipulations were collected. This study also showed that a number of the women had attempted potentially harmful weight reduction techniques including fasting (15 per cent), use of slimming tablets (10 per cent), diuretics (6 per cent), laxative agents (3 per cent) and cigarette smoking (4 per cent); this was consistent with the findings of the survey of school and university students described above.[41] At the time of the Adelaide survey, 43 per cent of the women were attempting to lose weight, including about one-third of the women who were not classified as overweight.

Studies of Australian men

Although at all ages significantly more Australian men than women are overweight or obese,[11] studies which address men's weight-control practices and beliefs are limited. Surveys conducted in the United States have shown that significant numbers of men are concerned about their weight and take steps to control it,[43–47] and a similar situation may exist in Australia, but local data are needed to address this issue. Two qualitative studies have recently been conducted in Australia which suggest that body weight and weight control may also concern Australian men.

A focus-group study was conducted with men and women in Dalby, a small rural town in Queensland,[48] and in the Hunter Valley of New South Wales, focus-group discussions were conducted with 86 blue-collar men.[49] Overweight women and overweight men in the Dalby study expressed a desire to lose weight, and there were opinions expressed that it was difficult to lose weight and that it was even harder to maintain weight loss. Similarly, overweight men in the Hunter Valley study expressed concerns about being overweight and the investigators concluded that there may be an unmet need for assistance in losing weight. Among the Dalby study participants there were beliefs that weight reduction could be achieved by only dieting and for some, exercising. Blue-collar men tended to see weight reduction efforts revolving around reducing food intake, rather than exercising. In both of these qualitative

studies, few participants were reported to have expressed an awareness of the health risks associated with excess body weight. For example, none of the participants in the Dalby study spontaneously linked overweight with health issues and among the Hunter Valley men there appeared to be only a vague awareness of the relationship between overweight and heart disease and no links were made with other diseases.

Conclusions

While we have excellent prevalence and trend data for the 1980s, on the anthropometry of overweight and obesity, little is known about population trends and correlates of weight-control behaviours in Australia. Beliefs, perceptions and knowledge related to weight control have been examined in a number of mostly small-scale and unrepresentative studies of Australian women, particularly younger women. These studies suggest that many women have extensive concerns about body weight, and some have quite unrealistic perceptions of what constitutes an appropriate body weight for themselves. There is also evidence from the few available population studies that at least a small proportion of women may be engaging in unhealthy weight-control behaviours, but the full extent of these practices is presently poorly understood. Limited data are available on the weight-control behaviours of men, and only two small-scale qualitative studies have examined how men attempt to control their weight. It is likely that the research emphasis on younger women is, at least in part, the result of concerns about the prevalence of eating disorders such as anorexia nervosa and bulimia and the great importance Western culture places on slimness for women, particularly young women.[50–54]

Other behaviours related to chronic disease risk—particularly to cardiovascular disease and cancer risk—have been studied in detail using population–prevalence data, and may provide useful models for the study of weight-control behaviours. There exists an extensive body of knowledge on the Australian population prevalence, recent trends and correlates of cigarette smoking,[55,56] and physical activity.[57,58] Representative data are also needed to inform the planning of public education strategies, programs and services related to weight control.[56,57]

The research agenda we would advocate has a stronger focus on specific weight-control behaviours. These include both the potentially harmful behaviours (fasting, medication use, cigarette smoking, excessive exercise) identified by previous studies,[41,42] and also appropriate adherence to healthy food choices and activity habits. Such a behavioural epidemiology focus does not imply that factors which cannot be directly observed in population studies are unimportant to understanding weight-control practices. A theoretical focus which emphasises environmental determinants of behaviour is relevant.[59] For example, specific dietary choices are likely to be influenced by food availability and food delivery systems,[60] just as opportunities to exercise may be influenced by the availability of facilities and resources.[61] Also, genetic factors which influence body weight are not denied by a research focus on self-reported personal behaviours.[62]

In order to gain a better understanding of weight-control practices, several research questions need to be addressed: what are the relationships of weight-control behaviours to other health risks? These risks may be biologically defined (for example, serum cholesterol levels, blood pressure), or behavioural (for example, cigarette smoking, physical inactivity, alcohol use, and other drug use). What are the relationships of weight-control behaviours to sociodemographic, environmental and other influences? Such studies can provide important descriptive epidemiology data dealing with the relationships to weight-control practices of factors such as age, gender or educational attainment.[55,57,63] What are the relationships of weight-control behaviours to cognitive, emotional and more proximal social influences? This domain is where behavioural epidemiology begins to merge with applied social psychology and health psychology; theoretical explanations of the dynamics and determinants of behaviour may be applied.[56,58]

Body weight is a key public health concern, as well as an issue of concern for a significant portion of the Australian public. Research is needed to elucidate more clearly the nature, extent and distribution of these concerns, and of the behaviours associated with them. Such research provides the basis for a more informed public health response to overweight and obesity.

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APPENDIX 2

THE RURAL RISK FACTOR PREVALENCE STUDY QUESTIONNAIRE

IN CONFIDENCE

NATIONAL HEART FOUNDATION CENTRE FOR SOCIAL AND PREVENTIVE RESEARCH RISK FACTOR STUDY 1992

Telephone numbers(s) where you may be contacted. *Home*_____

*Work*_____

CONSENT AND FORWARDING OF RESULTS

I consent to undergo the tests performed at the clinic and I understand that the results of my assessment will be given to me and/or my doctor if I wish.

I further understand that information and blood specimens collected in the course of the study will be used for research purposes, the results of which will be published in scientific journals or reports in such a way that individual participants cannot be identified.

I also understand that my own answers in this questionnaire and the results of my tests will not be released to anyone, even to my own doctor, without my specific permission.

Signature _____ Date __ _/ ___ / 1992

To whom would you like your results sent?
(Please tick the appropriate box)

To no-one ..... ☐

To myself only ..... ☐

To my doctor only* ..... ☐

To myself and my doctor* ..... ☐

* If you want your results sent to your doctor, please write the name and address below.

Dr _____

Address _____

_____ Postcode_____

OFFICE USE ONLY

To be copied from page 16.

Weight _____ kg

Height _____ kg

Blood pressure:

Average systolic _____ mmHg

Average diastolic _____ mmHg

Total cholesterol _____ mmol/l

H.D.L. cholesterol _____ mmol/l

Triglycerides _____ mmol/l

DIRECTIONS

- Please indicate your answer by ticking the appropriate box ☑ or by writing your answer in the space provided.
- Please use **BLOCK LETTERS**
- If you are uncertain about the answer to any of the questions leave them blank and ask the receptionist to help you when you have reached the end of the questionnaire.
- Please do not write in the right hand column of each page (**Office use only**).

Office use only

1. **Date of birth:** _____/_____/19_____
   day mth year

1 5

2. **Sex:** Male ..... ☐ 1
   Female ..... ☐ 2

6 11

3. **Marital status:**
   Never married ..... ☐ 1
   Now married ..... ☐ 2
   Separated but not divorced ..... ☐ 3
   Divorced ..... ☐ 4
   Widowed ..... ☐ 5

12 17

4. **How many children and full-time students are living with you in your care?**
   None ..... ☐
   Childern 0-14 years ____ number
   Full-time students 15-24 years ____ number

18

19 24

25

26 27

28 29

5. **Living arrangements:**
   Living with legal husband or wife ..... ☐ 1
   Living with partner as a couple (such as de facto marriage) ..... ☐ 2
   Living with other person(s) (such as children, parents, flatmates) . ☐ 3
   Living alone ..... ☐ 4

30

6. **Where were you born?** _____
   (Write State or Territory if born in Australia. Write country if born overseas.)

31 32

7. **If you were not born in Australia, how many years have you lived in Australia?** _____ **years**

33 34

Office use only

8. Please indicate the higest level of education you have completed.

- Never attended school ..... ☐ 1
- Primary school ..... ☐ 2
- Some high school ..... ☐ 3
- Completed high school (Year 12 or equivalent) .. ☐ 4
- University, C.A.E or other tertiary institution .... ☐ 5

☐ 35

9. When did you last have your blood pressure measured?

- In the last three months ..... ☐ 1
- In the last six months ..... ☐ 2
- In the last year ..... ☐ 3
- In the last three years ..... ☐ 4
- More than three years ago ..... ☐ 5
- Never measured ..... ☐ 6
- Don't know ..... ☐ 7

☐ 36

10. When did you last have your blood cholesterol measured?

- In the last three months ..... ☐ 1
- In the last six months ..... ☐ 2
- In the last year ..... ☐ 3
- In the last three years ..... ☐ 4
- More than three years ago ..... ☐ 5
- Never measured ..... ☐ 6
- Don't know ..... ☐ 7

☐ 37

11. Have you ever been told that you have any of the following?

	No	Yes	
High blood pressure	☐ 1	☐ 2	☐ 38
Angina	☐ 1	☐ 2	☐ 39
Heart attack (*a "coronary", coronary occlusion, coronary thrombosis, myocardial infarction*)	☐ 1	☐ 2	☐ 40
Stroke	☐ 1	☐ 2	☐ 41
High cholesterol	☐ 1	☐ 2	☐ 42
High triglycerides	☐ 1	☐ 2	☐ 43

12. Are you on tablets for blood pressure? No ☐ 1 Yes ☐ 2 ☐ 44

13. Are you having treatment to lower your blood fat? No ☐ 1 Yes ☐ 2 ☐ 45

14. Are you on tablets or other treatment for angina? No ☐ 1 Yes ☐ 2 ☐ 46

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15. **Has a doctor or nurse ever told you that you had diabetes?** No ☐ 1 Yes ☐ 2 — ☐ 47

If yes, please state the year you were first told 19_ _ _ _ _ (year) — ☐☐ 48 49

16. **Has a doctor or nurse ever told you that you showed sugar in the urine?** No ☐ 1 Yes ☐ 2 — ☐ 50

If yes, please state the year you were first told 19_ _ _ _ _ (year) — ☐☐ 51 52

17. **Have you ever been given advice or treatment for diabetes or sugar trouble?** No ☐ 1 Yes ☐ 2 — ☐ 53

If yes, please state the year this advice or treatment was first given 19_ _ _ _ _ (year) — ☐☐ 54 55

Was this
- Diet advice ..... ☐ 1
- Tablets ..... ☐ 2
- Insulin injections ..... ☐ 3
- Diet advice and tablets ..... ☐ 4 — ☐ 56
- Diet advice and injections ..... ☐ 5

QUESTIONS 18 TO 21 FOR WOMEN ONLY

18. **Have you ever taken the oral contraceptive pill?**

Yes ... ☐ 1

No .... ☐ 2 **Go to Question 21.** — ☐ 57

19. **For how long altogether have you taken the oral contraceptive pill?**
(*Please estimate the total of all periods of use.*)

- Less than 6 months ..... ☐ 1
- Between 6 months and 2 years ..... ☐ 2
- Between 2 and 5 years ..... ☐ 3
- Between 5 and 10 years ..... ☐ 4 — ☐ 58
- Longer than 10 years ..... ☐ 5

20. **Are you now taking the oral contarceptive pill?**

Yes ... ☐ 1

No .... ☐ 2 — ☐ 59

21. **Are you now pregnant?**

Yes .... ☐ 1

No ..... ☐ 2 — ☐ 60

In Questions 22 to 25 we want to find out about the exercise you had during the PAST 2 WEEKS;
*** For recreation, sport or health-fitness purposes,**
*** As part of your tasks at work and around the house.**
Please distinguish between vigorous exercise which made you breathe harder or puff and pant, and less vigorous exercise.

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RECREATION, SPORT OR HEALTH-FITNESS

22. In the PAST 2 WEEKS, did you engage in vigorous exercise - exercise which made you breathe harder or puff and pant? (*e.g. vigorous sports such as football, netball, tennis, squash, athletics; jogging or running; keep-fit exercises; vigorous swimming; etc.*)

No .... ☐ 1
Yes ... ☐ 2

61 ☐

If yes, how many sessions of vigorous exercise did you have over the 2 week period?_ _ _ _ _ _ _ _

62 ☐☐ 63

Please estimate the TOTAL TIME spent exercising vigorously during the PAST 2 WEEKS._ _ _/_ _ _ _
hours min.

64 ☐☐☐☐ 67

23. In the PAST 2 WEEKS did you engage in less vigorous exercise for recreation, sport or health-fitness purposes which did not make you breathe heavier or puff and pant?

No .... ☐ 1
Yes ... ☐ 2

68 ☐

If yes, how many sessions of less vigorous exercise did you have over the 2 week period?_ _ _ _ _ _

69 70 ☐☐

24. In the PAST 2 WEEKS did you walk for recreation or exercise?

No .... ☐ 1
Yes ... ☐ 2

71 ☐

If yes, how many times?_ _ _ _ _ _ _ _ _ _ _

72 73 ☐☐

VIGOROUS TASKS AT WORK AND AROUND THE HOUSE (Paid or unpaid work)

25. In the PAST 2 WEEKS did you engage in vigorous activity, apart from exercise, which made you breathe harder or puff and pant? (*e.g. carrying loads, heavy gardening, chopping wood, labouring - at home, during employment or anywhere else.*)

No .... ☐ 1
Yes ... ☐ 2

74 ☐

If yes, how many sessions of these types of vigorous activity did you have over the 2 week period?

_ _ _ _ _ _ _ _

75 76 ☐☐

Please estimate the TOTAL TIME spent in these types of vigorous activity during the PAST 2 WEEKS.

_ _ _/_ _ _ _
hours min.

77 ☐☐☐☐ 80

Office use only

26. Have you ever smoked cigarettes, cigars or a pipe regularly?

Yes . . . ☐ 1

No . . . . ☐ 2 **Go to Question 33.**

81

27. At what age did you start smoking regularly?

I started smoking at_ _ _ _ _ years of age.

82 83

28. Have you given up smoking?

Yes, I gave up smoking in _ _ _ /19 _ _ _
mth year

No, I still smoke . . . ☐ 8888 **Go to Question 30.**

84 87

If you have GIVEN UP SMOKING please answer the following questions:

29. How much did you smoke?

I used to smoke _ _ _ _ manufactured cigarettes **a day** 88 89

_ _ _ _ grams* "hand-rolled" cigarette tobacco per **week** 90 92

_ _ _ _ cigars per **week** 93 94

_ _ _ _ grams pipe tobacco per **week** 95 97

If you CURRENTLY SMOKE please answer Questions 30 to 32; otherwise go to Question 33.

30. I currently smoke _ _ _ _ manufactured cigarettes **a day** 98 99

_ _ _ _ grams* "hand-rolled" cigarette tobacco per **week** 100 102

_ _ _ _ cigars per **week** 103 104

_ _ _ _ grams pipe tobacco per **week** 105 107

*NOTE: A 1¾ ounce pouch of cigarette tobacco equals 50 grams

31. Which brand of manufactured cigarette do you usually smoke?
(*Copy the name from a packet if possible*)

I don't smoke manufactured cigarettes . . . . . ☐ 995 **Go to Question 33.**

108 110

The brand I usually smoke is_ _

(*Because of the number of varieties of many brands, please give this in full e.g. Benson and Hedges Extra Mild, Peter Jackson Ultimate.*)

32. Have you switched to lower tar manufactured cigarettes?

Yes, in_ _ _ / 19_ _ _
mth year

No . . . . . ☐ 8888

I don't know . . . . . ☐ 9999

111 114

Office use only

33. How often do you usually drink alcohol?

I don't drink alcohol	1	Go to Question 35.
Less than once a week	2	
On 1 or 2 days a week	3	
On 3 or 4 days a week	4	
On 5 or 6 days a week	5	
Every day	6	

115

34. On a day when you drink alcohol, how many drinks do you usually have?

1 or 2 drinks	1
3 or 4 drinks	2
5 to 8 drinks	3
9 to 12 drinks	4
13 to 20 drinks	5
More than 20 drinks	6

116

35. Do you add salt to your food after it is cooked?

Rarely or never	1
Sometimes	2
Almost always or always	3

117

36. Which of the following best describes your usual way of eating?
(Please tick one box only.)

No special diet	1	
Vegetarian	2	
Weight reduction diet	3	
Diabetic diet	4	
Fat modified diet to lower blood fat	5	
Other	6	Please specify _____

118

37. How often do you eat the fat on meat?

Usually	1
Sometimes	2
Rarely or never	3

119

38. How much of the following dairy products do you usually have IN A WEEK?

	Number in a week		
Full cream milk	_____	(litres)	120 [ ][ ] 121
Skim milk	_____	(litres)	122 [ ][ ] 123
Low fat milk	_____	(litres)	124 [ ][ ] 125
Yoghurt - plain or flavoured	_____	(small cartons)	126 [ ][ ] 127
Low fat yoghurt - plain or flavoured	_____	(small cartons)	128 [ ][ ] 129
Cream	_____	(tablespoons)	130 [ ][ ] 131
Ice-cream	_____	(scoops)	132 [ ][ ] 133

Office use only

39. **How tall are you without shoes?**

Centimetres_______

or Feet / inches ___/___

Don't know .... ☐ 999

134 136

40. **How much do you weigh without clothes and shoes?**

Kilograms__________

or Stone / pounds___/___

Don't know .... ☐ 999

137 139

Questions 41 to 46 ask about employment and income.

The answers to these questions play an important part in understanding the patterns of health in the Australian community.

For example, risk factors for heart disease are known to vary between different groups in the community.

Knowledge about these differences helps in providing the best health care.

41. **Do you have a full-time or part-time job of any kind?**
(*Either for payment or profit, or unpaid work in a family business*)

Yes .... ☐ 1

No ..... ☐ 2 **Go to Question 44.**

140

42. **In your main job, what is your occupation?**

- Give full title

  For example, Architect, Accounts Clerk, Fast Foods Cook, Farm Hand, Production Manager, Sales Assistant.

- Armed Services personnel state rank as well as occupation.
- Public Servants state official designation (e.g. ASO3) as well as occupation.

Occupation______________________________

____

____

____

43. **What are the main tasks or duties that you usually perform in that occupation?**

- Describe as fully as possible.

  For example, planning and designing buildings, recording and paying accounts, cooking hamburgers and chips, assisting farmer to plant crops, administering production activities of the organisation, selling ladies clothes.

Tasks or duties______________________________

____

____

____

141 144

145 148

Office use only

44. Which of the following describes the current employment status of yourself and of your partner (if applicable)?

- Here, partner means the person you are living with as legal husband or wife or "de facto"
- Please tick more than one box where applicable

	Self	Partner (spouse or "de facto")	Office use only
Working full-time	☐ 1	☐ 1	☐ 149 ☐ 150
Working part-time	☐ 1	☐ 1	☐ 151 ☐ 152
Not working (but not retired)	☐ 1	☐ 1	☐ 153 ☐ 154
Home duties	☐ 1	☐ 1	☐ 155 ☐ 156
Full-time student	☐ 1	☐ 1	☐ 157 ☐ 158
Part-time student	☐ 1	☐ 1	☐ 159 ☐ 160
Retired	☐ 1	☐ 1	☐ 161 ☐ 162
Permanently unable to work / ill	☐ 1	☐ 1	☐ 163 ☐ 164
Other (please specify)_____	☐ 1	☐ 1	☐ 165 ☐ 166

45. What is the gross income of yourself and of your partner (if applicable)?

- Include income from all sources (e.g. wages, interest, pensions, Family Allowance Supplement and other benefits, tax rebates) before tax or anything else taken out.
- Please estimate as best you can.

Gross income (i.e. before tax):	Self	Partner (spouse or "de facto")
No income	☐ 1	☐ 1
$1 to $135 per week ($1 to $7,000 per year)	☐ 2	☐ 2
$136 to $173 per week ($7,001 to $9,000 per year)	☐ 3	☐ 3
$174 to $212 per week ($9,001 to $11,000 per year)	☐ 4	☐ 4
$213 to $250 per week ($11,001 to $13,000 per year)	☐ 5	☐ 5
$251 to $289 per week ($13,001 to $15,000 per year)	☐ 6	☐ 6
$290 to $327 per week ($15,001 to $17,000 per year)	☐ 7	☐ 7
$328 to $365 per week ($17,001 to $19,000 per year)	☐ 8	☐ 8
$366 to $404 per week ($19,001 to $21,000 per year)	☐ 9	☐ 9
$405 to $442 per week ($21,001 to $23,000 per year)	☐ 10	☐ 10
$443 to $577 per week ($23,001 to $30,000 per year)	☐ 11	☐ 11
$578 to $769 per week ($30,001 to $40,000 per year)	☐ 12	☐ 12
$770 to $962 per week ($40,001 to $50,000 per year)	☐ 13	☐ 13
Over $962 per week (Over $50,000 per year)	☐ 14	☐ 14

Office use only

☐☐ 167 168 ☐☐ 169 170

Office use only

46. What is the main source of income of yourself and of your partner (if applicable)?

	Self	Partner (spouse or defacto")
Wages or salary	☐ 1	☐ 1
Own business or share of partnership	☐ 2	☐ 2
Any government pension or cash benefit	☐ 3	☐ 3
Superannuation	☐ 4	☐ 4
Investment / interest	☐ 5	☐ 5
Other (please specify)_____	☐ 6	☐ 6

☐ 171 ☐ 172

47. Which of the following best describes what you think about yourself and exercise (being physically active)?

Tick one box only

- I do not exercise and do not intend to start ☐ 1
- I think I should start to exercise, or do more exercise, but I'm not quite ready ☐ 2
- I'm actively thinking about how to start to exercise, or do more exercise ☐ 3
- I'm taking some sort of action to start to exercise or do more exercise (e.g. joining a class, setting a time to exercise, buying sport shoes etc) ☐ 4 **Go to Question 50.**
- I already exercise regularly and intend to continue ☐ 5 **Go to Question 50.**
- Don't know ☐ 6

☐ 173

48. Which of the following best describes how confident you are that, if you wanted to, you could start doing regular exercise (physical activity) in the next three months?

Tick one box only

- Very confident ☐ 1
- Quite confident ☐ 2
- Not very confident ☐ 3
- Not at all confident ☐ 4
- Don't know ☐ 5

☐ 174

49. Which of the following best describes the main reason that you don't exercise regularly?

Tick one box only

- I don't have enough time to exercise ☐ 1
- I don't really like exercising ☐ 2
- It is too expensive for me to exercise ☐ 3
- It is too much trouble to organise ☐ 4
- Joint or muscle problem ☐ 5
- Some other health problem ☐ 6
- Too boring ☐ 7
- Other ☐ 8
- Don't know ☐ 9

☐ 175

QUESTIONS 50 TO 54 FOR SMOKERS ONLY. IF YOU DO NOT SMOKE PLEASE GO TO QUESTION 55.

Office use only

50. Have you ever tried to give up smoking?

Yes ..... ☐ 1
No ..... ☐ 2 → 176

If yes, how many times ☐☐ → 177 178

51. Would you like to give up smoking?

Tick one box only

Yes, definitely ..... ☐ 1
Yes, probably ..... ☐ 2
Probably not ..... ☐ 3
Definitely not ..... ☐ 4 → 179

52. Which of the following best describes what you currently think about stopping smoking?

Tick one box only

I have not thought of stopping ..... ☐ 1
I think I need to consider stopping some day ..... ☐ 2
I think I should stop but I'm not quite ready ..... ☐ 3
I'm starting to think seriously about stopping ..... ☐ 4
I'm taking definite action to stop e.g. cutting down or enrolling in a Quit program ..... ☐ 5 → 180
None of the above / don't know ..... ☐ 6

53. Which of the following best describes how confident you are that, if you wanted to, you could give up smoking?

Tick one box only

Very confident ..... ☐ 1
Quite confident ..... ☐ 2
Not very confident ..... ☐ 3
Not at all confident ..... ☐ 4 → 181
Don't know ..... ☐ 5

54. Which of the following best describes the main things that stop you from giving up smoking?

Tick one or more boxes

I don't really want to stop smoking ..... ☐ 1 → 182
I am probably addicted to it ..... ☐ 1 → 183
I enjoy it too much ..... ☐ 1 → 184
I do not believe that it is bad for my health ..... ☐ 1 → 185
I am under too much stress to stop ..... ☐ 1 → 186
I don't want to put on weight ..... ☐ 1 → 187
People around me smoke ..... ☐ 1 → 188
Other ..... ☐ 1 → 189
Don't know / none of the above ..... ☐ 1 → 190

Office use only

55. People say that a healthy diet is one which does not have too much fat, is varied, and has plenty of fruits, vegetables and breads. In general, do you think that you eat this type of diet now?

Tick one box only

Yes ☐ 1 **Go to Question 59.**

No ☐ 2

Don't know ☐ 3

☐ 191

56. Which of the following best describes what you think about eating healthier food?

Tick one box only

I have no intention of changing to a healthier diet ☐ 1

I suppose I should change to a healthier diet but I have no intention of doing so at the moment ☐ 2

I should change to a healthier diet and I'm currently thinking about how to ☐ 3

I'm actively looking at ways of having a healthier diet. For example, looking for different foods at the shops, finding recipes for healthier food or eating less unhealthy food ☐ 4

Don't know ☐ 5

☐ 192

57. Which of the following best describes how confident you are that you could keep to a healthy diet if you wanted to?

Tick one box only

Very confident ☐ 1

Quite confident ☐ 2

Not very confident ☐ 3

Not at all confident ☐ 4

Don't know ☐ 5

☐ 193

58. Which of the following best describes the main reasons you don't keep to a healthy diet?

Tick one or more boxes

Healthy food takes longer to prepare ☐ 1 ☐ 194

I don't really want to change to a healthy diet ☐ 1 ☐ 195

It's too expensive ☐ 1 ☐ 196

I would not enjoy food as much ☐ 1 ☐ 197

It's too much effort to buy healthy food ☐ 1 ☐ 198

I'm not sure how to change my diet ☐ 1 ☐ 199

Other ☐ 1 ☐ 200

None ☐ 1 ☐ 201

Don't know ☐ 1 ☐ 202

59. How would you describe your current weight?

Tick one box only

Very underweight ☐ 1

Slightly underweight ☐ 2

About the right weight ☐ 3

Slightly overweight ☐ 4

Very overweight ☐ 5

I've never really thought about it ☐ 6

☐ 203

Office use only

60. Ideally, how much would you like to weigh at the moment?

Kilograms_ _ _ _ _ _ _ _ _

or stones / pounds_ _ _ /_ _ _

Don't know . . . . . ☐ 999

☐☐☐ 204 206

61. Which of the following best describes your feelings about your weight?

Tick one box only

I don't need to do anything to keep my weight under control . . . . . ☐ 1

I should try to keep my weight under control but I have no intention of doing so at the moment . . . . . ☐ 2

I should try to keep my weight under control and I'm currently thinking about how to do it . . . . . ☐ 3

I'm already doing things to keep my weight under control . . . . . ☐ 4

Other: (please explain)_ _

_ ☐ 5

☐ 207

62. Which of the following best describes how confident you are that you could keep your weight under control if you wanted to?

Tick one box only

Very confident . . . . . ☐ 1

Quite confident . . . . . ☐ 2

Not very confident . . . . ☐ 3

Not at all confident . . . . ☐ 4

Other . . . . . ☐ 5 Please explain_ _

☐ 208

63. Where do you currently live?

In the town . . . . . ☐ 1

Out of town . . . . . ☐ 2

☐ 209

64. Would you be happy for us to contact you again sometime over the next few years?

Yes . . . . . ☐ 1

No . . . . . ☐ 2

☐ 210

IF YES, would you mind giving us the telephone number of a family member or friend who does not live with you to assist us in locating you, in case you should move from your present address and we need to contact you.

Name_ _

Telephone number_ _

QUESTIONS 65 TO 68 FOR WOMEN ONLY, MEN PLEASE GO TO END OF PAGE

Office use only

65. Have you ever taken hormone replacement therapy (Oestrogen pills) at the "Change of Life" (menopause)

Yes ..... ☐ 1

No ..... ☐ 2 **Go to end of page.**

211 ☐

66. For how long altogether have you taken hormone replacement therapy? (Please estimate the total of all periods of use.)

Tick one box only

Less than 6 months ..... ☐ 1

Between 6 months and 2 years ..... ☐ 2

Between 2 and 5 years ..... ☐ 3

Between 5 and 10 years ..... ☐ 4

Longer than 10 years ..... ☐ 5

212 ☐

67. Are you now taking hormone replacement therapy?

Tick one box only

Yes ..... ☐ 1

No ..... ☐ 2

213 ☐

68. What is / was your main reason for taking hormone replacement therapy?

Tick one box only

Osteoporosis ..... ☐ 1

Cardiovascular disease ..... ☐ 2

"Change of Life" (menopause) symptoms ..... ☐ 3

Other ..... ☐ 4

Don't know ..... ☐ 5

214 ☐

PLEASE STOP HERE

Thank you for your co-operation. Please now return this questionnaire to the nurse and tell her / him about any difficulties you had with these questions.

OFFICE USE ONLY

To be completed during the examination

Weight _____ kg 215 ☐☐☐ ☐ 218

Height _____ cm 219 ☐☐☐ 221

Waist circumference:

1st reading _____ cm 222 ☐☐☐ 224

2nd reading _____ cm 225 ☐☐☐ 227

Hip (buttocks) circumference:

1st reading _____ cm 228 ☐☐☐ 230

2nd reading _____ cm 231 ☐☐☐ 233

Blood pressure observer _____ 234 ☐☐ 235

Spygmomanometer _____ 236 ☐☐ 237

Ambient temperature _____ °C 238 ☐☐ 239

Blood pressure:

1st reading

Systolic _____ mm Hg 240 ☐☐☐ 242

Diastolic _____ mm Hg 243 ☐☐☐ 245

2nd reading

Systolic _____ mm Hg 246 ☐☐☐ 248

Diastolic _____ mm Hg 249 ☐☐☐ 251

Age group indicator _____ ☐ 252

Have you had anything to eat or drink in the past 12 hours apart from water, black tea or black coffee?

No ☐ 1

Yes ☐ 2 ☐ 253

APPENDIX 3

THE WEIGHT-CONTROL SURVEY QUESTIONNAIRE

IN CONFIDENCE

HEART RESEARCH CENTRE

1993 RESEARCH STUDY

ABOUT THIS STUDY

This study is about health, eating and weight control. In order for the findings of the study to properly represent community views it is important that your answers are included. This survey is a follow-up to the Heart Foundation study you took part in last year.

Many sections of the questionnaire will not apply to you - so the questionnaire is not as long as it looks. There are instructions as to which questions you should answer. Please take your time and answer all of the questions which apply to you.

If you have any queries about the survey please call 008-066-051 between 9am and 5pm weekdays and we will be happy to assist you.

Study number:

BACKGROUND INFORMATION

These questions provide infomation which will help us to understand patterns of health in the community. Please answer all of the following questions which apply to you. The details you provide will be treated in the strictest confidence.

Q.1 What is your age?

_____ years old

Q.2 What is your sex? (Circle the number beside ***one*** answer)

1. Male
2. Female - **Are you now pregnant?** (Circle the number beside ***one*** answer)

    1. Yes
    2. No

    - **Have you had any children since you took part in the Heart Foundation study last year?** (Circle the number beside ***one*** answer)

    1. Yes
    2. No

Q.3 What is your present marital status?
(Circle the number beside ***one*** answer)

1. Never married
2. Now married
3. Separated but not divorced
4. Divorced
5. Widowed

Q.4 Which one of the following best describes your living arrangements?
(Circle the number beside ***one*** answer)

1. Living with legal husband or wife with/without children
2. Living with partner as a couple with/without children (such as de facto marriage)
3. Living with children only (ie not with any other adults)
4. Living with parents/other family members
5. Living with flatmates/friends
6. Living alone
7. Other living arrangement (Please describe) _____

Q.5 How many children and full-time students are living with you in your care?

_____ Children aged 0 - 14 years

_____ Full-time students aged 15 - 24 years

Q.6 **An important part of our research involves looking at the information you provide in this survey in relation to your risk factor profile (eg your blood pressure, cholesterol level etc), which was assessed during last year's study.**

Can we have your permission to link the information collected in last year's study with the information you are providing in this survey? Naturally all of this information will be treated in the strictest confidence. (Circle the number beside ***one*** answer)

1. Yes, I give my permission
2. No, I do not give my permission

Please sign you name: ..... Date: .....

Please print you name: .....

Q.7 **The following questions are about occupation and employment status. These questions are important, because a person's health may vary according to the type of work they do.**

Has your occupation or employment status changed since the Heart Foundation study last year? (Circle the number beside ***one*** answer)

1. No **(If No, go straight to question 11)**
2. Not sure
3. Yes

Q.8 **Do you have a full-time or part-time job of any kind? (Either for payment or profit, or unpaid work in a family business)** (Circle the number beside ***one*** answer)

1. No **(If No, go straight to question 10)**
2. Yes

Q.9 **In your main job, what is your occupation?** Please give a full title (eg Farm hand, Sales assistant, Accounts clerk etc)

.....

What are the main tasks or duties that you usually perform in that occupation? Please describe as fully as possible (eg assisting farmer to plant crops, selling clothes, recording and paying accounts)

.....

Q.10 **Which one of the following best describes your current employment status?** (Circle the number beside ***one*** answer)

1. Working full-time
2. Working part-time
3. Home duties
4. Permanently unable to work/ill
5. Retired
6. Not working at the moment
7. Student
8. Other - Please describe: .....

Q.11 Does your spouse or partner have a full-time or part-time job of any kind? (Either for payment or profit, or unpaid work in a family business) (Circle the number beside ***one*** answer)

1. I don't have a spouse or partner **(Go straight to question 14)**
2. No **(Go straight to question 13)**
3. Yes

Q.12 What is your spouse or partner's main occupation? Please give a full title (eg Farm hand, Sales assistant, Accounts clerk etc)

.....

What are the main tasks or duties that your spouse or partner usually performs in that occupation? Please describe as fully as possible (eg assisting farmer to plant crops, selling clothes, recording and paying accounts)

.....

Q.13 Which one of the following best describes your spouse or partner's current employment status? (Circle the number beside ***one*** answer)

1. Working full-time
2. Working part-time
3. Home duties
4. Permanently unable to work/ill
5. Retired
6. Not working at the moment
7. Student
8. Other - Please describe: .....

PHYSICAL ACTIVITY

These questions are about the exercise you had during the past 2 weeks for recreation, sport or health-fitness, and the physical activity you did as a part of your tasks at work and around the house.

Please distinguish between vigorous exercise and physical activity which made you breathe harder or puff and pant, and less vigorous exercise.

Q.14 In the past 2 weeks, did you engage in vigorous exercise - exercise which made you breathe harder or puff and pant? (eg vigorous sports such as football, netball, tennis, squash, jogging, vigorous swimming etc) (Circle the number beside ***one*** answer)

1. No
2. Yes - If so, how many sessions of vigorous exercise did you have over the past 2 weeks?

_____ sessions

Please estimate the total time spent vigorously exercising over the past 2 weeks:

_____ hours / _____ minutes

Q.15 In the past 2 weeks, did you engage in less vigorous exercise for recreation, sport or health-fitness purposes which did not make you breathe heavier or puff and pant?
(Circle the number beside ***one*** answer)

1. No
2. Yes - If so, how many sessions of less vigorous exercise did you have over the past 2 weeks?

_____ sessions

Q.16 In the past 2 weeks, did you walk for recreation or exercise?
(Circle the number beside ***one*** answer)

1. No
2. Yes - If so, how many times over the past 2 weeks?

_____ times

Q.17 In the past 2 weeks, did you engage in vigorous activity, apart from exercise, which made you breathe harder or puff and pant? (eg carrying loads, heavy gardening, chopping wood, labouring at home, during employment or anywhere else) (Circle the number beside ***one*** answer)

1. No
2. Yes - If so, how many sessions of these types of vigorous activity did you have over the past 2 weeks?

_____ sessions

Please estimate the total time spent in these types of vigorous activity over the past 2 weeks:

_____ hours / _____ minutes

FOOD AND EATING

Q.18 Below are some questions about your food and eating habits. Please answer each of the questions by circling your answer. If a question does not apply to you, circle N/A (ie not applicable).

AN EXAMPLE: **If you never skip breakfast you would make your answer by circling NEVER.**

How often do you skip breakfast because you don't have time?	N/A	(NEVER)	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
How often are you involved in deciding what food to buy for the week?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
How often are you involved in doing the weekly food shopping?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
How often are you involved in deciding what to prepare for the evening meal?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
How often are you involved in preparing the evening meal?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
If you see others eating do you also want to eat?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Do you have a desire to eat when you feeling down or discouraged?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Do you deliberatetly eat less so you do not become heavier?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
If you see or smell something delicious, do you have a desire to eat it?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Do you have a desire to eat when you are anxious, worried or tense?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
How often do you try not to eat between meals because you are watching your weight?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Do you have a desire to eat when you are cross?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
If food tastes good to you, do you eat more than usual?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
How often do you refuse food or drink because you are concerned about your weight?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Do you have a desire to eat when things have gone against you or gone wrong?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
How often do you try not to eat in the evenings because you are watching your weight?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
If you walk past a snackbar or cafe, do you have the desire to buy something delicious?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Can you resist eating delicious food?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Do you take your weight into account with what you eat?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN

Do you have a desire to eat when something unpleasant is about to happen?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
If food smells and looks good, do you eat more than usual?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
When you have put on weight, do you eat less than you usually do?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
Do you have a desire to eat when you are disappointed?	N/A	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN

YOUR WEIGHT - IN THE PAST

HOW TO ANSWER:

The following questions are about your weight. For these questions we would like you to record your answer in stones and pounds **OR** in kilograms (**not in both**). If you have no idea at all, circle don't know.

For example, if you weigh 9 stone 4 pounds, you would record your answer like this:

What is your weight at the moment?

_____ kilograms **OR** 9 stone and 4 pounds **OR** I don't know

Q.19 **What is the *heaviest* you have weighed since you turned eighteen (excluding pregnancies)?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

About how old were you then?

_____ years old

Q.20 **What is the *lowest* you have weighed since you turned eighteen (excluding any times you lost weight due to illness)?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

About how old were you then?

_____ years old

Q.21 **Since you have turned eighteen, about how many times have you lost or gained more than 6 kilograms - thats about 1 stone (excluding pregnancies)**

_____ times **OR** Never **OR** I don't know

Q.22 **Have you ever had any of these problems?** (Circle YES or NO for ***each*** problem)

Ever found it hard to lose weight?.....	YES	NO
Ever had problems maintaining your weight at a particular level?.....	YES	NO

Q.23 **Have you ever been told by a doctor or other health professional that you had any of these problems?** (Circle YES or NO for ***each*** problem)

Told you were underweight?.....	YES	NO
Told you were overweight?.....	YES	NO
Told you had anorexia nervosa?.....	YES	NO
Told you had bulimia?.....	YES	NO
Told you had some other health condition which affects your weight?.....	YES	NO

Q.24 **About how many times have you *ever* tried to lose weight (including any attempt you might be making now)?** If none, please circle none.

_____ times **OR** None **(If None, go straight to question 30)**

Q.25 **If you have *ever* tried to lose weight in the past, what is the *most* weight you have ever lost during *one* attempt?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

About how old were you then?

_____ years old

Q.26 **About how many times have you tried to lose weight since you took part in the Heart Foundation study *last year*? (including any attempt you might be making now)?** If none, circle none.

_____ times **OR** None **(If None, please go straight to question 30)**

Q.27 **If you have tried to lose weight since you took part in the Heart Foundation study *last year*, about how many weeks or months in total have you spent trying to lose weight?**

_____ weeks **OR** _____ months **OR** I don't know

Q.28 **If you have tried to lose weight since you took part in the Heart Foundation study *last year*, how supportive or helpful have the following people been? (Circle one response for each)**

Your spouse or partner?	NO SPOUSE	UNHELPFUL	NEUTRAL	HELPFUL
Your children?	NO CHILDREN	UNHELPFUL	NEUTRAL	HELPFUL
Other family members?	NO FAMILY	UNHELPFUL	NEUTRAL	HELPFUL
Your close friends?	NO FRIENDS	UNHELPFUL	NEUTRAL	HELPFUL
Your workmates?	NO WORKMATES	UNHELPFUL	NEUTRAL	HELPFUL

Q.29 **Which the following have you used in order to help you lose weight since you took part in the Heart Foundation study *last year*, and what worked for you?**

	Have you tried this?		Did it work for you?	
Cut down on the overall **amount** of food you eat?.....	NO	YES	NO	YES
Fasted or skipped meals?.....	NO	YES	NO	YES
Watched the **type** of food you eat?.....	NO	YES	NO	YES
Counted calories (ie look at the calorie content foods)?.....	NO	YES	NO	YES
Cut down on the **amount** of alcohol you drink?.....	NO	YES	NO	YES
Taken diuretics or fluid pills?.....	NO	YES	NO	YES
Taken laxatives?.....	NO	YES	NO	YES
Taken other slimming tablets or pills?.....	NO	YES	NO	YES
Used physical activity or exercise?.....	NO	YES	NO	YES
Attended a weight loss club or group?.....	NO	YES	NO	YES
Smoked for your weight?.....	NO	YES	NO	YES
Tried anything else?.....	NO	YES	NO	YES

Please check that for each of the weight loss methods you have tried you have also indicated whether it worked for you.

Q.30 **Has your weight changed since you took part in the Heart Foundation study *last year*?**
(Circle the number beside ***one*** answer)

1. My weight has increased a lot
2. My weight has increased a little
3. I don't think my weight has changed **(If so, go straight to question 32)**
4. My weight has dropped a little
5. My weight has dropped a lot
6. I don't know/I haven't noticed **(If so, go straight to question 32)**

Q.31 **If your weight has changed since the Heart Foundation study last year, *how much* has it changed by?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.32 **Are any of the people who live with you in your household currently trying to lose weight or doing things to avoid putting on weight?**

1. I live alone
2. No
3. Yes

Q.33 **Is there anyone else who is close to you (eg a close relative or close friend) who is currently trying to lose weight or doing things to avoid putting on weight?**

1. No / I don't know
2. Yes

YOUR WEIGHT - AT THE MOMENT

Q.34 **About how often do you usually weigh yourself?**
(Circle the number beside ***one*** answer)

1. At least once a day
2. Several times a week
3. About once a week
4. About once or twice a month
5. A few times a year
6. About once a year
7. I never weigh myself

Q.35 **How tall are you without shoes?**

_____ centimetres **OR** _____ feet and _____ inches **OR** I don't know

Q.36 **How much do you weigh at the moment (without clothes and shoes)?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.37 **How would you describe your current weight?**
(Circle the number beside ***one*** answer)

1. Very underweight
2. Slightly underweight
3. About the right weight
4. Slightly overweight
5. Very overweight
6. I've never really thought about it

Q.38 **How concerned are you about your current weight?**
(Circle the number beside ***one*** answer)

1. Not at all concerned
2. Not very concerned
3. Moderately concerned
4. Quite concerned
5. Very concerned

Q.39 ***Ideally,* how much would you like to weigh at the moment (without clothes and shoes)?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.40 **If you were to try and reach this *ideal* weight how confident are you that you could do so?**
(Circle the number beside ***one*** answer)

1. I am already at my ideal weight
2. Very confident
3. Quite confident
4. Moderately confident
5. Not very confident
6. Not at all confident
7. Don't know

Q.41 Please indicate how much you agree or disagree with each of the statements below by circling your response. We are interested in your views about yourself. Please answer every question.

AN EXAMPLE: **If you strongly agree with this statement, you would make your answer by circling STRONGLY AGREE**					
I would like to be a lot taller than I am	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I usually feel physically attractive	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I prefer not to let other people see my body	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I get so worried about my shape that I feel I ought to diet	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I feel fat when I can't get clothes over my hips	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
People avoid me because of my looks	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I worry that other people can see rolls of fat around my waist and stomach	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I think I deserve the attention of the opposite sex	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I hardly ever feel fat	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
There are more important things in life than the shape of my body	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
People hardly ever find me sexually attractive	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I feel fat when I wear clothes that are tight around the waist	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I quickly get exhausted if I overdo it	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I have a slim waist	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Wearing loose clothes makes me feel thin	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I hardly ever think about the shape of my body	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I am proud of my physical strength	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE

I feel that I have fat thighs	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Eating sweets, cakes or other high calorie foods makes me feel fat	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I have a strong body	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I think my buttocks are too large	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I try and keep fit	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I am preoccupied with the desire to be lighter	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
If I catch sight of myself in a mirror or shop window it makes me feel bad about my shape	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I spend a lot of time thinking about my weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
People often compliment me on my looks	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Losing one kilogram would not really affect my feelings about myself	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I feel fat when I can no longer get into clothes that used to fit me	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I have never been very strong	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I try to avoid clothes which make me especially aware of my shape	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE

Q.42 **How would you describe your overall level of body fatness at the moment?**
(Circle the number beside ***one*** answer)

1. Very fat
2. A little bit fat
3. Not too fat or too thin
4. A little bit thin
5. Very thin
6. I've never really thought about it

Q.43 **How concerned are you about your body fatness?**
(Circle the number beside ***one*** answer)

1. Not at all concerned
2. Not very concerned
3. Moderately concerned
4. Quite concerned
5. Very concerned

Q.44 **In your opinion, what is the *most* you could weigh and still *not* consider yourself overweight?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.45 **How confident are you that you can avoid gaining too much extra weight over the next two years?** (Circle the number beside ***one*** answer)

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.46 **If you were to become 3 kilograms (or about half a stone) heavier than you are at the moment, how concerned would you be about this?** (Circle the number beside ***one*** answer)

1. Not at all concerned
2. Not very concerned
3. Moderately concerned
4. Quite concerned
5. Very concerned

Q.47 **If you were to become 3 kilograms (or about half a stone) heavier than you are at the moment, how confident are you that you could lose this extra weight if you tried to do so?**
(Circle the number beside one answer)

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.48 **Please read this question carefully. Your answer to it determines which section of the questionnaire you should answer next.**

Which one of the following statements best describes you at the moment?
(Please circle the number beside one)

1. I am actively doing things to try to **gain** weight at the moment
   (If so, go straight to question 49 on page 13)

2. I am actively doing things to **avoid gaining** weight at the moment
   (If so, go straight to question 56 on page 14)

3. I am actively doing things to try to **lose** weight at the moment
   (If so, go straight to question 64 on page 16)

4. I am **not doing anything** in particular for my weight at the moment
   (If so, go straight to question 73 on page 18)

You should only answer questions 49 - 55 if you are actively trying to gain weight at the moment. If you are not, go back to question 48 on page 12 and check which section you should be completing.

Q.49 ***How much*** **weight would you like to gain over the** ***next twelve months*****?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.50 **Why are you trying to gain weight? (For example, were you advised to by a doctor, do you want to be bigger or stronger etc?)**

Please describe in your own words:

.....

.....

Q.51 **About how l*ong ago* did you begin your current attempt to gain weight?**

_____ days **OR** _____ weeks **OR** _____ months **OR** _____ years

Q.52 **About how much did you weigh when you *began* your current attempt to gain weight?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.53 **What level of weight are you hoping to get up to at the moment?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.54 **How much *longer* do you expect it will take you to achieve this weight?**

_____ days **OR** _____ weeks **OR** _____ months **OR** Don't know

Q.55 **What sort of things are you doing at the moment to help you gain weight? (For example, are you eating more of certain foods, eating new foods, doing more exercise etc?)**

Please describe in your own words:

.....

.....

.....

Now that you have finished this section
please go straight to Question 76 on Page 19

You should only answer questions 56 - 63 if you are actively doing things to avoid gaining weight at the moment. If you are not, go back to question 48 on page 12 and check which section you should be completing.

Q.56 **Why are you doing things to avoid gaining weight?** (Circle YES or NO for ***each*** statement)

So you will feel good about yourself.....	YES	NO
For appearance reasons.....	YES	NO
For your long-term health.....	YES	NO
To please your spouse or partner.....	YES	NO
To please your family.....	YES	NO
You were advised to by a doctor.....	YES	NO
To maintain your overall fitness.....	YES	NO
So you won't have problems with clothes.....	YES	NO

Any other reasons? -Please describe in your own words:

.....

.....

.....

.....

Q.57 **How confident are you that you can avoid gaining any weight over the *next twelve months*?** (Circle the number beside ***one*** answer)

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.58 ***How long ago*** **did you start to do things to keep your weight at its current level?**

_____ days **OR** _____ weeks **OR** _____ months **OR** _____ years

Q.59 **Are you doing any of the following in order to keep your weight at its current level?** (Circle YES or NO for ***each*** of the activities listed)

Watching the overall **amount** of food you eat?.....	YES	NO
Fasting or skipping meals?.....	YES	NO
Watching the **type** of food you eat?.....	YES	NO
Counting calories (ie looking at the calorie content of foods)?.....	YES	NO
Attending a weight-loss club or group?.....	YES	NO

Taking diuretics or fluid pills?	YES	NO	
Taking laxatives?	YES	NO	
Taking other slimming tablets or pills?	YES	NO	
Using physical activity or exercise?	YES	NO	
Watching the **amount** of alcohol you drink?	YES	NO	N/A
Smoking to help control your weight?	YES	NO	N/A

Q.60 **Are you doing anything else in order to keep your weight at its current level?**

1. No
2. Yes - Please describe in your own words what else you are doing:

.....

.....

.....

Q.61 **Which *one* of the following statements best describes what you think you should do about your weight over the *next twelve months*?** (Circle the number beside **one** statement)

1. I **don't intend** to try to lose weight in the next 12 months.
   (If so, go straight to question 76 on page 19)
2. I think **I should** try to lose weight in the next 12 months.
3. I'm thinking about **how** to lose weight in the next 12 months
   (eg how to change my eating practices, what sort of exercise to do etc).

Q.62 **If you think you should lose weight, or are thinking about how to lose weight, how much weight would you like to lose over the *next twelve months*?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.63 **How confident are you that you could actually lose this amount of weight over the *next twelve months* if you tried to do so?**

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Now that you have finished this section
please go straight to Question 76 on Page 19

You should only answer questions 64 - 72 if you are actively trying to lose weight at the moment. If you are not, go back to question 48 on page 12 and check which section you should be completing.

Q.64 **Why are you trying to lose weight?** (Circle YES or NO for ***each*** statement)

To feel better about yourself.....	YES	NO
To look better or for appearance reasons.....	YES	NO
For your long-term health.....	YES	NO
To please your spouse or partner.....	YES	NO
To please your family.....	YES	NO
You were advised to by a doctor.....	YES	NO
To improve your overall fitness.....	YES	NO
So you won't have problems with clothes.....	YES	NO

Any other reasons? -Please describe in your own words:

.....

.....

.....

Q.65 ***How much*** **weight would you like to lose over the *next twelve months*?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.66 **How confident are you that you can actually lose this amount of weight over the next twelve months?**

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.67 **About how *long ago* did you *begin* your current attempt to lose weight?**

_____ days **OR** _____ weeks **OR** _____ months **OR** _____ years

Q.68 **About *how much* did you weigh when you *began* your current attempt to lose weight?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.69 **What weight are you hoping to get down to at the moment?**

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.70 **How much *longer* do you expect it will take you to achieve this weight?**

_____ days **OR** _____ weeks **OR** _____ months **OR** I don't know

Q.71 **Are you doing any of the following in order to help you lose weight?**
(Circle YES or NO for ***each*** of the activities listed)

Trying to cut down on the overall **amount** of food you eat?.....	YES	NO	
Fasting or skipping meals?.....	YES	NO	
Watching the **type** of food you eat?.....	YES	NO	
Counting calories (ie looking at the calorie content of foods)?.....	YES	NO	
Attending a weight loss club or group?.....	YES	NO	
Taking diuretics or fluid pills?.....	YES	NO	
Taking laxatives?.....	YES	NO	
Taking other slimming tablets or pills?.....	YES	NO	
Using physical activity or exercise?.....	YES	NO	
Trying to cut down on the **amount** of alcohol you drink?.....	YES	NO	N/A
Do you smoke for your weight?.....	YES	NO	N/A

Q.72 **Are you doing anything else in order to help you lose weight?**

1. No
2. Yes - Please describe in your own words what else you are doing:

.....

.....

.....

Now that you have finished this section
please go straight to Question 76 on Page 19

You should only answer questions 73 - 75 if you are not doing anything in particular for your weight at the moment. If you are doing something for your weight, go back to question 48 on page 12 and check which section you should be completing.

Q.73 Which *one* of the following statements best describes what you think you should do about your weight over the *next twelve months*? (Circle the number beside **one** statement)

1. I **don't intend** to do anything in particular about for my weight in the next 12 months.
   (If so, go straight to question 76 on page 19)
2. I think **I should** try to do something to **avoid gaining** weight in the next 12 months.
   (If so, go straight to question 76 on page 19)
3. I'm thinking about **how** to **avoid gaining** weight in the next 12 months (eg how to change my eating practices, what sort of exercise to do etc).
   (If so, go straight to question 76 on page 19)
4. I think **I should** try to **lose** weight in the next 12 months.
5. I'm thinking about **how** to **lose** weight in the next 12 months (eg how to change my eating practices, what sort of exercise to do etc).

Q.74 If you think you should lose weight, or are thinking about how to lose weight, *how much* weight would you like to lose over the *next twelve months*?

_____ kilograms **OR** _____ stone and _____ pounds **OR** I don't know

Q.75 How confident are you that you can actually lose this amount of weight over the *next twelve months* if you tried to do so?

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Now that you have finished this section please go straight to Question 76 on Page 19

WEIGHT CONTROL - YOUR VIEWS

Q.76 Below are some statements about weight and controlling body weight. Regardless of whether or not you are trying to lose weight or are concerned about your weight, please indicate how much you agree or disagree with each of the statements. Everyone should answer these.

AN EXAMPLE: **If you strongly agree with this statement, you would make your answer by circling STRONGLY AGREE**

It is a lot harder to lose weight than it is to put it on in the first place	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	(STRONGLY AGREE)

By restricting what one eats, one can lose weight.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
When people gain weight it is because of something they have done or not done.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
A thin body is largely a result of genetics or hereditary.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
No matter how much effort one puts into dieting, one's weight tends to stay about the same.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
One's weight, to a large extent, is controlled by fate.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
There is so much fattening food around that losing weight is almost impossible.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Most people can only diet successfully when other people push them to do it.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Having a slim and fit body has very little to do with luck.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
People who are overweight lack the will-power necessary to control their weight.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Each of us is directly responsible for our weight.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Losing weight is simply a matter of wanting to do it and applying yourself.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
People who are more than a couple of pounds overweight need professional help to lose weight.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
By increasing the amount one exercises, one can lose weight.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Most people are at their present weight because that is the weight level that is natural for them.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Unsuccessful dieting is due to a lack of effort.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE

In order to lose weight people must get a lot of encouragement from others.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Exercising to lose weight is boring, hard work	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would feel more optimistic if I lost weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would be less productive in other areas if I lost weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would feel more attractive if I lost weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Losing weight means eating boring foods	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
If I lost weight, I would reduce my chance of getting heart disease	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
If I were to go on a diet, meal preparation would be more difficult for my family or housemates	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
If I lost weight my family would be proud of me	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would be less self-concious if I lost weight.	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Losing weight means giving up some of your favourite foods	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Others would have more respect for me if I were to lose weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would have to give up some of my favourite activities to lose weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Dieting would take the pleasure out of meals	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I could wear more attractive clothes if I lost weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
My health would improve if I lost some weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
Losing weight could be expensive when everything is taken into account	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would have to cut down on my favourite snacks if I was dieting	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would feel more energetic if I lost weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would be able to accomplish more if I was a little lighter that I am	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
I would have to avoid some of my favourite places if I were trying to lose weight	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE

THANK YOU

Thank you for the time you have taken to complete the questionnaire. Perhaps you would like take a break, before checking that you have answered all the questions that apply to you.

Would you interested in receiving a summary of the research findings?

1. **Yes**
2. **No**

If there are any comments you would like to make, please use the space below.

APPENDIX 4

THE COVER AND REMINDER LETTERS FOR THE WEIGHT-CONTROL SURVEY

Centre for Social and Preventive Research

Marian C Worcester PhD Director

Heart Foundation

National Heart
Foundation of Australia
ACN 008 419 761

September 1993

Last year you took part in our health research project which provided valuable information on the health of rural Victorians. I am now writing to seek your help with an important follow-up study.

This study is being conducted by the Heart Research Centre (formerly the National Heart Foundation Centre for Social and Preventive Research) with the help of the Australian National University. The study deals with a number of issues about health, eating and weight control.

It is important that we receive as many completed questionnaires as possible so that our results are accurate. I would be grateful if you would complete the enclosed questionnaire as soon as convenient and return it in the reply-paid envelope we have provided. The questionnaire will only take about 30 minutes to complete.

Please be assured that all your information will be treated in the strictest confidence. Your answers to the questionnaire will be used only for research purposes and no personal details will be released. *This is an important study and its success depends on your participation.* If you have any questions about the study, please telephone 008-066-051 (free-call) between 9am and 5pm weekdays.

Over the next few years, it is possible that we may contact you again. We would like to stress that we are very grateful for the time you have already given and for your assistance with this follow-up.

Yours sincerely

Marian Worcester

(Dr) Marian Worcester
Study Director

Dear Sir/Madam,

Re: Heart Research Study

A few weeks ago I sent you a questionnaire seeking your opinions about a number of important health issues. This survey is a follow-up to the Heart Foundation study you took part in last year.

If you have already completed and returned the questionnaire, please accept my sincere thanks. If not, I would be grateful if you would do so as soon as you can. In order for the findings of the study to properly represent community views it is important that your answers are included in the study.

If you have not received the questionnaire, or it has been misplaced, please contact us toll-free on 008-066-051 between 9am and 5pm on weekdays so that we can post another one to you. Thank you for your help.

Yours sincerely,

Dr Marian Worcester

Centre for Social and Preventive Research

Marian C Worcester PhD Director

Heart Foundation

National Heart
Foundation of Australia
ACN 008 419 761

November 10, 1993

Dear Sir/Madam,

About six weeks ago, I wrote to you seeking your help with a study of health, eating and weight. At this stage I have not received your completed questionnaire.

I am writing to you again because of the importance of this research. The Heart Research Centre is conducting this study because of community interest in weight control. Results from the survey will help health workers to make decisions based on accurate up-to-date information.

In order for the results of this survey to represent community views, *it is important for everyone to return a completed questionnaire*. The survey is a follow-up to the Heart Foundation study you took part in last year. If you are having any problems completing the questionnaire, please do not hesitate to ring us on 008-066-051 (free-call) between 9am and 5pm on weekdays and we will be pleased to help you. In the event that your questionnaire has been misplaced, a replacement is enclosed.

This is the last letter we will be sending about this year's research study, however there is still time for you to take part. Your help will be greatly appreciated.

Yours sincerely

Marian Worcester

(Dr) Marian Worcester

Study Director

APPENDIX 5

THOSE SECTIONS OF THE WEIGHT-CONTROL FOLLOW-UP QUESTIONNAIRE REPORTED IN THIS THESIS

IN CONFIDENCE

HEART RESEARCH CENTRE

1994 FOLLOW-UP STUDY

ABOUT THIS STUDY

This study deals with issues relating to health, eating, physical activity, smoking and weight control. The study is a follow-up to the research you took part in late last year.

Some of the questions are similar to last year's, but it is important you answer these so that we can monitor any changes over time. If the findings are to represent community views it is vital that your answers are included. Please answer all of the questions that apply to you.

If you have any queries about the survey please call 008-066-051 (toll-free) between 9am and 5pm weekdays and we will be happy to assist you.

Study number:

BACKGROUND INFORMATION

These questions provide information which will help us to understand patterns of health in the community. The details you provide will be treated in the strictest confidence.

Q.1 What is your age?

_____ years old

Q.2 What is your sex? (Circle the number beside ***one*** answer)

1. Male - **Go straight to question 3**
2. Female - **Are you now pregnant?** (Circle the number beside ***one*** answer)

    1. Yes
    2. No

    - **Have you had any children since you took part in last year's survey?** (Circle the number beside ***one*** answer)

    1. Yes
    2. No

Q.3 What is your present marital status?
(Circle the number beside ***one*** answer)

1. Never married
2. Now married
3. Separated but not divorced
4. Divorced
5. Widowed

Q.4 Has your occupation or employment status changed since last year's survey?
(Circle the number beside ***one*** answer)

1. No **(If No, go straight to question 7)**
2. Not sure
3. Yes

Q.5 Do you have a full-time or part-time job of any kind? (Either for payment or profit, or unpaid work in a family business) (Circle the number beside ***one*** answer)

1. No **(If No, go straight to question 7)**
2. Yes

Q.6 In your main job, what is your occupation? Please give a full title (eg Farm hand, Sales assistant, Accounts clerk etc)

.....

What are the main tasks or duties that you usually perform in that occupation? Please describe as fully as possible (eg assisting farmer to plant crops, selling clothes, recording and paying accounts)

.....

.....

YOUR WEIGHT

It is very important that *everyone* answers these questions, even if you don't have a problem with your weight.

Q.7 **Which *one* of the following statements best describes what you have done about your weight over the *past twelve months*?** (Circle the number beside **one** statement)

1. I didn't do anything to lose weight, and I never even thought about trying
   (If so, go straight to question 10 at the bottom of this page)
2. I didn't do anything to lose weight, but I did seriously think about trying
   (If so, go straight to question 10 at the bottom of this page)
3. I actively did things to try to lose weight
   (If so, go to the next question - ie question 8)

Q.8 **Which of the following have you used in order to help you lose weight since you took part in the Heart Research Study *last year*, and what worked for you?** (Circle YES or NO for each)

	Did you try this?		**If YES, did it work for you?**	
Cut down on the overall **amount** of food you ate?.....	NO_1	YES_2	NO_1	YES_2
Fasted or skipped meals?.....	NO_1	YES_2	NO_1	YES_2
Watched the **type** of food you ate?.....	NO_1	YES_2	NO_1	YES_2
Counted calories (ie looked at the calorie content foods)?.....	NO_1	YES_2	NO_1	YES_2
Attended a weight loss club or group?.....	NO_1	YES_2	NO_1	YES_2
Took diuretics or fluid pills?.....	NO_1	YES_2	NO_1	YES_2
Took laxatives?.....	NO_1	YES_2	NO_1	YES_2
Took other slimming tablets or pills?.....	NO_1	YES_2	NO_1	YES_2
Used physical activity or exercise?.....	NO_1	YES_2	NO_1	YES_2
Cut down on the amount of alcohol you drank?. ...DONT DRINK$_3$	NO_1	YES_2	NO_1	YES_2
Smoked to lose weight?.....DONT SMOKE$_3$	NO_1	YES_2	NO_1	YES_2
Tried something else?.....	NO_1	YES_2	NO_1	YES_2

Q. 9 **If you have you tried to lose weight over the *past 12 months,* how successful have you been overall?** (Circle the number beside ***one*** answer)

1. Very successful
2. Quite successful
3. Moderately successful
4. Not very successful
5. Not at all successful

Q.10 **Have there been any times over the past twelve months when you weren't trying to lose weight but were actively doing things to avoid gaining weight** (Circle **one** statement)

1. I didn't actively do anything to avoid gaining weight and I never even thought about trying
2. I didn't actively do anything to avoid gaining weight, but I did seriously think about trying
3. I actively did things to try to avoid gaining weight

It is very important that *everyone* answers all the questions on pages 3 and 4 . Please make sure you do.

HOW TO ANSWER:

For some of these questions we would like you to record your answer in stones and pounds **OR** in kilograms (**not in both**).

For example, if you weigh 10 stone 7 pounds, you would record your answer like this:

How much do you weigh at the moment?

_____ kilograms **OR** 10 stone and 7 pounds

Q.11 **How much do you weigh at the moment (without clothes and shoes)?**

_____ kilograms **OR** _____ stone and _____ pounds

Q.12 **Has your weight changed since you took part in the Heart Research Study *last year*?**
(Circle the number beside ***one*** answer)

1. My weight has increased a lot
2. My weight has increased a little
3. I don't think my weight has changed
4. My weight has dropped a little
5. My weight has dropped a lot
6. I don't know/I haven't noticed

Q.13 **How would you describe your current weight?**
(Circle the number beside ***one*** answer)

1. Very underweight
2. Slightly underweight
3. About the right weight
4. Slightly overweight
5. Very overweight
6. I've never really thought about it

Q.14 **How concerned are you about your current weight?**
(Circle the number beside ***one*** answer)

1. Not at all concerned
2. Not very concerned
3. Moderately concerned
4. Quite concerned
5. Very concerned

Q.15 **How confident are you that you can avoid gaining weight over the *next twelve months*?**
(Circle the number beside ***one*** answer)

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.16 **How would you describe your overall level of body fatness at the moment?**
(Circle the number beside ***one*** answer)

1. Very fat
2. A little bit fat
3. Not too fat or too thin
4. A little bit thin
5. Very thin
6. I've never really thought about it

Q.17 **How concerned are you about your body fatness?**
(Circle the number beside ***one*** answer)

1. Not at all concerned
2. Not very concerned
3. Moderately concerned
4. Quite concerned
5. Very concerned

Q.18 ***Ideally,* how much would you like to weigh at the moment (without clothes and shoes)?**

_____ kilograms **OR** _____ stone and _____ pounds

Q.19 **If you were to try and reach this *ideal* weight how confident are you that you could do so?**
(Circle the number beside ***one*** answer)

1. I am already at my ideal weight
2. Very confident
3. Quite confident
4. Moderately confident
5. Not very confident
6. Not at all confident
7. Don't know

Q.20 **Please read this question carefully. Your answer to it determines which section of the questionnaire you should answer next.**

Which one of the following statements best describes you at the moment?
(Please circle the number beside one)

1. I am actively doing things to try to **gain** weight at the moment
   (If so, go straight to question 31 on page 8)
2. I am actively doing things to **avoid gaining** weight at the moment
   (If so, go straight to question 21 on page 5)
3. I am actively doing things to try to **lose** weight at the moment
   (If so, go straight to question 25 on page 6)
4. I am **not doing anything** in particular for my weight at the moment
   (If so, go straight to question 28 on page 7)

You should only answer questions 21 - 24 if you are actively doing things to avoid gaining weight at the moment. If you are not, go back to question 20 on page 4 and check which section you should be completing.

Q.21 **Are you doing any of the following in order to keep your weight at its current level?**
(Circle YES or NO for ***each*** of the activities listed)

Watching the overall **amount** of food you eat?	YES$_1$	NO$_2$	
Fasting or skipping meals?	YES$_1$	NO$_2$	
Watching the **type** of food you eat?	YES$_1$	NO$_2$	
Counting calories (ie looking at the calorie content of foods)?	YES$_1$	NO$_2$	
Attending a weight-loss club or group?	YES$_1$	NO$_2$	
Taking diuretics or fluid pills?	YES$_1$	NO$_2$	
Taking laxatives?	YES$_1$	NO$_2$	
Taking other slimming tablets or pills?	YES$_1$	NO$_2$	
Doing physical activity or exercise?	YES$_1$	NO$_2$	
Watching the amount of alcohol you drink?	YES$_1$	NO$_2$	DONT DRINK$_3$
Smoking to help control your weight?	YES$_1$	NO$_2$	DONT SMOKE$_3$
Doing something else to control your weight?	YES$_1$	NO$_2$	

Q.22 **Which *one* of the following statements best describes what you think you should do about your weight over the *next twelve months*?** (Circle the number beside **one** statement)

1. I **don't intend** to try to lose weight in the next 12 months.
   (If so, go straight to question 31 on page 8)
2. I think **I should** try to lose weight in the next 12 months.
3. I'm thinking about **how** to lose weight in the next 12 months
   (eg how to change my eating practices, what sort of exercise to do etc).

Q.23 **If you think you should lose weight, or are thinking about how to lose weight, how much weight would you like to lose over the *next twelve months*?**

_____ kilograms **OR** _____ stone and _____ pounds

Q.24 **How confident are you that you could actually lose this amount of weight over the *next twelve months* if you tried to do so?**

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Now that you have finished this section
please go straight to Question 31 on Page 8

You should only answer questions 25 - 27 if you are actively trying to lose weight at the moment. If you are not, go back to question 20 on page 4 and check which section you should be completing.

Q.25 ***How much*** **weight would you like to lose over the** ***next twelve months*****?**

_____ kilograms **OR** _____ stone and _____ pounds

Q.26 **How confident are you that you can actually lose this amount of weight over the next twelve months?**

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.27 **Are you doing any of the following in order to help you lose weight?**
(Circle YES or NO for ***each*** of the activities listed)

Watching the overall **amount** of food you eat?.....	YES_1	NO_2	
Fasting or skipping meals?.....	YES_1	NO_2	
Watching the **type** of food you eat?.....	YES_1	NO_2	
Counting calories (ie looking at the calorie content of foods)?.....	YES_1	NO_2	
Attending a weight-loss club or group?.....	YES_1	NO_2	
Taking diuretics or fluid pills?.....	YES_1	NO_2	
Taking laxatives?.....	YES_1	NO_2	
Taking other slimming tablets or pills?.....	YES_1	NO_2	
Doing physical activity or exercise?.....	YES_1	NO_2	
Watching the amount of alcohol you drink?.....	YES_1	NO_2	$DONT\ DRINK_3$
Smoking to help you lose weight?.....	YES_1	NO_2	$DONT\ SMOKE_3$
Doing something else to lose weigh?.....	YES_1	NO_2	

Now that you have finished this section
please go straight to Question 31 on Page 8

You should only answer questions 28 - 30 if you are not doing anything in particular for your weight at the moment. If you are doing something for your weight, go back to question 20 on page 4 and check which section you should be completing.

Q.28 Which *one* of the following statements best describes what you think you should do about your weight over the *next twelve months*? (Circle the number beside **one** statement)

1. I **don't intend** to do anything in particular about for my weight in the next 12 months.
   (If so, go straight to question 31 on page 8)
2. I think **I should** try to do something to **avoid gaining** weight in the next 12 months.
   (If so, go straight to question 31 on page 8)
3. I'm thinking about **how** to **avoid gaining** weight in the next 12 months (eg how to change my eating practices, what sort of exercise to do etc).
   (If so, go straight to question 31 on page 8)
4. I think **I should** try to **lose** weight in the next 12 months.
5. I'm thinking about **how** to **lose** weight in the next 12 months (eg how to change my eating practices, what sort of exercise to do etc).

Q.29 If you think you should lose weight, or are thinking about how to lose weight, *how much* weight would you like to lose over the *next twelve months*?

_____ kilograms **OR** _____ stone and _____ pounds

Q.30 How confident are you that you can actually lose this amount of weight over the *next twelve months* if you tried to do so?

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Now that you have finished this section please go straight to Question 31 on Page 8

YOUR EATING HABITS

These questions are about some of the foods you might eat. For each question, please circle the number beside the response which best describes your answer. Please answer *all of these* questions.

Q.31 How is your meat usually cooked?
(Circle the number beside ***one*** answer)

1. I never eat meat
2. I eat meat only occasionally
3. Fried
4. Stewed or goulash (casseroled)
5. Grilled or roasted with added oil or fat
6. Grilled or roasted without added oil or fat

Q.32 How much of the fat on your meat do you eat?
(Circle the number beside ***one*** answer)

1. I never eat meat
2. I eat meat only occasionally
3. Most or all of the fat
4. Some of the fat
5. None of the fat

Q.33 How many times a week do you eat sausages, devon, salamis, meat pies, hamburgers or bacon?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.34 How much of the skin on your chicken do you eat?
(Circle the number beside ***one*** answer)

1. I don't eat chicken
2. Most of the skin
3. Some of the skin
4. None of the skin

Q.35 How often do you eat fried food with a batter or breadcrumb coating?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.36 How often do you eat vegetables that are fried or roasted with fat or oil?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.37 How often do you add butter, margarine, oil or sour cream to vegetables, cooked rice or spaghetti?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.38 How often do you eat gravy, cream sauces or cheese sauces?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.39 How do you spread butter or margarine on your bread?
(Circle the number beside ***one*** answer)

1. Thickly
2. Medium
3. Thinly
4. I don't use butter or margarine

Q.40 How many times a week do you eat hot chips or French fries?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.41 How many times a week do you eat potato crisps, corn chips or nuts?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.42 How many times a week do you eat pastries, cakes, sweet biscuits or croissants?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.43 How many times a week do you eat chocolate, chocolate biscuits or sweet snack bars?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.44 How often do you eat cream?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.45 How often do you eat ice cream?
(Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.46 How many times a week do you eat cheddar, edam or other hard cheese, cream cheese or cheese like camembert? (Circle the number beside ***one*** answer)

1. Six or more times a week
2. Three to five times a week
3. Once or twice a week
4. Less than once a week
5. Never

Q.47 What type of milk do you drink or use in cooking or tea and coffee?
(Circle the number beside ***one*** answer)

1. Condensed
2. Full-cream
3. A combination of full-cream and reduced-fat
4. Reduced-fat
5. Skim milk
6. I don't use milk

APPENDIX 6

THE COVER AND REMINDER LETTERS FOR THE WEIGHT-CONTROL FOLLOW-UP

October, 1994

Dear Sir/Madam,

Late last year you took part in our health research project which provided valuable information on the health of rural Victorians. I am now writing to seek your help with our 1994 follow-up study.

This study is being conducted by the Heart Research Centre with the help of the Australian National University. The study deals with a number of issues about health, eating, physical activity, smoking and weight control. Some of the questions are similar to last year's, but we need you to answer these so that we can monitor any changes over time.

It is important that we receive as many completed questionnaires as possible for our results to be accurate. I would be grateful if you would complete the enclosed questionnaire as soon as convenient and return it in the reply-paid envelope we have provided. The questionnaire will only take about 30 minutes to complete.

Please be assured that all your information will be treated in the strictest confidence. Your answers to the questionnaire will be used only for research purposes and no personal details will be released. *This is an important study and its success depends on your participation.* If you have any questions study please telephone 008-066-051 (free-call) between 9am and 5pm weekdays.

We are very grateful for your time and assistance with our research studies.

Yours sincerely

Dr Marian Worcester

Study Director

Dear Sir/Madam,

Re: 1994 Heart Research Study

A few weeks ago I sent you a questionnaire seeking your opinions about a number of important health issues. This survey is a follow-up to the Heart Research Study you took part in last year.

If you have already completed and returned the questionnaire, please accept my sincere thanks. If not, I would be grateful if you would do so as soon as you can. In order for the findings of the study to properly represent community views it is important that your answers are included in the study.

If you have not received the questionnaire, or it has been misplaced, please contact us toll-free on 008-066-051 between 9am and 5pm on weekdays so that we can post another one to you. Thank you for your help.

Yours sincerely,

Dr Marian Worcester

November 3, 1994

Dear Sir/Madam,

About a month ago I wrote to you seeking your help with a study of health, physical activity, eating and weight. At this stage I have not received your completed questionnaire.

I am writing to you again because of the importance of this research. The Heart Research Centre is conducting this study because of community concern about these issues. Results from the survey will help health workers to make decisions based on accurate up-to-date information.

In order for the results of this survey to represent community views *it is important for everyone to return a completed questionnaire*. The survey is a follow-up to the Heart Research Study you took part in last year.

If you are having any problems completing the questionnaire, please do not hesitate to ring us on 008-066-051 (free-call) between 9am and 5pm on weekdays and we will be pleased to help you. In the event that your questionnaire has been misplaced, a replacement is enclosed.

This is the last letter we will be sending about this year's research study, however there is still time for you to take part. Your help will be greatly appreciated.

Yours sincerely

Dr Marian Worcester

Study Director

APPENDIX 7

PREDICTION OF WEIGHT FROM SELF-REPORTED WEIGHT

Introduction

Studies which have examined the validity of self-reported weight have produced conflicting findings. Some investigators have concluded that the validity of self-report data are a cause for concern, others have found they are useful if a correction factor is employed, still others have found that self-report data are not appropriate for clinical studies, while several have concluded that self-reports are adequate for epidemiological studies (Bowman & DeLucia, 1992; Casey, Dwyer, Berkey, Coleman, Gardner, & Valadian, 1991; DelPrete, Caldwell, English, Banspach, & Lefebvre, 1992; Millar, 1986; Perry, Byers, Mokdad, Serdula, & Williamson, 1995; Rowland, 1990; Stevens, Keil, Waid, & Gazes, 1990; Yu & Nagey, 1992).

Only a few studies, however, have examined the effect of self-reported weight on the accuracy of relative weight classification (Kuskowska-Wolk, et al., 1992; Kuskowska-Wolk, et al., 1989; Nieto-Garcia, et al., 1990; Stewart, et al., 1987; Waters, 1993). These studies have found that, in spite of the high correlation between self-reported and objectively-measured weight, substantial misclassification can occur when self-report data are used to classify people into Body Mass Index (BMI) categories.

For the purposes of this thesis it was important to classify accurately subjects as underweight, an acceptable weight, overweight, or obese on the basis of their BMIs. However, since the 1993 Weight Control Survey was conducted by mail, it was only possible to collect data regarding self-reported weight. The aims of this Appendix, therefore, are to examine the validity of self-report in the Rural Risk Factor Prevalence Study (RRFPS) and its effect on BMI classification, and to describe the steps taken to improve the classification of subjects into BMI categories by estimating a correction factor for the Weight Control Survey sample.

The validity of self-reported weight and Body Mass Index category

In addition to having their weight objectively measured during the 1992 RRFPS, subjects were also asked in that survey to report their current weight, providing an opportunity to assess the validity of the self-report estimate. The question regarding self-reported weight was included in the questionnaire that subjects completed before their clinical examination (prior to their weight being measured). A total of 1489 of the 1550 subjects who completed the Weight Control Survey had had their weights measured during the RRFPS. Of these, 1239 subjects, or 83.2 per cent, self-reported their weight at the time of the RRFPS. The proportion of subjects who self-reported their weight varied by sex but not age. Twenty-one per cent of women, compared to 12.5 per cent of men (χ^2=19.17, df=1, p<0.0001) failed to report their weight during the RRFPS .

Table 1 presents the percentage of men and women in each age-group under-reporting their weight by more than two kilograms at the time of the 1992 RRFPS, the proportion over-reporting by more than two kilograms, and the mean reporting error (self-reported - measured weight) by sex and age-group.

Table 1. Percent distribution of under- and over-reporting of weight by more than one kilogram, and mean reporting error (self reported - measured weight) in 1992 by sex and age-group.

	Age-group (years)					Total sample
	18-29	30-39	40-49	50-59	60 and over	
Men						
(n)	(96)	(142)	(135)	(107)	(164)	(644)
Under-report by >2 kg (%)	13%	21%	27%	35%	30%	26%
Over-report by >2 kg (%)	19%	13%	17%	17%	10%	15%
Mean reporting error (kgs)	0.26	-0.18	-0.44	-1.09	-1.07	-0.55
Women						
(n)	(90)	(141)	(140)	(94)	(130)	(595)
Under-report by >2 kg (%)	21%	18%	21%	21%	21%	21%
Over-report by >2 kg (%)	10%	8%	6%	6%	6%	7%
Mean reporting error (kgs)	-0.39	-0.49	-0.68	-0.72	-0.62	-0.58

Table 1 shows that a substantial proportion of subjects mis-reported their actual weights. Men were significantly less likely than women to report their weight within two kilograms of their actual weight (χ^2=28.06, df=2, p<0.0001). Older men were more likely that men under 30 years to under-report their weight (χ^2=21.58, df=8, p=0.006). Among women there were no clear trends in reporting behaviour by age-group. Less that five per cent of subjects (6.4% of men and 2.9% of women) under-reported their weight by more than five kilograms, with less than three per cent (3.1% of men and 1.5% of women) over-reporting by more than five kilograms (data not shown).

For the purposes of this thesis, the self-reported weight data collected in the Weight Control Survey is used along with measured height to calculate Body Mass Index (BMI=weight in kilograms/height in metres^2). BMI is used to classify subjects as 'underweight', 'acceptable', 'overweight', or 'obese', using the scheme which has been adopted by Australian health authorities (National Health and Medical Research Council, 1985) and described in Chapter 2.

Crosstabulations of BMI category in 1992 based on measured weight by BMI category in 1992 based on self-reported weight were performed to assess the extent of misclassification that resulted from using self-reported rather that measured weight in the calculation of BMI (Table 2). This shows that if self-reported weight were used to classify subjects a substantial proportion would be misclassified, with BMI category being underestimated for more than one in ten of those overweight or obese.

Table 2. Percent distribution of BMI category in 1992 based on self-reported weight within sex and BMI categories in 1992 based on measured weight.

BMI category (self-reported weight)	BMI category (measured weight)				Total sample
	Underweight	Acceptable	Overweight	Obese	
Men					
(n)	(16)	(229)	(309)	(90)	(644)
Underweight	56.3	1.3	0.0	0.0	1.9
Acceptable	43.8	87.8	14.6	0.0	39.3
Overweight	0.0	10.9	81.9	12.2	44.9
Obese	0.0	0.0	3.6	87.8	14.0
Women					
(n)	(66)	(268)	(153)	(108)	(595)
Underweight	81.8	5.2	0.0	0.0	11.4
Acceptable	18.2	88.8	14.4	0.0	45.7
Overweight	0.0	6.0	83.7	12.8	26.4
Obese	0.0	0.0	2.0	88.0	16.5

Prediction of actual weight

Since the self-report weight data were shown to result in misclassification, regression analyses were performed on the 1992 data to establish a regression equation which could be used on the 1993 self report data to predict actual weight in 1993, with the aim of improving the classification of subjects into BMI categories. This assumes that any self reporting biases present in 1992 were also applicable in 1993.

Stepwise linear regression analyses were performed separately for men and women to predict actual weight in the 1992 RRFPS, using self-reported weight in 1992 and other variables which were common to both the 1992 RRFPS and 1993 Weight Control Survey. The variables which were included in a stepwise regression procedure as independent variables to predict actual weight were self-reported weight in kilograms, age in years, perception of weight (categorised as not overweight or overweight), and interactions between weight perception and age, weight perception and self-reported weight, and age and self-reported weight. In the first stage of the analyses the regressions were performed for all cases with non-missing data. The model was then repeated excluding the ten most extreme outliers for men and for women. The linear regression models for the prediction of weight from the independent variables described above are presented in Table 3.

Table 3. Linear regression models predicting measured weight from self-reported weight, age, perception of weight, and interaction terms.

	Men		Women	
	All available cases	**Outliers removed**	**All available cases**	**Outliers removed**
(n)	(633)	(623)	(595)	(585)
Self-reported weight (kgs)	0.9785	0.9871	0.9596	0.9618
Age (years)	0.0328	0.0295	-0.0666	-0.0608
Perceive themselves as overweight	0.7324	0.8802	(a)	(a)
Self-reported weight by age interaction	(a)	(a)	0.0011	0.0010
Constant	0.2947	-0.2597	2.9684	2.7648
Adjusted R^2	0.93	0.95	0.97	0.98
Standard error	3.16	2.75	2.30	2.00

(a) Not entered in stepwise model

Self-reported weight, age and weight perception were significant predictors of actual weight in men. Among women, self-reported weight, age, and an interaction between self-reported weight and age were significant predictors of actual weight. In the models developed for men and for women removal of the ten most extreme outliers increased slightly the R^2 estimates and reduced the predictor standard errors.

For men, predicted weight in kilograms in 1993 was therefore based on the following equation: Predicted weight = 0.9871 (1993 self-reported weight in kgs) + 0.0295 (age in 1993) + 0.8802 (weight perception in 1993) - 0.2597.

For women, predicted weight in kilograms in 1993 was based on the following equation: Predicted weight = 0.9618 (1993 self-reported weight in kgs) - 0.0608 (age in 1993)+ 0.001 (1993 self-reported weight in kgs x age in 1993) + 2.7648

Weight and Body Mass Index category in 1993

It was only possible to calculate a predicted weight in 1993 for 666 men and 676 women. The mean difference between self-reported and predicted weight in 1993 was only -0.6 kilograms for men and -0.5 kilograms for women (Table 4).

Table 4. Mean difference between self-reported and predicted weights (self reported minus predicted weight) in 1993 by sex and age-group.

	Age-group (years)					Total sample
	18-29	30-39	40-49	50-59	60 and over	
Men						
(n)	(101)	(146)	(142)	(110)	(167)	(666)
Mean difference (kgs)	0.20	-0.27	-0.55	-0.89	-1.26	-0.61
Standard deviation	0.40	0.40	0.38	0.36	0.40	0.63
Women						
(n)	(98)	(146)	(168)	(102)	(162)	(676)
Mean difference (kgs)	-0.40	-0.43	-0.50	-0.59	-0.59	-0.50
Standard deviation	0.18	0.06	0.10	0.22	0.42	0.25

Predicted weight in 1993 and measured height (which was available from the RRFPS) were used to calculate 1993 BMI. Subjects were classified as 'underweight', 'acceptable', 'overweight', or 'obese' on the basis of their BMIs. A comparison of BMI classification in 1992 (based on measured weight) with BMI classification in 1993 (based on predicted weight) showed that 82% of subjects remained in the same category in the two surveys. BMI category decreased in 8.6% of subjects, and increased in 9.4%.

Summary

Men and women tended to under-report their weight in the Rural Risk Factor Prevalence Study. As a consequence, the use of self-reported weight to calculate BMI resulted in a significant number of subjects being misclassified, with BMI category being underestimated for more than ten per cent of those who were overweight and obese subjects. Assuming that subjects' reporting biases at the time of the Rural Risk Factor Prevalence Study were the same at the time of the Weight Control Survey, the application of the correction factor which has been estimated is likely to result in subjects being more accurately classified into BMI categories.

APPENDIX 8

THE QUESTIONNAIRE USED IN THE RELIABILITY STUDY

IN CONFIDENCE

WEIGHT-CONTROL STUDY

Please record your Student ID Number in the space provided. This will allow me to link your responses from this questionnaire with those of the questionnaire you will complete in two weeks. Do not write your name anywhere on the questionnaire.

Write your Student ID Number here: _____

Q.1 **What is your age?** _____ years old

Q.2 **What is your sex?** (Circle the number beside ***one*** answer)

1. Male
2. Female

Q.3 **Have you ever tried to lose weight - including any attempt you might be making now?**
(Circle the number beside ***one*** answer)

1. Yes
2. No

Q.4 **Have you tried to lose weight in the past year - including any attempt you might be making now?**
(Circle the number beside ***one*** answer)

1. Yes
2. No

Q.5 **Please read this question carefully. Your answer to it determines which section of the questionnaire you should answer next.**

Which one of the following statements best describes you at the moment?
(Please circle the number beside one)

1. I am actively doing things to try to **gain** weight at the moment
   (If so, go straight to question 16 on page 5)
2. I am actively doing things to **avoid gaining** weight at the moment
   (If so, go straight to question 6 on page 2)
3. I am actively doing things to try to **lose** weight at the moment
   (If so, go straight to question 10 on page 3)
4. I am **not doing anything** in particular for my weight at the moment
   (If so, go straight to question 13 on page 4)

You should only answer questions 6 - 9 if you are actively doing things to avoid gaining weight at the moment. If you are not, go back to question 5 on page 1 and check which section you should be completing.

Q.6 **Are you doing any of the following in order to keep your weight at its current level?** (Circle YES or NO for ***each*** of the activities listed)

Watching the overall **amount** of food you eat?	YES_1	NO_2	
Fasting or skipping meals?	YES_1	NO_2	
Watching the **type** of food you eat?	YES_1	NO_2	
Counting calories (ie looking at the calorie content of foods)?	YES_1	NO_2	
Attending a weight-loss club or group?	YES_1	NO_2	
Taking diuretics or fluid pills?	YES_1	NO_2	
Taking laxatives?	YES_1	NO_2	
Taking other slimming tablets or pills?	YES_1	NO_2	
Doing physical activity or exercise?	YES_1	NO_2	
Watching the amount of alcohol you drink?	YES_1	NO_2	$DONT\ DRINK_3$
Smoking to help control your weight?	YES_1	NO_2	$DONT\ SMOKE_3$
Doing something else to control your weight?	YES_1	NO_2	

Q.7 **Which *one* of the following statements best describes what you think you should do about your weight over the *next twelve months*?** (Circle the number beside **one** statement)

1. I **don't intend** to try to lose weight in the next 12 months.
   (If so, go straight to question 16 on page 5)
2. I think **I should** try to lose weight in the next 12 months.
3. I'm thinking about **how** to lose weight in the next 12 months
   (eg how to change my eating practices, what sort of exercise to do etc).

Q.8 **If you think you should lose weight, or are thinking about how to lose weight, how much weight would you like to lose over the *next twelve months*?**

_____ kilograms **OR** _____ stone and _____ pounds

Q.9 **How confident are you that you could actually lose this amount of weight over the *next twelve months* if you tried to do so?**

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Now that you have finished this section
please go straight to Question 16 on Page 5

You should only answer questions 10 - 12 if you are actively trying to lose weight at the moment. If you are not, go back to question 5 on page 1 and check which section you should be completing.

Q.10 ***How much*** **weight would you like to lose over the** ***next twelve months*****?**

_____ kilograms **OR** _____ stone and _____ pounds

Q.11 **How confident are you that you can actually lose this amount of weight over the next twelve months?**

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.12 **Are you doing any of the following in order to help you lose weight?**
(Circle YES or NO for ***each*** of the activities listed)

Watching the overall **amount** of food you eat?.....	YES_1	NO_2	
Fasting or skipping meals?.....	YES_1	NO_2	
Watching the **type** of food you eat?.....	YES_1	NO_2	
Counting calories (ie looking at the calorie content of foods)?.....	YES_1	NO_2	
Attending a weight-loss club or group?.....	YES_1	NO_2	
Taking diuretics or fluid pills?.....	YES_1	NO_2	
Taking laxatives?.....	YES_1	NO_2	
Taking other slimming tablets or pills?.....	YES_1	NO_2	
Doing physical activity or exercise?.....	YES_1	NO_2	
Watching the amount of alcohol you drink?.....	YES_1	NO_2	DONT DRINK$_3$
Smoking to help you lose weight?.....	YES_1	NO_2	DONT SMOKE$_3$
Doing something else to lose weigh?.....	YES_1	NO_2	

Now that you have finished this section
please go straight to Question 16 on Page 5

You should only answer questions 13 - 15 if you are not doing anything in particular for your weight at the moment. If you are doing something for your weight, go back to question 5 on page 1 and check which section you should be completing.

Q.13 Which *one* of the following statements best describes what you think you should do about your weight over the *next twelve months*? (Circle the number beside **one** statement)

1. I **don't intend** to do anything in particular about for my weight in the next 12 months.
   (If so, go straight to question 16 on page 5)
2. I think **I should** try to do something to **avoid gaining** weight in the next 12 months.
   (If so, go straight to question 16 on page 5)
3. I'm thinking about **how** to **avoid gaining** weight in the next 12 months (eg how to change my eating practices, what sort of exercise to do etc).
   (If so, go straight to question 16 on page 5)
4. I think **I should** try to **lose** weight in the next 12 months.
5. I'm thinking about **how** to **lose** weight in the next 12 months (eg how to change my eating practices, what sort of exercise to do etc).

Q.14 If you think you should lose weight, or are thinking about how to lose weight, *how much* weight would you like to lose over the *next twelve months*?

_____ kilograms **OR** _____ stone and _____ pounds

Q.15 How confident are you that you can actually lose this amount of weight over the *next twelve months* if you tried to do so?

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Now that you have finished this section
please go straight to Question 16 on Page 5

Everyone should answer all of the questions on this page. They are similar to some you have already answered, but they help us to compare two measures of behaviour.

Q.16 **In the past month, have you been actively trying to lose weight?**
(Circle the number beside ***one*** answer)

1. Yes
2. No

Q.17 **In the past month, have you been actively trying to keep from gaining weight?**
(Circle the number beside ***one*** answer)

1. Yes
2. No

Q.18 **Are you seriously considering trying to lose weight to reach your goal in the next 6 months?**
(Circle the number beside ***one*** answer)

1. Yes
2. No

Q.19 **Have you maintained your desired weight for more than 6 months?**
(Circle the number beside ***one*** answer)

1. Yes
2. No

Q.20 **Has your weight changed over the past year?** (Circle the number beside ***one*** answer)

1. My weight has increased a lot
2. My weight has increased a little
3. I don't think my weight has changed
4. My weight has dropped a little
5. My weight has dropped a lot
6. I don't know/I haven't noticed

Q.21 **How confident are you that you can avoid gaining too much extra weight over the next two years?** (Circle the number beside ***one*** answer)

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

Q.22 **If you were to become 3 kilograms (or about half a stone) heavier than you are at the moment, how confident are you that you could lose this extra weight if you tried to do so?**

1. Very confident
2. Quite confident
3. Moderately confident
4. Not very confident
5. Not at all confident
6. Don't know

THANK YOU - Thats all for this questionnaire. Your help is appreciated.

APPENDIX 9

RESULTS OF FACTOR ANALYSES

This Appendix presents the results of the factor analyses of the Dieting Beliefs Scale (DBS), the Decisional Balance Inventory (DBI), and the Body Attitudes Questionnaire (BAQ). The three scales were analysed separately, using the Factor procedure in SPSS (SPSS Inc, 1988). In each case a principal-components factor analysis (with varimax rotation) was conducted. For the DBS and DBI, confimratory analyses were performed, with three factors extracted for the DBS, and two for the DBI. Since an abbreviated version of the BAQ was used in this study, exploratory factor analysis was performed.

The factor structure of the DBS was generally consistent with that of a previous study of university students (Stotland & Zuroff, 1990), and with that of a recent population-based study of adults (Paxton, pers. comm.), although there were some minor differences (Table 1). The first factor, which accounted for 17 per cent of the variance, was comprised of items concerned with beliefs that weight is under internal control; the second factor (16% of variance) was comprised of items concerned with beliefs that weight is influenced by chance factors; and the third factor (7% of variance) was comprised of items concerned with beliefs that weight is influenced by environmental factors.

The factor structure of the DBI was consistent with that described by O'Connell and Velicer (1988) for a sample of university students, with the exception of one item which loaded approximately equally on the two factors (Table 2). The first factor, which accounted for 33 per cent of the variance, was comprised of items concerned with beliefs in the benefits of losing weight, and the second factor, which accounted for 14 per cent of the variance, was comprised of items concerned with beliefs that there are costs in losing weight.

Factor analyses of the BAQ yielded one major factor accounting for 30 per cent of the variance, and five minor factors, which each accounted for less than eight per cent of the total variance (for a total of 26%). That one major factor was identified is not surprising, since an abbreviated version of the Body Attitudes Questionnaire was used in this study, with an emphasis on items assessing

feeling of fatness. Only this major factor, which was comprised primarily of items assessing feelings of fatness, was retained (Table 3).

On the basis of the factor analyses described above, three subscales were computed from the Dieting Beliefs Scale (Table 1), two were computed from the Decisional Balance Inventory (Table 2), and one was computed from the Body Attitudes Questionnaire (Table 3). Subjects' responses to the individual items that comprise each subscale were scored as follows: strongly disagree (-2); disagree (-1); neutral (0); agree (+1); strongly agree (+2). The subscales which were computed represented the unweighted sum of the items listed in the tables.

Table 1. Results of the factor analysis of the Dieting Beliefs Scale (for items comprising the three subscales which were developed*.)

Items comprising subscale		Factor loading		
		Factor 1	Factor 2	Factor 3
'Belief in internal control' subscale				
1.	By restricting what one eats, one can lose weight	0.45	-0.07	-0.10
2.	When people gain weight it is because of something they have done or not done	0.51	-0.03	0.08
9.	People who are overweight lack the will-power necessary to control their weight	0.64	0.11	0.20
10	Each of us is directly responsible for our weight	0.68	-0.17	0.06
11.	Losing weight is simply a matter of wanting to do it and applying yourself	0.76	-0.06	-0.08
15.	Unsuccessful dieting is due to a lack of effort	0.69	0.22	0.04
'Belief in chance factors' subscale				
3.	A thin body is largely a result of genetics or hereditary	-0.01	0.47	0.09
4.	No matter how much effort one puts into dieting, one's weight tends to stay about the same	-0.10	0.51	0.39
5.	One's weight, to a large extent, is controlled by fate	-0.10	0.70	0.25
14.	Most people are at their present weight because that is the weight level that is natural for them	0.03	0.65	0.05
'Belief in environmental factors' subscale				
7.	Most people can only diet successfully when other people push them to do it	0.10	0.30	0.63
12.	People who are more than a couple of pounds overweight need professional help to lose weight	0.04	0.19	0.56
16.	In order to lose weight people must get a lot of encouragement from others	0.01	-0.15	0.70

*Items 6, 8 and 13 ('There is so much fattening food around that losing weight is almost impossible'; 'Having a slim and fit body has very little to do with luck'; 'By increasing the amount one exercises, one can lose weight') were not included on any of the subscales because they loaded approximately equally on two factors, and/or had a low loadings on each of the factors (less than 0.40).

Table 2. Results of the factor analysis of the Decisional Balance Measure (for items comprising the two subscales which were developed*).

Items comprising subscale		Factor loading	
		Factor 1	Factor 2
'Pros of weight loss' subscale			
2.	I would feel more optimistic if I lost weight	0.71	0.17
4.	I would feel more attractive if I lost weight	0.76	0.13
6.	If I lost weight, I would reduce my chance of getting heart disease	0.70	0.04
8	If I lost weight my family would be proud of me	0.77	0.09
9.	I would be less self-concious if I lost weight	0.78	0.13
11.	Others would have more respect for me if I were to lose weight	0.59	0.28
14.	I could wear more attractive clothes if I lost weight	0.79	0.13
15.	My health would improve if I lost some weight	0.83	0.05
18.	I would feel more energetic if I lost weight	0.83	0.02
19.	I would be able to accomplish more if I was a little lighter that I am	0.78	0.13
'Cons of weight loss' subscale			
1.	Exercising to lose weight is boring, hard work	0.11	0.54
5.	Losing weight means eating boring foods	0.05	0.68
7.	If I were to go on a diet, meal preparation would be more difficult for my family or housemates	-0.01	0.63
10.	Losing weight means giving up some of your favourite foods	0.29	0.48
12.	I would have to give up some of my favourite activities to lose weight	0.18	0.51
13.	Dieting would take the pleasure out of meals	-0.07	0.71
16.	Losing weight could be expensive when everything is taken into account	0.01	0.57
17.	I would have to cut down on my favourite snacks if I was dieting	0.22	0.41
20.	I would have to avoid some of my favourite places if I were trying to lose weight	0.22	0.54

*Item 3 ('I would be less productive in other areas if I lost weight') was not included on either of the subscales because its low and approximately equal loading on the two factors (-0.26 on factor 1; 0.28 on factor 2).

Table 3. Items loading on the major factor derived from the factor analysis of the Body Attitudes Questionnaire*.

Items comprising subscale		Factor loading
'Feelings of fatness' subscale		
2.	I prefer not to let other people see my body	0.49
3.	I get so worried about my shape that I feel I ought to diet	0.75
4.	I feel fat when I can't get clothes over my hips	0.76
6.	I worry that other people can see rolls of fat around my waist and stomach	0.60
11.	I feel fat when I wear clothes that are tight around the waist	0.67
14	Wearing loose clothes makes me feel thin	0.41
17.	I feel that I have fat thighs	0.76
18.	Eating sweets, cakes or other high calorie foods makes me feel fat	0.73
20.	I think my buttocks are too large	0.76
23.	If I catch sight of myself in a mirror or shop window it makes me feel bad about my shape	0.72
27.	I feel fat when I can no longer get into clothes that used to fit me	0.75
29.	I try to avoid clothes which make me especially aware of my shape	0.70

*Only items that did not load (more than 0.40) on other factors were included in the subscale which was developed.

APPENDIX 10

SCORING THE SHORT FAT QUESTIONNAIRE

In completing Short Fat Questionnaire, subjects selected one response for each of the 17 items. The scores assigned to each response are indicated below in parentheses. A fat-intake behaviour score was calculated for each subject by summing their scores across the 17 items. The maximum possible score was therefore 63, and the minimum was zero.

How is your meat usually cooked?

I never eat meat (0)
I eat meat only occasionally (0)
Fried (4)
Stewed or goulash (casseroled) (3)
Grilled or roasted with added oil or fat (2)
Grilled or roasted without added oil or fat (1)

How much of the fat on your meat do you eat?

I never eat meat (0)
I eat meat only occasionally (0)
Most or all of the fat (2)
Some of the fat (1)
None of the fat (0)

How many times a week do you eat sausages, devon, salamis, meat pies, hamburgers or bacon?

Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How much of the skin on your chicken do you eat?

I don't eat chicken (0)
Most of the skin (2)
Some of the skin (1)
None of the skin (0)

How often do you eat fried food with a batter or breadcrumb coating?

Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How often do you eat vegetables that are fried or roasted with fat or oil?
Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How often do you add butter, margarine, oil or sour cream to vegetables, cooked rice or spaghetti?
Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How often do you eat gravy, cream sauces or cheese sauces?
Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How do you spread butter or margarine on your bread?
Thickly (3)
Medium (2)
Thinly (1)
I don't use butter or margarine (0)

How many times a week do you eat hot chips or French fries?
Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How many times a week do you eat potato crisps, corn chips or nuts?
Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How many times a week do you eat pastries, cakes, sweet biscuits or croissants?
Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How many times a week do you eat chocolate, chocolate biscuits or sweet snack bars?

Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How often do you eat cream?

Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How often do you eat ice cream?

Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

How many times a week do you eat cheddar, edam or other hard cheese, cream cheese or cheese like camembert?

Six or more times a week (4)
Three to five times a week (3)
Once or twice a week (2)
Less than once a week (1)
Never (0)

What type of milk do you drink or use in cooking or tea and coffee?

Condensed (4)
Full-cream (3)
A combination of full-cream and reduced-fat (2)
Reduced-fat (1)
Skim milk (0)
I don't use milk (0)