THE DEVELOPMENT OF A MULTIDIMENSIONAL SENSE OF CONTROL INDEX AND ITS USE IN ANALYSING THE ROLE OF CONTROL IN THE RELATIONSHIP BETWEEN SES AND HEALTH

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ABSTRACT

A robust and consistent relationship has been shown between socioeconomic status and health, and it has been suggested that psychosocial factors partially explain this relationship because they can operate at all levels of socioeconomic status (SES) and they can explain the findings concerning relative SES. The present research examined the proposal that control beliefs is one psychosocial factor which may explain the relationship between SES and health. Because of the complexity of the control field, care was taken to choose a suitable approach to control. Skinner's conceptualisation, which was chosen, has three key aspects. One aspect is the differentiation between capacity beliefs and strategy beliefs. A second is that the approach argues that it is the combination of these two beliefs which produces a sense of control. The third aspect is the proposal that a sense of control can be gained through any 'means' when it is believed that the person has access to the 'means' of control. Multidimensional sense of control was the term given to describe this conceptualisation.

A Multidimensional Sense of Control Scale (MSOCS) was developed for the present study because no suitable measure was available. 'Means' of control were selected for inclusion in the MSOCS, items were written for these 'means' and a content analysis was performed. Exploratory factor analyses revealed sets of items which loaded highly on the appropriate factor with very few cross-loadings. Using an independent sample, the factor structure for five 'means' (ability, family, friends, luck, and money) was tested using confirmatory factor analysis. The hypothesised model fitted significantly better than competing models. The subscales showed reasonable internal reliability, convergent validity analyses revealed expected relationships and the subscales were also shown to have reasonable consistency over a six week period. As a whole, these analyses indicated that, while improvements could be made to the measure, it was of sufficient quality to be used in the present study.

The present study considered hypotheses concerning the role of sense of control (from the five distinct 'means' and overall) in the relationship between SES (education, household income and community deprivation) and health (self-reported). The sample of 580 was

drawn from the New Zealand Electoral Role and completed a mail questionnaire. Analyses were performed using multiple regression. All three indicators of SES were associated with health at the bivariate level, while only household income was independently associated once age was controlled and all three indicators were considered together. All indicators of SES were associated with an overall sense of control at the bivariate level. However, only level of educational attainment and level of household income were associated once age was controlled and all three indicators were considered together. Indicators of SES were positively associated with a sense of control through 'ability', 'family', 'luck', and 'money'. However the relationship between SES and sense of control was not as simple as anticipated with different indicators of SES being associated with a sense of control through different 'means'. Level of educational attainment was independently associated with a sense of control through 'ability' and 'luck' while level of household income was independently associated with a sense of control through 'family' and 'money'. The direction of all relationships were in the hypothesised direction and some were in the opposite direction from that found using different measures of control beliefs, which is consistent with what was expected based on the multidimensional sense of control approach. A greater overall sense of control was positively associated with health while only a sense of control through 'luck' and 'money' were independently associated with health once age was controlled. Mediational analyses showed that both an overall sense of control and a sense of control through 'money' partially mediated the relationship between level of household income and health. This supported the suggestion by some authors that psychosocial factors will help explain the relationship between SES and health.

This thesis has made a number of important contributions to understanding in these areas. It has confirmed that capacity beliefs and strategy beliefs are different and so should be measured separately. It has also shown that beliefs about different 'means' of control differ and so these also should be measured separately. The hypothesis testing analyses showed that different indicators of SES are related to a sense of control from different 'means'. These analyses also showed that an overall sense of control and a sense of control from 'money' mediated the relationship between household income and health. These issues are discussed in regard to the need for further research in these areas.

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TABLE OF CONTENTS

Chapter Seven

APPENDICES

LIST OF FIGURES

LIST OF TABLES

Chapter One

THE RELATIONSHIP BETWEEN SES AND HEALTH: GENERAL ARGUMENTS FOR THE ROLE OF PSYCHOSOCIAL FACTORS

Research has shown a relationship between socioeconomic status (SES) and health for at least 160 years (MacIntyre, 1997). During this period research considering this relationship has escalated. It is now commonly recognised that health varies in accordance with socioeconomic status so that people of higher SES live healthier, longer lives (Carroll, Davey Smith, & Bennett, 1996; MacIntyre, 1997). In fact, SES is recognised as one of the strongest and most consistent predictors of health (Winkleby, Jatulis, Frank, & Fortman, 1992). Davis, McLeod, Ranson and Ongley (1997) stipulate that SES "must be understood in terms of socioeconomic stratification, the patterned unequal distribution of opportunities, advantages, resources and power among subgroups of a given population." (p. 8). SES is usually understood by the indicators that are used to measure it. Occupation, income and education are the most common indicators while several others are also used. Higher status occupation, higher income and more education indicate higher SES. While these indicators are interrelated, they each give information about slightly different aspects of SES (Davis et al., 1997). A variety of indicators of SES have been shown to be associated with health (e.g. Marmot et al, 1991; Matthews, Kelsey, Meilahn, Kuller, & Wing, 1989). The relationship also exists for all the usual measures of health: morbidity, disability, perceived health status and mortality (e.g. Bobak, Pikhart, Hertzman, & Marmot, 1998; Carroll, Bennett, Davey Smith, 1993; Mackenback et al, 1997) and has been shown in a range of countries including New Zealand (Howden-Chapman & Tobias, 2000)

Two other major issues concerning the relationship need to be noted. One question that has been raised is whether the relationship is real or just an artefact of the data. The other question concerns the direction in which the relationship predominantly operates: does SES affect health or does health affect SES? While these two issues have been dealt with

in detail elsewhere (e.g. Blane, 1985), they will be briefly covered here as they concern issues fundamental to the relationship. This brief overview of these two issues is based on the work of Blane (1985), Carroll et al (1993) and Carroll et al., (1996).

Is it an Artefact of the Data?

It has been suggested that the relationship between SES and health can be explained as an artefact of the data, in that the relationship may be a result of how the constructs are measured. Several versions of this explanation exist. One version proposes that measuring SES by occupation, as has traditionally been done, artificially inflates the relationship. It is argued that with unskilled occupations decreasing, newcomers to the work force are increasingly taking up skilled jobs, therefore unskilled workers have a higher mean age than those employed in skilled work. This difference in age could account for the difference in health. This explanation is not defensible, as the relationship has also been shown to exist using a number of measures of SES other than occupation. In fact, research using asset-based measures suggests that occupation based measures may have underestimated the extent of the relationship between SES and health (Carroll et al., 1993).

Another version of the artefact explanation concerns the way health is measured, suggesting that it is the reactions to illness that are related to SES not the illness itself (Kadushin, 1964). This argument suggests that people of lower SES feel the impacts of ill health more and so report more ill health. Analysis of the evidence suggests that this is not a valid argument (Conover, 1973; Mechanic, 1968). It has been found that lower SES people tend not to use health services as much as their health status suggests they would and so they actually under-report their ill health (e.g. Davis, 1985). There is also substantial evidence showing that SES is related to health when it is measured objectively with mortality rates (e.g. Chandola, 2000; Gregorio, Walsh & Paturzo, 1997). The evidence therefore suggests that the relationship between SES and health is real and not an artefact.

Is it just Social Selection?

The second question, sometimes labelled social selection, relates to the direction of the SES and health relationship. This body of literature acknowledges the existence of the relationship but interprets the direction of the relationship differently by suggesting that people's health affects their SES rather than their SES affecting their health. The argument proposes that illness prevents people from gaining an education and work and thereby attaining a good income, and that illness also causes people to lose their jobs. This leads to a concentration of ill people in the lower SES range. This explanation seems logical and Carroll et al. (1993) cite research that is purported to support it. For example, Goldberg and Morrison (1963) showed that while the fathers of schizophrenics had a normal SES distribution, those with schizophrenia had moved down in SES in recent time and were concentrated in the lower SES groups. Meadows (1961) showed that people with chronic bronchitis had also become concentrated in the lower SES groups over the previous ten years when compared with a control population.

Generally it is accepted that social selection does have some impact but the extent of the impact is contended. While Blane (1985) notes that while some methodological aspects of the studies used to support social selection have been challenged, other issues are also raised. The drawn out clinical course of both schizophrenia and chronic bronchitis means that the social selection explanation is possible. However this does not account for why the relationship is found in more rapid forms of illness. For example, Blane cites research showing that lung cancer has essentially the same SES gradient. If the social selection explanation was important a similar gradient would not be expected because lung cancer leads to rapid death.

Carroll et al. (1996) suggest three other lines of evidence contrary to the social selection explanation. Firstly, in the Whitehall I study (Marmot, Shipley, & Rose, 1984), when only those who were judged to have no disease were included in the analysis, the same relationship was found. It is unlikely that those who had no detectable disease would have experienced the downward drift that social selection suggests. Secondly, in the Longitudinal Study (Goldblatt, 1988, 1989), a comparison was made of the relationship between SES and mortality among people who did not change SES level and the whole group. If social selection were at work it would be expected that the group that had not

changed SES level would exhibit less of a relationship between SES and mortality than the whole group. Instead, the relationship was found to be similar. Lastly, the age range when people are most socially mobile does not match the age when people are most at risk of mortality and illness. Social mobility is most likely between entry into the work force and 40 years of age whereas this is a time when mortality and morbidity are low (see Blane, 1985 for a full discussion of this). In conclusion, while it is recognised that some amount of social selection does occur, it is not seen as a major factor in determining the relationship between SES and health.

Arguments Supporting Psychosocial Explanations

Having established that the relationship between SES and health is real and operates predominantly in the direction of SES influencing health, it is important to establish the mechanisms underlying the relationship. While a number of mechanisms instrumental to the relationship have been considered, it is increasingly being proposed that psychosocial factors might explain this relationship (e.g. Adler et al., 1994; Marmot, 1986; Kawachi & Kennedy, 1999; Williams, 1990). Psychosocial factors are those factors which are psychological and/or social in nature. The psychosocial factors that have been suggested to possibly mediate the relationship between SES and health include: control (Carroll et al., 1993; Williams, 1990); psychological stress (Adler et al., 1994; Carroll et al., 1993; Williams, 1990); hostility (Adler et al., 1994); social support (Adler et al., 1994; Carroll et al., 1993; Williams, 1990), social capital and social comparison (Kawachi & Kennedy, 1999; Lynch & Kaplan, 1997).

The remainder of this chapter will introduce a number of arguments that have been used to suggest that psychosocial factors may play an important role in explaining the SES inequalities in health. This chapter will focus on the arguments that are derived from understanding of and research into the relationship between SES and health.

The Limitations of Traditional Explanations

There are a number of mechanisms which have traditionally been thought to explain the relationship between SES and health. These mechanisms include living and working conditions, health behaviours, and access to and utilisation of health services. However,

some argue that these explanations seem to account for little of the relationship between SES and health and that consequently other explanations such as psychosocial factors need to be investigated (Carroll et al., 1993). These traditional explanations will now be reviewed, with reference to research which demonstrates their limited role in the SES-health relationship.

Living and Working Conditions

A prominent traditional explanation suggests that living conditions are the key factor in determining the relationship between SES and health. That is, it was argued that the living conditions of people from lower SES groups were unhealthy. In the past, lower SES people lived in conditions that were characterised by overcrowding, poor housing structures and poor sanitation. They also suffered from malnutrition. These factors have been shown to have direct negative effects on health (Public Health Association, 1992) and consequently it has been suggested that living conditions explained the difference in mortality and morbidity rates (Jaco, 1958). In the past this explanation made sense, as the living conditions of the poor were associated with the common diseases of the time such as diphtheria, measles, typhoid fever, tuberculosis, and syphilis. Accordingly, it was expected that the health inequalities would decline as the people of lower SES became more prosperous and public services such as sanitation and water quality were improved. But this has not been the case, for although housing and sanitation have improved, health differentials have not reduced (Link, 1996). For example, Pappas, Queen, Hadden, and Fisher (1993) compared the differential mortality in an American national sample in 1986 with the differential mortality in an American sample in 1960. They reported that, although the overall death rate had declined, there was still a disparity in mortality based on education and income, and this disparity had increased over the interval. While it must be recognised that even today some people in western society still live in unhealthy housing, they are a small proportion of the population (Howden-Chapman & Wilson, 2000). The presence of this small group of people would not account for the size of the relationship between SES and health and would not explain the SES differentials in health for people at the higher end of the SES spectrum (see section on the SES-health gradient).

Further to this, infectious diseases that are associated with living conditions are no longer the major causes of ill health and mortality. The diseases that are now the major causes of

ill health and mortality are diseases such as coronary heart disease, cancers, and stroke. These new diseases, which are related to SES, are not linked to living conditions. So, while what was thought to be the cause of the SES-health relationship has been eliminated, the relationship has expressed itself through other diseases. Although these new diseases, which are more prevalent in the lower SES groups, are not related to living conditions, they do seem to be related to psychosocial factors such as behaviour, stress, social support and perceptions of control.

Physical work conditions have also been considered as an explanation for the relationship between SES and health. Lower SES people are more likely to work in conditions that are hazardous to their health (Carroll et al., 1996). They are often working with chemicals or other substances that can be harmful such as coal dust. Because of its physical nature their work is also often more prone to accidents. However, participants in the Whitehall Study did not participate in this type of work (Davey Smith, Shipley, & Rose, 1990; Marmot, Shipley, & Rose, 1984). The lower grade occupations included workers such as clerical staff, messengers and porters, yet the relationship between SES and health was still strong. Marmot et al. also note that people who are not categorised as part of the workforce, such as housewives and the retired, also show the health inequalities, indicating that explanations other than work must be important. These findings suggest that the physical aspects of work do not adequately explain the relationship between SES and health.

Health Behaviours

Another traditional explanation is that the relationship between SES and health can be explained by differences in behaviour of people from different SES levels. Numerous studies have established the effects on health of behaviours such as smoking and exercise (e.g. Breslow, 1973; Hammond & Horn, 1984; Paffenbarger, Hyde, Wing, & Hseih, 1986). Research has suggested that there is also a relationship between these behaviours and SES. For example, in the Alameda County study people in the lower SES groups were three to four times more likely to engage in negative health behaviours than people in the higher SES groups (Berkman & Breslow, 1983). In New Zealand it has also been shown that people in lower SES groups are more likely to engage in health damaging behaviours (Hopkins, Wilson, Russell, & Herbison, 1991; Mann, Nye, & Wilson, 1991). It has been suggested that public campaigns aimed to improve health by improving behaviours may

have actually increased differences in health between SES groups because people from higher SES groups have more readily made the suggested changes (National Health Committee, 1998; Mann et. al. 1991)

Any explanation of the relationship between health and SES that implicated health behaviours would need to explain why it is that people in higher SES groups tend to perform more health behaviours. Given the prominent role of psychosocial factors in the major theories of health behaviours, this too may reinforce the argument for the role of psychosocial factors in explaining health inequalities. Davey Smith (2001) argues that the health inequalities can be partially understood by the ability of the higher SES individuals to respond to knowledge of what is good for health. He argues that higher SES individuals have greater knowledge of the risks, and the resources necessary to make the changes needed. While these would consist of tangible resources such as money, it would also include psychosocial resources which have been shown to be associated with behaviour performance (Ajzen, 1988, 1992; Bandura, 1986; Rosenstock, 1968; Schwarzer, 1995).

However, research also suggests that health behaviours alone do not fully account for the relationship between SES and health. Statistically controlling for health behaviours does reduce the relationship but it does not remove it. An example of this effect is found in the Alameda County study when 13 risk factors, including smoking, diet, alcohol, and exercise, were taken into account, but the group with the lowest family income still had one and a half times the risk of death of the highest family income group (Berkman & Breslow, 1983). Another example is a nationally representative prospective study of adults in the United States, which found that controlling for the health behaviours of drinking, smoking, body weight and physical activity did little to reduce the relationship between income and mortality (Lantz et al., 1998). The lower income group was still 2.77 times more likely to die over the 7.5 years of the study than those in the highest income group. These four health behaviours explained only 12-13% of the relationship between income and mortality. Similar outcomes have also been found in other studies (e.g. Hirdes & Forbes, 1992).

Health Services Access and Utilisation

Another traditional explanation that has been suggested for the SES inequalities in health is the difference in the access to and use of health services. As with living conditions, it was expected that the introduction of mass immunisations and free medical services, such as the National Health Service in the United Kingdom, would reduce health inequalities. However, research findings suggest that in England and Wales the health differences may have actually widened over this period (Hollingsworth, 1981; Wilkinson, 1986). In an attempt to explain this unexpected development, it has been suggested that SES may impact on the individual's use of health services so that those of lower SES are less likely to use the services. This may be because their lower education means they find it harder to access information, they give less credence to that information and they have fewer psychosocial skills to use the information and services. In support of this it has been found that SES does affect the use of health services, especially preventative services, and in addition higher SES individuals usually have better access to quality services (National Health Committee, 1998; e.g. Kephart, Thomas, & MacLean, 1998). In New Zealand, Davis (1985) has shown that lower SES people use health services less than their health suggests they would. He compared the ratio between SES and death by specific cause, with the ratio between SES and doctors visits in a large group of males aged 16-64. He found that while people in the lower SES groups generally visited the doctor more often, it was not to the extent that the likelihood of death from the illness would suggest. Despite State sponsorship of health services, money has still been shown to be a barrier to poorer New Zealanders consulting general practitioners (Barnett & Coyle, 1998). Williams (1990) suggested that use of health services by lower SES groups is affected by three factors: the cost of the services, the person's attitudes to the services and the characteristic of the health services. While the cost of the services have been a focus and subsequently attempts have been made to reduce costs, it may be the person's attitudes to the services and the characteristics of the health services that explain the continued lower use of health services by lower SES groups.

However, it should be noted that SES differences in the use of health services are not considered a major factor in the relationship between SES and mortality (Robert & House, 2000). Death from causes amenable to medical intervention make up a very small

proportion of overall mortality and this proportion has been declining over the past few decades, while the size of the relationship between SES and health has not decreased (Marmot, Kogevinas & Elston, 1987; Marshall, Kawachi, Pearce, & Borman, 1993). In 1979 the United States Department of Health, Education and Welfare estimated that medical care explained no more than ten percent of the SES related inequality in health (cited by Williams, 1990).

In summary, while these traditional explanations have been able to account for some of the variance in the SES-health relationship they have not been able to account for all of it. Consequently, other explanations such as psychosocial factors need to be investigated. The following arguments focus on aspects of the relationship between SES and health, which more directly support the consideration of psychosocial factors as an explanation of the relationship.

The Gradient

The gradient effect refers to the finding that the relationship between SES and health exists throughout the SES gradient and is not limited to a simple contrast of the poor and the rest (Adler et al, 1994; Blane, 1995). That is, no matter what the level of SES, people of higher SES have better health than people of slightly lower SES. Inequalities in health have been shown throughout the SES gradient in many studies. Illustrative of this are two studies conducted using British civil servants. The first study was in the late 1960s (Marmot & Shipley, 1984) and the second in the 1980s (Marmot et al, 1991). In both studies it was found that when the workers were divided using employment grade as a marker of SES, a higher grade always experienced better health than the grade immediately below. It should also be noted that all participants in these studies were employed, so the relationship between SES and health was evident even when unemployed people, who would be expected to be in the lower SES groups, were excluded.

This continuous nature of the SES-health relationship has important implications for its understanding. It reveals that the relationship does not affect the impoverished alone. While deprivation has been shown to explain much of the relationship at the lower levels of SES (Stronks, Mheen, & Mackenbach, 1998) it does not account for the relationship at

the upper levels of the SES continuum. This may be why the traditional explanations do not account for all of the SES-health relationship because they have focused on issues of poverty. Psychosocial factors can operate right across the SES gradient and so the gradient effect supports their consideration as an explanation (Carroll et al., 1993).

Duration

The relationship between SES and health has been shown to exist over a long period of time during which many changes have occurred. MacIntyre (1997) cites research demonstrating that Britain has investigated and shown evidence of the relationship for 160 years. Davey Smith, Carroll, Rankin, & Rowan (1992) and Carroll et al. (1996) present a number of studies showing that the health inequalities existed as far back as the fifteenth century. Carroll et al. (1996) argue that this means explanations of the relationship that are peculiar to present day situations are not appropriate. An example of this, mentioned in the last section, is that many of the behaviours we now consider unhealthy and are predominantly present in today's lower SES individuals, appear to have been found mainly in the higher SES groups in the 19th century (Davey Smith et al., 1992; Carroll et al., 1996). Any explanation of the relationship between SES and health must therefore be of the higher order so that it would be as valid at any period of time. Psychosocial factors fit this criteria.

Relative SES

While the traditional explanations of the relationship between SES and health have focused on absolute poverty, focus has more recently turned to relative poverty. This explanation suggests that what is important for health is not the absolute level of one's SES but the level of one's SES in comparison with others. The role of relative poverty has been used by many to argue for psychosocial explanations of the SES-health relationship (e.g. Marmot & Wilkinson, 2001; Wilkinson, 1999). Several lines of research findings have brought about this change in focus. Some of these are controversial and are still being debated while others are presently accepted. These findings will now be outlined. The gradient effect, which has just been discussed (Marmot & Wilkinson, 2001) is one line of support for the role of relative SES. It is suggested that, while absolute poverty

cannot explain the gradient effect, relative SES can because it operates throughout the gradient.

A second finding supporting the importance of relative SES is that when absolute income was compared between countries it was not related to health. Up to the late 1960s and early 1970s researchers had looked at comparisons within societies and found that more income resulted in better health. Lynch and Kaplan (1997) suggest this disparity was first recognised after comparisons between societies of the SES-health relationship produced unexpected results. An example of one such a study is that of Auster, Levenson and Sarachek (1969), who found that in the 50 states of America, states with the highest average income also had the highest mortality rates. Many subsequent studies have found similar results (Wilkinson, 1997). For example, Marmot and Wilkinson (2001) compared the median income and life expectancy of African-American and Costa Rican men in 1996. African-American men had a median income of $26, 522 and a life expectancy of 66.1 years while Costa Rican men had a median income of $6, 410 (adjusted to give equal purchasing power) and a life expectancy of 75 years. Thus, although the Costa Rican's median income was less than a quarter of that of the African-American's, they had a life expectancy of nine more years. Findings such as these suggest that the search for the explanation of health inequalities needs to look beyond absolute income. Wilkinson (1997) argues that social stratification exists within societies and not generally between them and that this matches the findings that SES related health inequalities operate within societies and not between them. Wilkinson (1997) further contends that supports the role relative SES in explaining health inequalities.

A third line of evidence suggesting the importance of relative income is located in research showing that there has been a change in the influences on health in developed countries. These research findings suggest that as societies become more affluent, relative income becomes more important. Preston (1975) looked at the relationship between life expectancy and per-capita national income in the decades of 1900, 1930, and 1960. He found that, above a certain income threshold, gains in per-capita national income had no effect on gains in life expectancy. This research also found that the relationship between absolute income and health had decreased through time so that in the 1960s absolute income had less of an effect on life expectancy than in the 1900s. Matching this are the changes in the diseases and causes of mortality associated with SES, which were discussed

earlier in this chapter. Diseases that affected the poor in the nineteenth century included diphtheria, measles, typhoid fever, tuberculosis, and syphilis. These diseases are associated with material deprivation resulting from absolute poverty and with the increased affluence of western society, they have mostly been eliminated. However other diseases have replaced them, which again are more prevalent among the poor, such as coronary heart disease, cancers, stroke, obesity, and hypertension (National Health Committee, 1998; Wilkinson, 1994). These are not diseases that are directly affected by absolute deprivation. Wilkinson (1997) argues that relative income distribution and social status account for these diseases better than absolute poverty.

Further evidence for the role of relative SES came in the 1990s from research which focuses directly on the relationship between health and income distribution. Countries, states or areas where incomes differ to a greater degree, and thus there is a bigger gap between the very rich and very poor, are said to experience worse health. An example of such a study compared the relationship between cause-specific mortality and income distribution in the 50 states of America (Kennedy, Kawachi and Prothrow-Stith, 1996). They found that the inequality of income distribution was strongly related to infant mortality, coronary heart disease, malignant neoplasms and homicide such that states which exhibited larger differences in income distribution also experienced more of these negative health outcomes. Kaplan, Pamuk, Lynch, Cohen, and Balfour (1996) found similar results when they considered mortality from all causes and several other health outcomes. In addition they found that the relationship between income distribution and health did not change when they controlled for median state income. The negative correlation between median state incomes and mortality disappeared when income distribution was controlled for.

Some other authors have questioned the suggestion that income inequality is a more important influence on health than absolute income. They say that much of the relationship identified in these studies may be due to the "ecological fallacy". The ecological fallacy refers to the problems that come from using relationships between variables at the population level to infer relationships at the individual level. Gravelle (1998) argues, that much, if not all, of the correlation between income inequality and health is the result of statistical artefact. He suggests that the relationship is found because of the curvilinear relationship between individual income and mortality. Fiscella and

Franks (1997) found that mortality was independently associated with family income and not inequality of income distribution at the community level. They suggest that results of studies supporting the role of income inequalities in affecting health are a result of not properly controlling for confounding by income at the individual level. Lynch et al. (2001) suggest that the relationship between income inequalities and health may only exist within the United States of America. The debate over these issues continues (see for example Kawachi & Kennedy, 1999; Kennedy, Kawachi, Glass, & Prothrow, 1998; Lynch, et al, 2001; Wolfson, Kaplan, Lynch, Ross, & Backlund, 1999).

Two broad types of mechanisms have been suggested to account for the way relative income inequality affects health: psychosocial and neo-material (Kaplan & Lynch, 2001; Lochner, Pamuk, Makuc, Kennedy, & Kawachi, 2001). The neo-material mechanism suggests that in areas with unequal income distribution there is also reduced spending on education, employment training, health care and housing. It is argued that this is the result of historical, cultural and economic processes and together they accumulate to affect people's health (Lynch, Davey Smith, Kaplan & House, 2000). It has also been contended that such conditions will increase the likelihood of the workings of the psychosocial mechanism by reducing social cohesion (Lochner et al., 2001).

The second mechanism suggests that psychosocial factors, influenced by income inequalities, directly affect health. Wilkinson (1990) who is a strong proponent of this explanation concludes that:

> It looks as if what matters about our physical circumstances is not what they are in themselves, but where they stand in the scale of things in our society. The implication is that our environment and standard of living no longer impact on our health primarily through direct physical causes, regardless of our attitudes and perceptions, but have come to do so mainly thorough *social and cognitively mediated processes* (p. 405; italics added).

Wilkinson (1990) clearly sees psychosocial factors as having an important role in explaining how relative standards and conditions might influence health and his view is supported by other researchers (Kawachi & Kennedy, 1999; Lynch & Kaplan, 1997). Two major psychosocial factors have been suggested to explain the relationship between

income inequalities and health: social capital and social comparison. It is suggested that increased income inequality reduces the quality of social relationships and brings about frustration and stress from negative social comparisons (Kawachi & Kennedy, 1999; Marmot & Wilkinson, 2001; Wilkinson, 1999).

Summary

This chapter has outlined a number of arguments raised that suggest psychosocial factors may help explain the relationship between SES and health. The first argument points out that the traditional mechanisms of living and working conditions, behaviour, and medical care explain only a limited amount of the relationship and so other mechanisms, such as psychosocial factors, need to be investigated. The second argument contends that because the relationship has been operating over a long period of time and during this time there have been many changes, higher order variables, such as psychosocial factors, need to be investigated. Another argument put forward focuses on the fact that the relationship between SES and health operates throughout the SES gradient. It is suggested that while the factors which focus on issues of poverty and are the basis of traditional explanations have difficulty explaining the gradient effect, psychosocial factors may be able to. The fourth argument contends that it is relative SES which is important for explaining health inequalities rather than absolute SES. Several arguments supporting the role of relative SES were outlined. If relative SES is important for explaining health inequalities then it is suggested that psychosocial factors are likely to account for its effect.

Control beliefs is a psychosocial factor that has been proposed as having an important role in mediating the relationship between SES and health. This particular psychosocial factor deserves closer attention in particular because of the large body of literature that has connected it to SES and health. Because control beliefs is such a complex construct, the next chapter will make some key distinctions and outline the theoretical approach to control beliefs that will be used in the present study before reviewing the research which supports its mediational role in Chapter Three.

Chapter Two

CHOOSING AN APPROACH TO CONTROL

Control is a psychosocial construct that has been extensively researched over the past fifty years using a number of different theoretical and practical approaches. Initial research in the 1940s and 1950s predominantly came from a behavioural perspective. In the laboratory this research manipulated the control available to animals and considered the effect this had on their behaviour. An example of a control theory that developed from this research is the theory of learned helplessness (Seligman, 1975), which tries to explain the finding that when animals experience repeated lack of control over their environment they stop trying to influence the outcome. Subsequent to this research using animals, similarly controlled experimental studies were performed both in the laboratory and in field-based settings using human participants. The cognitive revolution of the 1960s and 1970s also impacted on the study and understanding of control because it changed the focus from environmental determinants to internal determinants of behaviour. It was suggested that the way people act is determined by how they make sense of the world and that there are individual differences in how people make sense of the world, which explain the different ways people behave (Cronbach, 1957). The cognitive revolution brought with it a number of cognitive theories of control such as self-efficacy theory (Bandura, 1977). The change from a behavioural to a cognitive approach is well demonstrated by the cognitive reformulation of the learned helplessness theory (Seligman, 1975) to explanatory style theory (Abramson, Seligman, & Teasdale, 1978) which emphasises people's attributions of past experiences. Control has also been considered by a number of disciplines other than psychology (Peterson & Stunkard, 1989). For example, a number of sociologists have developed theories (e.g. Antonovsky, 1979) and measures (e.g. Mirowsky & Ross, 1991) of control.

Skinner (1996) identified approximately one hundred control-related terms. The abundance of terms can be partly explained by the fact that control has been studied over

an extended period of time and by theorists from a variety of positions. The large number of terms also arises partly from the many aspects on which control has been found to vary. This variety of terms has produced confusion because the same terms have been applied to different constructs and different terms have been used for essentially the same constructs (Skinner, 1996). Recently, there have been some useful attempts to provide a comprehensive overview of control theories or to create a uniform theory (e.g. Shapiro & Astin, 1998; Skinner, 1995, 1996; Walker, 2001). The purpose of this chapter is not to provide another comprehensive overview, but to outline a number of the key aspects on which control theories vary. Because control is so complex, not all aspects of control will be covered. The aspects of control which will be covered have been chosen either because they are considered essential for clarifying this area of research or because they are relatively new ideas which have the potential of adding value to research in this area. Defining terms and features of control will allow an appropriate approach to control to be identified that will be used in analysing the role of control in the relationship between SES and health.

Actual Control and Control Beliefs

A key distinction made in control theory and research differentiates between the control the person actually has and the person's beliefs about the control they have. This distinction can be explained by referring back to the history of control research. Traditional behavioural research, which was dominant in the 1940s and 1950s, manipulated the amount of control the animal or participant had over their situation. This can be contrasted with the cognitive approach which has been concerned with the person's thoughts about control. A dominant element of the cognitive approach has been the amount of control the person believes they have. While beliefs about control in the situation are an interpretation of the situation, and are therefore to some extent dependent on the actual control available to them, the relationship is not direct. Many studies have shown that people are not accurate in perceiving the amount of control they have. For example, it has been shown that a person can believe they have control when in fact they have no control whatsoever (Alloy & Abramson, 1979; Langer, 1975).

This review will focus on theories and research concerning control beliefs, because it is generally understood that a persons functioning is influenced more by their control beliefs than their actual degree of control (Burger, 1989). This is because beliefs about control determine feelings and behaviour, no matter what the level of actual control is.

Situational Control Beliefs and Stable Control Beliefs

Another important distinction discriminates between beliefs about control in a particular situation and beliefs about control which are more stable. Many control belief theories suggest that people develop consistent ways of interpreting situations. These stable control beliefs are developed from past experiences and from interpretations of those experiences (Abramson et al., 1978; Bandura, 1977; Rotter, 1996; Skinner, 1995). A person's control belief in a situation is distinct from, but influenced by, their stable control beliefs. In research which investigates the relationship between control beliefs and health, general control beliefs are more relevant because, if there is an influence, it is likely to operate over the long term.

Beliefs about Ability, Beliefs about Causation and a Sense of Control

Another important distinction that has been made by some theorists dintinguishes between beliefs about ability and beliefs about the cause of outcomes. This distinction is often not made by researchers who, using one or both, often provide no theoretical reasoning for their choice. A further distinction is also made between these *beliefs* about control and a *sense* of control. While beliefs about ability and beliefs about the cause of outcomes both concern control, neither indicate whether a person has a sense that things are under control. These distinctions will be further explained by outlining theories which make these distinctions.

One group of theorists that make such a distinction is Weisz and Stipek (1982). When talking about ability, Weisz and Stipek use the term 'competency' and it is defined as "the degree to which one is capable of producing those behavioural variations upon which the desired outcome is contingent" (Weisz, 1983, p. 241). 'Contingency' is the term used by

Weisz and Stipek when talking about causation beliefs and it is defined as "the degree to which the outcome in question is contingent upon (i.e., controllable by means of) variations in the behaviour of persons like oneself" (Weisz, 1983, p. 241).

Weisz and Stipek (1982) also distinguish between these beliefs and a 'sense of control'. (They use the term 'perceived control' but it will not be used in this context because it is used differently below). They argue that both 'competency' and 'contingency' beliefs affect a person's 'sense of control' because for a person to have a 'sense of control' the person must believe both that they can perform the action and that their actions can affect the outcome in question. For example, although it concerns an aspect of control, believing that you have the ability to produce the action will not give a 'sense of control' if you do not believe that the action will achieve the desired outcome. The inverse also applies, believing that an action will produce a desired outcome will not give a 'sense of control' if you do not believe that you have the ability to produce that action.

Weisz and Stipek (1982) use several examples to show how the interaction of 'competency' and 'contingency' beliefs truly measures a 'sense of control' and can give detailed clues to the cause of behaviour. One example considers a child's lack of perseverance at school and suggests that it may be because they do not believe they can control the outcome so they decide to stop trying. In this situation the child may believe that they are competent (high 'competency') but also that the outcome of their schoolwork is not dependent on their actions (low 'contingency'). Alternatively, the child may believe that the outcome of their schoolwork is dependent on their actions (high 'contingency') but that they are not able to perform the action (low 'competency'). Both sets of beliefs would result in reduced perseverance because of a low 'sense of control' but each set would require a different intervention to increase the 'sense of control'. They also show how the measurement of just one of these beliefs may be the cause of many of the conflicting results present in the field of control beliefs research. For example, two children could have the same 'contingency' beliefs, but if they had different 'competency' beliefs they would differ in their sense of control.

The conceptualisation of control outlined by Skinner (1995, 1996) also makes these distinctions. Skinner's conceptualisation has three essential elements and three beliefs leading from the relationships between these elements. Essential to Skinner's theory is the

distinction between the three elements of 'agents' of control, 'means' of control and 'ends' of control. 'Agents' refers to individuals or groups that exert control. 'Means' refers to ways in which control can be exerted. 'Ends' refers to outcomes (desired or undesired) over which control is exerted. Using this distinction, three separate sets of beliefs can be identified as shown in Figure 2.1.

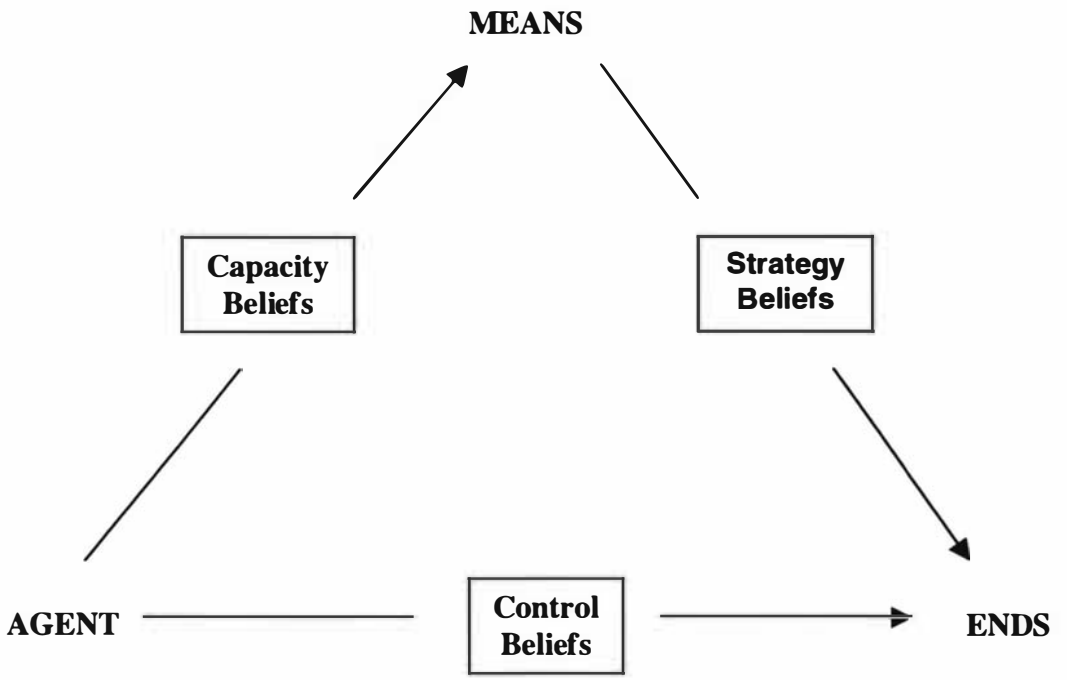


Figure 2.1. Skinner's conceptualisation: A distinction among three kinds of beliefs. (SOURCE: Skinner, 1995.)

'Strategy beliefs', which represent the relationship between the 'means' and 'ends', are defined as "generalised expectancies about the extent to which certain means or causes are sufficient conditions for the production of ends or outcomes" (Skinner, 1995, p. 30-31). Thus the 'strategy belief' concerns whether the person believes that the 'means' in question can produce the 'ends' or outcome and it is considered by Skinner (1996) similar to 'locus of control' (Rotter, 1966) and 'contingency' (Weisz & Stipek, 1982). The relationship between the 'agent' and 'means' is called a 'capacity belief' and is defined as "generalised expectancies about the extent to which the self possesses or has access to

certain causes" (Skinner, 1995, p. 31). 'Capacity beliefs' are similar to 'competency' beliefs (Weisz & Stipek, 1982). Relationships between the 'agent' and the 'ends' are called 'control beliefs' and are defined as "generalised expectancies about the extent to which self can produce desired or prevent undesired events" (Skinner, 1995, p. 30). This understanding of the term 'control beliefs' is a different understanding from that used in this thesis.

In consistency with Weisz & Stipek (1982), Skinner (1995, 1996) maintains that only when there is both a 'capacity belief' and a 'strategy belief' is there a 'sense of control'. To believe that you have access to a 'means' is not enough, you must also believe that the 'means' can achieve the 'ends'. In the same manner it is not enough to believe that the 'means' can achieve the 'ends', you must believe that you have access to that 'means'. It is the interaction between these two beliefs that results in a 'sense of control' to measure just one of them results in the loss of valuable information.

Another theory which makes the distinction between beliefs about ability, and beliefs about causation, and which emphasises the worth of both, is Bandura's (1977, 1986, 1997) self-efficacy theory. This theory distinguishes 'self-efficacy' from 'outcome expectancies'. 'Self-efficacy', the construct, is defined as "belief in one's capabilities to organise and execute the courses of action required to produce given attainments" (Bandura, 1977, p. 3). This is very similar to 'competency' beliefs (Weisz & Stipek, 1982) and 'capacity beliefs' (Skinner, 1995, 1996). 'Outcome expectancy' is defined as the "belief that the performance of an act will lead to a certain outcome" (Bandura, 1977, p. 3). This is very similar to 'contingency' beliefs (Weisz & Stipek, 1982), 'locus of control' (Levenson, 1972; Wallston, Wallston, DeVellis, 1978; Rotter, 1966) and 'strategy beliefs' (Skinner, 1995, 1996). While the emphasis in self-efficacy research is usually given to the 'self-efficacy' construct, self-efficacy theory explicitly acknowledges the role of 'outcome expectancies' and the interaction between 'self-efficacy' and 'outcome expectancies'.

The distinction between the beliefs concerning ability and beliefs concerning causation is supported by research validating the structural properties of measures developed and based on the conceptualisation outlined by Skinner (1995, 1996). One measure based on this conceptualisation of control is the Control, Agency, and Means-Ends Interview (CAMI; Skinner, Chapman & Baltes, 1988). It has ten subscales including 'capacity

beliefs' for 'effort', 'ability', 'teacher', and 'luck' as well as 'strategy beliefs' for 'effort', 'ability', 'teacher', 'luck' and 'unknown'. Skinner et al. (1988) report the psychometric properties for the CAMI including its structural properties which were analysed using exploratory factor analysis. In all analyses the predicted factors were indicated, supporting the distinction between beliefs about capacity and beliefs about strategy.

A study reported by Skinner, Wellborn, & Connell (1990) gives an excellent example of the value of a measure which differentiates between beliefs concerning different 'means' of control and considers the interaction between strategy and capacity beliefs. The sample consisted of children in a suburban elementary school who were present on the day the test was completed (N = 200, ages 9-12). The study investigated the ability of control beliefs to predict engagement in class work. Engagement for each student was assessed by teacher ratings of ten items which looked at both action and emotion. The CAMI (Skinner et al., 1988) was used to measure beliefs about control. The analysis considered both main effects and interaction effects (between matched 'strategy belief' and 'capacity belief' scales) of control beliefs and engagement. Engagement was associated with all subscales of the CAMI except 'strategy beliefs' for 'effort'. Correlations showed that higher engagement was associated with lower 'strategy' beliefs and the higher 'capacity' beliefs. The 'strategy belief' and 'capacity belief' subscales for each 'means' of control were regressed against engagement. For the 'means' of 'effort', only 'capacity beliefs' predicted engagement. Both 'capacity beliefs' and 'strategy beliefs' of 'ability', 'teacher' and 'luck' were predictive of engagement. This research highlights one of the benefits of measuring both 'capacity beliefs' and 'strategy beliefs' because it shows that while both constructs can concern aspects of control, their relation to the outcome can be different. For example, the belief that by working hard one can control the outcome ('strategy belief' for 'effort') was not related to engagement, whereas the belief that one can work hard ('capacity belief' for 'effort') was. A second example is that the belief that the outcome can be controlled through one's ability ('strategy belief' for 'ability') was associated with a decrease in engagement whereas the belief in one's ability ('capacity belief' for 'ability') was associated with an increase in engagement.

In the analysis of the interaction between 'capacity beliefs' and 'strategy beliefs' All four of the interactions were significant. Two patterns were found. One was found for 'effort' where high 'strategy beliefs' increased engagement for those who believed they could

work hard (high 'capacity beliefs') but decreased the engagement for those who did not believe they could work hard (low 'capacity beliefs'). Thus, for the 'means' of 'effort', engagement was greatest when 'strategy beliefs' were high and 'capacity beliefs' were high and engagement was least when 'strategy beliefs' were high and 'capacity beliefs' were low. The second pattern was found for the 'means' of 'ability', 'powerful others' and 'luck'. This pattern showed that low 'capacity beliefs' for each of these 'means' produced less engagement but especially for those that had high 'strategy beliefs' for the corresponding 'means'. For example, with the 'means' of 'luck', engagement was greatest when 'strategy beliefs' were low and 'capacity beliefs' were high, and it was least when 'strategy beliefs' were high and 'capacity beliefs' were low.

Schaubroeck and Merritt (1997) investigated the interaction of 'self-efficacy', 'job control' and 'job demand'. The research was based on Karasek's (1979) job demands-control model which suggests that job stress increases as job demands increase, but that the increase in job stress can be offset if the job demand is matched with an increase in job control. However, research concerning this interaction has been inconsistent. In the study reported by Schaubroeck and Merritt both general job self-efficacy and perceived job demands were measured using self-report measures. Job control was measured by Ganster's (1989 cited by Schaubroeck & Merritt) 22-item control instrument and concerned the amount of control the respondents believed they had over their work. This instrument seems to be a measure of causation beliefs and so is similar to 'contingency' beliefs (Weisz & Stipek, 1982) and 'strategy beliefs' (Skinner, 1995, 1996). A general self-efficacy scale, which had 11 items relating to job self efficacy, was adapted for use (Sherer et al., 1982). Blood pressure was measured by self-report (the authors give support for the validity of this approach). Analyses showed that job self-efficacy determined the effect of the interaction between job control and job demands on job stress. For people with high job self-efficacy, the belief that they had control in demanding situations reduced the amount of stress they experienced. However, for people with low job self-efficacy, the belief that they had control increased the amount of stress they experienced.

Further empirical support for the combined effect of beliefs about ability and causation is given in research by Kaplan, Atkins and Reinsch (1984) which considered the relation between beliefs about control and compliance with a walking program in a group of Chronic Obstructive Pulmonary Disease patients. Participants completed a walking self-

efficacy scale and the unidimensional Health Locus of Control scale (HLC; Wallston, Wallston, Kaplan, & Maides, 1976) where higher scores indicate a belief that control is held externally (HLC externals), and lower scores the belief that control is held internally (HLC internals). As pointed out earlier in this chapter 'self-efficacy' is similar to beliefs about ability, and 'locus of control' is similar to beliefs about causation. It was reported that over the three months of the study, walking compliance was correlated .63 with walking self-efficacy but not correlated with HLC. However, when they used a median split to create the two groups of HLC internals and HLC externals, they found that HLC moderated the relationship between walking self-efficacy and walking compliance. The relationship between walking self-efficacy and walking compliance remained significant for HLC internals but was not significant for HLC externals.

In summary, this section introduced theory that makes two points. The first point is that beliefs about ability and beliefs about causation are distinct control beliefs. These two beliefs are distinct theoretically and have different associations with outcomes. The second point is that beliefs about ability or causation cannot on their own imply a 'sense of control', but a 'sense of control' entails the interaction of these two beliefs. Research was outlined to support both these points.

Personal Control and Perceived Control

A further distinction that can be made in control theory is between 'personal control' and 'perceived control'. These terms have often been used interchangeably but Walker (2001) uses these terms to distinguish between two aspects of control. 'Personal control' is when a 'sense of control' is gained through belief in one's own ability to influence the outcome. This can be contrasted with 'perceived control', which is a 'sense of control' that is gained, not necessarily from 'personal control', but from any source. This distinction will be clarified in this section by introducing theorists who argue for the value of 'perceived control', and by outlining theories associated with each approach.

Personal Control

'Personal control' refers to an individual's belief in their own ability to control outcomes. Walker (2001) defines 'personal control' as "self-determination of an event (things are

under my control)" (p. 10). Hence, the focus is exclusively on a person's beliefs regarding the influence that his or her own actions and reactions have on the outcome and the implication is that a 'sense of control' will only come from a sense of 'personal control'.

'Personal control' is the dominant construct in the control beliefs field, with the more commonly known control theories, such as 'self-efficacy', 'locus of control', and 'learned helplessness', being 'personal control' theories. The dominance of 'personal control' has been so marked that terms such as, 'sense of control' and 'control beliefs', are often used interchangeably with 'personal control', resulting in a mistaken but pervasive assumption that they are the same thing.

A well known example of a 'personal control' theory is one developed by Rotter (1966), which suggests that the likelihood of a person engaging in a particular behaviour is a joint function of a person's belief in whether the behaviour would lead to a particular outcome and of the value of that outcome to the person. Thus, if a person values an outcome and believes that their behaviour can bring about that outcome then the person is likely to act. While Rotter's emphasis on the value of the outcome is usually overlooked, the generalised expectancy concerning the effect of the behaviour on the outcome has often been considered. It is this aspect of the theory that is called 'locus of control'. Rotter describes 'locus of control' as being a one-dimensional dichotomous construct; people perceive outcomes as either internally controlled or externally controlled. The theory suggests that a person with an internal 'locus of control' expects their actions to produce outcomes and so is an active, persistent person. A person with an external 'locus of control' is thought to expect that outcomes are not influenced by themselves but by external factors such as 'chance', 'luck' and 'powerful others', and so is passive and withdrawn (Rothbaum, Weisz, & Snyder, 1982). This type of person has also been described as fatalistic (Lefcourt, 1976). Traditionally, it was thought that people should be encouraged to develop an internal orientation because this would encourage them to take charge of their lives.

In summary, the 'personal control' theories focus on the individual's beliefs concerning their abilities and the outcomes of their actions. Constructs such as unidimensional 'locus of control' (Rotter, 1966) and 'outcome expectancies' (Bandura, 1977) focus on beliefs regarding the connection between the person's actions and the outcome. Constructs such

as 'self efficacy' (Bandura) focus on beliefs regarding the ability of the person to perform the action. Thus, the focus of 'personal control' theories is very much on the ability of the individual to influence outcomes. Belief in the ability of others to influence events is either ignored or understood as attenuating the 'sense of control' because it is seen as reducing 'personal control'.

Perceived Control

'Personal control' theories can be contrasted with 'perceived control' theories. The focus on 'personal control' as the determinant of a 'sense of control' has been challenged by suggestions that a person's 'sense of control' may also be enhanced through belief in control by others. 'Perceived control' is defined by Walker (2001) as "the extent to which an event is believed to be under control (things are believed to be under control)" (p. 10). The key difference is that 'perceived control' theories recognise that a 'sense of control' can be gained not only from a sense of 'personal control', but, can in certain circumstances, also be gained when it is believed that control is held by other 'means'.

A number of theories will now be introduced which suggest that a person can have a 'sense of control' even when they cannot directly influence the outcome themselves. These theories will be outlined and compared in order to help with the understanding of the differences between 'personal control' and 'perceived control'.

Antonovsky (1979) suggested that theories of 'personal control are about "I am in control" whereas, to have a 'sense of control' it is often sufficient to believe that "things are under control" (p. 155) which is the same contrast as was made by Walker (2001). Antonovsky argues that if one believes that control is in legitimate hands and that the person with the legitimate control will act in one's own interest, although there is no sense of 'personal control' a 'sense of control' can be maintained. A critical difference from Rotter's (1966) 'external control', which is seen to have negative effects, is that Antonovsky's theory prescribes that belief in control by an external force will be positive if the person also believes that the external force will act in the person's interest. Rotter does not include the orientation of the external force in his theory. Antonovsky's theory does not negate the value of 'personal control', but rather, recognises the potential value of control from other sources. Theoretically, the person with a 'sense of control' from a greater number of

sources would be better off. Antonovsky introduced the term 'sense of coherence' to avoid the 'personal control' bias that he felt was associated with the term 'sense of control', but the following definition shows that 'sense of coherence' acknowledges the potential value from both internal and external control:

> The sense of coherence is a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can reasonably be expected. (Antonovsky, 1987, p. 123)

Antonovsky (1979) identified three core components of 'sense of coherence': 'comprehensibility', 'manageability', and 'meaningfulness'. 'Comprehensibility' refers to whether the person perceives the stimuli they encounter as making sense (i.e. the stimuli are information that is orderly, consistent, and lucid). The person high in 'comprehensibility' expects that future stimuli will be predictable and, if it is not, they expect to be able to explain and organise it. 'Manageability' refers to the extent to which a person believes that the resources at their disposal are sufficient to deal with the stimuli that they encounter. Antonovsky explicitly states that resources "at one's disposal" are resources that are both under one's own control or in the hands of legitimate, trustworthy others such as a spouse, friends, colleagues, God or a physician. 'Meaningfulness' refers to the extent to which the person feels that problems and demands are worthy of the commitment of time and energy needed to effect change. Of these three components it is 'manageability' which is most easily identifiable as relating to perceived control. Antonovsky (1979, 1987) theorised that a sense of coherence would mediate the relationship between stress and health.

While 'dispositional optimism' is not normally described as a theory of control, optimism is considered to be closely related to control (Shapiro & Astin, 1998; Weinstein, 1993), and Scheier and Carver (1985, 1987, 1992) have a valuable contribution to make to this discussion. Their initial interest was in the self-regulation of behaviour and the influence of expectancies on this self-regulation (Scheier & Carver, 1982). Their theory proposes that 'outcome expectancies' are a major influence on behaviour. It should be noted however that their definition of 'outcome expectancies' is very different from that of other

authors, such as Bandura (1977, 1986). When using the term 'outcome expectancies', Scheier and Carver (1987) refer to the person's subjective belief about whether an outcome will occur or not. In contrast, Bandura used the term 'outcome expectancies' to refer to the belief that a particular behaviour will produce a particular outcome. Scheier and Carver postulate that people will continue to strive for goals as long as they expect that the goal is attainable. They believe that these expectancies can be stable over time, can be generalised to a variety of situations, and form the basis of an important personality characteristic. They label this characteristic 'dispositional optimism' and define it as "the tendency to believe that one will generally experience good vs. bad outcomes in life" (Scheier & Carver, 1992, p.203). This definition has strong similarities with the definition of Antonovsky's (1979) 'sense of coherence'.

Scheier and Carver (1987) see important similarities between their theory and control theories in the emphasis given to expectancies. They argue that control theories are concerned with expectancies of control, which are thought to affect people's expectancies of success while 'dispositional optimism' looks directly at people's expectancies of success. Scheier and Carver (1985, 1987, 1992) purposefully remove the emphasis from expectancies of control because they argue that this has traditionally focused around 'personal control' and they believe that expectation of success can also come from a number of other sources. They provide a number of examples of other sources of control which can also lead to positive expectancies of achieving future goals: assistance from other people, religious faith, belief in the effectiveness of medications or placebos, luck, and favour from others. They argue that by failing to consider such beliefs as positive sources of control, people who hold these beliefs are incorrectly categorised as not having positive expectations. Thus, Scheier and Carver argue that it is not the source of these beliefs that is important, but rather having the belief in a positive outcome, and that accordingly, it is sufficient to measure 'outcome expectancies' rather than the source of the expectation. The key point to be drawn from this discussion is that these theorists believe that belief in control by others can be positive and can lead to expectations of success, which is very similar to the thoughts of Antonovsky (1979). While Carver et al. (2000) explicitly separate 'dispositional optimism' from 'personal control', 'perceived control', as it is conceptualised here, includes similarities with 'dispositional optimism'.

Shapiro and Astin (1998) have proposed a theory of control aimed at integrating a number of control theories. While the theory is quite involved and the full detail is beyond this review, some aspects are of particular interest here. Like Antonovsky, Shapiro and Astin also recognise that a person can gain a 'sense of control' from sources other than 'personal control'. First, they differentiate between 'active/altering control' and 'yielding/accepting control'. 'Active/altering control' refers to when a person feels that they have the control to influence the outcome while 'yielding/accepting control' refers to when a person does not feel they have this control. They argue that 'yielding/accepting control' can be negative and may be characterised by terms like timid, hopeless and fatalistic. However, Shapiro and Astin also argue that 'yielding/accepting control' can be positive when it involves acceptance of what cannot be changed by personal control. Shapiro, Schwartz and Astin (1996) describe this positive 'yielding/accepting control' as maintaining a 'sense of control' by controlling oneself. This 'yielding/accepting control' is very different from the ideas of Antonovsky (1979). While both theories argue that a 'sense of control' can be gained when there is no 'personal control' this positive 'yielding/accepting control' involves acceptance of the status quo rather than trusting others to assist the achievement of desired outcomes. With 'yielding/accepting control' it is not the situation that is under control but the person's reaction to it.

However, a second aspect of Shapiro and Astin's (1998) theory is very similar to the arguments of Antonovsky (1979). They also argue that people can gain a 'sense of control' when control is held by benevolent others. Their examples, of doctors and a higher power, are very similar to those of Antonovsky and Scheier and Carver (1985, 1987, 1992). Shapiro and Astin argue that a person should ideally have belief in control by both self and others and that deficiency or excess of either of these can be a problem.

Another similar theory has been expressed in terms of gains from 'relinquishing control'. Burger (1989) suggests that there are times when 'personal control' is not seen as desirable and at such times people often choose to 'relinquish control' to others who are more likely to be able to exert control. This term 'relinquishing control' sounds very similar to Shapiro and Astin's (1998) positive 'accepting/yielding control' but is actually closer to Anonovsky's (1979) ideas. This notion is illustrated by a study by Burger, McWard and La Torre (1986) in which participants were given the choice between taking a blood sample from themselves or having an experimenter administer the sample. They

found that 75% to 90% of the participants chose to have the experimenter control the administration. It was thought that this was because the participants believed that the expert would be less likely to cause them pain. Thus 'relinquishing control', is very similar to Antonovsky's idea of gaining a 'sense of control' through belief in the ability of competent others. 'Relinquishing control', as theorised in this way, was seen as resulting in a number of positive outcomes, which are usually attributed to increased 'personal control' such as reduced anxiety.

Burger (1989) suggested that there are three conditions under which belief in personal influence can be negative and is likely to be relinquished: when it produces in the person an uncomfortable level of concern about how others evaluate them, when there is low belief in their ability to obtain the desired outcome, and when it leads to increased attention to the negative aspects of the situation. While this theory acknowledges that a 'sense of control' can be gained from believing that control is held by sources outside oneself, the strong influence of 'personal control' remains, and this is seen in two ways. First, through the term 'relinquishing control': although the theory states that through 'relinquishing control', 'sense of control' is actually gained, the use of the term 'relinquishing control' still implies that without exercising personal control, control is lost. Second, it is suggested that 'personal control' will only be relinquished when the person believes that they themselves cannot produce the desired outcome. This means that belief in control by others is seen only as a last resort.

Skinner's (1995, 1996) theory, described above, also acknowledges that a 'sense of control' can be gained through control held outside oneself. This theory recognises that a variety of 'means' can be seen as influencing the 'ends': it may be the ability of the person concerned, help from a friend, the power of another, luck or something else. The theory makes no assumptions about whether belief in control by any particular 'means' of control is positive or negative and it suggests that the belief in control by different 'means' should be investigated. Skinner proposes that different 'means' will be relevant in different settings and so suggests that the 'means' investigated in a study should be chosen specifically for each study to suit the population and the area of study. The 'means' that Skinner et al. (1988) have investigated in their educational research are 'effort', 'ability', 'powerful others', 'luck', and 'unknown strategies'.

'Locus of control', which was outlined in the section on 'personal control', deserves further comment at this stage because the construct has been developed since the original work by Rotter (1966) and has not always retained the focus upon 'personal control'. While Rotter's original formulation of 'locus of control' was clearly orientated to a 'personal control' perspective, its subsequent development into a multidimensional construct impacted on this. One of the earliest researchers to challenge the unidimensionality of the 'locus of control' construct was Levenson (1972, 1981) who made two points. First, she argued that internality and externality are separate dimensions and not opposite ends of one dimension. Levenson felt that she could believe that the outcome was controlled by others' actions and yet still believe that she could have some influence. In support of this, Levenson (1981) also pointed to factor analyses that suggest that 'locus of control' is multidimensional. Second, she proposed that externality consists of at least two separate dimensions because belief in control by 'powerful others' and belief in control by 'luck' or 'chance' has different implications. Levenson (1972) thought that people who believed that outcomes were controlled by 'luck' or 'chance' saw the world as unordered, whereas people who believed that outcomes were controlled by 'powerful others' still saw the world as ordered. She reasoned that these two sets of beliefs might cause people to behave and think differently. Interestingly, while Rotter operationalised 'locus of control' as unidimensional, he originally conceived it as multidimensional. In fact, Rotter, Seeman, & Liverant, (1962) originally suggested that external control might comprise four dimensions.

The belief in the multidimensionality of external control has subsequently led to the investigation of other external dimensions. This is seen especially in the area of supernatural and religious beliefs. Richards (1990) has suggested that belief in the influence of "universal forces" on the outcome of events may be important. "Universal forces" does not refer to God as conceptualised by any religion, but more to psychic and mystical experience. Wallston et al. (1999) have suggested that people's belief in the ability of 'God' to influence outcomes may be important. Wallston, Stein,& Smith, (1994) also developed a measure with a separate scale for 'doctors'. These authors state that there was a growing perceived need to analyse people's external beliefs about control at a more fine-grained level. Thus, the multidimensional approach to 'locus of control' has made it possible to acknowledge the role of beliefs in control by external 'means'.

While this multidimensional approach acknowledges that people can attribute outcomes to a number of different sources and to do so does not necessarily negate belief in 'personal control', it does not necessarily imply that an individual can gain a 'sense of control' from these other sources. There seems to be some difference of opinion on this issue from the theorists. Some indication of Levenson's perspective can be gauged by her explanation of the three different dimensions suggested. For example, Levenson (1981) sees the potential for control, when control is held by others, as being brought about through the "purposeful action" of the individual to influence the person who holds the control (p. 15). This still shows a 'personal control' focus and Levenson admits that this is quite similar to Rotter's (1966) conceptualisation of internality. The emphasis on personal action seems more similar to Bandura's (1997) concept of 'proxy control' (which includes having control through influencing those that control outcomes) than to the ideas of Antonovsky (1979), whose theory involves the assurance that benevolent powerful others will influence outcomes for your good. Also, Levenson (1972, 1981) suggests that people who believe that outcomes are controlled by 'powerful others' and those that believe that outcomes are controlled by 'luck' or 'chance' differ in the extent to which they believe the situation is ordered. She argues that a belief in control being attributed to 'luck' or 'chance' is a belief in the world being unordered. This indicates that she does not believe that a 'sense of control' may be derived from belief in control by 'luck'.

Wallston, who appears to take a different stance from Levenson (1981), has been involved in the development of several measures of control beliefs. The first two of these were a one-dimensional (Wallston et al., 1976) and then a multidimensional measure (Wallston, Wallston, & DeVallis, 1978) of 'locus of control' in the health domain. In contrast to Levenson, Wallston (1989) explicitly states that belief in control by 'powerful others' can aid a person's 'sense of control'. He uses the example of belief in the benign responsibility of an expert medical practitioner. Wallston even says that belief in control by 'luck' can be beneficial when the individual believes they can control random events or when there is little ability to influence events. He suggests that failing to recognise the role that 'luck' plays in outcomes may also be detrimental. Wallston also argues that the approach suggesting more 'personal control' is better is not appropriate and that too much belief in internal control may in fact be negative. He encourages the exploration of multiple 'means' of control, suggesting that there might be typologies of beliefs that have the best health outcomes (Wallston & Wallston, 1982). While most researchers have looked for the

'silver bullet', Wallston argues that there may be a particular combination of these which are best. Wallston also criticises researchers for continuing to focus on 'internal control' and not making the most of the multiple dimensions that are possible. Wong and Sproule (1984) took a similar stance. They suggested that people who possessed both an internal and external orientation were more able to cope because they had the optimal mix between belief in their own ability and faith in the appropriate external resources.

In summary, 'personal control' theories suggest that a 'sense of control' comes from belief in one's own ability to influence the outcome. Often implicit in this approach is the idea that belief in control by someone/something other than oneself will reduce a 'sense of control'. In contrast, 'perceived control' theories suggest that a 'sense of control' can come from belief in control by a variety of sources. Critical comparison of these theories shows a distinction between theories which hold that a person may have a 'sense of control' *despite* the belief that control is held by another source, which are in effect more aligned with 'personal control' theories, and theories which suggest that a person may have a 'sense of control' *because* they believe that control is held by another source.

Supporting Research

One of the key aspects of 'perceived control' is that it can be believed that control is held by different 'means' simultaneously. This multidimensional understanding is in contrast with the unidimensional understanding, best exemplified by Rotter's (1966) theory which suggests that to believe more in control by external 'means' was to believe less in control held by personal 'means'. Levenson (1981) cited several factor analytic studies which showed that 'locus of control' was not unidimensional. The multidimensional understanding has been further supported in the development of multidimensional measures. Analysis performed in the development of Levenson's (1972) original measure showed that belief in control by 'self', control by 'powerful others', and control by 'luck' were separate beliefs. Wallston et al. (1978) also demonstrated this in the health context and Wallston et al. (1994) further showed it in a separate scale measuring belief in control by the 'doctor'.

A second key aspect of 'perceived control' is that belief in control by external 'means' can be beneficial for a 'sense of control'. In the following studies, belief in control by other 'means' is shown to contribute positively to a sense of 'personal control'.

One of the external 'means' of control that is proposed is family and friends (Skinner, 1995, 1996). No research has considered belief in control by 'family' and 'friends' within the control beliefs context, but this idea has similarities with social support. Definitions of social support tend to focus on the availability of social relations and help to the individual. For example, Leary (1983) defines social support as "the availability of helping relationships and the quality of those relationships" (p. 5). Similarly Johnson and Sarason (1979) define it as "the degree to which individuals have access to social resources in the form of relationships on which they can rely." (p. 155). Consequently the relationship between control belief measures and social support is worth considering. In the past, the tendency has often been to believe that receiving support from others reduces a sense of 'personal control' because it signifies dependence (Smith et al, 2000). However, this need not be the case. The research outlined below shows that the perception that others are willing to support the individual can be encouraging and empowering.

Jensen, Olsen & Hughes (1990), in seeking to understand the causal factors in the development of 'locus of control', used data from nine European countries. One causal factor considered was marital status, which has often been used as a structural measure of social support. Structural measures of social support consider the interconnectedness of the person. Their measure of 'locus of control' was one statement, based on the work of Rotter (1966), with which participants were asked to indicate whether they agreed or not: "Please use the scale to indicate how much freedom of choice and control you feel you have over the way your life turns out." (p. 201). They found that 'locus of control' was related to marital status, in that people who were married were more likely to have a high belief in internal control. They suggest that this means that support from a partner enhances one's belief in 'personal control'.

Wickrama, Lorenz, Conger, Matthews and Elder (1997) performed a longitudinal study looking at the mediational role of psychosocial variables in the relationship between occupational quality and health. Occupational quality was measured by a combined index of social prestige, objective control, and demand. Control beliefs were measured by two

scales which measure 'personal control' (Pearlin, Lieberman, Menaghan & Mullan, 1981; Ross & Mirowsky, 1989). Physical health was measured by a self-report indication of illnesses and diseases experienced. 'Personal control' beliefs were associated with 'occupational quality', 'social integration' and 'marital integration' for husbands and by occupational quality and marital integration for wives. 'Personal control' beliefs also mediated much of the relationship between the social support measures ('social integration' and 'marital integration') and health behaviours. In sum, the relationship between social support and health behaviours was mediated by 'personal control' beliefs. This relationship between the social support measures and 'personal control' beliefs is similar to that reported by Jensen et al. (1990). Both these studies suggest that belief in control by others increases a sense of 'personal control'. Because 'personal control' measures were used, it is not possible to tell whether belief in control by others increases a sense of 'perceived control'.

In two independent analyses using elderly populations, Bisconti and Bergeman (1999) investigated how social support and control might be associated in their relationship with health. Social support was measured by quantity of support from friends and family, which is a structural measure and by satisfaction with social support. They included a construct which they named 'perceived social control' which refers to being able to elicit support when it is needed and they saw it as a domain specific aspect of global control. It was measured using a subscale of the Desire for Control measure (Reid & Ziegler, 1981). The subscale includes items such as "I can rarely find people who will listen to me" and "I find that if I ask my family (or friends) to visit me, they come". Health was measured by the participants' rating of their physical health. The authors thought that when a person had a positive perception of the support they could get from their environment this would increase their 'sense of control'. Consequently, they hypothesised that 'perceived social control' might mediate the relationship between social support and health. Analyses using both data sets supported this hypothesis. When 'perceived social control' was entered into an analysis after social support, the relationship between social support and health greatly reduced and in most cases to below the level of significance. 'Perceived social control' was always moderately related to health. The authors suggest that these findings indicate that social support is beneficial for health through its effect on 'perceived social control'. Their understanding of 'perceived control' seems very similar to the thoughts of Antonovsky (1979) and this study seems to support that view.

Smith et al. (2000) developed the work of Bisconti and Bergeman (1999) by further investigating the hypothesis that control mediates the relationship between social support and health. Their sample consisted of a convenience sample of 482 community-dwelling adults aged 18-93 years (mean 48.7). Social support was measured by a seven-item measure of 'emotional social support' (Pearlin, Mullan, Semple & Skaff, 1990) which is defined as "the perceived availability of a person who is caring, trustworthy, uplifting, and a confidant" (Smith et al, 2000). They differentiated between three types of control beliefs: 'interpersonal agency', 'personal agency', and 'perceived personal control'. 'Interpersonal agency' was defined as "obtaining positive ends through interactions with others" (p. 458). Smith et al. noted that like Bisconti and Bergeman's 'perceived social control', the idea of being able to mobilise support from others is key to one's construct of 'interpersonal agency'. 'Personal agency' is defined as "achieving desired outcomes on one's own behalf" (p. 458). Both of these constructs were measured by scales developed by the authors. 'Perceived primary control' was measured by two items of the Mastery Scale (Pearlin & Schooler, 1978) that measure control over positive outcomes. They defined mastery as a "generalised belief that people have regarding their ability to exercise control over important circumstances of their lives" (Smith et al, 2000, p. 463.). The outcome variable was psychological well-being which was measured by the Positive Well-Being subscale of the Psychological General Well-being Index (DuPuy, 1978 cited in McDowell & Newell, 1996). The authors tested a model in which 'emotional social support' was associated with 'interpersonal agency' and both 'interpersonal agency' and 'personal agency' were independently associated with 'perceived primary control'. In the model, psychological wellbeing was predicted by 'perceived primary control'. This model was supported by analysis using structural equation modelling again supporting the idea that a person's 'sense of control' can benefit from one's belief in assistance from others.

Reich and Zautra (1991) used an experimental study to investigate the mental health outcomes of internal control beliefs in older adults suffering from recent disability or conjugal bereavement. Mental health was measured by two items which assessed psychological distress and psychological well-being. 'Internal control' was measured using the internal subscale of Levenson's (1972) Multidimensional Locus of Control Scale. Three groups of participants were treated differently over a period of three months. One group was encouraged to develop perceptions of 'internal control' of their daily tasks.

A placebo group was given social contact but no control enhancing intervention. A third group was not contacted. The control enhancing intervention improved reports of mental health for participants who were already high in 'internal control' beliefs, while for the placebo and no contact groups, high beliefs in 'internal control' resulted in no change in mental health. Surprisingly, the placebo group produced increased mental health for the low 'internals', while the low 'internals' in the control intervention and no contact groups showed no increase in mental health. In a follow-up analysis the authors considered the impact of the degree that people were encouraged to be dependent. This was measured by items asking about the extent to which important members of their social networks encouraged them to be dependent. They tested this in an analysis of the interaction between 'internality' and 'dependency'. The interaction was significant only for the placebo group: mental health increased for low internals who felt more encouraged by others to be dependent. The results were interpreted in terms of congruency. For high 'internals' the control intervention was congruent and for the low 'internals' the placebo contact was congruent. A similar finding is reported by Chambliss & Murray (1979), where 'externals' improved weight loss through interventions designed to increase attributions to medications, whereas 'internals' through interventions designed to increase 'self-efficacy'. In this case, belief in 'external control' was beneficial in the congruent situation. These findings can be interpreted to support the theory that belief in external control can be beneficial in the right context.

Another source of control suggested by Antonovsky (1979) is God. In the past it was thought that the belief that outcomes were controlled by 'powerful others' was the opposite of belief in 'internal control' and so would lead to a reduced belief in 'internal control' (Rotter, 1966). This has particularly been the case with regards to belief in control by God, where terms like escapism, denial, avoidance, resignation, dependence and passivity have often been used to refer to belief in control by God (Pargament, 1997; Pargament & Park, 1995). However, as the following studies show, the assumption that belief in control by God is synonymous with reduced belief in 'internal control'.

Tebbi, Mallon, Richards and Bigler (1987) looked at the relationship between religiosity and 'locus of control' in a group of 28 adolescent cancer patients. Religiosity was measured using the Faulkner-DeJong Religiosity Scale (Faulkner & DeJong, 1966) which measures the ideology, intellectual, ritualistic, experimental, and consequential dimensions

of religiosity. Added to this were items asking about belief in control by God and whether faith helped them understand life better. 'Locus of control' was measured using the Nowicki-Strickland Locus of Control Scale for Children (Nowicki & Strickland, 1973), which is similar to Rotter's (1966) unidimensional Locus of Control scale. It was found that religiosity or specific items relating to belief in control by God did not affect the internal-external balance and so the belief in control by God did not make a person believe less in their 'personal control'. Jackson and Coursey (1988) found that belief in God was associated with an increased belief in 'personal control' in a sample of black parishioners belonging to a Baptist congregation. They measured belief in control by God using the 'God as a Causal Agent' Scale (Ritzema & Young, 1983). 'Locus of control' was measured using Rotter's (1966) unidimensional measure. Wrightson & Wardle (1997) explore cultural differences in 'locus of control' beliefs. Three cultures living in the United Kingdom were investigated: South Asian, white European and Afro-Caribbean. 'Locus of control' was measured using the Multidimensional Health Locus of Control scale (Wallston et al., 1978). One of the other factors measured was the extent to which the people were religious. Across all three cultures, higher religious beliefs were associated with higher scores on all of the 'locus of control' scales, showing again that religious beliefs do not reduce belief in internal control but can actually increase it.

Pargament (1997) tries to explain the findings that belief in control by God can enhance control beliefs, by referring to three methods of coping available to those who believe in God. One coping mechanism is referred to as a 'differing style' where the person takes a passive approach and chooses to trust God to control the outcome. The second is a 'self-directing style' where the person takes control of the situation themselves. The third method is a 'collaborative style' where the person works in partnership with God. Pargament argues that people using the 'collaborative style' believe that they can call on God for help and this increases their sense of personal control. This is similar to the thoughts of Antonovsky (1979).

Pargament et al. (1988) measured the three coping styles using the Religious Problem-Solving Scales. Belief in 'internal' and 'chance' control were measured by the appropriate subscales of Levenson's (1972) Multidimensional Locus of Control scale. Self-esteem was measured using Rosenberg's (1965) Self-esteem Scale. Tyler's (1978) Behavioural Attributes and Psychosocial Competence scale was used to measure ability to solve

problems in an active and organised way. Belief in control by God was measured using Kopplin's (1976 cited by Pargament et al., 1988) God Control scale. The 'self-directing style' was associated with less belief in control by God, while the 'deferring' and 'collaborative styles' were associated with more belief in control by God. The 'self-directed style' was also associated with higher 'internal control' beliefs and 'self-esteem'. The 'deferring style' was associated with lower 'internal control beliefs', lower 'self-esteem', and a less active approach to problem solving, furthermore it was associated with more belief in control by 'chance'. When the effect of the other coping styles were partialled out, the 'collaborative style' was associated with more belief in 'internal control' and 'self-esteem' and less belief in control by 'chance'. Pargament and Park (1995) report similar findings.

This section has considered theory and research which supports the distinction between 'personal control' and 'perceived control' theories. 'Personal control' refers to an individual's belief in their own ability to control outcomes, whereas 'perceived control' recognises that a person can believe that things are under control because of 'personal control' or when control is held by a variety of other 'means'. A number of theories were reviewed which make this distinction and support the value of the broader perspective of 'perceived control'. Research involving belief in control by other 'means' was also reviewed. In particular this research considered the 'means' of 'God' and 'family' and 'friends' by reviewing social support research. This research showed that belief in control by these 'means' does not reduce a sense of 'personal control', rather it can enhance it and subsequently also result in beneficial outcomes. Further research which supports this view will be reviewed in Chapter Three.

Global Control Beliefs and Specific Control Beliefs

Beliefs can be about control over very general outcomes or control over more specific outcomes. For example, locus of control refers to one's beliefs about whether outcomes were contingent on their own actions or factors external to themselves. The outcomes which locus of control beliefs concern can either be very general or more specific. This is evidenced by the different locus of control measures which have been developed. Levenson's (1972) Multidimensional Locus of Control scale is a measure of global control

beliefs which concerns control over general outcomes. The Multidimensional Health Locus of Control scale developed by Wallston, et. al. (1978) is a more specific measure of control beliefs because it refers to control over health outcomes. Form C of the Multidimensional Health Locus of Control scales (Wallston, et. al. 1994) is even more specific because it is developed so that control beliefs regarding specific medical conditions can be measured.

There are important implications for research from the measurement of control beliefs at different levels of specificity. Bandura (1977, 1986, 1997) strongly argues that 'self-efficacy' beliefs are not generalizable across domains and so more specific measurement of 'self-efficacy' beliefs results in more accurate predictions of behaviour. For example, measurement of 'self-efficacy' regarding a person's ability to exercise in general, will be less predictive of that person choosing to run every morning than measurement of their 'self-efficacy' regarding their ability to run on a regular basis. This is often taken as an argument for using more specific measures of control beliefs (e.g. O'Leary, 1992).

An alternative argument (Skinner, 1995) is that the level of specificity of the measurement of control beliefs should be appropriate for the specificity of the outcome. Therefore, when the outcome is specific, such as running every morning, then the control belief should also be measured specifically, but when the outcome is more general, such as health, the control beliefs may be measured at a more general level.

The Choice of A Theory

When considering the choice of a theory to use when investigating the role of control beliefs in the relationship between SES and health, several points need to be considered. Firstly, the theory should include an understanding of 'perceived control' and not be limited to a 'personal control' understanding. One reason for this is that each of the major 'personal control' theories were developed to explain and predict behaviour (e.g. Abramson et al., 1978; Bandura, 1977). In that context it makes sense that belief in 'personal control' is beneficial to the health of the person because a sense of 'personal control' increases the person's motivation to perform beneficial behaviours, while belief that control is held outside oneself does not encourage the performance of these

behaviours (Wallston, 1992). However, when the aim is to explain and predict health in general, a broader understanding of control is needed because there are factors other than behaviours which affect health. For example, stress has been shown to influence health. To investigate the role of control in the relationship between SES and health, an understanding of control which is not limited to the affects of health behaviours is needed.

A second reason it is important to include a 'perceived control' understanding of control, is that some argue that attributing the relationship between SES and health to personal control beliefs is like blaming the victim (Brownell, 1991). Franzblau and Moore (2001) argue that the emphasis in western society on 'personal control' blames the victim because it attributes to them responsibility for their situation, rather than recognising the influence of the individual's social context. In effect it suggests that the person's health is under their control and therefore their responsibility (Carroll et al., 1993). One major benefit of a 'perceived control' approach is that it recognises the impact of the social context on one's 'sense of control'. 'Perceived control' suggests that a person's 'sense of control' comes from a variety of experiences including interactions with friends and family and people in positions of authority and therefore much of the danger of victim blaming is removed because the emphasis is not solely on the person's experiences of success or failure.

'Perceived control' is dependent on the interaction between beliefs about ability and beliefs about causation (which is entailed in a 'sense of control'). For example, the belief that control is held by a 'powerful other' can produce a sense of control if it is also believed that the powerful other is benevolent. Therefore it is important that the theory adopted concerns beliefs about a 'sense of control'.

It is also important to include as much information as possible on control beliefs. Bailis, Segall, Mahon, Chipperfield, & Dunn (2001), in discussing their investigation of the role of control beliefs in the relationship between SES and health, suggested that a more detailed approach to control beliefs is needed to better understand its role because the measure they used was Pearlin and Schooler's (1978) Mastery Scale, which gives just one single score. Many measures of control beliefs are like the Mastery Scale and therefore limit the amount of information they gather. In particular Bailis et al. suggest that the conceptualisation of control outlined by Skinner (1996) provided potential for future gains in understanding because of the variety of information it involves. Therefore it would be

ideal for the theory to consider different aspects of control beliefs including a 'sense of control'.

Few theories are able to fulfil these criteria. A number of theories include only one aspect of control beliefs. An example of this is Pearlin and Schooler's (1978) Mastery scale which only concerns beliefs about personal contingency. Levenson's (1972) multidimensional locus of control does consider beliefs about multiple 'means' of control but does not consider 'sense of control' because it does not include the access to those 'means'. While the theory outlined by Shapiro and Astin (1998) considers 'sense of control' and recognises that a 'sense of control' can be gained through belief in control held by others, the Shapiro Control Inventory (Shapiro, 1994) only measures control from two sources, 'self' and 'others'. Other theories such as self-efficacy theory (Bandura, 1977) and the theory of Weisz and Stipek (1982) include a distinction between beliefs about ability and causation and their interaction to produce 'sense of control' beliefs, but they come from a 'personal control' perspective only.

One theory that includes all the aspects of control reviewed in this chapter, and, in particular, those which are relevant to an investigation of the role of control beliefs in the relationship between SES and health, is the conceptualisation of control outlined by Skinner (1995, 1996). It incorporates beliefs about ability and causation and theorises that it is the interaction of these beliefs which forms a 'sense of control'. It also recognises that a 'sense of control' can be gained through control being held by a variety of 'means' and that a 'sense of control' is not dependent on belief in 'personal control'. In this way it could be seen as a 'multidimensional sense of control' concept. This aspect builds on the interaction of 'capacity beliefs' and 'strategy beliefs'. It is argued that when there is belief that control is held by others, a 'sense of control' can still be experienced if it is also believed that there is access to that 'means'. Measures can also be developed to measure outcomes at any level of specificity.

Unfortunately for clarity in the present situation, Skinner (1995) uses the term 'perceived control' when referring to the conceptualisation that she outlines. In the present chapter, following the work of Walker (2001), the term 'perceived control' has been used to refer to the understanding that a 'sense of control' can be experienced when it is believed that control is held by a variety of 'means' and has been distinguished from 'personal control'.

Consequently, a new term is needed to refer to the understanding of control which includes both what this chapter has termed a 'sense of control' and what it has termed 'perceived control'. It was decided to use the term 'multidimensional sense of control'. The term 'sense of control' will be retained and the word 'multidimensional' is added because it recognises that a 'sense of control' can be gained through belief in control by a variety of 'means'.

While the conceptualisation outlined by Skinner (1995, 1996) is relatively new, Bandura (1997) has criticised the theory and it is appropriate to discuss those criticisms here. One of his major arguments is that the theory, which includes three components ('agent', 'means' and 'ends'), should include a fourth part. He suggests that this fourth part is 'performance' and that it lies between the 'means' and the 'ends'. Bandura argues that 'means' produces 'performance' and that 'performance' produces 'ends'. To illustrate this point he states it is not correct to say that effort produces royalties, but rather one should say, effort produces books, which produce royalties. There are two problems with this argument. Firstly, it raises the question of what constitutes an 'end'. Skinner (1996) defines 'ends' as "the desired and undesired outcomes over which control is exerted." (p. 552). In Bandura's example, the outcome is book royalties, but the outcome could quite possibly be 'food on the table' because that is what the book royalties are used for. There are a number of different 'ends' available in every situation which vary in their degree of specificity, and 'performance' can be seen as just one of those 'ends'.

A second problem with Bandura's (1997) argument is that Bandura's own model does not include the 'performance' component which he argues should be included in Skinner's (1995, 1996) model. As discussed previously in this chapter, Bandura (1977, 1986, 1997) makes a distinction between beliefs that is very similar to that made by Skinner. 'Strategy beliefs' as outlined by Skinner is very similar to Bandura's 'outcome expectancies', and Skinner's (1995) 'capacity beliefs' is very similar to Bandura' 'self-efficacy' beliefs. Bandura (1997) even uses three very similar terms in his explanation of 'self-efficacy' beliefs and 'outcome expectancies'. He says that 'self-efficacy' beliefs describe the relationship between the 'person' and the 'behaviour' and 'outcome expectancies' describe the relationship between the 'behaviour' and the 'outcome'. 'Person', 'behaviour' and 'outcome' are very similar to 'agent', 'means' and 'ends'. The major difference is the focus of the two theories. Bandura's (1977, 1986, 1997) model focuses around 'personal

action' and so 'behaviour' is specified as the 'means' whereas the conceptualisation outlined by Skinner (1995) does not have that focus and so the 'means' is not specified.

A second argument of Bandura (1997) is that the 'means' which have been included in the measures (SPOCQ [Wellborn, Connell & Skinner, 1989; CAMI [Skinner, Chapman & Baltes, 1988]) based on the conceptualisation outlined by Skinner (1995, 1996) are conceptually different. In particular, he argues that 'luck' cannot be a 'means' of control because it cannot be controlled. The problem with this argument is that it is based on a 'personal control' understanding. Bandura may be correct in saying that 'luck' cannot be controlled, but Skinner does not suggest that it can. She merely says that if people believe that 'luck' controls outcomes and that they are a lucky person then this will increase their 'sense of control'. As discussed above, Skinner's model takes the focus off the need for personal action and argues that a 'sense of control' can be felt without 'personal control'. Bandura seems to have missed this point.

Summary

In summary, a multidimensional sense of control approach was chosen a suited to investigation of the role of control in the relationship between SES and health. This approach has three key aspects. One is the differentiation between capacity beliefs and strategy beliefs. The second is the proposal that it is the combination of these two beliefs that indicates whether a person has a sense that things are under control. The third aspect is that it recognises that a 'sense of control' can be gained from a variety of 'means' and so removes the focus from 'personal control'. This approach to control has several benefits for the present investigation.

Chapter Three

THE ROLE OF MULTIDIMENSIONAL SENSE OF CONTROL IN THE RELATIONSHIP BETWEEN SES AND HEALTH

Chapter One outlined the background to the SES-health relationship and highlighted aspects of that literature which suggest a possible role of psychosocial factors, such as control, in the relationship. This chapter considers theory and research which support the role of control in the relationship between SES and health. Chapter Two suggested a conceptualisation of control that would have merit when investigating the role of control in the relationship between SES and health and labelled it 'multidimensional sense of control'. Because few studies have been reported using a 'multidimensional sense of control' approach in the areas of SES and health, the research available to be reviewed in this chapter, directly relating to this, is limited. Research using multidimensional locus of control measures is useful because they measure belief in the extent to which a number of 'means' control outcomes, but, locus of control does not measure the extent to which the person believes they have access to the 'means' of control. Also, there are few measures concerning belief in control by 'means' such as family and God, which have been suggested as important (Antonovsky, 1979; Shapiro & Astin, 1998). However, there is a large body of literature that looks at religious beliefs and this will be drawn upon when looking at belief in control by God. While there is little research looking specifically at belief in control by friends and family, research concerning social support is relevant because it concerns beliefs in the availability of support from friends and family (Walker, 2001).

The following sections will draw on a range of research evidence that supports different aspects of multidimensional sense of control in relation to health and SES. The first section will outline the theory and research concerning the relationship between multidimensional sense of control and health. The second section will describe the theory and the research concerning the relationship between SES and multidimensional sense of

control. The final section will review research that is relevant to the role of multidimensional sense of control in the SES-health relationship.

Multidimensional Sense of Control and Health

This section will consider theory and research related to the relationship between multidimensional sense of control and health. Firstly, it will consider two mechanisms by which control is thought to influence health: health behaviours and stress. Secondly, this section will outline further theory and research which link aspects of a multidimensional sense of control with health.

Mechanisms by which Control might affect Health

Health Behaviours

One explanation of the relationship between control beliefs and health is health behaviours. This explanation relates particularly to personal control. The association between personal control and health behaviours is evidenced by the fact that the major models designed to predict health behaviours (e.g. Health Action Process Approach [Schwarzer, 1995]; Theory of Reasoned Action [Ajzen, 1988, 1992]) include personal control constructs. Also relevant is the fact that many of the personal control theories were developed to predict behaviour (e.g. self-efficacy [Bandura, 1977] and locus of control [Rotter, 1966]). These theories suggest that those who have a belief in their personal control are more likely to take action and to persist in that action when obstacles get in their way because they believe that they can perform the required action and that what they do makes a difference. This has been found to be the case with health behaviours (Rodin, 1986). A large amount of research has shown that individuals with a greater belief in their personal control have healthier life styles, they are more likely to seek advice, follow that advice and persist with positive health behaviours in the face of obstacles (Peterson & Stunkard, 1989). For example, Armitage and Conner (1999) found that self-efficacy predicted intention to perform behaviours over a three-month time lag. Another example is research showing that self-efficacy was associated with participation in an exercise program for a group of 40-65 year old sedentary adults (Duncan & McAuley,

1993). However, it should be noted as Oberle (1991) points out, that not all research shows a relationship between personal control and health behaviours and the relationship is often quite weak.

Stroebe and Stroebe (1996) suggest that social support can also influence health through health behaviours. They suggest that structural social support, which incorporates the size and structure of relationships and refers to the extent to which a person is socially connected, works predominantly through its effect on health behaviours. Membership of groups and interactions with people influence our behaviour. While some social networks are related to the performance of behaviours which are bad for one's health (e.g. smoking and drugs), social support is generally associated with good health behaviours (Berkman, 1995). Berkman argues that social learning theory explains much of the learning of good behaviours through social support. She suggests that social support not only provides intimacy and a sense of belonging but also increases people's skills through observational learning, gives verbal support and persuasion and also gives a sense of self-efficacy.

Stress

A second mechanism through which it is proposed control beliefs influence health is through the relationship of control beliefs with stress. The relationship between psychological stress and health has been studied for over half a century with two of the early stress theorists (Cannon, 1932; Seyle, 1957) suggesting that chronic stress can cause physical illness. However, there is still debate over the extent to which this link has been established (Allen, 1998). The evidence is strongest for cardiovascular disease, infectious disease, and pregnancy complications (Adler, 1994). It has been suggested that stress can affect health through two different paths: physiological and behavioural (Stroebe & Stroebe, 1996). Stress may affect a number of physiological systems (Bartlett, 1998; Kiecolt-Glaser & Glaser, 1995; Taylor, 1995) and can influence health through these systems in three ways. One suggestion is that stress changes the physiology of the body and this may result in disease because it upsets the body's normal physiological function (Allen). For example, stress can cause an increase in corticosteroids which can lead to arthritis and kidney disease (Ogden, 1997). A second way is that physiological reactions to stress can reduce immune function (Adler, 1999; Allen, 1998; Bartlett, 1998). This can increase the probability of disease and also affect the rate of recovery from disease.

Thirdly, stress may affect disease stability. An illustration of this is that stress affects glucose metabolism, which makes it more difficult to manage diabetes (Allen).

Stress can also affect health by changing the way people behave. It is thought that people who are more stressed tend to take less care of their health (Stroebe & Stroebe, 1996). This can mean that they do not engage in health-promoting behaviours or use health-damaging behaviours to distract them from the stress (Adler, 1994). Research supporting this has shown that stress is linked to drinking problems (Brennan & Moos, 1990), smoking (Cohen & Lichenstein, 1990) and increases in eating (Grunberg & Straub, 1992).

It is thought that control beliefs may mediate the relationship between stress and health. Lazarus and Folkman (1984) explain how this may occur. They argue that the quantity of stress one experiences depends on one's appraisal of the stressor and of one's ability to cope with the stressor. Primary appraisal involves the assessment of whether the stressor is relevant to the person and whether it is threatening. If the stressor is seen as relevant and threatening then a second appraisal is performed. Secondary appraisal is the assessment of the resources available to cope with the stressor. If an individual feels they have the resources to deal with the stressor, the amount of stress experienced is reduced. Lazarus and Folkman distinguish between personal resources and environmental resources. Personal resources include things such as skills and control beliefs. Environmental resources include money, time and social support. If the person has a sense of control through their personal and environmental resources they will experience less stress (Folkman, 1984). Also relevant here is the fact that people with high personal control beliefs are more likely to persist in the advent of obstacles (Bandura, 1977, 1986). Thus, even when a stressor is perceived as being highly taxing, a sense of control will encourage the person to persist and overcome the problem.

While social support is included in the theory of Lazarus and Folkman (1984) as an environmental resource, further specific theory and research has investigated the role of social support as a moderator of the relationship between stress and health. This is often called the stress-buffering model (Cassel, 1976; Cobb, 1976). The stress-buffering model suggests that social support has the most benefit for people experiencing stress. Stroebe and Stroebe (1996) argue that functional social support influences health predominantly through buffering stress. Functional social support concerns the perceived availability of

certain support functions or the actual support functions received. The provision of several support functions has been shown to be important for health: emotional support, appraisal support, informational support, and instrumental support (House, 1981).

Social support can interact with stress in a number of ways that closely parallel those suggested by Lazarus and Folkman (1984) for control beliefs. Firstly, it can reduce the number of stressors that the person experiences, as when good advice or helpful information is given. Secondly, individuals with more social support have been shown to have better immunity when stressful events are experienced (e.g. Baron, Cutrona, Hicklin, Russel, & Lubaroff, 1990). Thirdly, it can reduce the level of perceived stress because it is felt that the resources required to manage the stressor are available. Social support can also motivate individuals to cope and improve their ability to cope. For example, a sense of being valued by others can give the person a reason to keep striving. A systematic review found that the stress-buffering effect of social support was most evident when it was operationalised as perceived social support (Kessler & McLeod, 1985). This suggests that the last two pathways discussed above are most likely to be operating (Wethington & Kessler, 1986).

Antonovsky (1979, 1987) suggested that a sense that things were under control would reduce stress. From the link between stress and health, it can be inferred that a 'sense of control' through any 'means' could be associated with better health. For example, if a person has a 'sense of control' because they believe that outcomes are controlled by 'luck' and that they are lucky, then they will experience less stress and the better health which is associated with that.

Belief in Personal Control and Health

An extensive body of research has looked at the relationship between personal control beliefs and health. Many of the early studies involved manipulation of the person's actual control, to influence their sense of control, and measurement of the effect of this on their health. Langer and Rodin's (1976) manipulated control in a nursing home illustrates this point. A random selection of residents were encouraged to make a greater number of choices and to have more control in their daily activities. This included being encouraged to care for plants and being given more choice in the nature of their meals and in the

movies they watched. Evaluations by doctors of the participants' medical records showed that participants who had been encouraged to have a greater sense of control showed a significantly greater improvement in health than the comparison group 18 months after the manipulation. The mortality rates over this period of time were also different, with only 15% of the group encouraged to have a greater sense of control dying in the following 18 months, compared with 39% of the comparison group (Rodin & Langer, 1977).

More recently, the vast majority of studies have used self-report measures of personal control beliefs. Research using a variety of measures has shown that a reduced belief in personal control can adversely affect health (for reviews see O'Leary, 1985; Rodin, 1986; Shapiro & Astin, 1998). As would be expected, it has been shown that personal control beliefs are related to the performance of health behaviours (O'Leary, 1985; Wallston & Wallston, 1982). For example, in a review of the research investigating the relationship between self-efficacy and health, O'Leary (1985) found that self-efficacy was positively associated with a wide variety of health outcomes; smoking cessation, the experience and management of pain, eating disorders, cardiac rehabilitation, and adherence to medical regimens. While the outcome in this research is often health behaviours, the link between health behaviours and health is well established as has been explained earlier in this chapter.

Personal control has also been found to be related to physical health itself (Shapiro & Astin, 1998). A cross-sectional study by Marshall (1991) of 181 outpatients from a veterans' clinic is an example of this. Control beliefs were measured by a construct called 'self mastery' which was defined as "the perceived capacity to achieve desired health outcomes" (p. 483). All items in the measure had a personal control focus. Two indicators of physical health status were used. One of these was called 'physical well-being' and was measured by questions about the person's perception of their health status. The other measure was called 'physical health problems' and was determined by the number of health problems a person indicated they currently had from a list of 33 chronic health conditions. Self-mastery was uniquely associated with both measures of physical health. Greater self-mastery was associated with greater physical well-being and with fewer physical health problems.

However, while the majority of studies have shown a positive relationship between personal control beliefs and health, research has also shown that high personal control beliefs can be detrimental to health (Carver et al., 2000). Shapiro, Schwartz, and Astin (1996) argue that this occurs when there is a mismatch between the amount of personal control perceived, the amount of personal control possible, and the amount of personal control desired. It has been found that when expectations of control are high but actual opportunities for control are low, poor health can result. This may be because such a mismatch can result in increased feelings of responsibility and frustration. For example, Taylor and Seeman (2000) argue that the increased risk of coronary heart disease (CHD) for people with Type A personality may be due to of such unrealistic beliefs about control.

Belief in Control by External Means and Health

While most research has looked at personal control beliefs, some research has also looked at belief in control by 'means' other than oneself. This section will consider research relating to belief in four different 'means' of control: the general concept of powerful others, luck, God, and family and friends. Research using unidimensional approaches to locus of control will not be considered because they are based on the understanding that belief in external control and belief in internal control are at opposite ends of the one dimension and therefore it is impossible to separate a low internal control belief from a high external control belief.

Belief in Control by 'Powerful Others'

This section considers research concerning the relationship between belief in control by 'powerful others' and health. Because of the health setting, the 'powerful other' in most of this research is a medical professional.

Multidimensional locus of control measures are based on the proposal that belief in control by internal 'means' and belief in control by external 'means' are different dimensions and that a person can believe in both simultaneously (Levenson, 1981). One external dimension in multidimensional locus of control measures is 'powerful others'. Because health behaviours are often advocated by 'powerful others', a belief in control by 'powerful others' is seen as likely to enhance the performance of health behaviours

because the person will follow their advice (Wallston & Wallston, 1981, 1982). It is also likely to reduce stress if they believe that the 'powerful other' is benevolent.

Wallston and Wallston (1981), in a review of research using the Multidimensional health locus of control scales (MHLC) scales, outline studies concerning information seeking, smoking cessation, weight reduction, behaviours related to dental hygiene and adherence to medical regimens. On the whole the studies found that belief in control by 'powerful others' did not predict performance of the health behaviours except for information seeking. However, Wallston and Wallston (1982) in a later review of research using the MHLC scales found that people who believe in control by 'powerful others' were more likely to seek health information, perform health behaviours, adhere to medical regimens, and use the health system. Belief in control by internal means was also positively associated with these behaviours while belief in control by chance was negatively associated.

More recently, studies have continued to find that belief in control by 'powerful others' promotes performance of positive health behaviours. For example, a study by Franco et al. (2000) investigated a number of psychosocial variables in 83 women who perceived themselves to be at risk of ovarian cancer. They found that the women's performance of their physicians' recommendations was associated with 'powerful others' locus of control beliefs. Women who scored higher on the 'powerful others' subscale were more likely to have completed a mammogram, PAP test and gynaecological examination within six months of the time recommended.

A similar finding was reported in a study that investigated the relationship between locus of control and self-reported compliance with treatment in adults with cystic fibrosis (Myers & Myers, 1999). This study used the MHLC scales Form C (Wallston, Stein, & Smith, 1994), which includes four locus of control subscales: internal, chance, 'powerful others' and doctors. In a multiple regression both 'powerful others' and 'doctors' subscales were predictive of compliance with treatment. Belief in control by doctors explained 35% of the self-reported compliance with treatment. Belief in control by self and chance were not entered into the analysis.

Weigmann and Berven (1998) looked at the relationship between control beliefs and recovery from injury. Control beliefs were measured using the MHLC scales (Wallston et al., 1978). Participants were involved in a program to aid recovery from injury. Recovery was measured by changes in grip strength, static strength, two-handed lift, flexibility and endurance. Five of the eight control profiles proposed by Wallston and Wallston (1982) were identified using cluster analysis. The two-handed lift was the only recovery measure that showed different rates of recovery for different profiles. The two profiles that had significantly higher degrees of improvement in two-handed lift ability were the profile with high belief in internal locus of control and 'powerful others' locus of control and the profile with high belief for all sources of control. In both cases the increase in two-handed lifting was greater than the increase of people with the profile of high belief in control by self (internal). Thus in both cases belief in control by 'powerful others' improved recovery from injury over and above belief in control by self.

Two articles have reported research using other measures of control beliefs which has also shown that belief in control by others can be beneficial for adjustment. Adjustment has important implications for health after stressful events (Kreitler, Kreitler, Chaitchik, Shaked & Shaked, 1997). Taylor, Lichtman and Wood (1984) looked at the relation between control beliefs and adjustment to breast cancer. Adjustment was measured by a composite measure including constructs such as mood and ratings of adjustment by self, interviewer and the physician. A questionnaire and interviews using standard wording and protocol were used. Participants were asked about their attributions for the cause of their cancer and whether they, others, or other things could control their cancer. Belief in the ability of self and belief in the ability of others to control the course of the cancer were independently positively associated with better adjustment.

Taylor, Helgeson, Reed, and Skokan (1991) report two studies looking at the relationship between adjustment and vicarious control over symptoms, treatment and the course of a disease. One study looked at the relationship between adjustment and vicarious control in participants with AIDS. Vicarious control was measured by three questions that asked how much control the person felt others had over their symptoms, their treatment, and their prognosis. Adjustment was measured using a composite index including constructs such as hopelessness, self-esteem and satisfaction with life. Vicarious control was found to be negatively associated with adjustment for participants with low self-rated health and

was not associated with adjustment for participants with high self-rated health. Taylor et al. (1991) suggest that these findings may be reconciled with those of Taylor et al (1984) in two ways. Firstly they suggest that the prognosis for the patients may explain the difference. Most of the patients in the study by Taylor et al. (1984) had a good prognosis whereas those in the study by Taylor et al. (1991) did not. Thus, it could be that vicarious control is adaptive when the 'powerful other' can actually control the outcome. An alternative explanation suggested by Taylor et al. (1991) is the gender of the patients, as the breast cancer participants were obviously all women and the AIDS patients were all men. Thus it could be that belief in vicarious control is adaptive for women but not for men. This idea has support from other research where it was found that women but not men improved their achievement when they believed more in control by others (Levenson, 1981). A second study to investigate these two possibilities looked at the relationship between belief in vicarious control and adjustment in a group of cancer patients. Adjustment was again measured by a composite measure including the constructs of mood, self-esteem, and adjustment. Analysis separated the results by gender and prognosis. The only group who showed a positive association between belief in vicarious control and adjustment was females who had a good prognosis.

No research using multidimensional locus of control measures was found to support the relationship between belief in control by external means and health itself. De Boer, Ryckman, Pruyn, and Van den Borne (1999) reviewed research looking at a number of psychosocial factors' relationship with cancer relapse and survival. The review included two studies using the Multidimensional Health Locus of Control scale (Wallston et al, 1978). Locus of control was found to be unrelated to cancer relapse or survival in these studies.

Research using other measures of belief in control by 'powerful others' has found a positive association with health. A study investigating the control profiles of people at high risk of cardiovascular disease was reported by Shapiro, Lindberg, Daniels, Breuer, and Astin, (1994). Risk of cardiovascular disease was measured by serum glucose level, left ventricular hypertrophy, serum cholesterol level, HDL level and systolic blood pressure after adjusting for age and gender. Control beliefs were measured using the Shapiro Control Index (Shapiro, 1994). This is a multidimensional measure incorporating four components of control: sense of control, modes of control, motivation of control, and

agency of control. The 'agency of control' dimension inquires as to the sources from which a person derives a sense of control; whether it comes from self, others or both. In this way it is similar to the multidimensional sense of control approach outlined in Chapter Two. Using this approach, two different control profiles were identified for people at high risk of cardiovascular disease. Neither profile included high belief in control by others while, one of the profiles included a low belief in others as a source of control.

Thus, some research considering the relationship between health and belief in control being held by 'powerful others' has found a positive association. This positive association has been particularly in relation to the performance of health behaviours, but it has also been related to better adjustment and its consequent reduction in stress. However these associations have been inconsistent. This may be because of the nature of the measures used. Many of these studies have used measures which concern the locus of control, but do not consider whether the person believes they have access to that control. As Antonovsky (1979) argues, the 'powerful other' must be perceived as benevolent for the person to gain a sense of control. While it would be likely that medical professionals would be perceived as benevolent there is no guarantee that this is so. This may explain some of the inconsistency in the results. The one study which did use a multidimensional sense of control approach did find a positive association between sense of control through others and lower risk of cardiovascular disease.

Belief in Control by Luck

Relevant research concerning the relationship between belief in control by luck and health comes from investigations using multidimensional locus of control measures. Theorists have seen belief in control by luck as being belief in lack of control (Levenson, 1981; Wallston & Wallston, 1982). Wallston and Wallston (1981) in a review of research using multidimensional locus of control measures found belief in control by luck to be negatively associated with information seeking and smoking reduction (Wallston & Wallston, 1981). In the next review, Wallston and Wallston (1982) found that belief in luck control was negatively related to information seeking and performance of preventative health behaviours, however, it was not related to adherence to medical regimens. Belief in luck control has also been shown to be associated with increased health risk factors. For example, Stenstroem, Wikby, Andersson, & Ryden (1998) found

that subjects with insulin-dependent diabetes mellitus, who possessed high belief that their diabetes was their responsibility and low belief that their diabetes was controlled by luck, had better metabolic control. In the review by De Boer et. al. (1999) none of the locus of control scales, including luck, were related to cancer relapse and survival.

These findings may seem to be in conflict with the argument, made in Chapter Two, that belief in control by any 'means' can be beneficial because it can give a sense of control. The difference may be that locus of control only concerns where the person believes control is held, which is analogous to strategy beliefs in Skinner's (1995) model. It does not consider belief in whether the 'means' of control is available to the person (capacity beliefs) and so does not give a true indication of whether a person feels that things are under control. A sense of control gained from belief in access to luck, would, theoretically, bring many of the health benefits brought by belief in control by other external means. Research undertaken to this point in time has not investigated this possibility in the health domain.

Belief in Control by God

One particular 'powerful other', specified in a number of the theories (e.g. Antonovsky, 1979; Shapiro & Astin, 1998; Wallston et al., 1999) which encourage a multidimensional conceptualisation of control beliefs, is God. A substantial amount of research has found a relationship between religion and health: in general, people who are more religious have better health (Levin, 1994). Most of this research has examined the relationship between health and religious involvement, which does not necessarily mean belief in control by God. However, while there is little understanding of how religious involvement and health might be associated (Levin, 1996), one of the proposed pathways is through the person's belief in God and trust in God to look after them (Levin & Vanderpool, 1989). Tix and Frazier (1998) cite a conference paper supporting this by Frazier, Krasnoff, and Port (1995) presenting research that patients who had recently experienced renal transplant surgery most often state that religion provided them with a sense of control. Thompson, Sobolew-Shubin, Galbraith, Schwankovsky, & Cruzen (1993) also report that cancer patients say that their faith gives them a sense of control over their emotions.

Kass, Friedman, Leserman, Zuttermeister, and Benson (1991) report the development of a measure of intrinsic religiousness which gauges the person's belief in the existence of God and a close relationship with God. Health was measured using a checklist of 25 symptoms with participants giving ratings of the frequency, degree of distress experienced and degree of interference with daily life. They found that people who reported greater belief in the existence of God and a greater belief that they had a close relationship with God also reported fewer medical symptoms.

Considerable research has investigated the relationship between religion and adjustment to stressful events. Adjustment has important implications for health because it is predictive of health after stressful events (Kreitler, Kreitler, Chaitchik, Shaked, & Shaked, 1997). One example of research investigating this relationship is investigated the relationship between 'religious coping' and adjustment after kidney transplant surgery (Tix & Frazier, 1998). Religious coping was measured by 10 items, such as "I sought God's help in dealing with the situation," and "I trusted that God would handle the situation". Thus religious coping, as operationalised in this study, was very similar to belief in control by a benevolent powerful other as suggested by Antonovsky (1979). Adjustment was measured by distress (anxiety, depression and hostility) and life satisfaction. Control was measured using the internal and chance subscales of the MHLC Scale (Wallston, et. al. 1978). Social support was measured by the Social Provisions Scale (Cutrona & Russell, 1987) which is a 24-items measure of perceived support. Religious coping was associated with better adjustment. It was also found that the relationship was not mediated through social support, internal control or chance control beliefs. This finding is potentially important because it suggests that religious coping as operationalised here adds unique value to adjustment to stress.

However, not all research has shown such positive results and religious beliefs have been associated with both good and poor adjustment (e.g. Park & Cohen, 1993; Park, Cohen & Herb, 1990; Wallston et al, 1999). Pargament (1997) describes a differentiation between three types of coping that can come from religious beliefs which may explain the conflicting findings. One is a deferring style where the person is passive and leaves the coping to God. A second is self-directing style where the person is active and God is perceived to be passive. The third is collaborative where both God and the person work together to deal with the stressor. Both self-directed and collaborative styles are associated

with more positive adaptation; however, the deferring style is associated with poorer adjustment. This would suggest that belief in control by God alone would not be conducive to coping but that belief in control by God as well as control by self would be good for coping.

Belief in Control by Family and Friends

As outlined above, belief in the availability of social support is similar to belief in the availability of control by friends and family. Because of the unavailability of research specifically focusing on control by friends and family, social support research will be reviewed in this section.

Social support was first linked to health in seminal articles by Cassel (1976) and Cobb (1976). Despite the use of a wide variety of approaches to social support and the many different measures of social support used to investigate these constructs, it has consistently been found to lower the chance of mortality and ill health, and to increase the rate of recovery (Stroebe & Stroebe, 1996; Taylor, 1995). A number of prospective epidemiological studies have shown a relationship between structural measures of social support and mortality (e.g. Berkman & Syme, 1979; House, Robbins, & Metzner, 1982). House, Landis and Umberson (1988) reported that the magnitude of the relationship of social ties with mortality was similar to that of smoking. Greater social support has also been shown to be negatively associated with specific diseases (Berkman, 1995) such as heart disease (Kaplan, et al, 1988; Shumaker & Czajkowski, 1994), complications in pregnancy (Norbeck & Tilden (1983), susceptibility to upper respiratory illness (Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997) and recovery from cancer (Vogt, Mullooly, Ernst, Pope, & Hollis, 1992).

Several studies have looked at the strength of the relationship between the different types of social support measures and health. These studies have found that perceived support is more closely related to health than the other aspects of social support (Stroebe & Stroebe, 1996). For example, Vandervoort (1999) compared the strength of the relationship of physical health with structural social support and perceived social support using a sample of 280 undergraduate students. Physical health was measured by items concerning symptoms, major health problems and chronic health problems. It was found that

perceived social support was more strongly associated with physical health than structural social support.

Summary

This section reviewed theory and research related to the relationship between aspects of multidimensional sense of control and health. Theory suggests that control beliefs can be associated with health through health behaviours and stress. A sense of personal control is more likely to influence health through health behaviours while a sense of control through other 'means' is especially likely to be associated with health through the reduction of stress. The research reviewed suggests that a sense of personal control, belief that control is held by 'powerful others' and belief that control is held by God can be associated with better health. Research also shows that belief in the perceived availability of social support, which is conceptually similar to the availability of control through friends and family, is also associated with better health. In contrast, belief in control by luck is associated with worse health. This contrary finding may be because this research used locus of control measures which do not assess the person's belief in the availability of the 'means' of control. The research reviewed in this section has limited direct applicability for the present study because, while it considers aspects of control beliefs it does not concern a sense of control. Hence, while it provides useful information, more reliance must be given to the theory.

SES and Multidimensional Sense of Control

This section considers whether there is a relationship between SES and multidimensional sense of control. Both theory and research is considered.

Belief in personal control

A number of different theories consider how SES might be associated with personal control beliefs. One theory suggests that SES might be associated with control beliefs because of the different experiences at the different levels of SES (Cohen, Kaplan, & Solonen, 1999; Pearlin & Schooler, 1978). Rotter (1966) suggests that control beliefs are developed as a result of successes and failures. When people achieve their goals, their

sense of control is heightened through increasing their expectancy that they can achieve other successful outcomes in the future. In a similar vein, Seligman (1975) suggests that repeated failure to achieve goals produces a general expectancy of helplessness. Given this theory of the antecedents of control beliefs, and that SES is indexed by factors such as income, education, and occupation, which can be seen as indicators of success, it would be expected that SES would be associated with increased belief in personal control. People of high SES have usually done well in the education system, have achieved high incomes, accumulated material assets and have achieved high status occupations. This is likely to have been the result of a large number of successes over prior years and, according to the theory of Rotter (1966) and Seligman (1975); these experiences will have increased their sense of control.

Mirowsky and Ross (1998) expound a similar theory relating specifically to the relationship between education and personal control. This theory, which they label 'human capital theory', suggests that education increases a sense of personal control because it gives people the skills and attitudes that improve their problem solving ability. Through practice and repeated success they develop an expectation that they can solve problems and control outcomes. The 'human capital theory' further argues that this belief in their ability to control outcomes gives higher educated people the ability and resolve to develop and maintain a healthier lifestyle. In support of this, their research found that a healthy lifestyle (indexed by a collection of health behaviours) explained most of the relationship between education and health. Sense of control (their own measure which they liken to Rotter's (1966) locus of control scale and Pearlin and Schooler's (1978) mastery scale and so is not the same as sense of control as conceptualised in Chapter Two) accounted for much of this relationship between education and a healthy life style.

Another suggestion concerning the relationship between SES and personal control beliefs is that SES reflects real resources and opportunities to control outcomes (Mirowsky & Ross, 1990). This theory proposes that people of lower SES may have less actual control over outcomes than people of higher SES. They have less money and this limits their ability to purchase the things or expertise they need. They have less education, which limits their ability to get the job they may want. Occupations with lower status are associated with less control in their work (e.g. Bosma et al, 1997; Kohn & Schooler, 1982; Marmot et al, 1997). Research by Ross and Mirowsky (1992) illustrates this suggestion.

They were interested in the relationship between control and employment and features of the employment. Using their own measure of control (Mirowsky & Ross, 1991), they found that employed people had a higher sense of personal control than unemployed people. Ross and Mirowsky (1992) also found that job autonomy and earnings were related to sense of personal control. Employed people who had greater job autonomy in their work had a greater sense of personal control. Similarly, Bosma et al. (1997) found that control in the workplace was associated with occupational status to the extent that those with higher occupational status had more job control (see also Kohn & Schooler, 1982; Marmot et al, 1991). It was also found that people who earned more had a higher sense of personal control. The researchers argue that money enables one to do what one wants and so having money gives the person a sense of personal control.

Another aspect of life endemic to people of lower SES that may contribute to their lower sense of control is the stress they experience because they live in more socially hazardous environments (Marmot & Wilkinson, 2001). Hsieh and Pugh (1993) conducted a meta-analysis of 34 studies which investigated violent crime, poverty and income inequality. It was concluded that both poverty and greater income inequality were associated with more violent crime. People of lower SES have little real control over this environment and this is likely to be reflected in their sense of control.

Although the theories outlined have all been suggested reasons for how SES and personal control beliefs might be associated and some supporting research has been offered, other research is much less consistent. Pearlin & Schooler (1978) reported that beliefs in personal mastery were positively associated with both education and income. Ryckman & Malkioski (1974) used Levenson's (1972) Multidimensional Locus of Control (MLC) scale and reported that professionals were more likely to believe in internal control than students or blue collar workers. However other studies have reported no relationship between SES and belief in internal control. Garcia and Levenson (1975) also used the MLC (Levenson) and they found that parents' occupation was not associated with students' belief in internal control. Galanos, Strauss, & Pieper (1994) used the MHLC (Wallston et al., 1978) and reported that in a sample of community dwelling elderly, belief in internal control was not associated with either occupational status or education.

Belief in control by luck

No theory was found that considered the relationship between SES and a sense of control through 'luck'. However, research involving the multidimensional locus of control scales is worth considering. This research is very consistent with belief in 'luck' controlling outcomes being associated with a lower SES. Ryckman and Malkioski (1974), using the MLC (Levenson, 1972), found that professionals were less likely to believe that outcomes were controlled by 'luck' than students or blue collar workers. Garcia and Levenson (1975), also using the MLC (Levenson), found that parents' occupation was negatively associated with students' belief that outcomes were controlled by 'luck'. Galanos et al. (1994), using the MHLC (Wallston et al., 1978), found that belief that health outcomes were controlled by 'luck' was negatively related to both occupational status and education. Thus, research has consistently shown that people of lower SES are more likely to believe that outcomes are controlled by 'luck'.

Belief in control by God

Little theory or research could be found concerning the relationship between SES and sense of control through belief in control by God. However, several studies have looked at the approaches that people find most helpful in times of stress. One study of a national sample of adult black Americans asked which strategy they found most helpful in times of stress (Neighbours, Jackson, Bowman & Gurin, 1983). Prayer was more likely to be identified as the most helpful coping response by lower SES people. Veroff, Kulka, and Douvan, (1981) report two studies using a national sample of Americans in 1957 and 1976. Respondents were asked what helped them when they were unhappy. Again, prayer was endorsed by more people who were poor and less educated. These findings are relevant to this review because prayer is likely to be used when it is believed that God has some influence over the outcome.

Pargament (1997) suggests that lower SES people use prayer more often because people of lower SES have less ability themselves to influence outcomes and have access to fewer secular resources. He proposes that influence by God is something they believe they have easier access to and so they make more use of it. However, that does not necessarily mean that higher SES people believe less in God's influence. It may be that higher SES people

believe in control by God but do not use it as much because they perceive that they have more options available to them.

In New Zealand, a recent nation-wide study looked at religious beliefs (Gendall, Healey & Parakal, 1999). While the relationship between SES and belief in control by God was not analysed, the researchers made the data available so the analysis could be performed for the present review. Several indices of SES were collected: years of formal education, highest qualification gained, personal income, household income and self-rated social status. Several items were also related to belief in control by God. Relevant items involved belief in God, belief concerning whether God involves Himself with people's lives, and how often people pray. No items concerning belief in control by God were related to years of formal education, highest qualification gained or self-rated social status. Belief in God and how often the person prayed exhibited a weak association with decreased personal and household income. Belief in God involving Himself in people's lives was weakly associated with increased household income.

Belief in control by others

Theory has been proposed that links SES to a sense of control through others. Like personal control beliefs, a sense of control through others is also likely to be influenced by previous experiences. While both Rotter (1966) and Seligman (1975) come from a personal control perspective, previous experiences may have also affected the subjects' beliefs regarding external control because the positive experiences associated with higher SES may have involved positive interactions with others who are in control. For example, it may have taught them that if 'powerful others' can help them they will choose to do so.

Mirowsky and Ross (1998) argue that education gives people the skills which make possible more supportive relationships. They say that education teaches people to understand the other person, negotiate, and seek compromise, and that these skills allow people to develop and maintain supportive relationships. This link between education and social support is empirically supported (e.g. Matthews, et. al., 1989).

It has also been suggested that the extra resources available to people of higher SES make the development of supportive relationships more likely (Krause & Borawski-Clark,

1995). They argue that having the resources to help others affects the type of relationships that can be developed with others. Family ties can often be maintained through a sense of obligation, but relationships with friends are often maintained through a sense of reciprocity. More resources allow higher SES people to maintain relationships based on reciprocity whereas people with fewer resources will find this more difficult to achieve (Stroebe & Stroebe, 1996).

Lastly, it has been proposed that the environment experienced by an individual affects their social support. Taylor, Repetti, and Seeman (1997) explore the characteristics of social environments and look at how these may influence psychosocial factors that may, in turn, impact on health. The article highlights several aspects of the lower SES environment which undermines social support. It is acknowledged that SES is not an environment in itself, but it does give some indication of the type of environment in which people reside (Blakely, 2002). The social environment is particularly important with regard to social support. The article argues, citing supporting evidence, that people at the lower end of the SES spectrum live in communities which are characterised by higher stress, work in jobs which have more stress and less control, and there is more violence, conflict, and abuse in their family and social environments. It is argued that an environment characterised by these features undermines the development of social ties, which, in turn, limits the social support available. For example, parents worried about the social environment, limit their children's social contacts, which means the children have less opportunity to develop relationships that can give social support.

Although the theories outlined have all suggested why SES might be associated with a sense of control through others, the research has been much less consistent. An example of this is research using multidimensional locus of control scales. Ryckman and Malkioski (1974), using the MLC (Levenson, 1972), reported that belief that outcomes were controlled by powerful others was not associated with occupation. Garcia and Levenson (1975), also using the MLC (Levenson), found that students' beliefs that outcomes were controlled by powerful others was not associated with the occupation of the students' parents. Galanos et al. (1994), using the MHLC (Wallston et al., 1978), reported that belief that outcomes were controlled by powerful others was associated with occupational status but not education.

Mirowsky and Ross (1983) considered the relationship between SES and mistrust. SES was measured by the respondents' years of education and by a composite score made up of a number of variables including their occupation and income. Mistrust concerned the extent to which the respondents had lost faith in other people and saw them as being unsupportive, self-seeking and devious. Thus mistrust is like belief that others will not help and so is like a capacity belief for others. People who worked in a lower status occupation or had a lower income were less likely to trust others.

Social support research is also relevant because social support is similar to belief that help is available from friends and family. Research has also shown an inconsistent relationship between SES and social support (Turner & Marino, 1994). Krause and Borawski-Clark (1995) suggest that the inconsistency might be explained by the different aspects of social support that are measured, and that different aspects may be related to SES in different ways and to different extents. For example, both the support that is available and the need of the person affect the support that is received. Because lower SES individuals have greater needs (Taylor, et. al., 1997) they may report similar levels of received support to higher SES individuals although while they may have less available support than those of higher SES. Perceptions of available social support and satisfaction with social support can act in a similar manner. Because lower SES individuals may be experiencing more need they may perceive that less social support is available and therefore report less satisfaction with social support, while they are actually receiving more social support. Studies reported by Krause and Borawski-Clark and Marmot et al. (1991) illustrate how different aspects of social support can relate to different aspects of SES in different ways.

Because different aspects of social support relate in different ways it is important to consider research concerning perceived social support, which is the aspect of social support most strongly related both to health (Stroebe & Stroebe, 1996) and to perceived control as it is conceived in the present study. Turner and Marino (1994) suggested that up until then there had been little research concerning the relationship between SES and perceived social support and the results had been mixed. Turner and Marino (1994) investigated the relationship between perceived social support and SES as indexed by occupational status. The sample was composed of 1,394 adults between the age of 18 and 55, from a province in Canada. Perceived support from four sources was measured: spouse/partner, relatives, friends, and co-workers. Analyses indicated that for the

occupational groups there were no differences in the amount of perceived support available from any of the sources. Two summary scores were also calculated. One score indicated the total amount of perceived support while the other indicated the amount of perceived support available per source of support. There were significant differences for both of these summary scores. The higher status occupations had higher scores for total perceived support available and reported more perceived support available per source of support.

Wills, McNamara, & Vaccaro (1995) looked at children's perception of support from their parents. The SES of the family was indexed by parental education. They predicted that children from lower SES families would perceive less parental support because of more economic stress. Perceived parental social support was measured using a 12-item functional support measure with five items for emotional support and seven items for instrumental support. In support of the hypothesis, it was found that children with less educated parents perceived that less emotional and instrumental support was available.

A more recent study also found that perceived social support is related to SES (Mirowsky & Ross, 1998). The sample consisted of 1,097 randomly selected American adults. In this study SES was again indexed by the number of years of formal education and perceived social support was indexed by measures of perceived emotional support and perceived instrumental support. Education was found to be positively associated with both perceived emotional support and perceived instrumental support.

Summary

The theories outlined in this section suggest a number of reasons why higher SES might be associated with a greater sense of control. One reason is that SES is a product of previous control experiences which have taught expectancies of high control and taught skills useful for future control. It is also suggested that SES reflects the availability of real control resources and opportunities and it affects the development and maintenance of supportive relationships. However the research is less consistent than the theory. The research reviewed concerning personal control is mixed, sometimes suggesting that personal control is positively associated with SES and at other times finding no association. Research has consistently found that belief that outcomes are controlled by

luck is associated with lower SES. The research reviewed concerning the association between belief in control by God and SES is mixed. Research concerning the relationship between SES and a sense of control through others is also inconsistent. Most of the studies considering belief that outcomes were controlled by powerful others' found no relationship, while one study found that higher SES was associated with less belief that outcomes were controlled by 'powerful others'. Another study found that lower SES was associated with more mistrust of others. If the mistrust of others felt by people of lower SES interacted with the belief that outcomes were controlled by 'powerful others' this would result in low sense of control through 'powerful others'. The recent research reviewed found that perceived social support was consistently associated with higher SES.

A limitation of this overview is that much of the research does not use measures designed to measure sense of control as it is conceptualised in the present study. Many studies assess where the person believes control is held, but do not measure whether the person's sense of control is benefited by these beliefs. Other measures, such as the measures of social support, ascertain whether the person believes they have access to the 'means', but not whether they believe the 'means' can influence the outcome. In addition to this, the research was often inconsistent. However, the theories were consistent and with their help inferences can be made about the relationship between SES and a sense of control. In sum, the theories suggested that SES is a reflection of previous control experiences and present control resources. For people of higher SES this is likely to result in the belief in the possession of, or access to, potential 'means' of control. As this is a prerequisite of a sense of control, it is likely that higher SES will be associated with a greater sense of control.

Multidimensional Sense of Control in the SES-health Relationship

This section outlines research that concerns the role of sense of control in the relationship between SES and health. Firstly, research that involves measures of personal control beliefs will be reviewed. Unfortunately, no research was found concerning the role of measures of belief in control by 'powerful others', luck, or God was found within the context of the relationship between SES and health. Research that investigates the role of social support will be reviewed last.

Research has examined two roles of control beliefs in the relationship between SES and health. The first role is as a mediator, where SES affects health through the influence of SES on control beliefs. The second role is as a moderator, where control beliefs affects the influence that SES has on health. Research considering both of these roles will be outlined.

Belief in Personal Control

Increasingly studies have examined the role of control beliefs in the relationship between SES and health. In this section, a number of studies looking at the role of personal control in the relationship between SES and health will be outlined. The first studies found that personal control mediates the relationship between SES and health while the second set of studies found that personal control moderates the relationship.

Mediational Studies

Mirowsky and Ross (1998) used a probability sample of 2,593 American adults. SES was measured by number of years of formal education of the person and their parents. Health was measured with self-reported items of general health, musculoskeletal impairment, and sensory impairment. Control beliefs were gauged using a measure developed by the authors which they describe as being similar to Rotter's (1966) locus of control and Pearlin and Schooler's (1978) Mastery scale. Thus it is a measure of personal control. Education was found to have a positive association with personal control. Personal control accounted for about 37% of education's total association with health.

Bailis, et. al. (2001) examined the role of personal control beliefs in the relationship between SES and health using Pearlin & Schooler's (1978) Mastery scale. Health was measured by indexes of chronic conditions, restricted activities, self-rated general health, and the Health Utility Index. Household income, employment status and education measured SES. Responses were collected from a large probability sample in Canada. Similar results were found for men and women. Higher SES was associated with better health. Mastery mediated the relationship between SES and health with the indirect effect of SES on health through 'mastery' beliefs equalling or exceeding the direct effect.

Cohen, et. al.(1999) report the results of two cross-sectional studies that examined the role of a number of psychological factors including personal control in the relationship between SES and health. Personal control was measured using different short (one item and two items) measures for each study. Both studies measured health using one-item self-report questions concerning current health status. They found that income and education were related to personal control beliefs. A number of psychological variables including personal control beliefs were also found to be related to health and were found to explain some of the relationship between SES and health. While the psychological measures were more important at the lower SES levels, they operated throughout the SES gradient.

Moderational Studies

Lachman & Weaver (1998) proposed that a sense of control could have a buffering effect upon the impact of lower SES. Although they use the term 'sense of control' they measure it using personal control scales: personal mastery and perceived constraints, which are different to sense of control as defined in Chapter Two. Personal mastery is on Pearlin and Schooler's (1978) scale which measures the person's belief that they can achieve their goal. Perceived constraints refers to the person's belief that there are obstacles beyond their control that stop them achieving their goals. High personal mastery beliefs and lower perceived constraint beliefs were taken to indicate a high sense of control. Health was measured by self-rated health, functional limitations, chronic health problems and acute health symptoms. SES was measured by total household income. It was found that lower income groups had lower personal mastery beliefs and higher perceived constraint beliefs. However, it was also found that there was considerable variation in these control beliefs within income groups and there was overlap in the level of these control beliefs between income groups. For all income groups, a higher sense of control was associated with better perceived health. These control beliefs moderated the relationship between SES and health, with lower income groups gaining more benefit from a high sense of control. Lachman & Weaver concluded that control beliefs seemed to act as a buffer, reducing the negative effect of low income on health.

Landau (1995) investigated the role of locus of control in the relationship between SES and adjustment to loss of a spouse. The link between adjustment and health has been mentioned earlier in the present chapter. Adjustment was indexed by depression and life

satisfaction. Locus of control was assessed using a measure based on Rotter's (1966) scale. While the problems associated with interpreting the findings associated with unidimensional locus of control measures have been acknowledged earlier, this study has been included because of the paucity of studies looking at the moderational role of control beliefs. Data came from a random sample of Israeli widows. This study showed that both SES and locus of control predicted depression and life satisfaction. What is most relevant for this present review is that for the higher SES widows there was very little difference in depression and life satisfaction between those who were internally oriented and those who were externally oriented, but for lower SES widows there was a much greater difference. In seeking to account for this difference between the two SES groups, Landau argues that the availability of resources means that higher SES widows do not need to cope with the daily hassles themselves, and so it does not matter whether they have a sense of personal control (internal orientation) or not (external orientation). However, an alternative explanation is also feasible. In a previous section it was suggested that higher SES people were more likely to believe that 'powerful others' wanted to help them because of their previous experiences. The study by Mirowsky and Ross (1983) supported this theory by showing that higher SES people had more trust of others. In light of this, an alternative explanation is that the higher SES widows can benefit from belief in external control because they believe that those with the control want to help them, subsequently belief in external control serves to give them a sense of control. Thus, for higher SES people, it is feasible that stress can be reduced by belief in both internal control and external control.

In addition to these studies, Cohen et al. (1999), as described above, found that a number of psychological variables including personal control beliefs were more important at the lower levels of SES. While they did not test for the significance of an interaction, this pattern suggests that SES and belief in personal control may have interacted.

Belief in Control Through External 'Means'

No research was found that used traditional control belief measures to investigate the role of sense of control through external 'means' in the relationship between SES and health. Therefore, the research presented in this section considers social support measures which can be considered similar to measuring belief in access to help from friends and family.

Mediational Studies

Cohen, et. al. (1999) report the results of two cross-sectional studies that have looked at the role of a number of psychological factors including perceived social support in the relationship between SES and health. Health was measured by single item self-report measures. Social support was measured using the Quality of Social Relationship Scale (Kaplan et al., 1994) which consists of eight items and measures the individual's feeling of being loved and close to others. They found that income and education were positively associated with perceived social support. Perceived social support was also found to be related to health, and a number of psychological measures (including perceived social support) were found to explain some of the relationship between the indicators of SES and health. While the psychological measures were more important at the lower SES levels, indicative of a moderating effect, the psychological factors did operate throughout the SES gradient, which indicates a mediating effect.

Mirowsky & Ross (1998) considered personal control as a mediator of the relationship between SES and health and they also considered the role of social support as a mediator. Two aspects of social support were measured: perceived emotional support and perceived instrumental support. Social support was found to have no direct effect on health or indirect effect through health behaviours, and so did not mediate the relationship between SES and health. Schrijvers, van de Mheen, Stronks, & Mackenbach, (1998) also found that social support did not mediate the relationship between SES and health.

Moderational Study

Krause (1997), in an 11-year longitudinal study, investigated the relationship between mortality and social support in older people of different SES levels. It was found that contact with kin significantly lowered the risk of mortality, while contact with friends was not related to mortality risk. It was also found that receiving emotional support decreased the risk of mortality. While anticipated support did not predict mortality, it did interact with SES. This interaction remained while other variables such as health behaviours, received support, contact with kin, sex and self-rated health were statistically controlled. The interaction was such that for people of high SES, anticipated support reduced mortality, while for people of low SES, anticipated support increased mortality. Krause

also showed that for people of high SES anticipated support is not drawn on (thus becoming received support) until there are a number of stressors; while, for lower social class members, anticipated support is drawn on as soon as any stress is experienced. Krause suggests that this difference is because higher social class people have more personal resources at hand and so do not have to call on help from others until the stress gets higher. He also proposes that because lower SES individuals have to draw on social support more frequently, it affects both the quality of that support available to them and their sense of independence. This research supports the value of measuring belief in control by self and belief in control by others.

In addition to these studies, Cohen et al. (1999), as described above, found that a number of psychological variables, including perceived social support, were more important at the lower levels of SES. While they did not test for the significance of an interaction effect, this suggests that perceived social support might moderate the relationship between SES and health.

In summary, a number of recent studies have shown that personal control beliefs operate in the relationship between SES and health. Research has shown that personal control has a mediating role. This has been shown in studies using a variety of measures of SES, control beliefs, and health. While there were few studies that considered the moderational role of personal control, the studies that were reviewed suggested that personal control did have a moderational effect. The research concerning the role of social support in the relationship between SES and health was inconsistent. Two studies found that social support mediated the relationship, while two other studies found that it did not. Again although there were few studies that considered the moderational role of control beliefs, the two studies that were reviewed suggested that social support did moderate the relationship between SES and health. A limitation of these studies is that, while they have measured aspects of control beliefs such as strategy beliefs (locus of control) and capacity beliefs (mastery and social support), they have not considered sense of control.

Summary

This review has explored theory and research linking multidimensional sense of control to SES and health. The relevance of the research reviewed has been limited by the nature of the measures of control beliefs used in the research. Few studies have used measures similar to the approach advocated in Chapter Two. This has meant that a variety of studies have been reviewed and their application to the present study has been considered. This has also meant a heavy reliance has been placed on theory. The theory and research reviewed in this chapter generally support the suggestion that multidimensional sense of control, as outlined in Chapter Two, is related to both SES and health. Recent research has also found support for a mediating and a moderating role for control. Personal control in particular has been found to mediate and moderate the relationship between SES and health.

Chapter Four

HYPOTHESES OF THE PRESENT STUDY

In light of the review of the literature in Chapters One to Three, several hypotheses are made for the present study. In this chapter these hypotheses will be specified and the reasoning for the hypotheses will be summarised.

SES and Health

Hypothesis One: Higher SES will be associated with better health

The research reviewed in Chapter One showed that the relationship between SES and health is robust. The relationship has been found in many studies using a variety of indicators of SES, in a wide range of different countries over time. Consequently it is hypothesised that SES will be positively related to health.

SES and 'Multidimensional Sense of Control':

Hypothesis Two: Higher SES will be associated with a greater 'overall sense of control'.

Hypothesis Three: Higher SES will be associated with a greater 'sense of control' through each 'means'.

These hypotheses are based on the theory outlined in Chapters Two and Three. Theory outlined in Chapter Three suggests that higher SES is associated with a greater 'sense of control' because SES is an index of previous control experiences which taught expectancies for future control (Cohen et al., 1999; Mirowsky & Ross, 1998; Pearlin & Schooler, 1978), the skills useful for future control, and the skills to successfully interact with others (Mirowsky & Ross, 1990; Taylor et al., 1997). The theory suggests that SES is also a reflection of real resources and opportunities, which affect ability to control

outcomes and to develop supportive relationships. The theory outlined in Chapter Two was that a 'sense of control' could be gained through the belief in control by any 'means', if it was believed that that 'means' was available. Because of this it is hypothesised that this relationship will exist for 'sense of control' from a variety of 'means', as well a sense of control from these means is summed to give an 'overall overall sense of control' score.

'Multidimensional Sense of Control' and Health:

Hypothesis Four: A greater 'overall sense of control' will be associated with better health

Hypothesis Five: A greater 'sense of control' through each 'means' will be associated with better health

These hypotheses are based on the theories outlined in Chapters Two and Three. The theory outlined in Chapter Two was that a 'sense of control' could be gained through the belief in control by any 'means'. In Chapter Three, the theory was outlined that a 'sense of control' could benefit health through its influence on health behaviours and stress. Because of this it is hypothesised that a greater 'sense of control' from any 'means' will be associated with better health and so this relationship will exist when 'means' are analysed individually, as well as when these scores are summed to give an 'overall sense of control'.

'Multidimensional Sense of control' Mediating the SES-Health Relationship:

Hypothesis Six: An 'overall sense of control' will mediate the relationship between SES and physical health.

Hypothesis Seven: A 'sense of control' through each 'means' will mediate the relationship between SES and physical health.

These hypotheses are based on the theory outlined in Chapters Two and Three. It has been suggested, as outlined in Chapter One, that psychosocial factors such as control beliefs

might explain some of the relationship between SES and health. The theory outlined in Chapter Three has shown that a 'sense of control' is related to both SES and health, which supports this suggestion. The theory outlined in Chapter Two argued that a 'sense of control' could be gained through the belief in control by any 'means' if it was believed that that 'means' was available. Because of this it is hypothesised that a 'sense of control' from a variety of 'means' will mediate the relationship between SES and health. It is also hypothesised that an 'overall sense of control' will also mediate the relationship between SES and health.

'Multidimensional Sense of Control' Moderating the SES-Health Relationship:

Hypothesis Eight: An 'overall sense of control' will moderate the relationship between SES and physical health.

Hypothesis Nine: A 'sense of control' through each 'means' will moderate the relationship between SES and physical health.

It is also possible that perceived control might moderate the relationship between SES and health. Research was described in Chapter Three that considers the interaction between control beliefs and SES in relation to health. Some of this research found that SES interacted with control beliefs to influence health. Consequently, it is hypothesised that a 'sense of control' will moderate the relationship between SES and health.

Chapter Five

DEVELOPMENT OF THE MULTIDIMENSIONAL SENSE OF CONTROL SCALE

Overview

Several steps were taken to develop a multidimensional sense of control measure. This chapter outlines the initial steps in this development. The first step was to identify the 'means' of control which were to be included in the measure. Items were written for the Multidimensional Sense of Control Scale (MSOCS) with consideration given to producing items which covered different aspects of each construct area. To ensure that these items fitted within the definition of each subscale a content analysis study was conducted. The results of this study were to modify some items. The results were also used to help choose which items would be included in the exploratory factor analysis study. The exploratory factor analysis study was conducted to further investigate the structure of the measure and to help choose the items that would be included in the further analyses.

Identification of 'Means' of Control

The first step in developing the MSOCS was to identify the potential 'means' of control that would be included in the measure. These were identified by open-ended interviews, reviewing other measures and the suggestions of other theorists.

Open-ended interviews

Open-ended interviews have been used in the development of similar measures (Skinner, 1995; Skinner et. al., 1988; Wellborn et al., 1989). The open-ended interviews were used to identify 'means' which people thought impacted on outcomes. The aim of this process was to identify some other 'means' that would be useful to investigate.

Thirty people participated in individual open-ended interviews. Although the participants were an opportunity sample, attempts were made to involve as wide a range of people as was possible by inviting people to participate from a variety of groups. Participants came from university, community, sports and church groups.

The interviews were semi-structured and were based around two questions:

"When you have a problem what are the things that you think affect your ability to deal with that situation."

"What are the sorts of things that you think affect your doing well in a situation."

Further questions were used to clarify the participants' responses. Although the interviews were not recorded, notes were taken for later analysis. Oral summaries of the notes taken were related to the participants to ensure that they accurately represented the participants' thoughts.

After the interviews the 'means' of control were identified from the notes. Once this had been completed for all the interviews, the most commonly identified 'means' of control were established. The 'means' of control that were identified most often were, money, family and friends, the boss, confidence and time.

Other theories and measures

To broaden the scope of the study and allow comparison with previous findings, 'means' that have been identified by other researchers and used in other measures were included. 'Means' from multidimensional locus of control measures (Levenson, 1972; Wallston et al, 1999) and from the CAMI (Skinner et al, 1988) and SPOCQ (Wellborn et al., 1989) which had not been identified in the interviews were added to this list. As a consequence of this, 'ability', 'effort', 'luck' and 'God' were added because they had been included in these other measures. 'Ability' and 'effort' are in the CAMI (Skinner et al., 1988) and SPOCQ (Wellborn et al., 1989) measures and are similar to the internal dimension of the multidimensional locus of control scales (Levenson, 1972; Wallston et al., 1978). 'Luck' is investigated in the SPOCQ (Wellborn et al., 1989), CAMI (Skinner et al, 1988) and

multidimensional locus of control scales (Levenson, 1972; Wallston et al., 1978). A 'God' scale was added to Wallston et al's. (1978) Multidimensional Health Locus of Control scale (Wallston et al, 1999). The inclusion of 'God' and 'luck' as potential 'means' of control is also supported by the theories of Antonovsky (1979), Scheier and Carver (1985, 1987, 1992), and Shapiro and Astin (1998).

Item Development

Once potential 'means' were identified, items were written for each subscale. This required making a number of decisions. Two prior measures developed based on the conceptualisation of control outlined by Skinner (1995, 1996) were considered for use as a model. These two measures are the CAMI (Skinner, et. al., 1988) and SPOCQ (Wellborn, 1989). In accordance with these measures all items were written as statements. The major difference between the CAMI and the SPOCQ is the nature of the beliefs concerning the relation between the 'means' and the ends. The CAMI labels the relationship between the 'means' and the 'ends' as Means-Ends Beliefs and the items are worded in the third person. It asks about "general perceptions of the usefulness, utility, or importance of a given 'means' for achieving" a good outcome (Little & Lopez, 1997, p. 165). For example, a 'powerful others' strategy item for the CAMI is "When kids do really good in school, is it because of the teacher?" (Skinner et al., 1988). In contrast, the SPOCQ labels the relationship between the 'means' and the 'ends' as Strategy Beliefs and the items are worded in the first person. It asks about the perceptions concerning the usefulness, utility, and importance of a given 'means' for achieving a good outcome to the person. An example of a 'powerful others' strategy item for the SPOCQ is, "If I want to get good grades in a subject, I have to get along with my teacher" (Skinner 1995; Wellborn et al., 1989).

Consideration was given to which of these approaches should be used in writing the items. It was decided to use the first person approach because it was thought that people's beliefs about their own situation would have more impact on their feelings and behaviour. The third person approach may allow for some to endorse a 'means' as a source of control in general but not believe it is a source of control for themselves. It was also noted that

strategy beliefs are similar to locus of control beliefs. Both the measure by Levenson (1972) and the measure by Wallston et al. (1978) used the first person approach.

Because of the decision to use the first person approach, the term 'Strategy Beliefs' was used in the present study to refer to items concerning the relationship between the 'means' and the 'ends'. To be consistent with this, the term 'Capacity Beliefs' was used in the present study to refer to items concerning the relation between the 'agent' and the 'means'. These terms are also consistent with those used by Skinner (1995, 1996) when she outlined the theory on which this measure is based.

In strict accordance with the definition of Capacity Beliefs (Skinner, 1995, 1996; Skinner et al., 1990), items for the Capacity Belief scales were written to assess access to the 'means' rather than ability to bring about the 'means'. For example, to have a Family Capacity Belief it is not required that you believe that you can *influence* your family to help you. This is more like Bandura's (1997) Proxy Control where the emphasis is still on personal influence. To have a Family Capacity Belief it is sufficient that you believe you have a family who is willing and able to help you. This maintains the theoretical move away from the focus on personal influence.

'Family' and 'Friends' were kept as separate 'means' because, although under the construct of social support they are often conceptualised together, it was decided that they were different enough to warrant separate investigation. This came through strongly in the open-ended interviews where a number of people mentioned one of these 'means' but not the other. It was also felt that it would be easier to combine them rather than to separate them at a later stage if that was appropriate.

In writing the items several terms required extensive consideration. One of these was the term to use for 'powerful other'. In domain specific measures a specific term can be given to the powerful other. For example in the MHLC (Wallston et al., 1978) the term 'doctor' is mainly used while the terms 'nurse', 'family', and friends' are also used. The same approach is used in the SPOCQ and CAMI (Skinner et.al., 1988) where the term 'teacher' is used. However in the general domain the issue is not so clear. Levenson (1972) uses terms such as, 'powerful others', 'those people above me', 'powerful people', 'those in positions of power'. These terms seemed very awkward, complex, and often like terms a

psychologist would use rather than real terms that people could relate to. Therefore it was decided that the term 'Boss' would be used. This is a term that all people are familiar with and clearly communicates what is intended. It was felt that while some people would not presently have a boss they could hopefully still be able to answer the questions based on past experience. While it is a term which is to some extent domain specific it was felt that in this circumstance it was better to be too specific than too general. The decision to use a specific term also made sense given that other areas of the 'powerful other' construct were covered through the 'Family', 'Friends' and 'God' subscales

There was concern that the term 'God' might be seen as relating only to the Christian God or the Jewish God. Other terms were considered such as 'higher power'. Again it was felt that terms like 'higher power' were awkward and a number of people would not be able to relate to them. It might also be that the people from a Christian background (most of New Zealand) would not relate to this. In making this decision, consideration was given to the approach by the Religion in New Zealand study beliefs (Gendall et al., 1999). In this study, the term 'God' was used and seemed to cause no problems. This study also showed that over 60% of the New Zealand population indicated that they believed in God. From this it was concluded that a large proportion of the New Zealand population would understand the use of this term. After making this decision it was also discovered that the term 'God' was also used in a development of the God subscale of the Health Locus of Control Scale (Wallston et al., 1999).

As can be seen in Table 5.1 items were written for 22 subscales. There were Capacity and Strategy Belief subscales for Ability, Effort, Luck, Boss, Family, Friends, God, Time, Money and Confidence. There was also a Control Beliefs subscale and an Unknown Strategy subscale. Six items were written for each subscale. These items were adaptations of the items in the SPOCQ. The adaptations removed the items from the education domain into the general domain.

Table 5.1

Subscales for MSOCS

Capacity Beliefs	Strategy Beliefs	
Ability Capacity	Ability Strategy	Control Beliefs
Effort Capacity	Effort Strategy	
Luck Capacity	Luck Strategy	
Boss Capacity	Boss Strategy	
Family Capacity	Family Strategy	
Friends Capacity	Friends Strategy	
God Capacity	God Strategy	
Time Capacity	Time Strategy	
Money Capacity	Money Strategy	
Confidence Capacity	Confidence Strategy	
	Unknown Strategy	

Once the items were written a small pilot study was conducted using a convenience sample of 33 people. (These items are contained in Appendix One). However, subsequently it was realised that the wording of the items within subscales was too similar, which would restrict the coverage of the construct content area and could artificially raise the internal reliability of the subscales (Cattell, Eber, & Tatsuoka, 1970). To solve this problem more items were written to be as varied as possible while still relating to the construct area. This process produced 8 to 12 items for each subscale (except the Luck Capacity subscale which only had 4 items; Appendix Two).

Content Analysis Study

A content analysis exercise was performed as a test of the construct validity of the items and to improve their quality. It was expected that people who were aware of the theoretical basis of the subscales would be able to identify correctly which subscale each of the items belongs.

Method

Participants

Nine 'experts' (7 female, 2 male) participated in this exercise. All were Lecturers in Psychology or PhD students in Psychology from Massey University.

Materials and Procedure

Each participant completed the exercise separately in a quiet room with unlimited time. The exercise involved trying to identify the subscale each item belonged to. Each item was printed on a separate slip of paper. The name of each subscale was printed on a separate envelope for the participants to place the items in. There were 22 subscales with a total of 269 items (Appendix Two). Standardised instructions, a written outline of the theory and definitions of capacity beliefs and strategy beliefs were given to each participant (Appendix Three). Participants were also asked for any verbal feedback that they wished to make.

Results

Responses were judged for their correctness and when items were not placed in the correct subscale, the subscale it was place into was recorded. The percentage correctly placed by each participant ranged from 62 to 96%. The average number of items correctly placed by the participants was 84.9% (SD = 12). One hundred and two items were placed in the correct subscale 100% of the time. Most misplacement was between the subscales within the 'means' (i.e. a capacity belief item being put in the strategy belief subscale for the same 'means'). All items that did not have a 100% correct placement rate were scrutinised for why any confusion might have occurred. This information and verbal feedback from participants was also used to make alterations to items where the incorrect responses gave clear indication of what was wrong with the items. Items that clearly caused problems were discarded. An example of an item that was discarded is an item written for ability strategy: "People fail because they aren't good enough." Only five of the nine people placed this item in the correct scale. Most wrong placements were into the Ability Strategy

scale. Another example of an item which was discarded is an item written for Effort Capacity: "It's easy for me to stick to my goals". Only three people placed this in the correct scale.

Discussion

The content analysis showed that many of the items were able to be placed in the correct subscale by people who had some knowledge of the construct that the subscale was designed to measure. It also showed which items could not be correctly placed and, in some cases, gave information that could be used to correct confusion created by the wording of the items.

One limitation of the content analysis study was that the 'experts' had little, or no, prior knowledge of the conceptualisation of control outlined by Skinner (1995, 1996). However, they were all doctoral students or lecturers in psychology and so would have some understanding of control theories. Also, a clear description of the conceptualisation and definitions of the constructs were provided for them to refer to.

A second limitation was that the participants were aware that all the items belonged in a subscale. Therefore, even if a participant thought that an item did not properly fit in any subscale, they would have placed it in the subscale that they thought was most likely. This limitation could have been avoided by informing the participants that if they did not think that an item belonged in any subscale, they should place it to the side.

Exploratory Factor Analysis

There were two purposes for this factor analysis. A major aim was to establish the factor structure of the items and to confirm that the items grouped together as was expected. Items from the same subscales should load together in one factor and not with items of the other scales. While a number of 'means' had been brought through to this stage, it was never anticipated that they would all be included in the final measure. 'Means' that did not emerge clearly in the factor structure would be strongly considered for removal. However, 'means' that were seen as important would be kept in the measure if at all possible. Important 'means' were those involved in other similar measures and ones which had

come through strongly in the open ended interviews and underlying theory (Antonovsky, 1979). A second aim was to reduce the number of items so that the measure would be of a manageable size. This was likely to be partly achieved by the reduction of the number of means. It would also be achieved by reducing the number of items in each subscale. The decision to remove items was considered using information from the EFA's in combination with tests of internal reliability.

Method

Participants

The participants in this study were a convenience sample of volunteers from a number of different groups. The groups were undergraduate and graduate classes at Massey University (Auckland, Palmerston North and Wellington), employment programs (Wellington), and sports clubs (Palmerston North). There were 290 participants with a mean age of 30.25 years (SD = 11.47). There were 205 females and 85 males.

Questionnaire

The questionnaire included items that were chosen from the items in the content analysis study. Generally 8-10 items were chosen for each subscale based on three criteria: balancing the number of items relating to negative outcomes and positive outcomes, items that scored high on the content analysis exercise (all items selected were placed correctly by at least six of the nine participants in the Content Analysis) and items which were more likely to tap different areas of the construct. Items were presented in random order.

Participants were asked to indicate their level of agreement with the statements on a four point scale (not at all true = 1, not very true = 2, sort of true = 3, very true = 4). This is the same scale as that used in the SPOCQ (Wellborn et al., 1989).

Each item was given an identification code. The code begins with the name of the 'means'. The next letter indicates whether the item concerns 'Capacity Beliefs' (C) or 'Strategy Beliefs' (S). As an example, the code AbilityS1 identifies the first item

concerning the 'means' of Ability and its relationship with outcomes (S). 'Control Beliefs' are labelled with Cont (e.g. Cont1).

The questionnaire also asked participants to state their age and indicate their gender. As a general measure of socioeconomic status participants were asked to indicate the category that best describes the amount of formal education they had completed. A copy of the questionnaire is presented in Appendix Four.

Results

Initial screening

The data was screened to make sure that it was entered correctly and was assessed for whether it met the assumptions of multivariate normality, homoscedacity and linearity. While some evidence of the violation of these assumptions was found it was decided not to transform these variables. This decision was made because it has been shown that these assumptions are fairly robust and that the breaking of these assumptions will only diminish the correlations in the data (Coakes & Steed, 2001; Hair, Anderson, Tatham, & Black, 1998). Therefore any analysis based on this slightly skewed data set would only underestimate the strength of the relationships.

Outliers

Z-scores were produced for each response and a small number of outliers were identified. Only 427 of the responses had z-scores which were beyond 3 or minus 3 and only 7 were beyond 4 or minus 4. The z-scores ranged from -6.276 to 9.004. As outliers can have a strong influence on factor analysis (Coakes & Steed, 2001) and in accordance with the suggestion of Hair et al. (1998), analyses were run with and without the outliers. No difference was found in the two sets of analyses and so the analyses including all the responses is reported.

Missing data

Hair et al. (1998) suggest that participants with more than 50% missing data should be removed from the study. A more conservative cut off was used in this study and so all

cases with more than 25% missing data were removed from the study. This change meant that only one extra person was removed. One hundred and forty-seven of the participants had no missing data. On average, each participant had 5.89% missing data.

Most items had less than 1% missing data. Only items from the Boss Strategy (10.7-13.1%), Boss Capacity (11.7-13.1%), God Strategy (5.9-12.4%), and God Strategy (8.6-15.5%) subscales had more than 5% missing data. When the missing items per participant were calculated without the items from the God and Boss subscales, the mean missing data per participant for the other items dropped from 5.89% to 1%. Analysis of the items with the small amount of missing data showed no pattern, and so it was concluded that the missing data from these items were missing completely at random (MCAR).

The data that were missing completely at random could be dealt with in a number of ways. The EM approach with Little's χ^2 test in SPSS was used because this has been shown to produce less bias (Hill, 1997). When EM was performed on all the items in the subscales except the items in the God and Boss subscales, Little's χ^2 test ($\chi^2 = 11832.925$, $df = 11703$ and $p = 0.198$) indicated that the data missing in those items was MCAR supporting the decision.

Analysis of the missing data in the items in the God and Boss subscales revealed a pattern. Most of the missing data could be attributed to a small group of people. After looking at the data it was established that if a person had not responded to one item in one of these subscales they were very likely to have not answered the other items in the subscale. For the Boss Strategy subscale 11.42% of participants responded to less than half the items. For the Boss Capacity subscale 12.11% of participants responded to less than half the items. For the God Strategy subscale 7.27% of participants responded to less than half the items. For the God Capacity subscale 11.76% of participants responded to less than half the items. In addition, the participants who answered less than half the items of the Boss Strategy subscales tended to be the same participants who answered less than half the items in the Boss Capacity subscale. This was shown by a correlation of .97 between the number of missing items for the Boss Capacity and Boss Strategy subscales. The same pattern was found in the God subscales ($r = .87$). Another pattern that was found was that females were less likely to answer the Boss Strategy and Boss Capacity items than the males. Given these clear patterns it was decided that the data missing in the items

associated with these subscales was not MCAR. Accordingly, the decision as to how to deal with the missing data associated with these items was more complex. Case deletion in such a situation is likely to produce bias as the participants with missing data may be different on other variables than the participants with complete data. In addition, the sample was already small and the removal of cases would further reduce the size of the sample. Hence, case deletion was not used. Consideration was also given to remove the items with large amounts of data. However, because the items comprise complete subscales this would have serious effects on future investigations. These subscales represent important 'means' that have been directly identified in the theories this measure is based on. Consequently it was decided that it was important to keep these subscales in the analysis and so item deletion was not used.

Because the reason that the data is missing in these items is not clear, it is difficult to tell whether the data is missing at random (MAR) or not missing at random (NMAR). The general rule is to assume that all missing data is NMAR until you prove otherwise. However, Scheffer (2000) states that if the missingness can be modelled on other observed variables in the data, set then it can be treated as MAR.

> Often there are covariates present in an analysis which may explain, or predict missingness although the actual nonresponse mechanism is not known. This can also be handled as MAR, as long as these covariates are present in the analysis. (p. 59)

Accordingly, further analysis of the items involved was performed using regression analysis to test if the missing data could be modelled on other observed variables in the data set and therefore the missing data could be handled as MAR. The missingness of each of these items was found to be related to several other variables and so it was decided that missingness in these items could be treated as MAR. Thus, imputation techniques such as EM could be used to replace the missing data. This approach would introduce much less bias than case deletion and allow for the inclusion of these important variables. However, as a step of caution it was decided that analyses would be run with and without the subscales associated with these items.

Design

Factor analysis requires there should be at least five times as many observations as there are variables (Coakes & Steed, 2001; Hair et al., 1998). Because of the limited sample in this study, it was not possible to include all the variables in the one analysis. Consequently, several separate analyses were performed, each examining the items in a theoretically defined group of subscales. This approach is similar to that of Skinner et al. (1988) in the development of the CAMI. An added benefit of this approach was that the items from the subscales with the missing data problems could be analysed separately and would not influence the analysis of the other items.

The same process was followed for all factor analyses. Firstly, the suitability of the data for factor analysis was assessed by examining the correlation matrix for sufficient correlations, Bartlett's test of sphericity, and the measure of sampling adequacy at both the variable level and overall level. Once suitability for factor analysis was established the factor analysis was performed.

Common factor analysis with oblimin rotation was used because the primary objective was to identify the latent constructs in the original variables, and there was little was known about the amount of specific and error variance (Hair et al., 1998). Maximum Likelihood was chosen as the common factor method. An oblique rotation was performed because it was expected that the factors were correlated and the goal was theoretically meaningful factors (Hair et al., 1998).

The decision as to how many factors to extract was made using the A Priori Criterion. This involves instructing the computer when to stop extracting factors based on the theory of the measure. This method is suitable to be used when testing the theory or hypothesis about the number of factors to be extracted (Hair et al., 1998). In the present situation the items were written according to a very clear model and so it was appropriate that this drove the analysis. One more and one less factors than that theoretically involved were also extracted and the results were compared. These results were also compared with the Latent Root Criterion which suggests that each factor should have an eigenvalue of more that one to be considered significant (Hair et al., 1998).

Decisions as to which items to carry forth to the next stage of analysis were based on a number of criteria. For a sample of 290, factor loadings are significant with a significance level of .05 and a power level of 80 percent, when the factor loadings are greater than .3 (Hair et al., 1998). Based on this, items with high single loadings were kept and items with low loadings or cross loadings greater than .3 were removed from further analysis. When a decision had to made between including one of two items which had similar loadings the one that provided the most variety in wording was included. In some instances items which did not have ideal loadings were added so that items with a variety of wording were carried forward to the next stage. This decision was in accordance with the aim to keep the items within the subscales as varied as possible. It was also justified in that the sample was not representative and this may have affected the results. It was decided that it was better to keep these items in the analysis where possible than to totally lose them to the study. Consideration was also given to the inter-item correlation scores from reliability analyses. Tables 5.2-5.9 show the final items which were chosen and the results associated with their analysis.

The first set of items factor analysed were the items written for the Ability Capacity, Ability Strategy, Effort Capacity, Effort Strategy, Confidence Capacity, and Confidence Strategy subscales. These subscales were grouped together because they all have an internal orientation. By this it is meant that the 'means' all involve something which is internal to the person. These 'means' are similar to the internal scale of Levenson (1972). It was found in this analysis that there was no clear distinction between items written for the Ability and Confidence subscales and so the Confidence items were removed. The Confidence items were removed rather than the Ability items because the Ability 'means' is included in the other measures based on the theory outlined by Skinner (1995, 1996) and so its inclusion would mean that comparisons may be able to made in the future. Because of the removal of the Confidence subscales space was available for another subscale. Consequently the Control Beliefs subscale was added to this analysis because it too has an internal orientation.

The loadings of the items chosen to be carried forward to the next stage are presented in Table 5.2. Loadings below .25 are suppressed to make the reading of the table easier and yet show the presence of cross loadings close to significance. This table shows a very clear

factor structure. All of the items loaded significantly on only one factor and all but one item loads with the other items that were written for the same subscale. Cont4 does not load significantly with any factor and its highest loading is in the factor with the Ability Capacity items. This item was kept in the analysis to try and provide variety to the Control Belief subscale. While EffortS6 also loads with the Effort Capacity items the cross loading does not reach significance and the loading on the Effort Capacity factor is substantially less than the loading on the Effort Strategy factor.

The eigenvalues and amount of variance explained are presented in Table 5.3. While the sixth eigenvalue being marginally over 1 might suggest that six factors is appropriate, the extraction of six factors produced a singlet with Cont4. When Cont4 was removed from the analysis only 5 factors had eigenvalues over 1. Further evidence for the 5 factor solution was given by the goodness of fit test ($\chi^2 = 93.832$, $df = 85$, $p = .240$) which indicate that a 5 factor solution was a good fit.

Table 5.2

Pattern Matrix for Exploratory Factors Analysis of Items of the Ability Capacity, Abillity Strategy, Effort Capacity, Effort Strategy and Control Belief Subscales

	Ability Capacity	Ability Strategy	Effort Capacity	Effort Strategy	Control Beliefs
AbilityC3	.837				
AbilityC1	.626				
AbilityC2	.556				
AbilityC4	.498				
AbilityC5	.431				
Cont4	.249				
AbilityS1		-.790			
AbilityS3		-.728			
AbilityS2		-.653			
AbilityS5		-.541			
EffortC3			-.787		
EffortC5			-.648		
EffortP2			-.558		
EffortC4			-.532		
EffortS6			-.289	.602	
EffortS4				.566	
EffortS2				.528	
EffortS1				.521	
Cont2					-.683
Cont3					-.461
Cont1					-.395

Table 5.3

Eigenvalues and Percentage Variance Explained for the Exploratory Factors Analysis of Items of the Ability Capacity, Ability Strategy, Effort Strategy, Effort Strategy and Control Belief Subscales

	Initial Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	4.847	23.081	23.081
2	2.359	11.234	34.315
3	1.785	8.498	42.813
4	1.396	6.647	49.460
5	1.234	5.877	55.337
6	1.005	4.787	60.124
7	.901	4.289	64.413

The second set of items factor analysed were those that were written for the Family Capacity, Family Strategy, Friend Capacity, and Friend Strategy subscales. These subscales were grouped together because they are all external subscales and all involve other people. The loadings for these items are presented in Table 5.4 and show that four factors emerged very clearly. All but one of the items loaded significantly only on one factor and with the other items which were written for the same subscale. FamilyS1 significantly cross-loaded on factor 2 which comprised the items written for the Family Capacity subscale. This item was included because it provided variation within the subscale and at face value fitted clearly in the Family Strategy subscale. FamilyS5 also loaded on two factors but the second loading was not significant and was substantially lower than the loading with the other Family Strategy items. However the goodness of fit test suggested that this was not a good factor structure ($\chi^2 = 106.071$, $df = 74$, $p = .009$). When FamilyS1 and FamilyS5 are removed the goodness of fit test suggested that the factor structure was acceptable ($\chi^2 = 65.689$, $df = 51$, $p = 0.081$)

Table 5.4

Pattern Matrix for Exploratory Factors Analysis of the Items from the Family Capacity, Family Strategy, Friend Capacity and Friend Strategy Subscales

	Family Strategy	Family Capacity	Friend Capacity	Friend Strategy
FamilyS3	.639			
FamilyS4	.638			
FamilyS5	.595		-.274	
FamilyS2	.552			
FamilyS1	.394	.387		
FamilyC2		.728		
FamilyC1		.684		
FamilyC3		.671		
FamilyC4		.531		
FriendC1			.737	
FriendC3			.660	
FriendC2			.658	
FriendC5			.514	
FriendS5				-.772
FriendS1				-.719
FriendS2				-.691
FriendS3				-.666

The eigenvalues and amount of variance explained are presented in Table 5.5. Four eigenvalues are above one, which further supports the extraction of four factors.

Table 5.5

Eigenvalues and Percentage Variance Explained for the Exploratory Factors Analysis of Items from the Family Capacity, Family Strategy, Friend Capacity and Friend Strategy Subscales

	Initial Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	4.474	26.318	26.318
2	2.610	15.354	41.672
3	2.099	12.349	54.021
4	1.169	6.877	60.898
5	.802	4.718	65.616

The third set of items factor analysed were those that were written for the God Capacity, God Strategy, Boss Capacity, and Boss Strategy. These subscales were grouped together because they were all external scales and involve entities that have power over the person. They were also the subscales that had the largest amount of missing data and so it was good to analyse them separately. The loadings for these items are presented in Table 5.6 and show that four subscales emerged very clearly. All but one item loaded significantly on the one factor and with the other items that were written for the same subscale. GodC1, while loading most strongly with the other God Capacity items, did not reach significance. However the goodness of fit test suggested that it was not a good factor structure (χ^2 = 264.412, $df = 87$, $p = .000$).

Table 5.6

Pattern Matrix for the Exploratory Factors Analysis of Items from the God Capacity, God Strategy, Boss Capacity, and Boss Strategy Subscales

	God Capacity	God Strategy	Boss Capacity	Boss Strategy
GodC3	.943			
GodC6	.909			
GodC2	.726			
GodC3	.548			
GodC1				
GodS1		.850		
GodS3		.840		
GodS2		.826		
GodS4		.784		
GodS1		.754		
BossC1			.821	
BossC6			.689	
BossC2			.582	
BossC4			.581	
BossS4				.854
BossS1				.629
BossS6				.610
BossS2				.601

The eigenvalues and amount of variance explained are presented in Table 5.7. While the fifth eigenvalue being marginally over one might suggest that five factors were appropriate, the extraction of five factors produced a singlet with GodC1. When GodC1 was removed from the analysis only 4 factors had eigenvalues over 1.

Table 5.7

Eigenvalues and Percentage Variance Explained for Exploratory Factors Analysis of Items from the God Capacity, God Strategy, Boss Capacity and Boss Strategy Subscales

	Initial Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	5.213	28.961	28.961
2	2.794	15.523	44.484
3	2.148	11.934	56.418
4	1.621	9.003	65.421
5	1.005	5.585	71.007
6	.749	4.160	75.167

The last set of items factor analysed were those externally oriented items that had not been analysed previously. The loadings for these items are presented in Table 5.8 showing a relatively clear factor structure. However, there were three items which cross loaded. MoneyS4 loaded significantly with the other Money Strategy items and also had a non-significant loading with the Money Capacity items. Both LuckC1 and LuckC3 loaded with the other Luck Capacity items but also loaded significantly with the Luck Strategy items. These items were maintain in the analysis because there were few Luck Capacity items available. The goodness of fit test indicated that this was not a good factor structure. (χ^2 = 162.835, df = 100, p = .000).

Table 5.8

Pattern Matrix for Exploratory Factors Analysis of Items from the Money Capacity, Money Strategy, Luck Strategy, and Luck Capacity Subscales

	Luck Strategy	Money Capacity	Money Strategy	Luck Capacity
LuckS2	.804			
LuckS3	.751			
LuckS4	.627			
LuckS1	.575			
MoneyC3		.868		
MoneyC2		.767		
MoneyC4		.715		
MoneyC1		.503		
MoneyS3			.748	
MoneyS1			.728	
MoneyS2			.664	
MoneyS4		.259	.426	
LuckC2				.578
LuckC1	.337			.576
LuckC3	.421			.452

The eigenvalues and amount of variance explained are presented in Table 5.9. Four eigenvalues are above 1, which supports the extraction of four factors.

Table 5.9

Eigenvalues and Percentage Variance Explained for Exploratory Factors Analysis of Items from Money Capacity, Money Strategy, Luck Strategy, and Luck Capacity

	Initial Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	4.399	29.324	29.324
2	2.193	14.621	43.945
3	1.748	11.653	55.597
4	1.307	8.716	64.313
5	.784	5.224	69.537

Assessing the Internal Reliability of Each Subscale

The internal reliability of each subscale of the MSOCS was analysed using Cronbach's Alpha coefficients. The items included in the subscales are those which were identified as loading on the same factor in the previous section. The only exceptions to this are when the loading was below .25 or when an item loaded on a scale that it was not theorised to. Family Strategy has a second coefficient in parentheses, which indicates the internal reliability excluding FamilyS1 which had significantly cross loaded in the EFA. Luck Capacity also has a second coefficient in parentheses, which indicates the internal reliability excluding LuckC3 which had a worse cross loading than LuckC1.

Table 5.10 shows Cronbach's Alpha coefficients for each subscale. While .70 is a commonly accepted value above which a construct is acceptably reliable, with exploratory research a lower value can be deemed acceptable (Hair et al., 1998). Consequently it was decided that all but one of these reliability coefficients were acceptable. The one exception was for the coefficient associated with Luck Capacity, however when LuckC3 was removed the coefficient increased to .814.

Table 5.10

Internal Reliability (Cronbach's alpha coefficients) for the MSOCS Subscales

Subscale	Cronbach's alpha coefficient
Ability Capacity	.767
Ability Strategy	.779
Effort Capacity	.741
Effort Strategy	.657
Control Beliefs	.612
Family Capacity	.764
Family Strategy	.688 (766)
Friend Capacity	.733
Friend Strategy	.826
God Capacity	.875
God Strategy	.911
Boss Capacity	.789
Boss Strategy	.760
Luck Capacity	.300 (.811)
Luck Strategy	.814
Money Capacity	.811
Money Strategy	.741

Discussion

This analysis showed that most of the items written for each subscale loaded together significantly and did not load with items written for other subscales. One limitation of this study was that it used a convenience sample, which was not representative of the New Zealand population.

A second limitation was that all the items could not be entered into the same analyses because the sample was not large enough. While this approach has been used in other studies (e.g. Skinner et al., 1988) and the most theoretically similar subscales were

grouped together to make the test as stringent as possible, the test was still not as stringent as it would have been if all items were entered into the same analysis.

A third limitation was that, in two of the analyses, while the factor structure looked clear, the χ^2 goodness of fit test indicated that the fit was not acceptable. This suggests that caution should be used when making conclusions about the factor structure of the subscales included in these analyses. However, when the sample size is large, the χ^2 goodness of fit test is subject to wrongly indicating that the factor structure is not acceptable (Hair et al., 1998). This may explain the conflict between the goodness of fit test and the apparently clear factor structure.

Because of these limitations no definitive conclusion can be made on the factor structure of the measure. These limitations need to be taken into consideration when conducting further investigations into the properties of the measure. A future analysis should use a nationally representative sample and include all subscales in the one analysis. Further testing of the factor structure of the MSOCS will be reported in Chapter Six.

Summary

Eleven 'means' were identified as a result of open-ended interviews, theory and similar measures. In accordance with Skinner's (1995, 1996) conceptualisation, measurement of two separate constructs for each 'means' was necessary. Therefore, 22 subscales were developed for the measure. A wide variety of items were written for each of these subscales with an aim to make the items as diverse as possible. A content analysis exercise was performed where 'experts' used definitions of the constructs to place each of the items in the subscales they thought that the item belonged to. Information gained from this exercise was used to modify some items and to choose items to be included in an exploratory factor analysis. The exploratory factor analysis showed that there were a number of items for each subscale which loaded together. Cronbach's alpha coefficients showed that the subscales including these items had reasonable internal reliability.

Chapter Six

FINAL DEVELOPMENTAL ANALYSES OF THE MULTIDIMENSIONAL SENSE OF CONTROL SCALE

Overview

After the initial development of the Multidimensional Sense of Control Scale (MSOCS) three further analyses of its properties were performed: Confirmatory Factor Analysis (CFA), an analysis of convergent validity, and a test-rested reliability study. These three analyses will be described in this chapter. Data for the CFA and Convergent Validity analyses were collected at the same time and so the collection of that data will be described first followed by the results of the CFA and then the results of the convergent validity analysis. The screening for inaccurate data inputting and treatment of missing data is discussed at the end of the method section because it relates to both the CFA and convergent validity analysis. The test-retest reliability data was collected separately and that analysis is presented last.

Method for CFA and Convergent Validity Analysis

Design

Data for the CFA, Convergent Validity and Hypothesis Testing analyses were collected by a cross-sectional survey method in the same questionnaire. This was possible because there was considerable overlap between the measures needed for the three analyses. The pragmatic advantage of collecting the data for these analyses in the same questionnaire was that it allowed a larger sample to be surveyed and so increased the sample size for the analyses. This section will describe the participants, the data collection procedure, and relevant details of the questionnaire. Details of the questionnaire relevant only to the hypothesis testing will be described in detail in Chapter Seven.

Participants

Potential participants were randomly selected from an up to date copy of the New Zealand Electoral Role (provided by the New Zealand Department of Statistics on CD two weeks prior to selection and posting of the first contact). The electoral role was used because it is the most cost-effective way of getting a broad sample of New Zealanders.

Of the 980 people contacted, 60.2 % returned a completed questionnaire. Of these people, 47.3 % were male which is slightly less than those identified in the 1996 census (49.1 %). They had a mean age of 46.7 (SD = 16.7) with a range from 18 to 98. This is a higher mean than was present in the 1996 census which was 39.3 (SD = 17.1; Census, 1998). Table 6.1 shows that there were more respondents in the present study who identified themselves as NZ European/Pakeha (84.1) than those who identified themselves as NZ European/Pakeha in the 1996 census (80.1). Respondents who identified themselves as 'Other' were also over-represented while those who identify themselves as NZ Maori, Asian and Pacific Islanders were under-represented. Table 6.1 also includes description of the work situation, highest educational qualification attained, personal and household income, and living situation of the sample.

The questionnaire included the SF12 which is a self-report measure giving a score for Physical Health and Mental Health (see Chapter Seven for a full description). The respondents' scores on the SF12 can be compared with the results of the 1996/1997 New Zealand Health Survey (Ministry of Health, 1999) which collected data from a nationally representative sample of 7,862 New Zealand adults. In the present sample the mean Physical Health score was 49.5 (SD = 10.1) with a range from 15 to 65. The 1996/1997 New Zealand Health Survey sample had a similar mean (50.1, SD = 9.8) but had a broader range (9-70; Ministry of Health, 1999). The present sample had a mean Mental Health

Table 6.1

Ethnicity, Work Situation, Highest Educational Qualification, Income and Living Situation of Questionnaire Respondents

	Number of Respondents	Percentage of Respondents (1996 Census)
Ethnicity		
NZ Maori	45	7.7 (11.1)
Asian	16	2.7 (4.3)
NZ European/Pakeha	493	84.1 (80.1)
Pacific Islander	13	2.2 (4.1)
Other	17	2.9 (0.4)
Missing	2	.3
Highest educational qualification		
No school qualification	140	23.9
School certificate passes	109	18.6
Higher school qualifications	58	9.9
Trade certificate or Professional certificate or diploma	129	22
University degree, diploma, or certificate	91	15.5
Post graduate qualification	40	6.8
Missing	19	3.2
Present work situation		
Unpaid work	51	8.7
Retired	106	18.1
Full-time work (30 hours a week or more)	302	51.5
Unemployed	18	3.1
Part-time work (less than 30 hours a week)	69	11.9
Permanently unable to work/ill	10	1.7
Other	24	4.1
Missing	6	1.0
Personal Income ($)		
Loss/zero	19	3.2
1-20,000	186	31.7
20,001-30,000	88	15.0
30,001-40,000	94	16.0
40,001-50,000	59	10.1
50,001-70,000	51	8.7
70,001-and more	39	6.7
Don't know	22	3.8
Missing	28	4.8
Household Income ($)		
Loss/zero	2	.3
1-20,000	76	13.0
20,001-30,000	68	11.6
30,001-40,000	68	11.6
40,001-50,000	70	11.9
50,001-70,000	95	16.2
70,001-and more	126	21.5
Don't know	39	6.7
Missing	42	7.2
Living Situation		
Alone	65	11.1
With someone	521	88.9

score of 50.4 (SD = 9.8) with a range of 17 to 69. The 1996/1997 New Zealand Health Survey sample had a similar mean (50.2, SD = 9.2) but again had a broader range (5-72). Thus the sample of the present study lacked people at the extremes of the health range, especially at the lower end of the range.

Data Collection Procedure

Potential participants were sent a letter (Appendix Five) informing them that they had been randomly selected to be invited to participate in the study and giving initial information about the study. They were also informed that in a few days they would be sent another letter informing them more about the study accompanied by a questionnaire to complete if they wished to be involved in the study.

Five days later, all potential participants were sent the second letter (Appendix Six), a questionnaire (Appendix Seven) and a freepost reply envelope. The letter included information about the study and outlined the participant rights. The letter also informed them that there would be reminder letters sent and telling them how to indicate that they did not want to receive these if this were the case.

One week later a postcard (Appendix Eight) was sent to all remaining participants. This thanked those who had already returned the questionnaire and informed those that had not yet returned it that their responses were still welcome.

Three weeks after the postcard another letter (Appendix Nine), questionnaire (Appendix Seven) and freepost reply envelope were sent to all potential participants who had not yet returned a questionnaire (completed or uncompleted).

Questionnaire Format

Collecting data for the CFA, Convergent Validity and Hypothesis Testing Analyses at the same time meant that, while there was considerable overlap between the measures needed for the different analyses, there was danger of the questionnaire becoming too large. This was a concern as research has shown that response rate is affected by questionnaire size (Dillman, 2000). Consequently, while not compromising the quality of the content, efforts

were made to keep the questionnaire to a reasonable size to encourage a good response rate.

The overall format of the questionnaire included three sections. The first section focused on health issues related to the participant. The second section included the MSOCS items and measures which would be used in the validation of the MSOCS. The third section included items concerned with the socio-demographic information such as age, gender and socio-economic status.

In an attempt to minimise the effect of the order of the measures in the second section, two versions of the questionnaire were used. The two versions had a different order of the scales within the second section. A copy of one version of the questionnaire is included in Appendix Seven.

The Measures

Health Measures

The first section of the questionnaire contained measures of health status and health behaviours. These measures were not used in the CFA and convergent validity analysis and therefore will be described in Chapter Seven.

Psychological Measures

The second section included the psychological measures including the MSOCS and a number of measures that were used in its validation.

MSOCS

The 79 MSOCS items selected from the EFA (see Chapter Five) were included in the questionnaire. As with the EFA study, participants were asked to indicate which answer best expressed their thoughts and beliefs on a four point scale (1 = *not at all true*, 2 = *not very true*, 3 = *sort of true*, 4 = *very true*). For the convergent validity analysis, subscale scores were calculated by using means of the items in the subscale. A higher score on a Capacity item or subscale indicates that the person believes they possess or has more

access to the 'means'. A higher score on a Strategy item or subscale indicates that the person believes the 'means' is more effective in producing the desired outcome.

Social Support

The Medical Outcomes Study Social Support Scale (Sherbourne & Stewart, 1991; MOS SSS) is a relatively short measure of functional social support. It provides an overall social support score as well as scores on four dimensions of support: Emotional/Informational Support, Tangible Support, Affectionate Support, Positive Social Interaction.

The MOS SSS includes nineteen items with different items being used in the scoring of the different dimensions of support. All nineteen items were used in the scoring the Overall Functional Social Support Index. Participants are asked to indicate how often the different types of support are available to them on a five point scale (1 = *none of the time*, 2 = *a little of the time*, 3 = *some of the time*, 4 = *most of the time, 5 = all of the time*). As averages are calculated the possible range for all scores is 1-5 and a higher score on the subscales or the Overall Functional Social Support Index indicates greater perceived support.

Internal reliability of the measure is supported by the coefficient alphas of all scales being greater than .90 (Sherbourne & Stewart, 1991). In the present study the coefficient alphas ranged from .88 to .95. Test-Retest reliability with a one year interval was found to be above .71 for all subscales and the Overall Functional Social Support Index. The structure of the measure has been supported by appropriate inter-item correlations, exploratory factor analyses and confirmatory factor analyses. Results of convergent validity analyses reported by Sherbourne & Stewart (1991) support the meaning of the scales.

While the measure was originally developed for use with patients with chronic conditions the publishers suggest that it may also be appropriate for use with other populations (Rand, n.d.). That only three of the items relate directly to health further supports the use of the scale with general populations.

This measure was included to validate the family and friends subscales of the MSOCS measure which should be positively related to social support. The subscales and overall

index should correlate more strongly with the capacity subscales than with the strategy subscales of the MSOCS because the items of the MOS SSS predominantly relate to perceived availability of support and not to beliefs about the ability of support to influence the outcome.

Neuroticism

Neuroticism was measured using the neuroticism subscale of the NEO-Five Factory Inventory (Costa & McCrae, 1992; NEO-FFI). The NEO-FFI is a short form version of the NEO-Personality Inventory-Revised (Costa & McCrae, 1992; NEO-PI-R). In both measures neuroticism is seen as being composed of six facets: anxiety, angry hostility, depression, self-consciousness, impulsiveness and vulnerability. The neuroticism subscale of the NEO-FFI consists of 12 items of which eight are worded positively and four are worded negatively. Participants are asked to rate on a five point scale the extent to which they agree with each item (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The four negatively worded items are reverse scored and the average score for all the items is calculated and so the possible range is 1-5. A higher score indicates a higher degree of neuroticism.

The psychometric properties of the NEO-FFI are outlined in the NEO manual (Costa & McCrae, 1992). The correlation between the neuroticism subscale of the NEO-FFI and the neuroticism subscale of the NEO-PI-R is .92. An acceptable coefficient alpha of .86 was reported for the neuroticism scale of the NEO-FFI. In the present study the coefficient alpha was also .86.

Costa and McCrae (1992) demonstrate the validity of the NEO-FFI through reporting studies which show appropriate correlations with self-reports in other scales, with adjective self-reports obtained three years earlier, and with ratings by the person's spouse and peers. In the present questionnaire items from the NEO-FFI were mixed with items from the LOT-R to disguise the purpose of the items as they are usually mixed with items from the other subscales of the NEO-FFI. This was possible because both measures used the same response scales.

Neuroticism was measured to support the validation of the MSOCS. It is expected that there will be a weak to moderate negative correlation between neuroticism and the capacity subscales of the MSOCS. The correlations with the strategy subscales should be non-significant or weak. It has been argued that optimism is the opposite of neuroticism (Smith, Pope, Rhodewalt, & Poulton, 1989). As optimism is similar to sense of control it might be that a lack of a sense of control is the same as neuroticism. Although subscales of the MSOCS will be related to neuroticism they should not be too highly correlated. Other studies (e.g. Scheier, Carver, & Bridges, 1994) have used measures like the trait form of the Stait-Trait Anxiety Index (Speilberger, Goruch, & Luchene, 1974) and Becks Depression Inventory (Beck, Rial, & Rickels, 1974) to test the relation of their positively oriented measure with a negatively oriented measure. The neuroticism subscale of the NEO was chosen in the present study because it demonstrates good psychometric properties and was developed to measure personality traits of the general population. The NEO also has the advantage of being a higher order measure and so measures multiple constructs including anxiety and depression.

Multidimensional Health Locus of Control

Form A of the Multidimensional Health Locus of Control (MHLC) Scale was devised and tested by Wallston et al., (1978). The scale comprises three subscales which relate to three different sources of reinforcement ("internal" health locus of control [IHLC]; "powerful others" health locus of control [PHLC]; and "chance" health locus of control [CHLC]). The scale consists of 18 items with six items in each subscale, all of which are positively worded. Participants are asked to rate on a 6 point scale the extent to which they agree with each item (1 = *strongly disagree*, 2 = *moderately disagree*, 3 = *slightly disagree*, 4 = *slightly agree, 5 = moderately agree, 6 = strongly agree*). Scores are calculated for each of the three subscales by averaging the responses to each of the six items in each subscale and so the possible range is 1-6. Higher scores on a scale indicate a greater degree of attribution of control to that source.

The psychometric properties were reported by Wallston et al., (1978). Internal consistencies of the three subscales were acceptable with coefficient alphas of IHLC .77, PHLC .67 and CHLC .75. In the present study the coefficient alphas were IHLC .71, PHLC .78 and CHLC .65. Wallston et al., (1978) reported that the three subscales were

moderately statistically independent. The correlation between IHLC and PHLC was not significant. Although the IHLC and CHLC subscales were negatively correlated, they shared less than 10% common variance. The CHLC and PHLC subscales only modestly correlated (r = .22). Factor analyses have shown that the three subscales are independent (Wallston & Wallston, 1981).

Wallston et al., (1978) also report that appropriate correlations have been shown between the three subscales and the three subscales of Multidimensional Locus of Control scale (Levenson, 1972). Each subscale correlated most highly with its theoretical equivalent subscale in Multidimensional Locus of Control scale (Levenson, 1972). However the PHLC also correlated significantly with the Chance subscale of the Multidimensional Locus of Control scale (Levenson) and the CHLC also correlated significantly with the Powerful Others subscale of the Multidimensional Locus of Control scale (Levenson, 1972; Wallston et al., 1978).

The MHLC was chosen for the present study to support the validation of the MSOCS measure because it measures belief in control by 'self', 'powerful others' and 'luck' and is recognised as being similar to strategy beliefs (e.g. Marshall, 1991). Unfortunately it is a measure of beliefs relating to the health domain and so is not a measure of non-domain specific beliefs like the MSOCS. However, appropriate correlations can still be expected with the strategy subscales. The IHLC subscale should correlate more strongly with the Ability Strategy subscale than with the others subscales; the PHLC subscale should correlate more strongly Family Strategy and Friends Strategy subscales than with the other subscales; the CHLC subscales should correlate more strongly with the Luck Strategy subscale than with the other subscales.

Optimism

Optimism was measured using the Life Orientation Test-Revised (LOT-R: Scheier, Carver, & Bridges, 1994). This is a six-item measure of dispositional optimism. Three items are phrased positively ("In uncertain times, I usually expect the best") and three items are phrased negatively ("If something can go wrong for me, it will"). Participants are asked to rate on a five point scale the extent to which they agree with each item (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The three

negative worded items were reverse scored and the average of all the items is calculated. There is a possible range of 1-5 with a higher score meaning a greater expectation that good things will happen.

The psychometric properties of the LOT-R are reported by Scheier, Carver, and Bridges (1994). They report acceptable internal consistency with a coefficient alpha of .78. In the present study the coefficient alpha was .72. Test-retest reliability was reported over four time periods: 4 months (r = .68, N = 96), 12 months (r =.60, N = 96), 24 months (r =.56, N = 52), 28 months (r =.79, N = 21). The LOT-R showed a very high correlation with the original LOT (r = .95) and modest correlations in appropriate directions with measures of neuroticism, trait anxiety, self-mastery, and self-esteem,

There has been some controversy over whether LOT-R is a unidimensional measure of optimism-pessimism. It was originally developed to be a unidimensional measure but to date factor analyses have indicated that optimism and pessimism may not be bipolar but independent of each other (Hummer, Dember, Melton, Howe, & Schefft, 1992; Marshall & Lang, 1990; Robinson-Whelen, Kim, MacCallum, & Kiecolt-Glaser, 1997). In a review of the optimism and pessimism literature Lightsey (1996) stated that when using the LOT-R both an overall scale score and two subscale scores should be used. Thus three scores will be reported; LOT Total, LOT Optimism and LOT Pessimism. In the present study the optimism subscale had a coefficient alpha of .60 and the pessimism subscale a coefficient alpha of .72.

In the questionnaire, items from the LOT-R were mixed with items from the NEO-FFI. This was possible because both measures used the same response scales. This was done in an attempt to disguise the purpose of the items.

The theory behind the LOT-R, as outlined in Chapter Two, acknowledges the positive impact that belief in control by forces internal and external to oneself has on one's outlook. Because of this it would be expected that the LOT-R be similar to an overall MSOCS score. In its relations with the individual subscales it would be expected that it would be more strongly correlated with the capacity subscales than the strategy subscales. The LOT Total and Optimism scores would correlate positively while the Pessimism score would correlate negatively.

Self-Efficacy

Self-efficacy was measured using Schwarzer's (1993) Generalised Self-Efficacy Scale. This is a 10-item measure of people's general perception of their personal agency. Participants are asked to rate the extent to which each item applies to them on a four point scale (1 = *not at all true*, 2 = *barely true*, 3 = *moderately true*, 4 = *exactly true*). The scores to all items are averaged with a possible range of 1-4. A higher score indicates a higher general perception of personal agency.

Schwarzer (1993) reports the psychometric properties of the scale. A number of studies are reported in which the internal consistencies typically range between coefficient alpha of .73 and .93. In the present study the coefficient alpha was .86. EFA and CFA studies reported by Schwarzer (1993) support the one dimensionality of the scale. The temporal stability of the scale is shown by reasonable correlations between scores taken over a two year period (r = .47 for men and r = .63 for women). Criterion-related and prognostic validity is also reported by Schwarzer (1993). A study with 991 East German migrants (Schwarzer, Hahn, Jeruselem, 1993) and a study with elderly citizens of Dusseldorf (Schwarzer, 1992) show correlations of suitable levels and directions with constructs such as self-esteem, depression, loneliness, anxiety, optimism and pessimism.

The Generalised Self-Efficacy scale was chosen to support the validation of the MSOCS. It was expected that it should correlate higher with the capacity subscales than with the strategy subscales and in particular the Ability Capacity subscale. The correlations with the capacity subscales should be positive.

Self-Esteem

Self esteem was measured using the Rosenberg (1965) Self-Esteem Scale. The scale provides a measure of global attitudes about self. It has ten items of which five are negatively worded ("At times I think I am no good at all") and five are positively worded ("On the whole I am satisfied with myself"). Participants are asked to rate the extent to which they agree with each item on a 4 point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, 4 = *strongly agree*). The five negatively worded items are reverse scored and the average response for all the items is calculated. There is a possible range of 1-4 with a higher score indicating higher self-esteem.

Research has indicated that Rosenberg's Self-esteem scale has acceptable to high internal consistency with coefficient alphas ranging from .72 (Ward, 1977) to .88 (Fleming & Courtney, 1984). In the present study the coefficient alpha was .87. Test-retest reliability has been reported over a variety of times including: one week (.82; Fleming & Courtney, 1984), six months (.63; Byrne, 1983), and one year (.50; McCarthy & Hoge, 1984).

The Rosenberg (1965) Self-Esteem Scale is one of the most widely used scales of self-esteem and has been used to validate a number of measures in this area (e.g. Scheier, Carver, & Bridges, 1994). In the present study it was also used for validation. It would be expected that it would be more strongly related to capacity subscales than strategy subscales and in particular the Ability Capacity subscale. However it would not be expected to be as strongly related to the Ability Capacity subscale as Schwarzer's (1993) Generalised Self-efficacy scale.

Socio-demographic Measures

A number of socio-demographic measures were included in section three. Items used to describe the sample were: age, gender, ethnicity, highest educational level achieved, work status, occupation, own income and household income, and living situation.

Screening for Inaccurate Data Input and Treatment of Missing Data

The data set was first screened for any data that had been inaccurately entered and any mistakes were corrected.

In accordance with the suggestion of Hair et al. (1998), five participants who had more than 50% missing data were removed from the study. There was no missing data in the responses of 182 (31.1%) of the participants. On average each participant had 7.24 % (median = 2%) missing data.

Most items had less than 1% missing data. Only 21 items (20%) had more than 5% missing data. These were items from the Boss Strategy (10.1-16.1%), Boss Capacity

(12.0-18.5%), God Strategy (11.2-16.6%), and God Strategy (11.2-20.8%) subscales and the Household Income (7.2%) item. The amount of missing data in the items associated with Boss and God was higher than that present in the EFA study (see Chapter Five).

Analysis of the missing data in the items in the God and Boss subscales revealed the same pattern as was present in the EFA study (see Chapter Five). Most of the missing data can be attributed to a small group of people. After looking at the data it was established that, for each of these subscales, if a person had not responded to one item they were very likely to have not answered the other items in the subscale. For the Boss Strategy subscale 9.2% of participants responded to none of the items. For the Boss Capacity subscale 11.4% of participants responded to none of the items. For the God Strategy subscale 9.0% of participants responded to none of the items. For the God Capacity subscale 12.5% of participants responded to none of the items. In addition, the participants who answered none of the items of the Boss Strategy subscales tended to be the same participants who answered less than half the items in the Boss Capacity subscale. This was shown by a correlation of .89 between the number of missing items for the capacity and strategy subscales. The same pattern was found in the God subscales (r = .85). Given this clear pattern it was decided that the data missing in the items associated with these subscales was not missing completely at random (MCAR).

As outlined in the EFA study (see Chapter Five), when it is established that the missing data can be modelled by the data available, EM imputation can be used (Scheffer, 2000). However, in the present study it was decided not to do this for two reasons. Firstly, in the present study the percentage of missing data in these items is greater and so raises more concern. Such a large amount of missing data strongly suggests that there was something about these items that was causing the participants to not respond to these items. While imputation could replace these responses this was not seen as prudent as the mechanism for the missingness was not well understood. The second reason is that while it was still possible to use EM to replace the missing data in these items, there were not enough participants in the present data set to perform CFA on all the subscales. This meant that some subscales would need to be withdrawn at this stage of the study and it was decided that the Boss and God subscales would be among those that were removed because of the concerns over the missing data. That other subscales were available that also concerned

control by external means (Family and Friends) made the loss of the Boss and God subscales less of a concern.

When the missing items per participant were calculated without the items from the God and Boss subscales, the mean missing data per participant dropped from 7.24% to 4.03% (median = 1%). Analysis of the items with a small amount of missing data (3% or less) showed no pattern, and so it was concluded that the missing data from these items were MCAR. Items with more than 3% missing data were also scrutinised and revealed no pattern of missingness. However, it was decided that more caution was needed with these items because they contained more missing data and so the mechanism of the missingness could have more impact. Scheffer (2000) states that if the missingness can be modelled on other observed variables in the data set then it can be treated as missing at random (MAR). If the missingness in the variables could be treated as MAR then EM could be used. The use of EM has been shown to reduce the bias that can be associated with other methods of dealing with missing data (Hill, 1997).

Accordingly, further analysis of the items with more than 3% of missing data was performed using regression analysis to test if the missingness could be modelled on other observed variables in the data set. It was found that the missingness of all these items could be modelled and these variables could be treated as MAR. Thus EM imputation could be used to replace the missing data.

Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) of the measure, using data from the random sample, was performed using AMOS 4.0 (Arbuckle, 1999). This procedure was to further confirm the theorised structure which had been partially supported by the EFA study (see Chapter Five). A second purpose was to compare the fit of this model with the fit of other theoretically possible models. Firstly, the proposed model was compared with other competing models. Then further analysis of the fit of the best model was performed. Some items were removed on the basis of examination of parameter estimates, standardised residuals, results in the EFA and theoretical understanding. Finally, the internal consistency of the subscales were assessed.

Selection of 'Means' to be Included

As a general rule it is suggested that there should be at least five participants for every estimated parameter (Bentler & Chou, 1987). As the sample size available for analysis was 586 this meant that ten subscales could be analysed and therefore only five 'means' of control could be investigated. The decision as to what 'means' to further investigate was made on the basis of theoretical interest of the 'means' and the past statistical performance of the items and subscales associated with those 'means'.

It was important to investigate beliefs about internal 'means' of control. As discussed in Chapter Two internal 'means' of control has been a focus of control belief theory and research in the past. This meant that either the Ability or Effort 'means' must be included. Ability was seen as the most important in the present study for two reasons. Firstly, being able to work hard could be seen as an Ability thus Effort was partially subsumed with Ability. Secondly, Effort, which was included on the basis of previous work by Skinner et al. (1988) and. Wellborn et al., (1989), is likely to be more relevant to predicting behaviour rather than health. Thus, while it was highly relevant for the research concerning engagement (e.g. Skinner et al. 1990), it is not so relevant for the present research.

'Powerful other' is a 'means' which is often included in both theory (Antonovsky, 1979; Scheier & Carver, 1985; Shapiro & Astin, 1998) and measurement (Levenson, 1972; Shapiro, 1994; Skinner et al., 1988; Wallston et al., 1978; Wallston et al., 1994;Wellborn et al., 1989). The decision to exclude the 'means' of Boss and God because of the problems with missing data has been explained earlier. Therefore it was decided to include both the 'means' of Family and Friends.

The fourth 'means' included was Luck. Again this 'means' has a strong background in this field. A number of theorists have recognised that people often believe that outcomes are controlled by luck (e.g. Antonovsky, 1979; Shapiro & Astin, 1998). As a consequence belief in control by luck has been included in the majority of multidimensional measures of control beliefs (e.g. Levenson, 1972; Skinner et al., 1988; Wallston et al., 1978).

Lastly, it was decided to include the 'means' of Money. This 'means' is very different from those included in the other measures which makes it interesting to investigate. Other similar measures do not include a 'means' which is tangible and non-human. In addition, Money will be of particular interest in the future studies that look at socio-economic status.

In summary, the hypothesised model which was tested in the present analysis included ten constructs representing Strategy Beliefs and Capacity Beliefs for five 'means' of control: Ability Capacity, Ability Strategy, Family Capacity, Family Strategy, Friends Capacity, Friends Strategy, Luck Capacity, Luck Strategy, Money Capacity, and Money Strategy. These constructs were allowed to correlate in the hypothesised model because it was considered that beliefs regarding different aspects of control would be correlated. This hypothesised model is shown in Figure 6.6.

Assumptions

Structural equation modelling is based on several assumptions: independent observations, random sampling of respondents, multivariate normality, and linear relationships.

The assumptions of multivariate normality and linearity were evaluated through SPSS DESCRIPTIVES and output from Amos 4.01 (Arbuckle, 1999). Univariate normality was

assessed through the examination of histograms and skewness and kurtosis statistics. A number of the items were not normal and consequently, transformations were performed to make the pattern of responses fit a more normal distribution. The transformations brought the normality within acceptable limits. Multivariate normality was analysed using Mardia's coefficient which is supplied in the Amos 4.01 output. This indicated that even after the transformations the data was not multivariate normal.

Outliers were assessed using z-scores created by SPSS DESCRIPTIVES. Eight univariate outliers were identified and removed from the analysis. Two multivariate outliers were identified using Mahalanobis distance in Amos 4.01. One was a 61 year old female who identified herself as a NZ European/Pakeha and with no educational qualifications. For this person the majority of the scores were at the extremes. She was particularly high on items relating to Luck Strategy and low on items relating to Friends Strategy. The other person was a 47 year old female who identified herself as NZ Maori and had no educational qualifications. This person also tended to score at the extremes scoring particularly high on neuroticism and emotional/informational support items and particularly low on optimism, Luck Capacity and internal health locus of control items. Both participants were identified as multivariate outliers and removed from the analysis. One of these two participants had also been identified as a univariate outlier which meant that only nine participants in total were removed from the analysis.

Model Estimation

For all analyses Amos 4.01 (Arbuckle, 1999) was used with parameter estimates calculated using maximum likelihood (ML). ML is based on the assumption of normality. West, Finch and Curran (1995) identified several problems which arise from having non-normal distributions when estimation techniques are used that assume normality. One of the problems is that the χ^2 value is inflated and so can suggest that good fitting models should be rejected. There is also a tendency for fit indices such as the Tucker-Lewis index (TLI; Tucker & Lewis, 1973) and the comparative fit index (CFI; Bentler, 1990) to be underestimated which again can lead to the degree of fit of a model being underestimated. Non-normality can also lead to the underestimation of standard errors. This in turn can lead to regression paths being significant when they are not.

ML has been shown to perform well when the assumption of normality was reasonably well met and the sample size over 500 (e.g. Olsson, Foss, Troye, & Howell, 2000; Wang, Fan, Willson, 1996). The results of several studies have suggested that ML estimation is remarkably robust even when there is marked departure from multivariate normality (Huba & Harlow, 1987; Olsson et al., 2000; Wang et al., 1996). However, because the assumption of normality was not met, alternative options were considered. The Yuan-Bentler or Satorra-Bentler estimation procedures, which are not based on the assumption of normality, are not available with Amos 4.01. The Asymtotically Distribution Free option is available in Amos 4.01 but this requires sample sizes over 2500 to work well (Hu, Bentler & Kano, 1992).

Amos 4.01 provides 'bootstrapping' which is an alternative method to address non-normal data. 'Bootstrapping' is a technique in which successive samples are taken from the overall sample. The model can then be tested on all the subsamples and the mean and variance of the bootstrap samples can be calculated. The benefit of this approach is that it is not based on the assumption of normal distribution and so more accurate results are calculated (Byrne, 2001; Hoyle, 1995). This option was used and produced essentially the same results as the ML analysis and so the ML results will be presented for clarity.

Competing Models

Because a relatively new model of control was being tested it was decided to compare the fit of a number of competing models. The models are based on the theory outlined in Chapter Two and test the two key aspects of the MSOCS. One is the separation of capacity beliefs and strategy beliefs and the other is the extent to which beliefs regarding external 'means' are separate. Model A, which is shown in Figure 6.1, assumes that there is no difference between capacity beliefs and strategy beliefs and so the capacity belief items and the strategy belief items for each 'means' were specified to identify with the same subscale. This suggests only five subscales: one for each 'means'. The separation between capacity and strategy beliefs, while it has been suggested by a number of theorists (Bandura, 1986; Skinner, 1995, 1996), has not been tested extensively and so should be tested further at this stage. Often scales include both capacity and strategy items (Skinner, 1995). Model B, which is shown in Figure 6.2, continues the assumption that there is no difference between capacity beliefs and strategy beliefs and also combines control beliefs

regarding family and friends. Thus, Model B specifies only four subscales. Beliefs regarding family and friends are combined in social support measures (e.g. Sherbourne & Stewart, 1991) and the 'powerful others' subscales of multidimensional locus of control measures (Levenson, 1972; Wallston et al., 1978) and so it was appropriate to investigate whether they should be combined in this situation. Model C, which is shown in Figure 6.3, again continues the assumption that there is no difference between capacity beliefs and strategy beliefs and in addition combines all external 'means' and so only suggests a separation between internal 'means' (Ability) and external 'means' (Family, Friends, Luck and Money). Model C therefore specifies only two subscales. Model C tests whether there is difference in people's beliefs regarding external 'means' or whether their beliefs regarding these 'means' are all the same. Model D, which is shown in Figure 6.4, specifies that there is a difference between capacity beliefs and strategy beliefs but like Model B specifies that Family Capacity items and Friends Capacity items combine to make one subscale while Family Strategy and Friends Strategy items combine to make another subscale. Thus, Model D suggests 8 subscales. This option was investigated for the same reasons as in Model B, but this time the capacity items and strategy items are separated. Model E, which is shown in Figure 6.5, again specifies that there is a difference between capacity and strategy beliefs but like Model C combines all items relating to external 'means' giving only four subscales. Model F, which is shown in Figure 6.6, is the original hypothesised model.

In summary, the models differ on two dimensions. Firstly, models A, B and C combine capacity belief items and strategy belief items into the same construct while models D, E and F separate these items into their own constructs. Secondly, models A and F keep the 'means separate', while models B and D combine the family and friends 'means' and models C and E combine all the external 'means'.

In all these competing models all constructs were allowed to correlate although for clarity this was not shown in the figures. This was because beliefs regarding different aspects of control were expected to be related. This was in line with the decision in the exploratory factor analysis (Chapter Five) to use an oblique rotation.

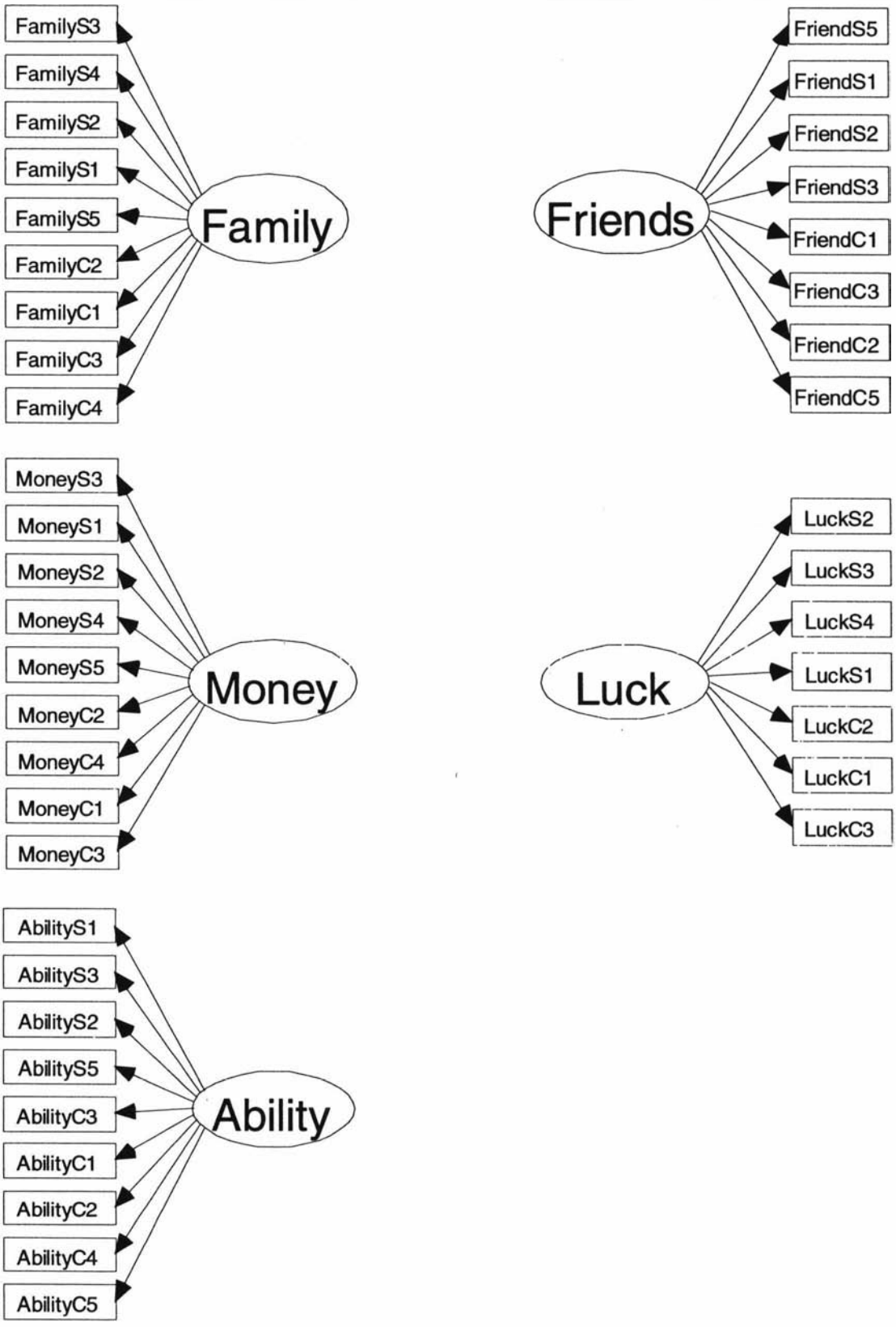


Figure 6.1. Model A with five subscales (in circles) and the items comprising each subscale (in rectangles)

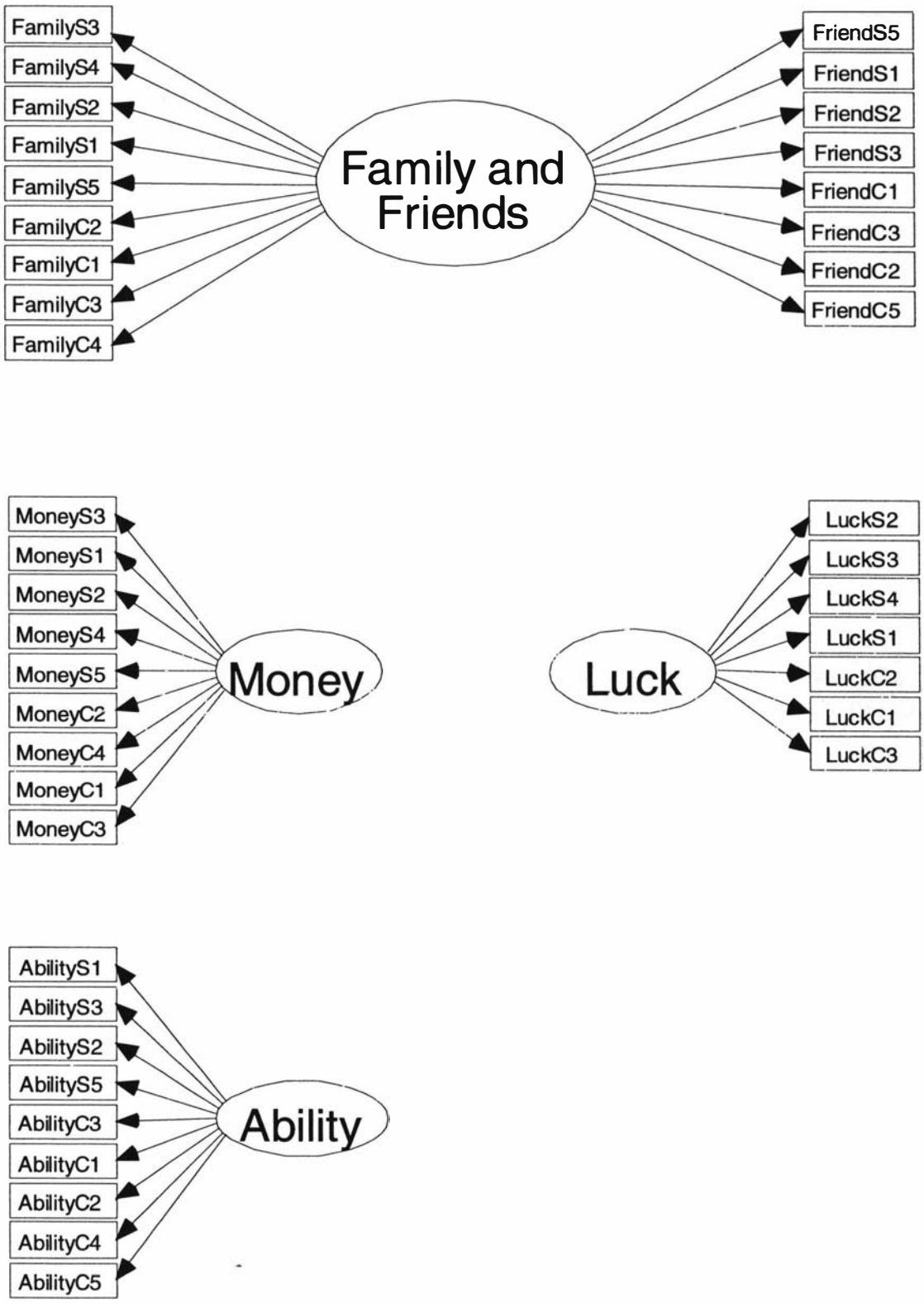


Figure 6.2. Model B with four subscales (in circles) and the items comprising each subscale (in rectangles)

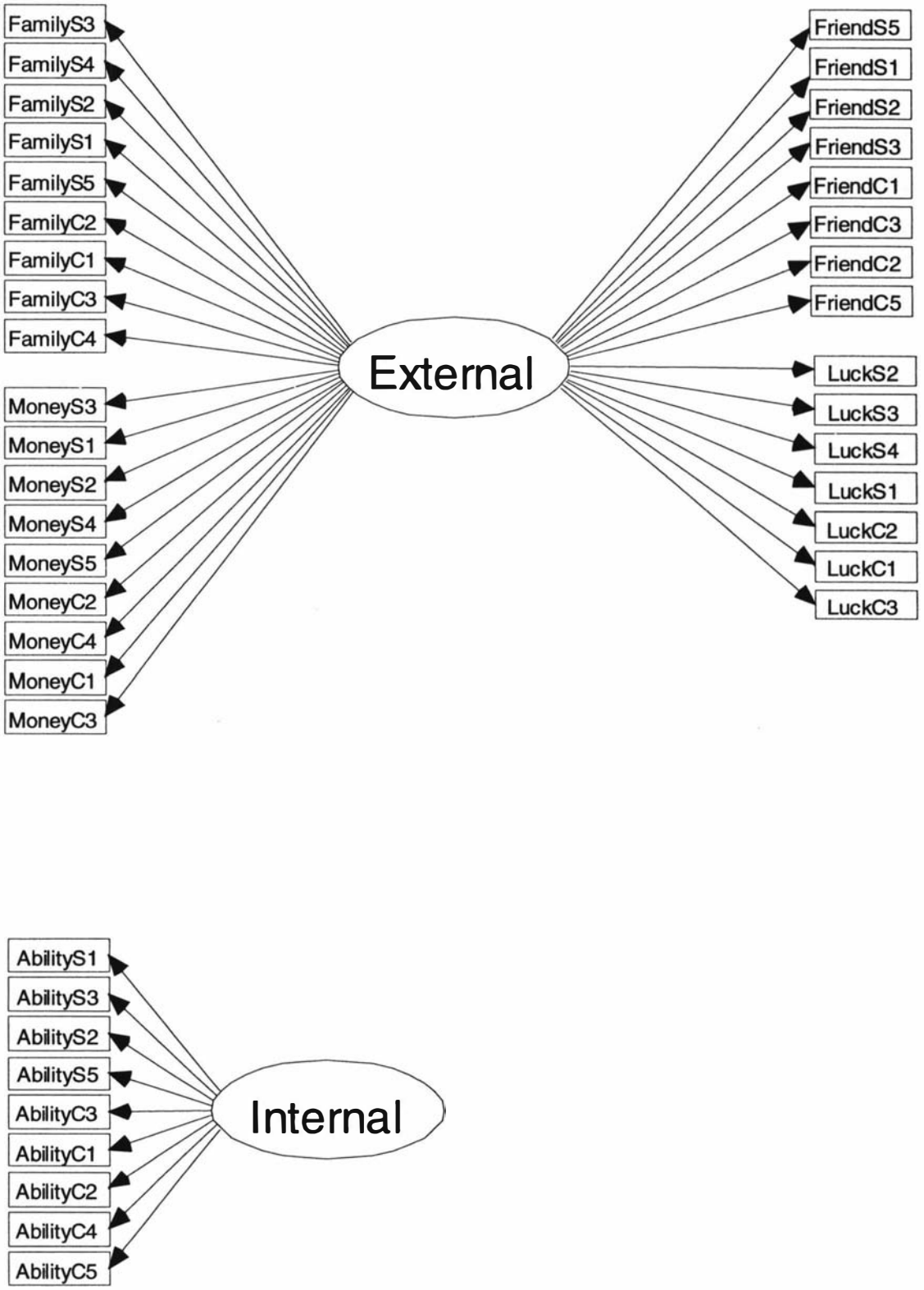


Figure 6.3. Model C with two subscales (in circles) and the items comprising each subscale (in rectangles)

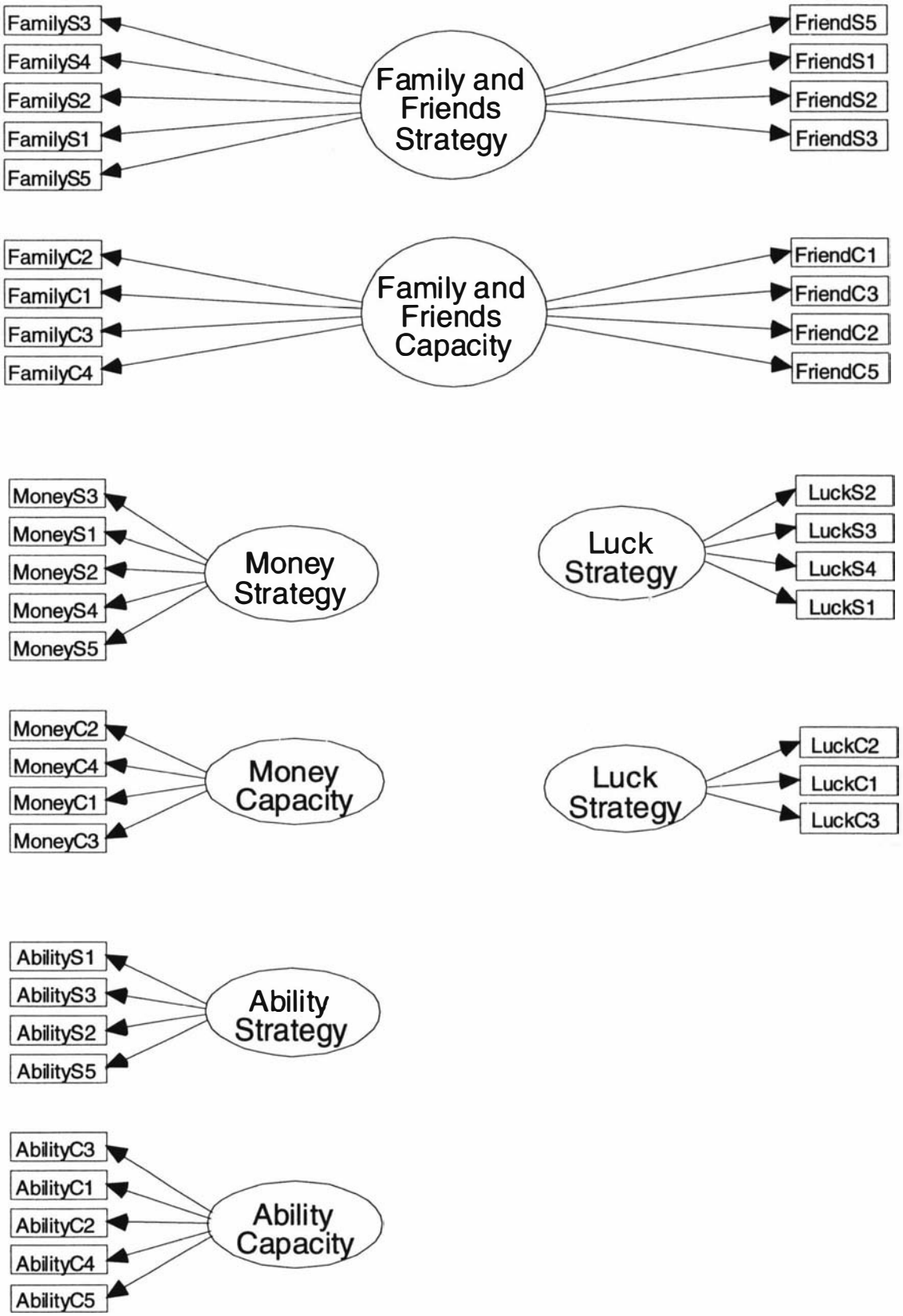


Figure 6.4. Model D with eight subscales (in circles) and the items comprising each subscale (in rectangles)

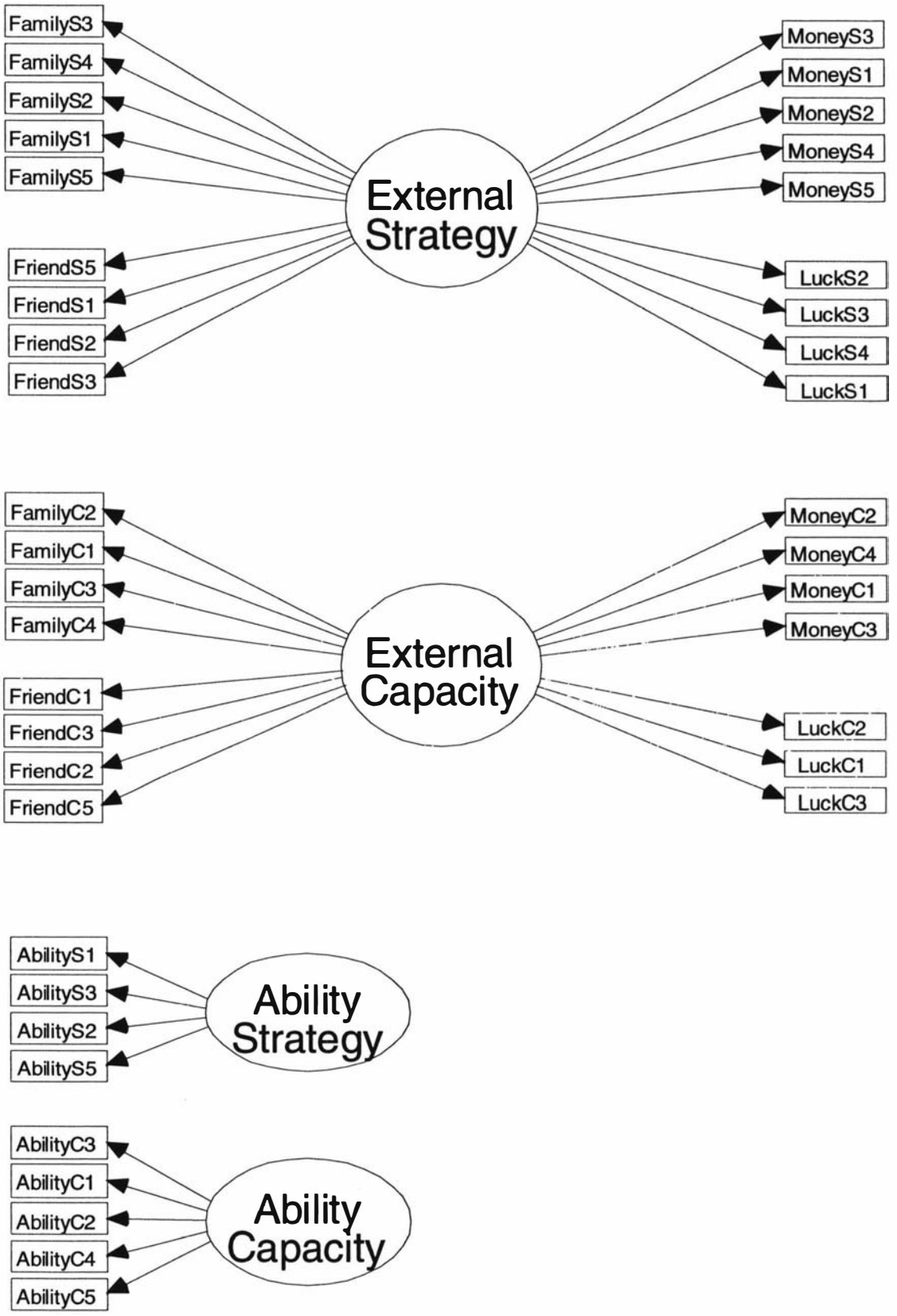


Figure 6.5. Model E with four subscales (in circles) and the items comprising each subscale (in rectangles)

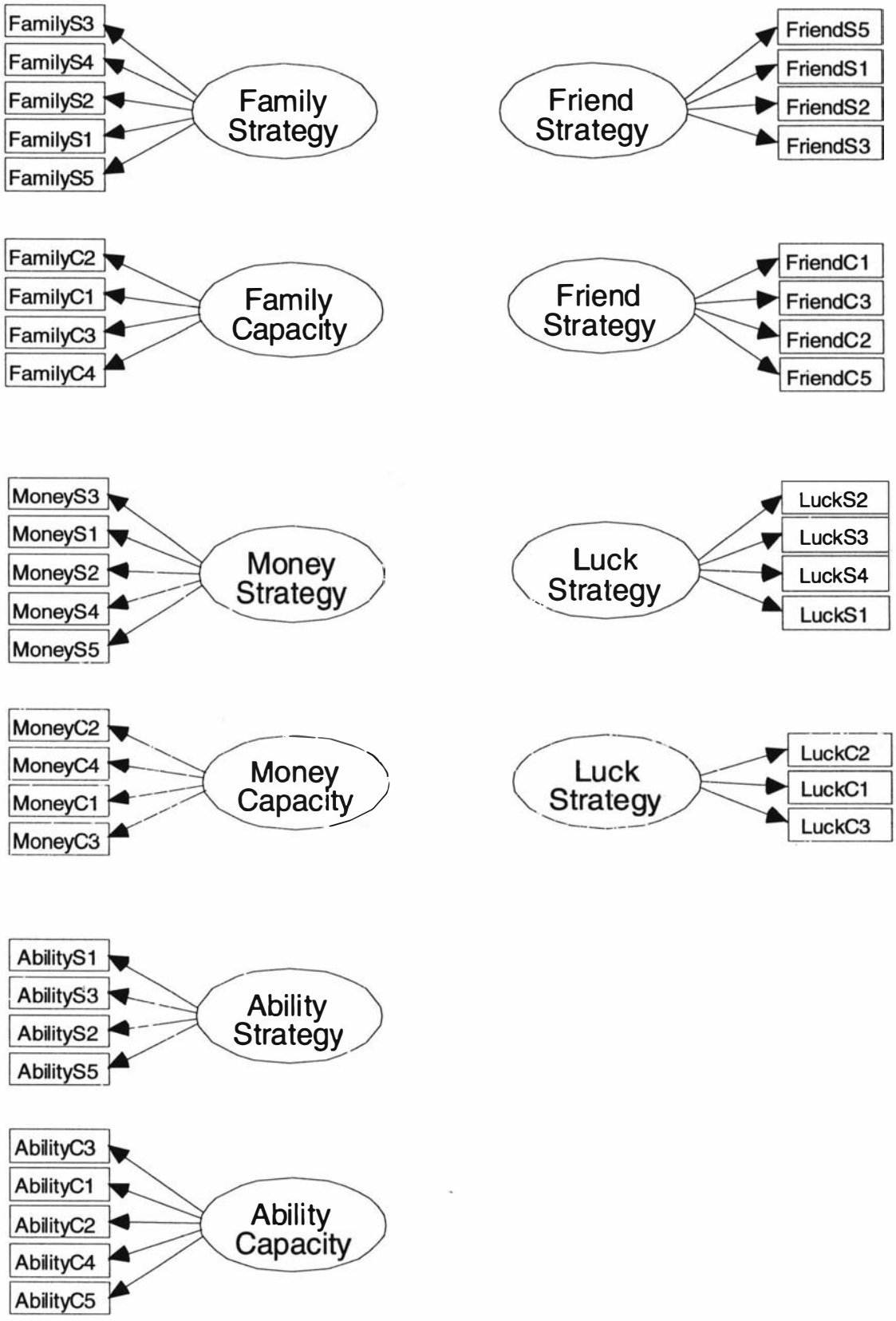


Figure 6.6. Model F with 10 subscales (in circles) and the items comprising each subscale (in rectangles)

Statistics Used to Analyse Fit

There are several ways to analyse the fit of a model. Fit can be tested through the χ^2 statistic with a non-significant result indicating that the sample covariance matrix is the same as that which would produced by the model. However, the χ^2 statistic is influenced by sample size with a larger sample giving more likelihood of the result being significant (Ullman, 2001). Consequently other indicators of fit are often used. It is suggested that a number of fit indices be considered with different types of fit indices chosen (e.g. Hair et al., 1998; Ullman, 2001).

Comparative fit indices compares the independence model (all variables completely unrelated) and the saturated model (all variables related). The Comparative Fit Index (CFI; Bentler, 1990; Bentler & Bonett, 1980) and Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) were chosen as comparative fit indices. It was originally suggested that a score above .90 indicated good fit (Bentler, 1992) but it has recently been suggested that this be increased to .95 (Hu & Bentler, 1999). However, some recent papers still use the .90 as a minimum criteria (e.g. Brouwers & Tomic, 2001; Fox, McManus, & Winder, 2001; Wolfe et al., 2001).

The Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993) was also chosen because it attempts to correct for the tendency to reject good models because of large sample size (Hair et al., 1998). This is important because according to Hair et al. the sample size of 586 is large. The value that indicates an acceptable model varies with Browne and Cudeck (1993) suggesting that values over 0.1 indicate poor fit, values below 0.08 indicating acceptable fit and values under 0.05 indicating good fit, Hu and Bentler (1999) suggesting that a value of 0.06 or less indicates good fit and Hair et al. (1998) suggesting that values ranging from 0.05-0.08 indicate acceptable fit. Amos 4.01 (Arbuckle, 1999) provides 90% confidence intervals for the RMSEA which provide information about the precision of the estimate.

Another set of indices assesses the "weighted proportion of variance in the sample matrix accounted for by the estimated population covariance matrix" (Ullman, 2001, p. 700). The Adjusted Goodness of Fit Index (AGFI) was chosen because it adjusts for the number of

parameters estimated and so encourages the development of a parsimonious model. A value greater than or equal to .90 indicates an acceptable model (Hair et al., 1998).

Indices which take into account parsimony are another type of indices and of these the Consistent Akaike Information Criterion (CAIC) was included. This gives the added ability to compare between models when the models are not nested and also takes sample size into consideration (Byrne, 2001). Smaller values indicate a better fitting, more parsimonious model.

When models are nested the relative fit of the models can be judged by comparing the difference in the χ^2 values of the models. It was decided that the competing models were nested because they all contained the same variables while the only differences were that in some of the models some of the factors are collapsed (Frone, 2001; Newsom, 2001). For example, Model A and Model F are nested because the only difference is that in Model A the strategy belief items and capacity belief items have been collapsed into one construct. Because the models are nested the fit of the models could be compared by using the χ^2 difference test (Ullman, 2001). This allows the statistical comparison of two nested models rather than relying on visual comparison of fit indices. The test involves evaluating the significance of the difference in the χ^2 values of two competing models with the degrees of freedom being the difference in degrees of freedom of the two models (Ullman). The fit indices for the six models are presented in Table 6.2

Results of Goodness of Fit Comparison

Table 6.2 shows that none of the models satisfy the χ^2 test of absolute fit.
It also shows that the models generally did not meet the requirements of the fit indices. The only acceptable values are for Models D and F which are within the acceptable fit range of the RMSEA, as suggested by Hair et al. (1998). Because the models were nested χ^2 difference tests could be used for comparison.

Table 6.2

Fit Indices for the Six Models.

	χ^2	*df*	*p*	AGFI	TLI	CFI	RMSEA (90% CI)	CAIC
Model A	3856.9	809	0.00	.65	.61	.64	.081 (.078-.083)	4693.99
Model B	4449.4	813	0.00	.62	.54	.57	.088 (.086-.091)	5260.21
Model C	5950.6	818	0.00	.52	.36	.39	.104 (.102-.107)	6856.24
Model D	3018.3	791	0.00	.73	.71	.73	.070 (.067-.073)	3940.16
Model E	5088.4	813	0.00	.60	.46	.49	.095 (.093-.098)	5989.46
Model F	2144.4	774	0.00	.82	.82	.84	.055 (.053-.058)	3213.10

A major premise on which the hypothesised model is based, is that there is a difference between strategy beliefs and capacity beliefs. To test this, models which kept items relating to these beliefs separate, were compared with models which collapsed these items into one construct. Equivalent models which kept capacity and strategy items separate were shown by χ^2 difference tests to have significantly better fit than equivalent models which did not (Model A and Model F, $\triangle\chi^2 = 1712.5$, $\triangle df = 35$, $p < .001$; Model B and Model D, $\triangle\chi^2 = 1431.1$, $\triangle df = 22$, $p < .001$; Model C and Model E. $\triangle\chi^2 = 862.2$, $\triangle df = 5$, $p < .001$).

A second major premise on which the hypothesised model was based is that beliefs regarding distinct 'means' of control would be different and so should be measured in different subscales. To test this, models that kept these items separate, were compared with models that did not do this. Equivalent models which separated the means of control were shown by χ^2 difference tests to have significantly better fit than models which did not (Model A and Model B, $\triangle\chi^2 = 592.5$, $\triangle df = 4$, $p < .001$; Model A and Model C, $\triangle\chi^2 = 2093.7$, $\triangle df = 9$, $p < .001$; Model B and Model C, $\triangle\chi^2 = 1501.2$, $\triangle df = 5$, $p < .001$; Model F and Model D, $\triangle\chi^2 = 873.9$, $\triangle df = 17$, $p < .001$; Model F and Model E, $\triangle\chi^2 = 2944$, $\triangle df = 39$, $p < .001$; Model D and Model E, $\triangle\chi^2 = 2070.1$, $\triangle df = 22$, $p < .001$)

When comparing the models the fit indices indicate that model F is the best model. It has the lowest χ^2 value, and higher values on the AGFI, TLI and CFI than all the other measures. It also has a lower RMSEA, AIC and CAIC values than all the other models. The fit indices indicate that Model D is the next best. The difference in χ^2 of these two

models showed that the difference was significant ($\triangle\chi^2 = 873.9$, $\triangle df = 17$, $p < .001$) suggesting that Model F fits the data significantly better than the other models.

Further Examination of Fit and Post Hoc Modifications

Following the recommendations of Hair et al. (1998) and Ullman (2001) further assessment of the fit of Model F was performed.

The first step was to check the parameter estimates. All estimates were within expected ranges. No regression coefficients were above 1 and no error measurements were negative. All the regression coefficients were significant with the exception of the LuckC3. The variable LuckC3 was removed from the model because a non-significant regression coefficient had shown that it was not related to Luck Capacity. This decision was supported by a significant cross loading in the EFA (see Table 4.8).

On examining the covariances between the latent variables, it was found that 10 of the 45 covariances were not significant. When the non significant correlations were removed the fit did not change.

The modification indices suggested no additional relationship that could be added to the model that could be justified theoretically and no Wald test statistics were available in Amos 4.01 (Arbuckle, 1999) to suggest which parameters were not necessary in the model. Modifications were made based on examination of the standardised residual matrix and the parameter estimates.

The residuals indicate the differences between the correlation matrix observed in the data and the correlation matrix estimated from the model (Hair et al., 1998). Large residuals indicate that the model does not estimate the relationship between the two variables well. Thus, residuals can indicate items which are causing problems in the fit. It is expected that no more than 5% of the standardised residuals will be larger than 2.58 (Hair et al.). A number of large residuals were found in the estimation of Model F further indicating that there were problems with the fit of the model.

When the large residuals were examined, a number of variables were found to be associated with more than one large residuals. These variables were AbilityC1, FamilyS5, FriendS2, FriendC3, MoneyC1, and LuckC3. One approach to this situation is to add additional paths to the model so that variables are proposed to be related to more than one construct (Ullman, 2001). However, the aim of this CFA was to produce a simple model for use in multiple regression analysis and in addition, there is no theoretical basis for such cross-loadings. An alternative approach is to remove the variables associated with the large residuals (Hair et al., 1998). This approach was used because it maintained a simple model. The residuals associated with LuckC3 further supported the previous decision to remove it from the model. The removal of FamilyS5 was supported by its cross-loading on the Friends Capacity factor in the EFA (see Table 5.4). Some support was also available for the removal of MoneyC1 as it had the lowest loading on the Money Capacity factor in the EFA (see Table 5.8). As no support could be found for the removal of the variables FamilyS5, FriendS2 and FriendC3 these variables were not removed from the model.

Subsequent Analysis of Fit

With LuckC3 and MoneyC1 removed, the model was reanalysed and the overall fit improved. The χ^2 statistic was still not significant indicating that the model did not satisfy the χ^2 test of absolute fit (χ^2 1688.7, *df*, 657, $p = 0.00$). The AGFI (.84), TLI (.85) and CFI (.87) were close to the value of .90. The RMSEA was .052 (.049-.055) which indicates an acceptable fit according to all criteria. The CAIC dropped to 2593.91 from 3213.10 indicating a better fitting, more parsimonious model. Overall, the fit of this revised model could be seen as marginal (Hair et. al., 1998).

Testing the Effect of Post-Hoc Changes on Parameter Estimates

Because post-hoc changes were made to the measure it would have been ideal to validate the measure again with another sample. As this was not possible, a correlation was calculated between the hypothesised model parameter estimates and the estimated parameter estimates of the final model as recommended by Ullman (2001). The high correlation ($r = .980$, $p < .001$) indicates that the parameter estimates of the two models are highly similar suggesting that the post hoc changes made little difference to the estimates of the model.

Assessing the Internal Reliability of Each Latent Construct

The latent constructs in the CFA were to be used as subscales in the MSOCS and so the internal reliability of each subscale was tested using Cronbach's alpha. Table 6.3 shows the Cronbach's alpha coefficients for each subscale. While .70 is a commonly accepted value above which the subscale is acceptably reliable, with exploratory research a lower value can be deemed acceptable (Hair et. al., 1998). These reliability values were considered acceptable.

Table 6.3

Internal Reliability (Cronbach's Alpha) for the MSOCS Subscales

	Cronbach's alpha
Ability Capacity	.77
Ability Strategy	.67
Family Capacity	.77
Family Strategy	.77
Friend Capacity	.69
Friend Strategy	.77
Luck Capacity	.69
Luck Strategy	.79
Money Capacity	.76
Money Strategy	.80

Discussion

This analysis investigated the fit of the model hypothesised in Chapter Two, to data gathered from a randomly selected nation-wide sample. Firstly, the hypothesised model was compared with five competing theoretically driven models. While none of the models achieved acceptable fit, the relative fit of the models gave important information. One of the key aspects of the hypothesised model is that capacity beliefs and strategy beliefs are different and items measuring the different constructs should not be combined into the same subscale (Skinner, 1995, 1996). The models which kept capacity belief and strategy

belief items separate (Models D, E, and F) gave a significantly better fit than their counterpart models which combined capacity belief and strategy belief items into one subscale (Model B, C, and A respectively). Another key aspect of the hypothesised model is that the external subscales should be separated such that different 'means' of control are measured separately. Models B and D combined the family and friends items into one subscale whereas Models C and E combined all external 'means'. Model F which kept all the items associated with external 'means' in their respective subscales gave a significantly better fit than those that did not (Models B, C, D and E). Thus Model F, which is based on the conceptualisation of control beliefs outlined by Skinner (1995, 1996), and which reflects the proposed measure, gave the best fit of all the models. Hair et al. (1998) state that even when overall fit is not acceptable, support can be gained for a model which gives better fit than competing models. In this case the model which was being tested was shown to provide better fit than competing models. Thus, some support to the proposed model is given by the results of this initial analysis.

The competing models method gave support to two key aspects of the model. One was that capacity beliefs and strategy beliefs were distinct and the other was that beliefs concerning different 'means' were also distinct. No previous research has tested the distinction between capacity beliefs and strategy beliefs as rigorously as was done in the present study. While the distinction between different 'means' of control has been partially tested previously (Levenson, 1972; Wallston et al., 1978), these analyses have still grouped some 'means' together. For example, Wallston et al., (1978) kept the 'means' of doctors, friends and family grouped together. Analyses in the present thesis showed that this should not be done. These findings have implications for other measures which do not make these distinctions. Researchers developing and choosing measures of control beliefs should consider these findings.

Once the hypothesised model was found to be the best fitting of the competing models, further analysis was performed in an attempt to improve its fit. It was found that one item did not load significantly onto its proposed construct. It was also found that several items were associated with sizeable standardised residuals. Where further support for the removal of these variables could be found, they were removed. Once these changes were made the fit of the model was marginal. It was also shown that the subscales based on the model had acceptable internal reliability given the exploratory nature of the research.

A limitation of this analysis is the post-hoc changes that were made to the original model. Post-hoc changes raise the concern that the marginal fit that was found is only a product of this particular sample and not relevant to the whole population. Because of this concern, changes were only made when further support for the changes could be found. Further attempts were made to alleviate some of this concern by comparing the parameter estimates of the two models. This established that the changes had made little difference to the parameters of the model. However, concerns about the post-hoc changes will only be totally removed by testing the model again on an independent sample. In spite of these concerns about post-hoc changes, the findings of the superiority of the hypothesised model over the competing models was established prior to the post-hoc changes and these changes do not affect this superiority.

That the data was not perfectly normal should also be noted again at this stage. Maximum Likelihood estimation, which was used in the present analysis, is based on the assumption of normality and so this raises some concerns. One of the problems that arises from non normal data is that the χ^2 statistic is inflated and fit indices may be underestimated which means that models that would otherwise meet the standard of absolute fit do not (Hair et al., 1998; West et. al., 1995). Given the non normality of the data, two factors give some support for the validity of the results. Firstly, when the analyses were run using 'bootstrapping' no difference was found in the results. As 'bootstrapping' is not based on the assumption of normality this supports the results of the analysis. Secondly, an increasing number of studies are showing that maximum likelihood estimation techniques perform well under conditions which are not ideal, including non-normality (Hoyle & Panter, 1995). The results of several studies have suggested that maximum likelihood estimation is remarkably robust even when there is marked departure from multivariate normality (Huba & Harlow, 1987; Olsson et al., 2000; Wang et al., 1996).

Ideally, another estimation technique that is not based on the assumption of normality would be used. At a future stage, when revalidation is completed on an independent representative sample, it would be ideal to use one of the estimation techniques which are not based on the assumption of normal distribution.

In conclusion, the CFA showed that the model on which the MSOCS was based had a marginal fit with the data. However, while the fit was only marginal, it was significantly better than the fit of other models based on other theories and the two key aspects of the model were supported. It was also shown that the internal consistency was acceptable. While this analysis gives tentative support for the structural validity of the MSOCS, the model should be revalidated on an independent sample at some later stage because post-hoc changes were made.

Convergent and Discriminatory Validity Results

The aim of this analysis was to test the meaning of the MSOCS subscales by considering their relationships with each other and with other similar and dissimilar measures.

Design

Pearson's correlations were calculated for the relationships between the subscales of the MSOCS and subscales of the Multidimensional Health Locus of Control (Wallston et al., 1978), the Generalised Self-efficacy scale (Schwarzer, 1993), the Rosenberg (1965) Self-esteem scale, the Life Optimism Test-Revised (Scheier et al., 1994), subscales of the Medical Outcomes Study Social Support Scale (Sherbourne & Stewart, 1991), and the Neuroticism subscale of the NEO-FFI (Costa & McCrae, 1992). This analysis uses data from the cross-sectional survey described at the beginning of this chapter. Mean scores for each MSOCS subscale were calculated using the items included in the CFA. Mean scores were also calculated for the other scales included in the questionnaire which are described in detail at the beginning of this chapter. The means and standard deviations for the subscales and scales are shown in Table 6.4.

Table 6.4

Means and Standard Deviations of the Scales in Convergent and Discriminant Validity Analysis

	Mean	Standard Deviation
Ability Capacity	3.31	.52
Ability Strategy	3.36	.49
Family Capacity	3.59	.56
Family Strategy	2.96	.68
Friends Capacity	3.23	.58
Friends Strategy	2.05	.70
Luck Capacity	3.36	.72
Luck Strategy	3.66	.63
Money Capacity	2.65	.78
Money Strategy	2.36	.68
IHLC	4.38	.84
PHLC	2.74	1.12
CHLC	2.70	.94
Generalised Self-efficacy	3.10	.46
Self-esteem	3.18	.48
LOT Total	3.65	.63
LOT Optimism	3.67	.68
LOT Pessimism	3.64	.83
MOS Tangible	4.17	.91
MOS Emotion/Information	4.06	.90
MOS Love	4.29	.96
MOS Social	4.22	.89
MOS Total	4.13	.82
Neuroticism	2.50	.69

Assumptions

The assumptions of normality and linearity were evaluated through SPSS 10.0. Normality was assessed through the examination of skewness and kurtosis statistics and histograms produced by SPSS DISCRIPTIVES. Many of the variables were non-normal and transformations were performed to normalise the distribution of responses. Analyses were performed with the transformed and untransformed data and there was very little difference between the two sets of results. Consequently, the results reported are those for the untransformed data for ease of interpretation.

The correlations are shown in Table 6.5 and trends will be highlighted in this section. To further aid the clear and concise description of the results, the subscales have been grouped in two ways. Firstly, they have been grouped according to whether they are capacity subscales or strategy subscales. Secondly, they have been grouped according to the type of 'mean' they measure. The first group includes the subscales that measure internal 'means' (Ability), The second group includes those subscales that measure 'means' that are external and relate to people (Friends and Family), and the last group includes those subscales that are external and do not relate to people (Luck and Money).

Results

Internally Oriented Capacity Subscale (Ability)

As expected weak positive correlations were found for the Ability Capacity subscale with the other capacity subscales of the MSOCS. A weak to moderate positive correlation was found between Ability Capacity and Ability Strategy. Non-significant or weak negative correlations were found with the other strategy subscales of the MSOCS.

Moderate to strong positive correlations were found with capacity type scales (Self-efficacy, Self-esteem, LOT total, and LOT Optimism). Self-efficacy, Self-esteem, LOT Optimism and LOT Pessimism correlated higher with Ability Capacity than with any of the other MSOCS subscales. Ability Capacity correlated highest with Generalised Self-Efficacy. A moderate negative correlation was found with LOT Pessimism.

Weak negative correlations were found with externally oriented strategy type scales such as the PHLC and CHLC while a weak positive correlation was found with the IHLC.

Weak positive correlations were found with the MOS SSS subscales and the MOS SSS Overall Functional Social Support Index.

Lastly, Ability Capacity exhibited a moderate negative correlation with Neuroticism. This correlation was not as high as the correlations with Self-esteem, Self-efficacy and LOT Total.

Internally Oriented Strategy Subscales (Ability)

Ability Strategy tended to be unrelated to the other MSOCS subscales with the exception of a weak positive correlation with two of the other four strategy subscales (Family Strategy and Money Strategy).

A higher positive correlation was found with between Ability Strategy and the IHLC subscale than PHLC and CHLC subscales. The correlation of CHLC and Ability Strategy was non-significant.

Weak or non-significant correlations were found with the capacity type scales of Self-esteem, Lot Total, LOT Optimism, LOT Pessimism, Neuroticism and the MOS SSS subscales and the MOS SSS Overall Functional Social Support Index. The exception to this was Self-efficacy which had a weak to moderate positive correlation. This was similar to the correlation between Ability Capacity and Ability Strategy.

People Oriented Capacity Subscales (Friend and Family)

Family Capacity had a moderate positive correlation with Family Strategy while Friend Capacity had a weak positive correlation with Friend Strategy. Each subscale exhibited weak negative correlations with other external strategy subscales of the MSOCS and non-significant correlations with Ability Strategy.

Family Capacity and Friends Capacity correlated higher with each other than they correlated with any of the other MSOCS capacity subscales.

Both Family Capacity and Friends Capacity subscales exhibited weak to moderate positive correlations with Self-esteem, Self-efficacy, LOT Total, and LOT Optimism.

Moderate to strong positive correlations were found with the MOS SSS subscales and Overall Functional Social Support Index. These correlations were stronger than the MOS

SSS subscales and the Overall Functional Social Support Index exhibited with any other subscales including the Family Strategy and Friend Strategy subscales.

Weak to moderate negative correlations were found with Neuroticism and LOT Pessimism.

People Oriented Strategy Subscales (Friend and Family)

Family Strategy and Friend Strategy correlated higher with each other than they correlated with any of the other MSOCS strategy subscales. The correlations with the MSOCS capacity subscales were either weak or non-significant.

Family Strategy and Friend Strategy correlated more strongly with the PHLC subscale than with either the IHLC or the CHLC.

Similarly they exhibited weak or non-significant correlations with Self-efficacy, Self-esteem, LOT Total, LOT Optimism, LOT Pessimism and Neuroticism.

Weak to moderate correlations were found with MOS SSS subscales and the Overall Functional Social Support Index. These correlations were all weaker than those of Family Capacity and Friend Capacity with the MOS SSS subscales and the Overall Functional Social Support Index but stronger than all the other MSOCS subscales with the MOS SSS subscales and the MOS SSS Overall Functional Social Support Index.

Unexpectedly, the correlation of Friend Strategy with Neuroticism, while being weak was of similar magnitude as the correlation of Friends Capacity with Neuroticism.

Other Externally Oriented Capacity Subscales (Money and Luck)

Luck Capacity had a moderate negative correlation with Luck Strategy. It also had a moderate negative correlation with Money Strategy while the correlations with the other strategy subscales were non-significant. The correlation with the other capacity subscales of the MSOCS were moderate and positive. Money Capacity also had a moderate negative correlation with Money Strategy and correlated with all the other capacity subscales. It had a weak negative correlation with Luck Strategy.

Both subscales exhibited moderate positive correlations with Self-esteem and LOT Optimism. Weak positive correlations were found with Self-efficacy, the MOS SSS subscales and the Overall Functional Social Support Index.

Luck Capacity and Money Capacity showed a moderate negative correlation with LOT Pessimism and Neuroticism.

Other Externally Oriented Strategy Subscales (Money and Luck)

Luck Strategy and Money Strategy correlated positively and moderately with each other.

Luck Strategy subscales correlated higher with CHLC than the IHLC or PHLC. The correlation with IHLC was non-significant. Money Strategy had identical correlations with the CHLC and PHLC and a non-significant correlation with the IHLC.

The capacity type scales of Self-efficacy, Self-esteem, LOT Total, LOT Optimism, the MOS SSS subscales and the Overall Functional Social Support Index were found to have non-significant or weak negative correlations with both Luck Strategy and Money Strategy. The one exception to this is that there was a weak positive correlation between Luck Strategy and Self-efficacy.

Both Luck Strategy and Money Strategy exhibited weak to moderate positive correlations with LOT Pessimism and Neuroticism. These correlations were weaker than Pessimism and Neuroticism showed with Luck Capacity and Money Capacity.

Table 6.5

Correlation Matrix of Relationships between the MSOCS Subscales and Other Scales Chosen for Validation

	1	2	3	4	5	6	7	8	9	10
1. Ability Capacity	1.00	.30**	.22**	.04	.19**	-.09*	.35**	-.19**	.22**	-.19**
2. Ability Strategy	.30**	1.00	.06	.15**	-.02	.03	.04	.01	-.07	.14**
3. Family Capacity	.22**	.06	1.00	.51**	.42**	.03	.33**	-.12**	.23**	-.21**
4. Family Strategy	.04	.15**	.51**	1.00	.16**	.36**	.08	.12**	.00	.08*
5. Friends Capacity	.19**	-.02	.42**	.16**	1.00	.26**	.26**	.10**	.12**	-.18**
6. Friends Strategy	-.09*	.03	.04	.36**	.26**	1.00	-.08	.21**	-.09*	.21**
7. Luck Capacity	.35**	.04	.33**	.08	.26**	-.08	1.00	-.41**	.32**	-.38**
8. Luck Strategy	-.19**	.01	-.12**	.12**	-.10*	.21**	-.41**	1.00	-.18**	.36**
9. Money Capacity	.22**	-.07	.23**	.00	.12**	-.09*	.32**	-.18**	1.00	-.40**
10. Money Strategy	-.19**	.14**	-.21**	.08	-.18**	.21**	-.38**	.36**	-.40**	1.00
IHLC	.19**	.21**	.08	.12**	.05	-.03	.10*	-.04	.01	-.04
PHLC	-.23**	.10*	-.04	.26**	-.08*	.32**	-.17**	.23**	-.09*	.25**
CHLC	-.12**	.07	-.13**	.09*	.10*	.11**	-.26**	.35**	-.20**	.25**
Generalised Self-efficacy	.59**	.32**	.13**	.08	.08*	-.11**	.22**	.15**	.15**	-.09*
Self-esteem	.52**	.14**	.30**	.07	.20*	-.12**	.44**	-.23**	.39**	-.33**
LOT Total	.42**	.06	.30**	.07	.29*	-.06	.53**	-.19**	.44**	-.29**
LOT Optimism	.35**	.10*	.20**	.13**	.16**	.02	.26**	-.04	.28**	-.17**
LOT Pessimism	-.35**	.00	-.30**	.00	-.31**	.11**	-.59**	.26**	-.43**	.30**
MOS Tangible	.22**	.04	.48**	.35**	.27**	.14**	.22**	-.14**	.25**	-.20**
MOS Emotion/Inf	.22**	.00	.55**	.36**	.47**	.09*	.29**	-.13**	.22**	-.19**
MOS Love	.24**	.03	.53**	.38**	.29**	.14**	.30**	-.14**	.20**	-.23**
MOS Social	.31**	.05	.48**	.28**	.37**	.13**	.28**	-.14**	.25**	-.23**
MOS Total	.26**	.02	.58**	.38**	.42**	.00	.30**	-.15**	.25**	-.23**
Neuroticism	-.39**	-.05	-.26**	-.02	-.15**	.14**	-.41**	.21**	-.40**	.33**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Discussion

The correlations contained in Table 6.5 and outlined above support the theoretical meaning of the MSOCS subscales. The relative size and direction of the correlations were as expected. Because many of the MSOCS subscales were unique, very strong correlations were not expected but the MSOCS subscales correlated most strongly with the measures which were most similar and generally reduced in size as the similarity reduced. None of the subscales of the MSOCS correlated too highly with the other measures indicating that they are measuring different constructs. This is especially important concerning the correlations with neuroticism where none of the correlations were above a moderate level.

The lack of more similar measures to compare the MSOCS subscales with is a limitation of this analysis. However, because of the newness of this approach this was mostly unavoidable. Levenson's (1972) Multidimensionsal Locus of Control Scale could have been used instead of The Mutlidimensional Health Locus of Control Scale (Wallston et al., 1978) because it is not focused on one domain. However, its subscales would still have not been a direct match for the strategy subscales of the MSOCS. The SPOCQ (Wellborn et al., 1989) and the CAMI (Skinner et al., 1988) have been developed based on the same model as used to develop the MSOCS, but were not suitable for several reasons. Firstly, they were developed for the school/academic domain while the MSOCS was developed for the general domain. Secondly, the most thoroughly developed measures were developed for use with school children while the MSOCS was developed for adults. The SPOCQ (Wellborn et al., 1989) was adapted for adults in the academic domain but it was not validated. Thirdly, only two of the 'means' that are measured in the MSOCS are also in the SPOCQ (Wellborn et al., 1989) or the CAMI (Skinner et al., 1988).

In Sum, this analysis gives support for the construct validity of the MSOCS subscales. The correlations with other measures are of the size and direction that would be expected given the understanding of the meaning of the subscales and measures.

Test-Retest Reliability Study

Overview

It is theorised that the beliefs that the MSOCS measure are relatively stable over time. It is partly the hypothesised temporal stability of these beliefs that enables them to have an influence on health over time. It was therefore necessary to demonstrate the stability of the MSOCS over time.

This study was conducted to investigate the temporal stability of the MSOCS and used a test-retest design. While it was hypothesised that the subscales would be relatively stable over time, it was also expected that there would be some variation between the subscales because the beliefs concern very different 'means' and the nature of these 'means' will lead to different degrees of change. For example, beliefs regarding the availability of money are likely to be less stable than beliefs regarding ability. As the MSOCS follows a similar approach to control beliefs as the SPOCQ (Wellborn et al., 1989) and the CAMI (Skinner et al., 1988) the temporal stability of the subscales in these measures is worth considering. The test-retest reliability of the SPOCQ over an 8-week interval ranged from .39 to .64. It is understandable that some of these values are low given that the participants were children. It is expected that higher temporal reliability will be found for the subscales of the MSOCS.

Method

Participants

The participants in this study were an opportunity sample of undergraduate students. These students were from Massey University (Palmerston North) and were completing a second year psychology course in research methods. Participation in the exercise was voluntary. Forty-two students completed the questionnaire on both occasions. The participants had an age range of 19 – 44 and a mean age of 23.58 (median = 20.00).

Thirty-one of the participants were female while 11 were male. Details of the ethnicity and highest educational qualification are contained in Table 6.6. The majority of the participants identified themselves as NZ European/Pakeha (59.5%) while 16.7 percent identified themselves as NZ Maori. Most participants had a higher school qualification such as University Entrance (83.2%) while only 7.1% had a university degree, certificate or diploma and none of the participants had a trade certificate or professional certificate or diploma.

Table 6.6

Ethnicity and Highest Educational Qualification

	Number of respondents	Percentage of respondents
Ethnicity		
NZ Maori	7	16.7
Asian	3	7.1
NZ European/Pakeha	25	59.5
Pacific Islander	2	4.8
Other	5	11.9
Highest educational qualification		
No school qualification	3	7.1
School certificate passes	4	9.5
Higher school qualifications	32	76.2
Trade certificate or Professional certificate or diploma	0	0
University degree, diploma, or certificate	3	7.1
Post graduate qualification	0	0

Questionnaire

The questionnaire included the items from the MSOCS which were chosen for further testing at the end of the EFA (see Chapter Five) and questions concerning age, gender, ethnic group, and highest educational qualification. A copy of the questionnaire is attached in Appendix Ten.

Procedure

The purpose of the study and what the study involved was explained to the students during class. Students who wished to be involved with the study completed the questionnaire immediately during class time. The questionnaire was completed twice with a six-week interval between administrations.

Results

Missing Data

82.3% of the items had no missing data. The items that had missing data had only small amounts with the most data missing for any one variable only being 5.7%. Most people (69%) missed no items. On average each person missed only .66% of the items with a range of 0-6% items missed. EM imputation was used to replace the missing data.

Subscale Scores

Mean subscale scores were calculated using the items included in the CFA analysis and the sample means and standard deviations are shown in Table 6.7.

Assumptions

The assumptions of normality and linearity were evaluated through SPSS 10.0 DISCRIPTIVES. Normality was assessed through the examination of skewness and kurtosis statistics and histograms. Many of the variables were non-normal and transformations were performed to normalise the distribution of responses. Analyses were performed with the transformed and untransformed data and there was very little difference between the two sets of results. Consequently, the results reported are those for the untransformed data because these are easier to interpret.

Table 6.7

Means and Standard Deviations of MSOCS Subscales in the Test-Retest Analysis

	Mean	Standard Deviation
Ability Capacity 1	3.16	.54
Ability Strategy 1	3.11	.38
Family Capacity 1	3.70	.39
Family Strategy 1	3.21	.46
Friends Capacity 1	3.34	.46
Friends Strategy 1	2.40	.45
Luck Capacity 1	3.43	.71
Luck Strategy 1	1.65	.54
Money Capacity 1	2.37	.31
Money Strategy 1	2.43	.50
Ability Capacity 2	3.11	.64
Ability Strategy 2	3.12	.43
Family Capacity 2	3.70	.41
Family Strategy 2	3.17	.54
Friends Capacity 2	3.27	.61
Friends Strategy 2	2.35	.54
Luck Capacity 2	3.50	.75
Luck Strategy 2	1.83	.48
Money Capacity 2	2.46	.35
Money Strategy 2	2.43	.55

The scores from the first data collection can be identified by the number 1 after the subscale name and the scores from the second data collection can be identified by the number 2 after the subscale name.

Table 6.8 shows the test-retest reliability of the MSOCS subscales. The test-retest reliability for the subscales varied markedly from Money Capacity (.49) to Ability Capacity (.87).

Table 6.8

Test-Retest Reliability for MSOCS Subscales

Subscale	
Ability Capacity	.87
Ability Strategy	.53
Family Capacity	.63
Family Strategy	.72
Friends Capacity	.78
Friends Strategy	.67
Luck Capacity	.65
Luck Strategy	.67
Money Capacity	.49
Money Strategy	.59
Control	.68

Discussion

The results show that, as expected, most of the subscales have reasonable stability over a six-week interval. The two subscales which had the worst temporal reliability were Ability Strategy and Money Capacity. The relatively low reliability of Money Capacity is understandable given that the participants were students. Money Capacity essentially measures whether the person believes that they have access to the money they need. It would be expected that, with the nature of student finances, there would be change over a period of six weeks. The low temporal stability of Ability Strategy is less understandable and does cause some concern. It may be that the participation in academic activities changes students' belief in the role of ability to achieve their goals. As the sample was quite young, it would be expected that the stability coefficients would be higher with a more representative sample which included older people. Students are at a time of change

and their attitudes and beliefs may be relatively unstable. However, the responses were more stable than those reported for the SPOCQ (Skinner et al., 1988).

It is recognised that the sample used in this study is small and is not representative of the general population. Another limitation is that the time interval between administrations is only six weeks. The mechanisms outlined in Chapter Three through which control beliefs are associated with health are likely to operate over extended time periods. Consequently, it would be expected that control beliefs would need to be fairly stable over extended periods of time. In the future it would be ideal to test the temporal stability of the subscales again with a larger more representative sample with a more extended interval between administrations.

However, although there are these limitations, the study does give some indication of the temporal stability of the measure and does suggest that with this sample, over a six-week period, the beliefs measured by the MSOCS are fairly stable.

Summary

This chapter has presented analyses used in the final development and assessment of the properties of the MSOCS. The first analysis was a confirmatory factor analysis which compared the hypothesised model to alternative theoretical models. This analysis showed that the hypothesised model fits the data better than any of the alternative models which supported the hypothesised structure of the measure. However, the model fit was only marginal and as a result of efforts to improve the model two items were removed. Analysis of the internal reliability of the subscales showed that the resulting subscales had acceptable internal reliability. The third analysis looked at the relationship of the MSOCS subscales to themselves and to a number of other similar and dissimilar psychological measures. It was found that the relationships were of the size and direction that would be expected given the theoretical understanding of the measures. Lastly, the temporal stability of the subscales over six weeks was explored. This showed that the subscales generally had good temporal stability over this period of time. From the analyses performed in this chapter it was concluded that while improvements could be made to the MSOCS in the future, it would be suitable for exploratory analyses.

Chapter Seven

TESTING OF HYPOTHESES

Overview

A number of hypotheses were made in Chapter Four as a result of the literature review contained in Chapters One to Three. This chapter reports the analyses which test those hypotheses outlined in Chapter Four. These hypotheses are based on the research outlined in Chapters One to Three and follow principles outlined by Baron and Kenny (1986) and Holmbeck (1997) for testing mediational and moderational relationships using multiple regression. For convenience these hypotheses are stated again below.

Higher SES will be associated with better health

Higher SES will be associated with a greater overall sense of control.

Higher SES will be associated with a greater sense of control through each 'means'.

A greater overall sense of control will be associated with better health.

A greater sense of control through each 'means' will be associated with better health.

An overall sense of control will mediate the relationship between SES and health.

A sense of control through each 'means' will mediate the relationship between SES and health.

An overall sense of control will moderate the relationship between SES and health.

A sense of control through each 'means' will moderate the relationship between SES and health.

Method for Hypothesis Testing

The same data set was used for the testing of the hypotheses as was used for the CFA and convergent validity analyses. Therefore the data collection procedures and the sample description are outlined in Chapter Five.

Measures

The Calculation of Sense of Control Scores Using MSOCS Subscale Scores.

A major implication of the theory on which the MSOCS was based is that capacity and strategy scores combine to reflect a sense of control (see Chapter Two). Accordingly, in the present study the participants' scores on the capacity and strategy subscales were combined to produce sense of control scores for each 'means'. This combination was different from that used in previous studies using different measures (e.g. Wellborn et al., 1989) where the subscales were combined in the way that it was believed would best predict students' engagement in school activities.

Scores produced by simple multiplication do not reflect the theorised result of the combination of capacity and strategy beliefs. This can be clearly shown using some examples. Simple multiplication scores suggest that a person who believes they have no access (Capacity score = 1) to an important means (Strategy score = 4) has a higher sense of control (Control = 4) than a person who believes they have no access (Capacity score = 1) to a means which is not important (Strategy score = 1). In theory, the first person must have a lower sense of control than the second but simple multiplication scores cannot reflect this.

Because simple multiplication scores were not able to reflect the theorised result of the combination of capacity and strategy beliefs. a more complex means of combining the subscales was sought. Two separate equations were needed: one for when capacity beliefs was equal to or greater than strategy beliefs ("I have access to the means of control") and

the other for when capacity beliefs was less than strategy beliefs ("I do not have access to the means of control"). The equations which produced these scores were[1]:

If $c >= s$ $\quad c + 2 + s\,(9 - s\,) / 2$

If $c < s$ $\quad c + 6 - (s - c) * (7 + c - s) / 2$

Where c = capacity belief score and s = strategy belief score.

The variable that concerned a sense of control through ability was labelled Ability Control, through family, Family Control, through Friends, Friend Control, through luck, Luck Control and through money, Money Control.

Once sense of control scores were calculated for each 'means' a total score was also calculated by summing the sense of control scores for each of the 'means'. The reasoning behind this was that a sense of control from each individual 'means' should contribute to an overall sense of control. This was supported by the fact that none of the correlations between the sense of control scores were negative as seen in Table 7.01. This variable was labelled Control Total or overall sense of control.

Table 7.01

Correlations Between Scores for Sense of Control through Ability, Family, Friends, Luck and Money.

	Ability Control	Family Control	Friend Control	Luck Control	Money Control
Ability Control	1.00	.04	.04	.15**	.20**
Family Control	.04	1.00	.30**	.19**	.12**
Friend Control	.04	.30	1.00	.15**	.04
Luck Control	.15**	.19**	.15**	1.00	.22**
Money Control	.20**	.12**	.04	.22**	1.00

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

1 This equation was formulated by Ian Smart, Kate Smart and Susan Kelly

Health

While an objective measure of health would have been ideal it was not possible given the constraints of the present study. However self-report measures have been shown to have good validity. A large amount of research has shown that self-report measures of health predict morbidity and mortality (Idler & Benyamini, 1997). They have been found to be a stronger predictor of mortality than health assessed by a doctor (Mossey & Shapiro, 1982). Because self-report measures assess well-being and not merely the absence of disease they comply with the World Health Organisation's definition of health (Ross & Mirowsky, 1998). Two self-report measures of health are used in this analysis.

Health Problems

One self-report measure of health was a count of the number of health problems the person had been diagnosed with. The participants were asked to indicate whether they had ever been diagnosed with any of the health problems (e.g. high blood pressure, diabetes, and osteoporosis) in a list of 24. The health problems included in this question were chosen to cover a broad range of health problems. There was also the option for respondents to indicate another health problem which was not included in the list. These responses were considered and if they were different from the other options the response was included as a health problem. A total score was calculated by summing the health problems the person had indicated they had been diagnosed with. The actual range of the scores was 0 to 14 with a higher score indicating a greater number of problems diagnosed.

This approach to measuring health has been used extensively by other researchers. For example, Lachman & Weaver (1998) and Bailis et al (2001) who investigate the mediating role of psychosocial variables in the relationship between SES and health also use this approach.

SF12

The second self-report measure of health was the SF-12 (Ware, Kosinski, & Keller, 1998). The SF36 (Ware, Kosinski, & Keller, 1994) was considered for inclusion but it was too large and also provided more information than was needed. The SF12 is much shorter and gives sufficient information for this analysis.

At least one item representing each of the eight health concepts in the SF-36 is included in the SF-12. The SF-12 gives the same two summary scores as the SF-36: Physical Component Summary (SF-12 PCS) and Mental Component Summary (SF-12 MSC). The SF-12 PCS and SF-12 MCS are scored using norm based methods. Each of the twelve items in the SF-12 are used in scoring both summary scores but different regression weights and constants are used to produce the summary scores. The aim of this is to reproduce as closely as possible the SF-36 summary scores. Norm based standardised scores are produced with means of 50 and standard deviations of 10 in the general U.S. population. Higher scores indicate better health.

Because the items were chosen to represent the eight different facets of health in the SF-36, the items were expected to contain unique reliable variance. For this reason internal consistency was not seen as an appropriate way of measuring the reliability of the scales and therefore test-retest methods were used. In a U.S. population, scores on the SF-12 PCS taken over a two week interval correlated 0.89 with 85.3% of people remaining within a 95% confidence interval of their first score. In a U.K. population, scores on the SF-12 PCS taken over a two week interval correlated 0.88 with 89.9% of people remaining within a 95% confidence interval of their first score. This shows that the SF-12 PCS has satisfied the test-retest requirements for measuring health as outlined by Nunnally and Bernstein (1994).

That items representing each of the eight facets of the SF-36 are included in the SF-12 is evidence of its content validity. These facets are the same as those most frequently included in the most widely used health measures (Ware, Snow, Kosinski & Gandek, 1993).

A test of the validity of the SF-12 is to assess its relationship with the SF-36. The SF-12 PCS correlated 0.951 with the SF-36 PCS, while the SF-12 MSC correlated 0.969 with the SF-36 MSC. This represents R^2 values of 0.904 and 0.939 respectively. The SF-12 PCS and SF-12 MSC correlate very weakly ($r = 0.06$) showing that the two subscales are independent. The high correspondence between the SF12 and SF-36 summary scores means that the norms for the SF-36 can be used in interpreting the SF-12.

The SF-12 and SF-36 are recognised as reliable and valid measures of health-related quality of life (Schofield & Mishra, 1998). However they can also be used as an indicator of health status. Several studies are reported in the SF-12 scoring manual (Ware et. al., 1998) to support its validity as a measure of health status. These studies compare its scores with the SF-36 and assess its ability to discriminate between different groups. The PCS-12 agreed with the PCS-36 on all occasions and was able to differentiate between different groups on all occasions. The validity was also investigated in a large study involving Australian women (Schofield & Mishra, 1998). The PCS-12 was able to discriminate well between women who reported experiencing a large number of symptoms in the last 12 months from those who reported experiencing few symptoms. That the 1996/1997 New Zealand Health Survey (Ministry of Health, 1999) used the SF-36 as a measure of health is further support for the use of the SF-12 as a measure of health.

Socioeconomic Status

Educational Attainment

Participants were asked to indicate the highest educational attainment they had gained. Options for response were: no school qualification, School Certificate passes, Higher School Qualifications (e.g. University Entrance), Trade Certificate or Professional Certificate or Diploma, University Degree, Diploma, or Certificate, and Post Graduate Qualification. Because this was an ordinal measure it was converted into dummy variables for the purposes of this analysis. The decision as to how to split the education variable was made on the basis of comparing means on the measures of health of the different education options while also maintaining relatively equal sized groups. Three splits were made. One split was made between those who had School Certificate passes and those who had a Higher School Qualification. The dummy variable created based on this split was labelled Education 1. A second split was made between those who had a Trade Certificate or Professional Certificate or Diploma and those who had a University Degree, Diploma, or Certificate. The dummy variable created based on this split was labelled Education 2. The third split was made between those who had a University Degree, Diploma or Certificate and those who had a Post Graduate Qualification. The dummy variable created based on this split was labelled Education 3.

Income

Another available index of SES was income. Respondents were asked about their own level of income (Own Income) and the level of their household income (Household Income). Eight response options were available: Loss/Zero, $1-$20,000, $20,001-$30,000, $30,001-$40,000, $40,001-$50,000, $50,001-$70,000, $70,001-and more, don't know. The "don't know" option was treated as missing data. The decision to give discrete response options rather than allowing people to indicate the income level themselves was made to reduce the amount of missing data (Najman, 1988). However, this meant that this data was ordinal and so dummy variables were created. The decision as to how to split the income variables was made on the basis of comparing means on the measures of health of the different income options while also trying to maintain equal sized groups. For the Own Income variable three groups were identified. One group was from Loss/Zero to $20,000, from $20,001 to $70,000 and above $70,001 and more. These splits were made and binary variables were made on their basis. For Household Income two splits were made. One was made between responses of $30,000 and below and responses of $30,001 and above. The dummy variable created based on this split was labelled Household Income 1. The second split was made between responses of $50,000 and below and responses of $50,000 and above. The dummy variable created based on this split was labelled Household Income 2. Initial analyses showed that the binary variables of Own Income were strongly correlated with the binary variables of Household Income suggesting that they were measuring similar information. This is understandable because household income is at least partially made up of own income. In addition, household income is preferred to personal income as an indicator of SES because it recognises that the income within a household is shared (Davis et al., 1997). Initial analyses also showed that household income was more strongly correlated with health than the own income. For these reasons it was decided that it would be appropriate to only analyse Household Income and that this would make the analysis and its reporting less complex.

Deprivation Index

The 1996 version of the New Zealand Deprivation Index (NZDep96; Salmond, Crampton, & Sutton, 1998) was a third indicator of SES used in the analyses. The NZDep96 allocates a deprivation score to each meshblock in New Zealand based on information provided in the 1996 census. Two scores are provided. One score has a range of 1 to 10 where 1

signifies the least deprived and 10 the most deprived areas. This score is considered an ordinal score. The second score has a mean of 1,000 with a standard deviation of 100 with higher scores again indicating more deprivation. Factors used in calculating the deprivation score were communication, income, employment, household income, transport, support, qualifications, owned home, and living space.

Because deprivation scores are allocated to meshblocks they are a community measure of SES, not an individual measure. This is an important point as the present study is looking at individual SES. There can be substantial differences in a person's individual SES and the SES of the community they live in. However, this measure has three benefits. One is that it contains no missing data, another is that it is an ordinal measure and lastly it incorporates a variety of aspects of SES. In addition, it is recognised as a measure of SES and has been used as such in a number of studies (Blakely, 2002). The NZDep96 is more appropriate that some other community measures as an indicator of SES position because it uses particularly small areas (Blakely, 2002). Therefore, the decision was made to use the measure while being aware of its limitations.

Other Variables

Age

Age was measured by asking the person to indicate their age in years. Age was used to describe the sample and to control for its impact on health.

Gender

Gender was used to describe the sample and it was thought that it might me needed to control for its impact on health.

Analyses

The hypotheses were tested using pearsons correlations and multiple regression. The choice to use multiple regression instead of structural equation modelling was made because of the large number of single indicator variables in the analyses which would have caused identification problems (Ullman, 2001).

Results For Hypothesis Testing

Data screening

No data entry accuracy problems were encountered and missing data was replaced using EM as described in Chapter Six.

As new scores had been calculated,(as described earlier in this chapter) the assumptions for multivariate analysis were assessed. Subscales were assessed for univariate normality using skewness and kurtosis statistics and histograms produced by SPSS FREQUENCIES. This indicated that none of the subscales were univariate normal and so transformations were performed to correct this. Reverse and logarithmic transformations for Ability Control, Family Control, Luck Control, Money Control. A reverse and square root transformation was made to Friends Control. A square root transformation was performed on the Health Problems variable. Logarithmic transformations were performed on the PCS-12 and Control Total variables. An inverse transformation was performed on the NZDep96 scores.

Analysis of multivariate outliers, normality, linearity, and homoscedasticity was performed using SPSS REGRESSION. With the use of a $p < .001$ criterion for Mahalanobis distance, one outlier was identified. This participant was a 61 year old female who identified herself as NZ European/Pakeha, with no school qualification who was retired. This participant's Mahalanobis distance value was substantially larger than that of the next highest participant. Careful examination of this participants scores revealed no obvious reason why this person was so different from the other participants. Because it was only one participant and there was such a large difference it was decided to remove this person from further analysis.

Multivariate normality was assessed using a normal probability plot of the standardised residuals, and a scatterplot of the standardised residuals against the standardised predicted values. Both of these figures showed that the variables were multivariate normal. The

scatterplot was also used to assess linearity and homoscedasticity. It revealed that both of these assumptions were met. Multicollinearity was assessed using the Tolerance statistics produced by SPSS REGRESSION. These revealed that there was no multicollinearity problems.

Results

Hypothesis One: Higher SES will be associated with better health

To examine the association between SES and health the mean scores for Health Problems and PCS-12 were compared at each level of Education and Household Income. Table 7.02 shows the mean health scores for the original measures of Education and Household Income. The general pattern for Education is that PCS-12 scores increase with increased Education. The pattern for Household Income is clearer with increased PCS-12 scores and decreased Health Problems associated with increased Household Income.

Table 7.02

Mean Health Problems and PCS-12 Scores for Levels of Education and Household Income

	Response	PCS-12	Health Problems
Education	1	48.52	2.82
	2	47.97	2.98
	3	51.13	2.41
	4	50.48	2.41
	5	51.97	2.25
	6	49.45	2.68
Household	1	43.77	1.5
Income	2	43.16	3.87
	3	45.62	2.96
	4	49.53	2.70
	5	51.76	2.47
	6	52.69	2.00
	7	52.60	2.37

Bivariate Correlations

As seen in Table 7.03, Education 1, Household Income 1 and Household Income 2 were associated with both measures of health. The NZDep96 was associated with the PCS-12. Education 2 and Education 3 were not associated with either measure of health. When there was an association it was such that increased SES was associated with better health.

Table 7.03

Bivariate Correlations Between Measures of SES and Health

	PCS-12	Health Problems	Age	Gender
Education 1	-.13**	-.11**	-.17***	-.07
Education 2	-.07	-.04	-.10*	-.05
Education 3	.01	-.04	-.01	-.05
Household Income 1	-.32***	-.16***	.31***	-.02
Household Income 2	-.25***	-.17***	-.17***	-.02
NzDep96	-.10*	-.05	.05	-.02
Age	.33**	.35**	1.00	-.01
Gender	.06	.06	-.01	1.00

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

Regression Analyses

Regression analyses were performed to examine the significant relationships between the measures of SES and health while controlling for the impact of Age on the dependent variable. Age (see Table 7.03) was positively associated with both measures of health. Increased Age was associated with reduced education and household income.

Two hierarchical multiple regression equations were run with Age entered at the first step, Education 1, Education 2, Education 3, Household Income 1, Household Income 2 and the NZDep96 as independent variables and PCS-12 or Health Problems as the dependent variable. The results of these analyses are described below.

SES and PCS-12

The results of this analysis are shown in Table 7.04. PCS-12 was the dependent variable. Age was entered at the first step. Education 1, Household Income 1, Household Income 2

and the NZDep96 were entered at step two. Age accounted for a significant 14.6% of the variance in PCS-12. In the second step, the addition of Education 1, Household Income 1, Household Income 2 and the NZDep96 accounted for 5.6% significant additional variation in PCS-12. Household Income 1 (*Beta* = -.153, p = .001; note the *Betas* are negative because the variables were transformed) and Household Income 2 (*Beta* = -.097, p = .031) were shown to have a positive association with the PCS-12 with a higher household income being associated with better health. Education 1 and the NZDep96 were not significantly related to the PCS-12 when entered into the equation with the other variables.

Table 7.04

Hierarchical Multiple Regression of PCS-12 on Education 1, Household Income 1, Household Income 2, and NZDep96 Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	F Change	Beta
1		.146	.144	.146	99.485***	
	Age					.382***
2		.201	.194	.056	10.062***	
	Age					.320***
	Education 1					-.008
	Household Income 1					-.152**
	Household Income 2					-.095*
	NZDep96					-.062

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

SES and Health Problems

The results of this analysis are shown in Table 7.05. Health Problems was the dependent variable. Age was entered at the first step. Education 1, Household Income 1 and Household Income 2 were entered at step two. Age accounted for a significant 12.1% of the variance in Health Problems. In the second step, the addition of Education 1, Household Income 1 and Household Income 2 accounted for 1.3% significant additional variance in the PCS-12. Household Income 1 was shown to have a positive association with the PCS-12 (*Beta* = -.111) with a higher household income being associated with

better health. Household Income 2 was not shown to be independently associated with Health Problems.

Table 7.05

Hierarchical Multiple Regression of Health Problems on Education 1, Household Income 1 and Household Income 2 Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	F Change	Beta
1		.121	.119	.121	80.156***	
	Age					.348***
2		.134	.128	.013	3.001*	
	Age					.325***
	Education 1					-.023
	Household Income 1					-.111*
	Household Income 2					.002

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

Summary

When Age was controlled Household Income 1 and Household Income 2 were associated with the PCS-12 and Household Income 1 was associated with Health Problems.

Hypotheses 2 and 3: Higher SES will be associated with a greater sense of control

Bivariate Correlations

The correlations between measures of SES and sense of control scores are shown in Table 7.06. Control Total and Money Control was associated with all measures of SES. Ability Control was associated with all measures of SES except the NZDep96. Family Control was only associated with Household Income 1 and the NZDep96. Friends Control was not associated with any measure of SES. Luck Control was associated with Education 1, Education 2 and Household Income 2. All associations between measures of SES and

sense of control were such that higher SES was associated with increased sense of control control.

Table 7.06

Bivariate Correlations Between Measures of SES and Sense of Control Scores

	Control Total	Ability Control	Family Control	Friends Control	Luck Control	Money Control
Education 1	-.222***	-.321**	.024	.014	-.146***	-.130**
Education 2	-.247***	-.264***	.019	.005	-.127**	-.157***
Education 3	-.162***	-.204***	-.001	.014	-.033	-.127**
Household Income 1	-.320***	-.192***	-.136**	-.077	.114	-.269***
Household Income 2	-.259**	-.149***	-.062	-.026	-.089*	-.256***
NZDep96	-.143***	-.041	-.099*	.005	-.037	-.183***
Age	.081*	.203***	-.035	.073	.012	-.121**
Gender	-.045	.006	-.041	-.151***	-.040	.033

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

Regression Analyses

Regression analyses were performed to examine the significant relationships between the measures of SES and sense of control while controlling for the association of Age with the dependent variable. Age (see Table 7.06) was associated with increased Control Total, Ability Control and decreased Money Control. Five hierarchical multiple regression equations were run with Age entered at the first step when appropriate, a combination including Education 1, Education 2, Education 3, Household Income 1, Household Income 2 and the NZDep96 as independent variables and Control Total, Ability Control, Family Control, Luck Control or Money Control as the dependent variable. The results of these analyses are described below.

SES and Control Total

The results of the analysis are shown in Table 7.07. Control Total was the dependent variable. Age was entered at the first step. Education 1, Education 2, Education 3, Household Income 1, Household Income 2 and the NZDep96 were entered at step two. Age accounted for a significant 0.5% of the variance in Control Total. In the second step, the addition of the SES variables accounted for 13.8% significant additional variance.

Education 2 (*Beta* = -.121, p = .016) and Household Income 1 (*Beta* = -.239, p < .000) were shown to have a positive association with Control Total with higher SES being associated with a greater sense of control. The other SES variables were not related to Control Total once they were entered with the other SES variables and Age was controlled.

Table 7.07

Hierarchical Multiple regression of Control Total on the SES Variables Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	F Change	Beta
1		.007	.005	.007	3.880*	
	Age					.081*
2		.149	.138	.142	16.044**	
	Age					-.028
	Education 1					-.084
	Education 2					-.121*
	Education 3					-.028
	Household Income 1					-.239***
	Household Income 2					-.060
	NZDep96					-.041

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

SES and Ability Control

The results of the analysis are shown in Table 7.08. Ability Control was the dependent variable. Age was entered at the first step. Education 1, Education 2, Education 3, Household Income 1 and Household Income 2 were entered at step two. Age accounted for a significant 4.1% of the variance in Ability Control. In the second step, the SES variables accounted for 8.3% significant additional variance. Education 1 (*Beta* = -.100, p = .028), Education 2 (*Beta* = -.138, p = .006) and Education 3 (*Beta* = -.099, p < .029) were shown to have a positive association with Ability Control with higher SES being associated with a greater sense of control through ability. Household Income 1 and Household Income 2 were not related to Ability Control once Age was controlled and they were entered with the other SES variables.

Table 7.08

Hierarchical Multiple Regression of Ability Control on Education 1, Education 2, Education 3, Household Income 1, and Household Income 2 Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	F Change	Beta
1		.041	.040	.041	25.160***	
	Age					.203***
2		.124	.115	.083	10.962***	
	Age					.148***
	Education 1					-.100*
	Education 2					-.138**
	Education 3					-.099*
	Household Income 1					-.086
	Household Income 2					-.013

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

SES and Family Control

The results of this analysis are shown in Table 7.09. Family Control was the dependent variable. Household Income 1 and the NZdep96 were entered at step one. Household Income 1 and the NZDep96 accounted for 2.4% significant variance. Household Income 1 (*Beta* = -.120, *p* = .004) was shown to have a positive association with Family Control with higher SES being associated with a greater sense of control through family. The NZDep96 was not related to Family Control once it was entered with Household Income 1.

Table 7.09

Multiple Regression of Family Control on Household Income 1 and NZDep96 Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.024	.020	.024	7.081**	
	Household Income 1					-.120**
	NZDep96					-.074

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

SES and Luck Control

The results of this analysis are shown in Table 7.10. Luck Control was the dependent variable. Education 1, Education 2 and Household Income 2 were entered at step one. Education 1, Education 2 and Household Income 2 accounted for 2.7% significant variance. Education 1 (*Beta* = -.103, *p* = .029) was shown to have a positive association with Luck Control, with higher SES being associated with a greater sense of control through luck. Education 2 and Household Income 2 was not related to Luck Control once they was entered with Education 1.

Table 7.10

Multiple Regression of Luck Control on Education 1, Education 2 and Household Income 2 Showing Standardised Regression Coefficients (Beta), R, R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.027	.022	.027	5.372**	
	Education 1					-.103*
	Education 2					-.065
	Household Income 2					-.041

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

SES and Money Control

The results of this analysis are shown in Table 7.11. Money Control was the dependent variable. Age was entered at the first step. Education 1, Education 2, Education 3,

Household Income 1, Household Income 2 and the NZDep96 were entered at step two. Age accounted for a significant 1.5% of the variance in Money Control. In the second step, the addition of the SES variables accounted for 13.6% significant additional variance. Household Income 1 (*Beta* = -.237, $p < .000$) and Household Income 2 (*Beta* = -.118, $p = .013$) were shown to have a positive association with Money Control with higher SES being associated with a greater sense of control through money. The other SES variables were not related to Money Control once they were entered with the other SES variables and Age was controlled.

Table 7.11

Hierarchical Multiple Regression of Money Control on the SES Variables Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	F Change	Beta
1		.015	.013	.015	8.715**	
	Age					.121**
2		.151	.141	.136	15.411***	
	Age					-.224***
	Education 1					-.040
	Education 2					-.049
	Education 3					-.026
	Household Income 1					-.237***
	Household Income 2					-.118*
	NZDep96					-.075

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

Summary

Control Total was associated with Education 2 and Household Income 1. Ability Control was associated with Education 1, Education 2 and Education 3. Family Control was associated with Household Income 1. Luck Control was associated with Education 1. Money Control was associated with Household Income 1 and Household Income 2.

Hypotheses Four and Five: A greater sense of control will be associated with better health

Bivariate Analyses

As seen in Table 7.12 Control Total and Ability Control were related to both measures of health while Luck Control and Money Control were related to the PCS-12. Family Control and Friends Control were not related to either measure of health. The associations were such that an increased sense of control was associated with better health.

Table 7.12

Bivariate Correlations Between Measures of Health and Sense of Control Scores

	PCS-12	Health Problems	Age	Gender
Control Total	.17***	.14**	.08*	-.05
Ability Control	.15***	.11**	.20***	.06
Family Control	.04	.03	-.04	-.04
Friends Control	.02	.06	.07	-.15***
Luck Control	.15***	.08	.01	-.04
Money Control	.09*	.05	-.12**	.03
Age	.33***	.35***	1.00	-.01
Gender	.06	.06	-.01	1.00

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

Regression Analyses

Regression analyses were performed to examine the significant relationships between the measures of sense of control and health while controlling for the association of Age with the dependent variable. Age (see Table 7.12) was associated with reduced health.

Four hierarchical multiple regression equations were run with Age entered at the first step when appropriate, either Control Total or a combination of Ability Control, Luck Control and Money Control as independent variables and PCS-12 or Health Problems as the dependent variable. Ability Control was not associated with Health Problems once Age was controlled. The three equations in which the association between sense of control and health, while controlling for Age, were significant are described below.

Control Total and PCS-12

The results of this analysis are shown in Table 7.13. PCS-12 was the dependent variable. Age was entered at the first step to control for its association with the PCS-12. Control Total was entered at step two. Age accounted for a significant 14.6% amount of the variance in the PCS-12. In the second step, Control Total accounted for 1.9% significant additional variance. Control Total was shown to have a positive association with PCS-12 with more belief in one's sense of control being associated with better health.

Table 7.13

Hierarchical Multiple Regression of PCS-12 Scores on Control Total Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	F Change	Beta
1		.146	.144	.146	99.485***	
	Age					.382***
2		.164	.162	.019	13.035***	
	Age					.371***
	Control Total					.137***

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

Ability Control, Luck Control and Money Control and PCS-12

The results of this analysis are shown in Table 7.14. PCS-12 was the dependent variable. Age was entered at the first step to control for its association with PCS-12 scores and the sense of control variables were entered at step two. Age accounted for a significant 14.6% of the variance in the PCS-12. In the second step, the addition of the sense of control variables accounted for 3.2% significant additional variance in the PCS-12. Ability Control was not found to be associated with the PCS-12 when entered with the other sense of control variables. Sense of control through the 'means' of luck and money were shown to be positively associated with PCS-12 scores with a greater sense of control through luck or money being associated with better health.

Table 7.14

Multiple Regression of PCS-12 Scores on Ability Control, Luck Control and Money Control Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.146	.144	.146	99.485***	
	Age					.382***
2		.178	.172	.032	13.035***	
	Age					.387***
	Ability Control					.029
	Luck Control					.118**
	Money Control					.101*

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

Control Total and Health Problems

The results of the analysis are shown in Table 7.15. Health Problems was the dependent variable. Age was entered at the first step to control for its association with Health Problems. Control Total was entered at step two. Age accounted for a significant 12.1% of the variance in the PCS-12. In the second step, Control Total accounted for 1.2% significant additional variance. Control Total was shown to have a positive association with Health Problems with a greater overall sense of control being associated with better health.

Table 7.15

Hierarchical Multiple regression of Health Problems on Control Total Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.121	.119	.121	80.156***	
	Age					.348***
2		.132	.129	.012	7.719***	
	Age					.339***
	Control Total					.108**

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

Summary

Control Total was related to both measures of health when Age was controlled. Luck Control and Money Control were related to the PCS-12 when Age was controlled. Ability Control was not related to either of the measures of health when Age was controlled. Family Control and Friends Control were not related to either measure of health.

Hypotheses Six and Seven: A sense of control will mediate the relationship between SES and health

The purpose of these analyses was to test the hypothesis that a sense of control will mediate the relationship SES and health. This relationship was tested using the process outlined by Baron and Kenny (1986) and Holmbeck (1997). Firstly, a relationship must be established between SES and health. In previous analyses reported above Household Income 1 and Household Income 2 were shown to be associated with PCS-12 (Table 7.04) and Household Income 1 associated with Health Problems (Table 7.05). A relationship must also be established between SES and sense of control. In previous analyses, reported above, Education 1 was associated with Ability Control (Table 7.08) and Luck Control (Table 7.10), Education 2 was associated with Control Total (Table 7.07) and Ability Control (Table 7.08), Education 3 was associated with Ability Control (Table 7.08), Household Income 1 was associated with Control Total (Table 7.07), Family Control (Table 7.09) and Money Control (Table 7.11) and Household Income 2 was associated with Money Control (7.11). The third requirement is that a relationship must be established between sense of control and health. In previous analyses reported above Control Total was associated with PCS-12 (Table 7.13) and Health Problems (Table 7.15) while Luck Control and Money Control were associated with PCS-12 (Table 7.14). The final requirement is that the relationship between SES and health should be reduced when sense of control is entered into the equation.

Based on the first three sets of previous analyses four potential mediating relationships were tested to see if they fulfilled the fourth requirement. Hierarchical multiple regression equations were used to test these four relationships. In these equations Age was entered at the first step, the SES variable entered at the second step, the sense of control variable at

the third step and the PCS-12 or Health Problems were the dependent variable. These equations are described below.

The mediational role of Control Total in the relationship between Household Income 1 and the PCS-12

The results of this analysis are shown in Table 7.16. PCS-12 was the dependent variable. Age was entered at the first step to control for its association with the PCS-12. Age accounted for a significant 14.6% of the variance of the PCS-12. The addition of Household Income 1 at the second step accounted for an additional 4.3% of the variance of PCS-12 (*Beta* = -.219, $p < .000$). The addition of Control Total in the third step accounted for an additional 0.6% of the variance of PCS-12 (*Beta* = .080, $p = .042$). The addition of Control Total reduced the strength of the relationship between Household Income 1 and PCS-12 (*Beta* = -.193, $p < .000$).

Table 7.16

Hierarchical Multiple Regression Testing the Mediational Role of Control Total in the Relationship Between Household Income 1 and PCS-12 Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

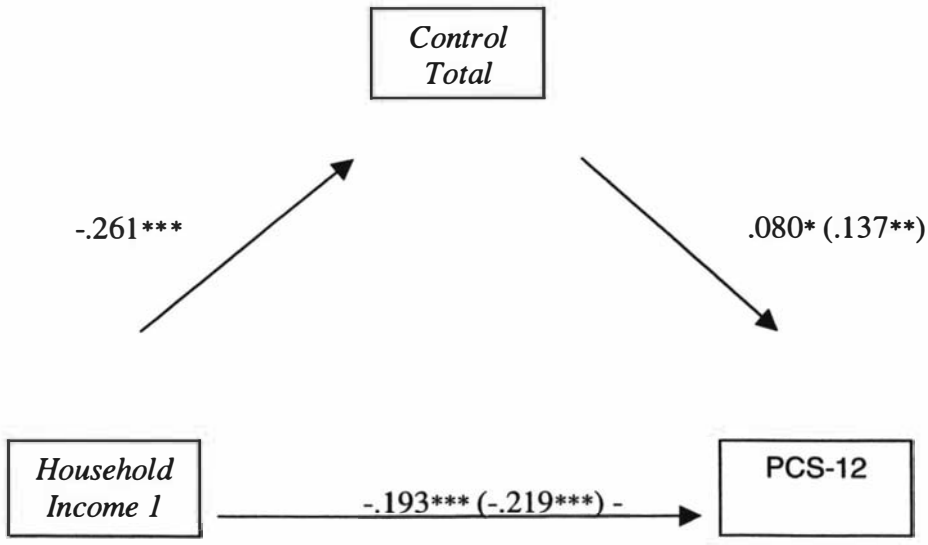
Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.146	.144	.146	99.485**	
	Age					.382***
2		.189	.186	.043	31.174***	
	Age					.313***
	Household Income 1					-.219***
3		.195	.191	.006	4.137*	
	Age					.315***
	Household Income 1					-.193***
	Control Total					.080*

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

To help explain the mediating effects, indirect effects were calculated by multiplying the *Beta* of the relationship between the independent variable and the mediating variable by

the *Beta* of the relationship between the mediating variable and the dependent variable (Klem, 1993).

Figure 7.1 shows the model tested by the multiple regression analyses and the associated regression coefficients. The indirect effect of Household Income 1 on PCS-12 through Control Total is .021 which means that 9.8 % of the relationship between Household Income 1 and the PCS-12 is through Control Total.



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

Figure 7.1. Path diagram depicting the role of Control Total in mediating the effect of Household Income 1 on scores on the PCS-12. Standardised regression coefficients (*Betas*) are shown. The *Betas* in the brackets are for the relationship between the two variables without controlling for the third variable.

The mediational role of Money Control in the relationship between Household Income 1 and the PCS-12

The results of the analysis are shown in Table 7.17. PCS-12 was the dependent variable. Age was entered at the first step to control for its association with the PCS-12. Age accounted for a significant 14.6% of the variance of the PCS-12. The addition of Household Income 1 at the second step accounted for a significant additional 4.3% of the variance of PCS-12 (*Beta* = -.219, $p < .000$). The addition of Money Control did not account for additional variance of PCS-12.

Table 7.17

Hierarchical Multiple Regression Testing the Mediational Role of Money Control in the Relationship Between Household Income 1 and PCS-12 Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change and Partial Correlations (N=585)

Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.146	.144	.146	99.485**	
	Age					.382***
2		.189	.186	.043	31.174***	
	Age					.313***
	Household Income 1					-.219***
3		.194	.190	.005	3.515	
	Age					.330***
	Household Income 1					-.194***
	Money Control					.074

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

The mediational role of Money Control in the relationship between Household Income 2 and the PCS-12

The results of the analysis are shown in Table 7.18. PCS-12 was the dependent variable. Age was entered at the first step to control for its association with the PCS-12. Age accounted for a significant 14.6% of the variance of the PCS-12. The addition of Household Income 2 at the second step accounted for an additional 3.5% of the variance of PCS-12 (*Beta* = -.189, $p < .000$). The addition of Money Control in the third step accounted for an additional 0.7% of the variance of PCS-12 (*Beta* = .089, $p = .032$). The addition of Money Control reduced the strength of the relationship between Household Income 2 and PCS-12 (*Beta* = -.164, $p < .000$).

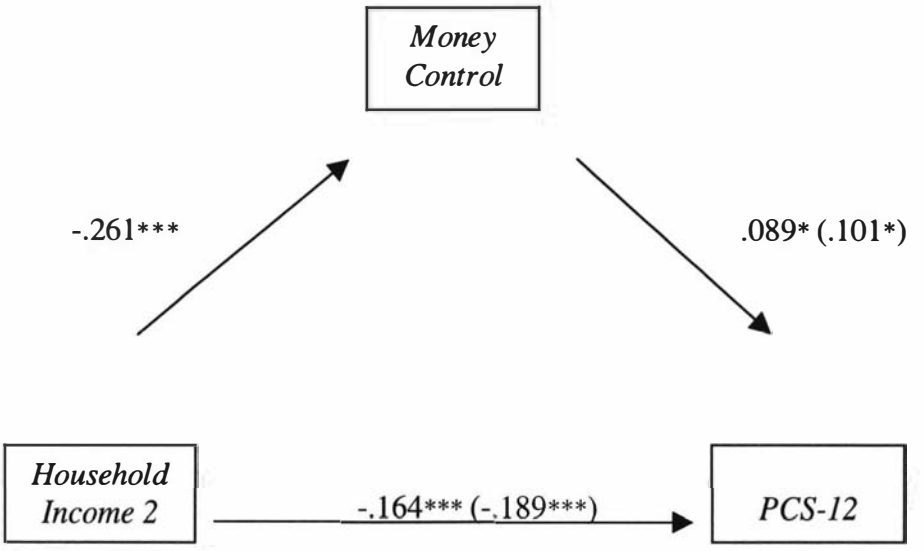
Table 7.18

Hierarchical Multiple Regression Testing the Mediational Role of Money Control in the Relationship Between Household Income 2 and PCS-12 Showing Standardised Regression Coefficients (Beta), R^2, adjusted R^2, R^2 Change and F Change (N=585)

Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.146	.144	.146	99.485**	
	Age					.382***
2		.180	.178	.035	24.570***	
	Age					.349***
	Household Income 2					-.189***
3		.188	.183	.007	5.116	
	Age					.364***
	Household Income 2					-.164***
	Money Control					.089*

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

Figure 7.2 shows the model tested by the multiple regression analyses and the associated regression coefficients. The indirect effect of Household Income 2 on PCS-12 through Money Control is .023 which means that 10.8% of the relationship between Household Income 2 and the PCS-12 is through Money Control.



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

Figure 7.2. Path diagram depicting the role of Money Control in mediating the effect of Household Income 1 on scores on the PCS-12. Standardised regression coefficients (*Betas*) are shown.

The mediational role of Control Total in the relationship between Household Income 2 and Health Problems

The results of the analysis are shown in Table 7.19. Health Problems was the dependent variable. Age was entered at the first step to control for its association with Health Problems. Age accounted for a significant 12.1% amount of the variance of Health Problems (*Beta* = .348, p = .000). The addition of Household Income 1 at the second step accounted for an additional 1.3% of the variance of Health Problems (*Beta* = -.116, p = .003). The addition of Control Total in the third step accounted for an additional 0.7% of the variance of Health Problems (*Beta* = .084, p = .035). The addition of Control Total reduced the relation between Household Income 1 and Health Problems.

Table 7.19

Hierarchical Multiple Regression Testing the Mediational Role of Control Total in the Relationship Between Household Income 1 and Health Problems Showing Standardised Regression Coefficients (Beta), R, R^2, adjusted R^2, R^2 Change and F Change and Partial Correlations (N=585)

Step	Variables	R^2	adj R^2	R^2 change	*F* Change	*Beta*
1		.121	.119	.121	80.156***	
	Age					.348***
2		.134	.131	.013	8.704**	
	Age					.328***
	Household Income 1					-.116**
3		.140	.136	.007	4.485*	
	Age					.324***
	Household Income 1					-.094*
	Control Total					.084*

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

Figure 7.3 shows the model tested by the multiple regression analyses and the associated regression coefficients. The indirect effect of Household Income 1 on Health Problems through Control Total is .010, which means that 9.9 % of the relationship between Household Income 1 and Health Problems is through Control Total.

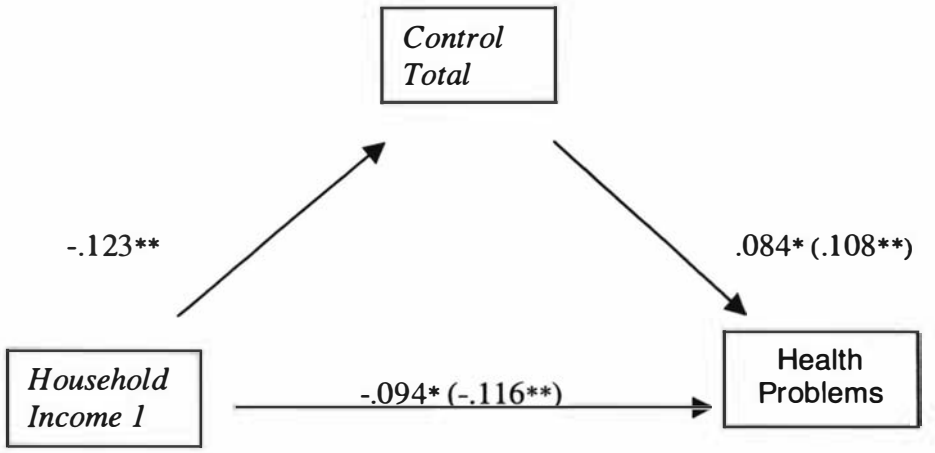


Figure 7.3. Path diagram depicting the role of Control Total in mediating the effect of Household Income 1 on Health Problems. Standardised regression coefficients (*Betas*) are shown.

Summary

Control Total partially mediated the relationship between Household Income 1 and PCS-12. Money Control partially mediated the relationship between Household Income 2 and PCS-12. Control Total partially mediated the relationship between Household Income 1 and Health Problems.

Hypotheses Eight and Nine: A sense of control will moderate the relationship between SES and health

The purpose of these analyses was to test the possibility that sense of control might moderate the relationship between SES and health. This relationship was be testing using multiple regression following the process outlined by Baron and Kenny (1986) and Holmbeck (1997). In these equations Age was entered at the first step, the SES and sense of control variables entered at the second step, the interaction term between the SES and the sense of control variables were entered at the third step, and the PCS-12 or Health Problems is the dependent variable. To avoid problems of multicollinearity between the

interaction terms and the independent variable and possible moderator, the moderator was 'centred' before calculating the interaction term. 'Centring' the moderator variable involves subtracting the sample mean from all individuals' scores Tabachnic & Fiddel, 2001). None of the interaction terms were significant.

Chapter Eight

DISCUSSION OF HYPOTHESIS TESTING

This chapter discusses the results from the analyses in Chapter Seven that tested the nine hypotheses made in Chapter Four. These hypotheses concerned the relationships between SES, multidimensional sense of control, and health. This chapter has eleven sections. Each of the first nine sections discusses one of the hypotheses. These sections will summarise the results relating to each hypothesis and interpret these findings in terms of the hypothesis and previous research and theory. Limitations and opportunities for future research specific to each hypothesis will be discussed in its relevant section, while general limitations and opportunities for future research will be discussed in the last two sections.

Hypothesis One: Higher SES will be associated with better health

The first hypothesis was that SES would be associated with health, such that higher SES would be associated with better health. Three indicators of SES were used: level of educational attainment, level of household income, and community deprivation. Health was measured by two self-reported measures: 'self-rated health' and the number of health problems diagnosed. Level of educational attainment was associated with both measures of health at the bivariate level. However, this was only at the lowest level of comparison with the only difference being between those with either no school qualification or only school certificate passes and those with higher educational qualifications. That the relationship did not operate throughout the range of educational qualifications is contrary to the research which shows that the relationship between SES and health operates throughout all levels of SES (Adler et al., 1994; Blane, 1995).

Level of household income was also associated with both measures of health at the bivariate level. Those from households with a higher income reported better 'self-rated health' (measured by the PCS-12) and fewer health problems. This relationship was evident throughout all levels of comparison of household income, which is consistent with

previous research showing a gradient effect (Adler et al., 1994; Blane, 1995).The SES of the community the person lived in was positively associated with self-rated health at the bivariate level. However, the SES of the community was not associated with the 'number of health problems' reported. A large body of previous research both internationally (e.g. Eachus et al., 1996 ; Eames, Ben-Shlomo, & Marmot, 1993) and locally (using the NZDep96; Salmond, Crampton, & Sutton, 1998) has shown a consistent relationship between community deprivation and health and the bivariate findings of the present study are partially consistent with those findings.

When the effect of age was controlled and all the indicators of SES which were associated with health at the bivariate level were considered together, only household income was found to have an independent association with health. This association was at both levels of comparison. People from the lowest income households had poorer 'self rated health' than people from the middle and highest income households and people from the highest income households had better 'self-rated health' than people from the middle and lowest income households. People from the lowest income household also reported more health problems than people from the middle and highest income households but there was no difference in the number of health problems reported by people from the highest income households when compared with the middle and lowest income households.

That level of educational attainment and community deprivation were not independently associated with health is consistent with previous research which has found that income is more strongly and consistently associated with health than other indicators (e.g. Hay, 1988; Krieger & Fee, 1994). The lack of independent association between level of educational attainment and health suggests that the benefit education provides to health may essentially be the same as that provided by household income. This means that the benefit it provides may be through the increased income that is often associated with higher educational attainment. This is consistent with the finding reported by Lantz et al (1998) that education is associated with health through its association with income. That community deprivation was not independently associated with health may be explained by the fact that income and education contribute to the calculation of the NZDep96 score (Salmond et al., 1998).

In summary, these results support the first hypothesis. Higher SES, as measured by all three indicators, was associated with better health at the bivariate level. When all three indicators of SES were considered together and age was controlled, only household income had an independent association with health. This implies that the relationship between educational attainment and health may be through the increased income that comes with higher education. While the relationship between household income and health is likely to operate in both directions, previous theory and research, as outlined in Chapter One, suggest that it is predominantly higher household income that is likely to bring better health.

Hypothesis Two: Higher SES will be associated with a greater 'overall sense of control'

All measures of SES were positively associated with an 'overall sense of control' at the bivariate level. Once age was controlled and all three SES indicators were considered together, community deprivation was no longer associated with an 'overall sense of control'. That community deprivation was not independently associated with SES could be explained by the fact that a number of the factors which contribute to the calculation of the NZDep96 score concern education and income (Salmond et al., 1998). This finding is also consistent with the relatively small nature of the bivariate correlation between community deprivation and an 'overall sense of control'. This suggests that community deprivation is not associated with an 'overall sense of control' and the relationship shown at the bivariate level is due to the inclusion of education and income variables in the calculation of community deprivation. Once the multivariate analysis was performed only differences at certain levels of comparison of educational attainment and household income were associated with an 'overall sense of control'. Those with a university degree or higher educational attainment had a greater 'overall sense of control' than people with lower educational attainments, while differences in 'overall sense of control' did not exist for comparisons at the other levels of educational attainment. Similarly, those from households with the middle or highest incomes had a higher 'overall sense of control' than households with the lowest income, while there were no differences between those from households with the highest incomes and those from households with the middle and lowest incomes.

These findings support the theories described in Chapter Three concerning the relationship between SES and control beliefs. These theories suggest that SES reflects previous life experiences (Cohen et al., 1999; Mirowsky & Ross, 1998; Pearlin & Schooler, 1978) and also indicates the skills and resources available to control, or to gain access to control, in the future (Mirowsky & Ross, 1990; Taylor et al., 1997), all of which shape expectations about future control.

In summary, the results of the present study support the hypothesis. At the bivariate level all three indicators of SES were positively associated with an 'overall sense of control'. When the effect of age was controlled and all three indicators of SES were considered together, both level of educational attainment and household income were associated with an 'overall sense of control'. These variables, together with age, accounted for any variance in 'overall sense of control' that is explained by community deprivation.

Hypothesis Three: Higher SES will be associated with a greater sense of control from all 'means'

This hypothesis was partially supported with SES being associated with a sense of control through 'ability', 'family', 'luck' and 'money'.

A sense of control through 'ability' was positively associated with both level of educational attainment and level of household income at the bivariate level However, once age was controlled and both indicators were considered together, only education was independently associated with variance in 'ability'. These findings support the hypothesis.

That level of educational attainment was associated with 'ability' is consistent with Mirowsky and Ross' (1990) 'human capital theory', which suggests that education gives a person an increased sense of control because it gives them the skills and attitudes which improve their problem solving abilities. Personal control is most similar to a sense of control through 'ability' and so research using measures of personal control is most relevant to this discussion. A study reported by Pearlin and Schooler (1978) found that mastery was positively associated with education and so was in accordance with the finding in the present study. However, a study by Galanos et al., (1994), which used the MHLC (Wallston et al., 1978), found no relationship between belief in internal control and

education. The different finding by Galanos and colleagues may be explained by the more domain specific measure of personal control beliefs that is used, as the MHLC concerns beliefs regarding control in the health domain (Wallston et al., 1978). In contrast, both the present study and the study by Pearlin and Schooler (1978) concern beliefs about control in the general domain. It may be that, while level of education does not affect the belief in personal control in the health domain, it does in the general domain.

The fact that level of household income was not independently associated with 'ability' suggests that any relationship between household income and a sense of control through 'ability' may be due to the association between household income and education. This finding is not consistent with the research of Pearlin and Schooler (1978) who reported that mastery was associated with income, but their analysis was only at the bivariate level. The finding in the present study is also not consistent with the theory that SES provides the resources to control outcomes (Mirowsky & Ross, 1990). The present finding suggests that a sense of control through 'ability' does not seem to come from the things a person owns or can buy.

A sense of control through 'family' was associated with level of household income and community deprivation, however, when both indicators of SES were considered together, only level of household income was found to be independently associated with 'family'. These findings support the hypothesis.

That level of educational attainment was not associated with 'family' is not consistent with the argument that education gives people the skills to develop and maintain supportive relationships (Mirowsky & Ross, 1998). If this were so, it would be likely that those with higher educational attainment would have a greater sense of control through 'family'. It may be that family relationships are inherently supportive and therefore there is less need to have skills which will develop and maintain them. However, previous research has shown that people with higher education are more likely to report better social support (e.g. Krause & Borawski-Clark, 1995; Mirowsky & Ross, 1998; Wills et al., 1995). Therefore, the explanation for the finding in the present study may lie in the extent to which different SES groups believe that outcomes are controlled by their family. Further analysis of the present data may be able to clarify this issue.

The difference in sense of control through 'family' existed only in comparisons of household income at the low level and not the high level. This suggests that there may be a stage at which a household income gets so low that people feel that their family are less willing, or are not able, to help them. This may be for a number of reasons which are not mutually exclusive. It may be because the family of the person from the lowest income household can offer the person less help because of the amount of stress the whole family is experiencing (Hsieh & Pugh, 1993; Marmot & Wilkinson, 2001; McLeod & Kessler, 1990). Alternatively, it may be because the family has fewer resources with which to help and so while they would like to help they are unable to do so. It may also be because the person has more problems and so, while the family has the same resources as other families, the need of the person is greater than the help which is available.

The fact that level of education was not associated with 'family' in the present study, but household income was, may be explained by the nature of the SES indicators. People often share a household with their family and therefore it would be expected that a sense of control through 'family' would be more strongly associated with household income than with educational attainment. Education is a measure of the person's own skills and knowledge while household income is more a measure of the present financial resources of the household (Davis et al., 1997). Therefore this finding may imply that a sense of control through 'family' comes from the immediate tangible resources that are available in the household and not from any of the skills bestowed by education which may enable the person to develop and maintain supportive relationships.

A sense of control through 'friends' was not related to any of the indicators of SES. This does not support the hypothesis. This finding is difficult to explain. Previous research has shown that people of higher SES believe that they have more support available. Therefore, an explanation of the present finding may lie in the beliefs concerning whether outcomes are controlled by friends. That SES is associated with 'family' but not 'friends', may be explained by the proximity of these two potential sources of control. It may be that people believe that outcomes are more controlled by family than friends because of previous experience and because of the greater functional interaction people have with family. Further analysis of the present data may clarify these issues.

A sense of control through 'luck' was positively associated with level of educational attainment and level of household income at the bivariate level. However, when both indicators of SES were considered together, only level of educational attainment was independently associated with a sense of control through 'luck'. These findings support the hypothesis.

That SES was positively associated with a sense of control through 'luck' is contrary to previous research using the multidimensional locus of control scales (Galanos et al., 1994; Garcia & Levenson, 1975; Ryckman & Malkioski, 1974). This previous research, which used occupation and education as indicators of SES, found that the belief that outcomes are controlled through 'luck' was more likely among people of lower SES. These different findings are most likely explained by the difference between 'locus of control' and sense of control (This difference is explained in detail in Chapter Two.). A sense of control through luck considers both whether the person believes that they are lucky and whether they believe that luck controls outcomes, while locus of control considers only the latter. In the present study it was thought that people of higher SES would be more likely to believe that they were lucky because of the many positive outcomes they had experienced. As a consequence of this, it was hypothesised that, while locus of control research suggests that higher SES people would be less likely to believe that outcomes are controlled by luck, to the extent that they did believe this, they would have a sense of control through 'luck' because they also believe that they are lucky. That the present finding supports the hypothesis endorses the conceptualisation of control used in the present study.

A sense of control through 'money' was positively associated with level of educational attainment, level of household income, and community deprivation. However once age was controlled and all the indicators of SES were considered together, only household income was found to be independently associated with a sense of control through 'money'.

The lack of independent association between level of educational attainment and sense of control through 'money' suggests that the benefit education provides to health may be essentially the same as that provided by household income. This means that the association may be through the increased income that often comes with higher educational attainment. The finding that household income was the indicator of SES that was

independently associated with a sense of control through 'money' is not surprising as it would be expected that people who had a greater household income would also have a greater sense of control through 'money' because they would be more likely to believe that the money was available.

It is noteworthy that, while community deprivation was positively associated with a sense of control through 'family' and 'money' at the bivariate level, it was not independently associated with a sense of control through any of the 'means'. This may be explained by the fact that income and education contribute to the calculation of the NZDep score (Salmond et al., 1998). This may also be explained by the fact that community deprivation is a measure of community level SES and education and household income are measures of individual SES. It may be that sense of control is related to individual SES and not community SES.

Summary

The findings of the present study did not fully support the hypothesis that higher SES would be associated with a greater sense of control from all 'means'. Higher SES was associated with a greater sense of control through 'ability', 'family', 'luck', and 'money'. At the bivariate level, educational attainment was associated with a sense of control through 'ability', 'luck' and 'money'; level of household income was associated with a sense of control through 'ability', 'family', 'luck', and 'money'; and community deprivation was associated with a sense of control through 'family' and 'money'. The consistent exception was that no SES indicator was associated with a sense of control through 'friends'. When all associated indicators of SES were considered together and age was controlled where necessary, indicators of SES were associated with a sense of control through 'ability', 'family', 'luck', and 'money'. While some relationships were not significant, no relationship was in the opposite direction to that hypothesised.

The associations between SES and sense of control from the 'means' of 'ability', 'family', 'luck', and 'money' were all in the direction hypothesised and for the 'means' of 'luck' and 'money' the association was in the opposite direction reported in studies using multidimensional locus of control measures but in the same direction as that hypothesised. This supports the approach to control used in this study because the direction of the

relationship was in the direction suggested by the approach and different from that found using other measures.

That all indicators of SES were not associated with a sense of control through each of the 'means', but that different indicators of SES were associated with a sense of control through the different 'means', gives a greater understanding of the relationship between SES and control beliefs. These results suggest that the relationship is not as simple as the broad hypothesis suggested but that specific aspects of SES are associated with a sense of control from different 'means'. This is worthy of further consideration and investigation.

Hypothesis Four: A greater 'overall sense of control' will be associated with better health

It was hypothesised that 'overall sense of control' would be positively associated with health. This hypothesis was supported as 'overall sense of control' was associated with both measures of health at the bivariate level and when age was controlled these relationships remained.

Hypothesis Five: A greater sense of control through all 'means' will be associated with better health

A sense of control through 'ability', 'luck' and 'money' were positively associated with 'self-rated health' at the bivariate level. A sense of control through 'ability' was also positively associated with the number of 'health problems reported' at the bivariate level. When the effect of 'age' was controlled and the 'means' which were associated with each measure of health at the bivariate level were considered together, both a sense of control through 'luck' and a sense of control through 'money' were associated with 'self-rated health'. However, a sense of control from 'ability' was no longer associated with either 'self-rated health' or the number of 'health problems reported'.

No relationship was found between a sense of control from any of the 'means' and the number of 'health problems reported' when age was controlled and the 'means' were considered together. This finding does not support the hypothesis and is also in conflict with the findings of the present study involving the other measure of health. The apparent

conflict in findings may be explained by the different nature of the health measures. The number of 'health problems reported' is a very simplistic measure of health as it merely added the problems with no consideration given to the severity of the health problems which is in contrast to the SF-12, which is a well validated measure of health. However, other studies have shown a relationship between control beliefs and measures of health problems (e.g. Bailis et al., 2001; Lachman & Weaver, 1998). Therefore the suggestion that the simplicity of the health problems measure is an explanation for these non-significant findings is not completely satisfactory.

The finding that a sense of control through 'luck' is associated with better 'self-rated health' is contrary to previous research using the 'luck' scales from 'locus of control' measures (De Boer et al., 1999; Wallston & Wallston, 1981; Wallston & Wallston, 1982). The 'locus of control' literature is not consistent, with some studies suggesting that belief that outcomes are controlled by 'luck' was associated with poorer health outcomes and other studies suggesting there was no relationship between the two. However, no study reviewed found a relationship between increased belief in control by 'luck' and better health outcomes. Much of the locus of control research has considered health behaviours and not health itself as the outcome. However, this is unlikely to explain the difference between those findings and the present finding, as locus of control research which did use health as the outcome also had findings which were contrary to those of the present study (e.g. De Boer et al., 1999). The contrast between the present finding and the findings of the 'locus of control' literature is consistent with the sense of control construct used in this study. A person who believes that outcomes are controlled by 'luck' (has a luck locus of control) but that they are not lucky may experience stress and therefore they are more likely to have poorer health. In contrast, a person who believes that they are 'lucky' and that 'luck' controls outcomes (has a sense of control through 'luck') is likely to have less stress and consequently better health.

Similar interpretations can be made of the relationship found in the present study between a sense of control through 'money' and self-rated health. A belief that outcomes are controlled by money is a belief in control by an external 'means', and therefore the previous discussion concerning a sense of control through 'luck' is relevant. Previous research has shown either a negative relationship between belief in control by external 'means' and health or no relationship at all (Wallston & Wallston, 1981; Wallston &

Wallston, 1982), which is in contrast with the present finding. This again may be explained by the different nature of the control constructs.

The lack of relationship between health and a sense of control through 'ability', 'family' and 'friends' is contrary to the hypothesis that a sense of control for all 'means' would be associated with better health. This hypothesis was made because it was expected that a sense that things were under control would reduce stress and therefore benefit health no matter where that sense of control came from. That this hypothesis was not supported suggests that the relationship is not so simple, but that a sense of control from only some 'means' is associated with better health.

Previous research has found that certain control beliefs (e.g. self-efficacy) are associated with health. The difference between the findings in this study and other studies suggests that for different 'means' of control, different aspects of control beliefs are associated with health. For example, it could be that for personal control beliefs it is capacity beliefs which are associated with health and not a sense of control through personal ability. Alternatively, a sense of control through 'ability' focuses on one 'means' of personal control. It does not include other 'means' of personal control such as 'effort'. Therefore, it may be that while a sense of personal control is associated with health, it is not the person's beliefs about their ability which is involved in this. Further research to explore these issues using multifaceted measures is needed. It would also be worthwhile to consider more proximal aspects of health, such as stress and health behaviours, because it may be that different aspects of control beliefs are related to different aspects of health.

Looking more specifically at the lack of relationship between health and a sense of control through 'ability', previous research suggests another possible explanation. While previous research has found a positive relationship between personal control beliefs and health (e.g. Langer & Rodin, 1976; O'Leary, 1985), it is increasingly being recognised that too much belief in personal control can be harmful (Carver et al., 2000; Shaprio et al., 1996). This suggests that the relationship between personal control beliefs and health may be non-linear so that moderate belief in personal control is good for health while both low and high belief in personal control is bad for health. The analyses performed in the present study assumed a linear relationship and this may explain the lack of relationship found

between a sense of control through 'ability' and health. Further analyses which do not make the assumption of linearity should explore this possibility.

It may also be that the relationship between health and sense of control through 'family' and 'friends' is not linear. The finding by Krause (1997) that the relationship between social support and control beliefs was parabolic supports this possibility. Again, further research using analyses which are not based on the assumption of linearity could investigate this possibility.

Another explanation for the contrary findings may be that previous studies have generally not considered control from multiple sources and not accounted for the relationship of a 'sense of control' through 'luck' and 'money' with 'self-rated health' in their analyses. The most similar research has involved multidimensional locus of control scales and this has almost exclusively used simple bivariate correlations (Wallston & Wallston, 1982).

In summary, the hypothesis that a sense of control through all 'means' of control would be associated with better health was not supported. While a sense of control through 'luck' and 'money' were both independently associated with better 'self-rated health', a sense of control through 'luck' and 'money' were not associated with the number of health problems reported and a sense of control through 'ability', 'family' and 'friends' were not associated with either measure of health. The findings concerning 'luck' and 'money' provide support for the conceptualisation of control used in the present study. The failure of the other 'means' to be associated with health when similar constructs have been shown to be associated with health in previous studies implies that the relationship between control beliefs and health may be more complex than hypothesised. Although some tentative interpretations can be made, further work at both theoretical and empirical levels is needed to understand these findings.

Hypothesis Six: 'Overall sense of control' will mediate the relationship between SES and health

The hypothesis that 'overall sense of control' would mediate the relationship between SES and health was supported by the analyses. Of the SES indicators used in this study, only differences in household income had an independent association with health. People from

households with the middle and highest incomes had a greater overall sense of control than people from the lowest income households, and a greater overall sense of control was associated with better health. Mediational analyses showed that overall sense of control partially mediated the relationship between household income and 'self-rated health', which supported the hypothesis. This was only at the lower level of comparison of household income. It was also found that overall sense of control partially mediated the relationship between household income and the number of 'health problems rated'. Again this was only at the lower level of comparison of household income.

The finding that overall sense of control mediated the difference in health only between people from the lowest income households and people from the middle and highest income households has important implications. Theorists have suggested that psychosocial factors might explain some of the relationship between SES and health and in particular that psychosocial factors might explain the gradient effect (Adler et al., 1994; Carroll et al., 1993). The present findings do not support this because an 'overall sense of control' does not explain the difference in 'self-rated health' between those who are from the highest income households and those who are from the lowest and middle income households. However, the use of dummy variables in the present study means that caution must be used in any interpretation of these findings.

In summary, an 'overall sense of control' partially mediated the relationship between household income and both measures of health, which supported the hypothesis. However, this was only at the lower level of comparison of household incomes and this does not support suggestions that psychosocial factors might explain the gradient effect.

Hypothesis Seven: A sense of control through all 'means' will mediate the relationship between SES and health

'Money' was the only 'means' which met the first three criteria for mediating the relationship between SES and health. A sense of control through 'money' was found to partially mediate the relationship between household income and 'self-rated health. People from higher income households had a greater sense of control through 'money' and this was associated with better 'self-rated health'. This result supports the suggestion that psychosocial factors might help explain the gradient effect because they explain

differences at the higher levels of SES while other factors, such as poverty, explain differences at the lower levels of SES (Adler et al., 1994; Carroll et al., 1993). However, a sense of control through 'money' did not mediate the difference in 'self-rated health' between people from the lowest income households and people from the middle and highest income households.

That a sense of control through 'money' partially mediated the relationship between household income and 'self-rated health' implies that part of the benefit to health of a high income is not directly from the things that it can buy but through the sense of control that it gives. That this effect operates only at the higher levels of household income implies that there needs to be a certain level of household income before the benefit to health from a sense of control through 'money' occurs.

A sense of control from the other 'means' did not mediate the relationship between SES and health. This is inconsistent with past research which has found that personal control beliefs and social support mediate the relationship between SES and health (e.g. Bailis et al., 2001; Cohen et al., 1999). In appropriate sections of this discussion attempts have been made to explain why the bivariate associations expected were not found. In addition to those explanations, part of the failure of a sense of control from the other 'means' to mediate the SES-health relationship can be explained by the fact that in the analysis of the present study only factors which had an independent association were considered. For example, while a sense of control through 'ability' was associated with both level of household income and 'self-rated health' at the bivariate level, once other factors were controlled, level of income and 'self-rated health' were not independently associated with 'ability'. This makes the present analysis more exacting than other studies in which control beliefs were not tested for an association independent of other control beliefs.

Baron & Kenny (1986) identify two assumptions of multiple regression which need to be considered when it is used to test mediational analyses. One assumption is that there is no measurement error in the mediator. In the present study the analyses performed in the development of the MSOCS have shown that it does include measurement error. When the mediator has measurement error, its effect on the dependent variable tends to be underestimated and the effect on the independent variable tends to be overestimated. The second assumption is that the dependent variable does not cause the mediator. As is

outlined in Chapter Three most of the research investigating the relationship between perceived control and health has been correlational and so while it is often assumed that control beliefs affect health the direction of the relationship cannot be guaranteed. In fact it is very conceivable that health does affect perceived control.

In summary, the findings of the present study did not support the hypothesis that a sense of control through all 'means' would mediate the relationship between SES and health. A sense of control through 'money' was shown to partially mediate the relationship between household income and 'self-rated health'. This mediation operated for comparisons in household income at the upper level and in one way supports suggestions that psychosocial factors may explain the gradient effect (Adler et al., 1994; Carroll et al., 1993). That a sense of control through 'money' mediates the relationship between SES and health implies that people from households with higher incomes do not benefit only from the things that the money can buy but also from knowing they can control future situations through the money they have. However, a sense of control through the other 'means' did not mediate the relationship between SES and health.

Hypothesis Eight: An 'overall sense of control' will moderate the relationship between SES and health

An 'overall sense of control' did not moderate the relationship between SES and health. This hypothesis was based on a few previous empirical findings using other measures of control beliefs but not on theoretical reasoning. It is therefore not surprising that the findings of the present study did not support the hypothesis.

Hypothesis Nine: A sense of control through each 'means' will moderate the relationship between SES and health

A sense of control from each 'means' did not moderate the relationship between SES and health, and did not support the hypothesis. Again this hypothesis was based on a small number of previous empirical findings using different measures of control beliefs and not on theoretical reasoning and therefore the failure of the present findings to support the hypothesis is not surprising.

General Limitations

Up to this stage some possible interpretations and implications of findings have been discussed. While some limitations have been raised at appropriate times during the discussion, there are a number of more general limitations that have not yet been considered. These limitations relate to more than one hypothesis and so it was decided to discuss them together.

That the present study used a cross-sectional design is one clear limitation. Because the design was cross-sectional, the causal direction of any relationships cannot be confirmed. While both theory and previous research have suggested the direction of these relationships, caution must still be used when interpreting the direction of the relationships identified in this study. It is likely that many of the relationships are bi-directional. It would be ideal for future research to follow a cohort from birth into adulthood.

It is important also to acknowledge that the measures used in the present study have a number of limitations. SES is a difficult construct to assess and any measure will have limitations. Davis et al (1997) highlight a number of general limitations of the use of education as an indicator of SES. One limitation of educational attainment is that it focuses on traditional education and does not value skills and knowledge learnt doing the job. Also, educational attainment does not recognise the different income and prestige value of different specialities. Another general limitation of education is that the value of educational qualifications gained has changed over time. For example, the value of an undergraduate degree gained 20 years ago was greater than the value of an undergraduate degree gained now. Lastly, it must be recognised that ethnicity and gender affect the value of education; education brings more economic rewards to white males in New Zealand.

Davis et al (1997) also points out several general limitations of using income as an indicator of SES. One limitation is that income does not accurately reflect the SES of groups such as the elderly and self-employed. Their taxable income is often low, but their assets may be substantially greater. A more specific limitation of the income measure used in the analysis of the present study is that, while it is a measure of household income, no adjustment was made for the number of people in the household (Davis et al., 1997). Another limitation that is specific to the measures of educational attainment and income

used in the present study is that both indicators of SES were measured at the categorical level so that much information about variability was lost.

There are also a number of limitations in the use of an area measure of community deprivation (Crampton & Laugesen, 1995). The major limitation is that this study has concerned SES at the level of the individual and so a community level measure is not fully appropriate. It must be recognised that not every person in a community which is seen as deprived will be deprived (Blakely, 2002). Any conclusions made about individuals based on this community measure must take this into consideration. A second problem is that the NZDep96 is based on New Zealand census figures and there was an interval between when the census data was collected (March 1996) and when the data for the present study was collected (November 2000). This period of time could allow for the nature of the community to change and therefore make the deprivation scores invalid.

That measures of health were used that rely on self-report instead of more objective measures is also a potential limitation. It is possible that self-report measures of health reflect personal biases of the individuals rather than objective health. However, four points give confidence in their use in the present study. Firstly, self-reported health has been shown to be a strong predictor of health and mortality (Idler & Benyamini, 1997; Mossey & Shapiro, 1982). Secondly, the SF-12 in particular has undergone extensive validation. Thirdly, these limitations are characteristics inherent in the indicators and not specific to the way they were used in the present study. The measures used in the present study are accepted measures of health which are regularly used in health surveys (Mirowsky & Ross, 1998). Fourthly, Wannamethee and Shaper (1991) found no difference between different SES groups in self-reported health given the same objective level of health. Sometimes the effect of negative response bias on self-reported health is controlled for by controlling for neuroticism or negative affectivity. It was decided not to do this in the present study because of the similarity between these constructs and a sense of control (Scheier, Carver, & Bridges, 1994). However, it will be important in future research to determine whether the same patterns are found with more objective measures of health.

It may also be that the calculation of the sense of control through the different 'means' is not correct. These limitations were discussed as the development of the measure was reported and so will not be commented on again here. However, it is important to

recognise that the measure needs further development. It is also important to recognise that the combination of capacity beliefs and strategy beliefs was performed in a way that, while it is consistent with the theoretical understanding of how the two beliefs combine, has not been used or tested before. It is possible that these limitations have influenced the results. Further development and validation of the MSOCS and sense of control scores would be ideal before they are used in further research.

It is also important to recognise that a sense of control from only five 'means' has been assessed in the present analysis. As explained in Chapter Two, other theory and research has identified other potential 'means' of control. For various reasons, usually practical, these other 'means' were not assessed. If these 'means' had also been analysed this may have changed the results.

Future research

Opportunities for future research have been suggested at appropriate times during the discussion but there are some opportunities which are broader than particular relationships. One opportunity is to look at profiles of beliefs as was suggested by Wallston and Wallston (1982), as opposed to individual beliefs as was done in the analysis of the present study. It may be that a sense of control from a particular combination of 'means' is more strongly associated with health and SES that any 'means' on its own or the addition of the same 'means' assessed separately. Wallston & Wallston (1982) showed the value of this approach especially when considering beliefs concerning multiple 'means'. This could be done using a variety of methods including Q factor analysis or cluster analysis.

Secondly, the present research produced some findings which were different from previous research using related measures. Systematic research involving both sense of control and other control beliefs has the potential to aid in the understanding of the different constructs.

It would also be interesting to investigate the relationship between the traditional explanatory factors (e.g. health behaviours, access to health care, and working and living conditions) and control beliefs. In particular it would be useful to investigate whether

control beliefs operated independently of these traditional explanatory factors or whether there was a mediating relationship. For example, it is possible to conceive that health behaviours and the use of health care services mediates the relationship between control beliefs and health. While some research has begun to investigate these possibilities this has been limited.

Lastly, this research made no attempt to consider differences based on ethnicity because it was considering the relationships in a broad population. However, previous research has suggested that there are differences in control beliefs between ethnic groups (Wallston & Wallston, 1981). Future research could explore this further using a multiple sense of control index.

Summary

This chapter has interpreted the results of tests of hypotheses concerning the relationships between SES, multidimensional sense of control, and health. All three indicators of SES were positively associated with health. However only household income was associated independent of age and the other two indicators. All indicators of SES were positively associated with an overall sense of control, but only level of educational attainment and level of household income were associated independent of age and the other SES indicators. Indicators of SES were positively associated with a sense of control through 'ability', 'family', 'luck', and 'money'. However the relationship between SES and sense of control was not as simple as anticipated with different indicators of SES being associated with a sense of control through different 'means'. Level of educational attainment was independently associated with a sense of control through 'ability' and 'luck' while level of household income was independently associated with a sense of control through 'family' and 'money'. This gives a greater understanding of the relationship between SES and sense of control suggesting that a sense of control can be developed in different ways and that these ways seem quite specific to the 'means'. Some of these relationships are logical such as the relationship between education and sense of control through 'ability' and support previous theory that education gives a sense of personal control. Other relationships are less understandable such as the relationship between education and a sense of control through 'luck' and will need further study and theoretical development to understand. The direction of all relationships were in the

hypothesised direction and some were in the opposite direction from that which has been found using different measures of control beliefs. This is consistent with what was expected based on the approach to control beliefs used in the present study. A greater overall sense of control was positively associated with health while only a sense of control through 'luck' and 'money' was associated with health independent of age and a sense of control from the other 'means'. Both an overall sense of control and a sense of control through 'money' partially mediated the relationship between level of household income and health. This supports the suggestion by some authors that psychosocial factors might explain the relationship between SES and health.

Conclusion

This thesis has produced some very valuable results in both its measure development phases and its hypothesis testing phase. This section will briefly highlight those results. Two key findings came from the development of the Multidimensional Sense of Control Scale. The first is that the analyses confirmed that there is a distinction between capacity beliefs and strategy beliefs as has been suggested by several theorists (e.g. Bandura, 1977, 1986, 1997; Skinner et al, 1988). This research was important because, while a number of theorists have previously suggested this distinction, no previous research has tested it as rigorously as it has been tested in this thesis. In addition, it is also important because it has been suggested that some existing scales combine these two beliefs (Skinner, 1995,1996). This finding suggests that researchers should consider this distinction when developing control measures and choosing control measures for use in research.

The second key finding is that the analyses confirmed that control beliefs for different 'means' of control were distinct. While this had been partially tested previously (Levenson, 1972; Wallston et al., 1978), previous analyses have still grouped some 'means' together. For example, Wallston et al., (1978) kept the 'means' of doctors, friends and family grouped together in the powerful others subscale. Analyses in the present thesis showed that this is not appropriate because models which separated the 'means' fitted the data better than models which combined the 'means'. This also has implications for

researchers in their choice of measures . Skinner (1995, 1996) suggested that different 'means' would be relevant for different settings and so researchers should choose measures which include 'means' that will be relevant to their settings.

The hypothesis testing phase also produced some valuable findings. One was that the relationship between a sense of control through the different 'means' and SES was not as simple as was originally thought. This study showed that a sense of control from only some 'means' were related to SES and in addition only one of the three indicators of SES were independently associated with a sense of control through each 'means'. This gave a greater understanding of the relationship between SES and a sense of control and also highlighted the suggestion by Skinner (1995, 1996) that different 'means' would be relevant in different settings.

Another valuable finding was that all the relationships were in the expected direction. This is particularly significant when this direction was opposite from that found in previous research using different measures of control beliefs. For example, a sense of control through 'luck' was found to be positively associated with both health and SES in the present thesis where the relationship reported from previous studies using measures of locus of control for luck has been negative. That this was consistent with the hypothesis supports the combination of capacity beliefs and strategy beliefs and the way they were combined in the present thesis.

Lastly, it was shown that both an 'overall sense of control' and a sense of control through 'money' partially mediated the relationship between SES and health. This suggests that some of the better health experienced by higher SES people is through the greater sense of control that higher SES provides. More specifically, in addition to the assumed increased opportunity to purchase things to benefit health, it was shown that a higher household income provides a sense of control through having access to money, which in turn increases health. These findings also support the suggestion by some authors that psychosocial factors might explain some of the relationship between SES and health. Most importantly it supports the suggestion that psychosocial factors might explain the gradient effect. This support comes from the finding that a sense of control through 'money' mediated the difference in health between those from the highest income households and those from the middle and lowest income households.

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APPENDIX ONE

Items included in the Pilot Study

Control Beliefs

If I decide to do something hard, I can.

I can do things well if I want to.

I can succeed.

I can't do things well no matter what I do.

I can't stop myself from doing poorly.

I can't do things well, even if I want to.

Strategy Beliefs for Effort

For me to do things well, all I have to do is work hard.

If I want to do things well, I just need to try hard.

The best way for me to succeed is to work hard.

If I don't do something well, it's because I didn't work hard enough.

If I fail, it's because I didn't try hard enough.

If I don't do things well, it's because I didn't try hard enough.

Capacity Beliefs for Effort

I can work hard.

I can work really hard.

I can really work hard.

I can't seem to try very hard.

I have trouble working hard.

Strategy Beliefs for Luck

Doing things well for me is a matter of luck.

To do something well I have to be lucky.

If I succeed, it's because I'm lucky.

If I fail, it's because I'm unlucky.

If I don't succeed, it is because of bad luck.

When I don't do something well, it's because of bad luck.

Capacity Beliefs for Luck

I'm lucky.

I'm pretty lucky.

As far as doing things well goes, I'm pretty lucky.

I am unlucky when it comes to doing things well.

When it comes to doing things well, I'm unlucky.

I am unlucky, when it comes to doing things well.

Unknown Strategy Beliefs

When I do something well, I usually can't figure out why.

I don't know what it takes for me to succeed.

If I succeed, I usually don't know why.

When I do something badly, I usually can't figure out why.

I don't know how to keep myself from failing.

If I fail, I usually don't understand why.

Strategy Beliefs for Confidence

I have to be confident to succeed.

Succeeding depends on my confidence.

If I want to do things well, I have to be confident.

If I don't have confidence, I won't succeed.

If I'm not confident, I won't do things well.

If I'm not confident at things, I won't do them well.

Capacity Beliefs for Confidence

I think I'm a confident person.

I am a confident person.

I would say I'm a confident person.

I don't have the confidence to do things well.

I am not a confident person.

I don't think I'm confident.

Strategy Beliefs for Friends

To do something well, I just need to have my friend's support.

The best way for me to do things well is to have my friend's support.

If I want to do things well, I need the support of my friends.

I can't do things well if my friends don't support me.

If my friends don't support me, I won't do things well.

If I don't do something well, its because my friends didn't support me.

Capacity Beliefs for Friends

I have friends who support me.

My friends support me.

When I need them to my friends support me.

My friends don't support me.

When I need them to my friends don't support me.

My friends don't support me when I need them to.

Strategy Beliefs for Family

To do things well, I just need to have my family's support.

The best way for me to do things well is to have my family's support.

If I want to do things well, I need the support of my family.

I can't do things well if my family doesn't support me.

If my family don't support me, I can't do something well.

If I don't do something well, its because my family didn't support me.

Capacity Beliefs for Family

I have a family who supports me.

My family supports me.

When I need them to my family supports me.

My family doesn't support me.

When I need them to my family doesn't support me.

My family doesn't support me when I need them to.

Strategy Beliefs for Capacity

I have to be capable to succeed.

Doing something well depends on my ability.

If I want to do things well, I have to be capable.

If I'm not capable, I won't succeed.

If I'm not already good at things, I can't do well at them.

If I'm not capable, I can't do things well.

Capacity Beliefs for Ability

I think I'm a capable person.

I'm a capable person.

I would say I'm a capable person.

I am not a capable person.

I'm not a capable person.

I don't think I'm a very capable person.

Strategy Beliefs for Boss Liking You

To do something well, I just have to get the boss to like me.

The best way for me to succeed is to get the boss to like me.

If I want to succeed, I have to get along with the boss.

I won't do well at things if my boss doesn't like me.

If my boss doesn't like me, I won't do things well.

If I fail at something, it's because I don't get along with my boss.

Strategy Beliefs for Having a Good Relationship with the Boss

When I do something well, it is because I have a good working relationship with the boss.

The best way for me to do something well is to have a good working relationship with the boss.

If I want to succeed, I have to work well with the boss.

If I don't have a good working relationship with the boss I won't be able to do things well.

If I fail at something, its because I don't get along with the boss.

When I do something poorly, it is because I don't have a good working relationship with the boss.

Capacity Beliefs for the Boss Liking You

I am able to get a boss to like me.

I can get a boss to like me.

I can get along with a boss.

I can't get a boss to like me.

I don't seem to be able to get a boss to like me.

I'm just not able to get along with a boss.

Capacity Beliefs for Having a Good Working Relationship with the Boss

I am able to develop a good working relationship with a boss.

I can develop a good working relationship with a boss.

I can work well with a boss.

I can't develop a good relationship with a boss.

I don't seem to be able to develop a good working relationship with a boss.

I'm just not able to get along with a boss.

Strategy Belief for God

I need to have God on my side to succeed.

Success depends on having God on my side.

If I want to do something well, I need to have God on my side.

If I don't have God on my side, I won't succeed.

If I don't have God on my side, I can't do things well.

I can't do things well, if I don't have God on my side.

Belief for God

God is on my side.

God wants me to do well at things.

I think that God is on my side.

God does not care whether I do well at things.

I do not think that God is on my side.

God is not on my side.

Strategy Beliefs for Time

For me to succeed, all I need is enough time.

If I want to do something well, I just need to have enough time.

I can do things well if I have enough time.

If I don't do things well, it's because I didn't have enough time.

If I fail, it's because I didn't have enough time.

If I don't have enough time, I won't succeed.

Capacity Beliefs for Time

I generally have enough time to do things well.

When it comes to doing something well I generally have enough time.

I generally have enough time.

I don't have enough time to do things well.

I never have enough time to succeed.

When it comes to doing things well, I don't have enough time.

Strategy Beliefs for Money

To succeed I need to have enough money.

Succeeding depends on how much money I have.

If I want to do something well, I need to have enough money.

If I don't have enough money, I won't succeed.

If I haven't got enough money, I can't do things well.

If I don't have enough money, I can't do something well.

Capacity Beliefs for Money

When I need it I have enough money.

I have enough money when I need it.

I don't have enough money when I need it.

When I need it I don't have enough money.

I don't seem to have enough money when I need it.

When its important I have enough money.

APPENDIX TWO

Items included in the Content Analysis

Control Beliefs

If I decide to do something, I can.

I can't do things well no matter what I do.

I can't stop myself from doing poorly.

I can't do things well, even if I want to.

I can always do what I want.

No problem is too hard for me.

I have little control over how things turn out.

I can handle any situation.

How things turn out is up to me.

Strategy Beliefs for Effort

For me to do things well, all I have to do is work hard.

If I want to do things well, I just need to try hard.

If I fail, it's because I didn't try hard enough.

I'll get nowhere without hard work.

If I put in the effort I will get the reward.

My level of effort determines my level of success.

I get out of life what I put into it.

When I fail it's because I've been lazy.

If I keep on trying I will eventually get there.

When I do well it is because I tried hard.

Capacity Beliefs for Effort

I can work hard.

I can't seem to try hard.

I have trouble working hard.

I give things a real go.

I think I'm just lazy.

I have never been afraid of a hard days work.

I enjoy a hard days work.

I work as hard as I can.

I have no problem keeping on trying.

I often give up.

Strategy Beliefs for Luck

Doing things well for me is a matter of luck.

If I succeed, it's because I've been lucky.

If I fail, it's because I've been unlucky.

When I don't do something well, it's because I've had bad luck.

How things turn out for me is a matter of luck.

I need good luck to succeed.

Success depends on me being in the right place at the right time.

I need to have things go my way to succeed.

Things go wrong when I'm out of luck.

Luck is not important to how things turn out for me.

Capacity Beliefs for Luck

I'm lucky.

I'm unlucky.

I don't have any luck.

Luck is on my side.

Unknown Strategy Beliefs

When I do something well, I usually can't figure out why.

I don't know what it takes for me to succeed.

If I succeed, I usually don't know why.

When I do something badly, I usually can't figure out why.

I don't know how to keep myself from failing.

When things don't turn out, I usually don't understand why.

Its hard to know why sometimes things go well and other times they don't.

I can never tell whether I am going to do well or not.

I don't understand why things turn out well.

If things don't turn out well I don't know what to do next.

Strategy Beliefs for Confidence

I have to be confident to succeed.

If I want to do things well, I have to be confident.

If I don't have confidence, things won't turn out well.

If I don't believe in myself, I won't do things well.

If I don't believe in myself I'm wasting my time.

For me, the difference between success and failure is believing in myself.

Believing in myself is 90% of any challenge.

If I believe in myself I'm more than half way there.

If I fail it is because I didn't believe in myself.

When things go my way it is because I believed in myself.

Capacity Beliefs for Confidence

I am a confident person.

I am not a confident person.

I don't have a lot of faith in myself.

I have confidence in myself.

I wish I had more confidence.

I am uncertain about myself.

I have faith in myself.

I am not very sure of myself.

I have a lot of self doubt

Strategy Beliefs for Friends

With the help of my friends I can do anything.

To do something well, I need to have the support of my friends.

The best way for me to do things well is to have the help of my friends.

If I want things to turn out, I need the support of my friends.

I can't do things well if my friends don't support me.

Friends can help me a lot.

Help from my friends is vital.

My friends can give you access to heaps of help.

If things don't turn out well its because I haven't had the support from my friends.

Having help from my friends is a real asset.

Capacity Beliefs for Friends

I don't tell my friends about my problems.

My friends are happy to help where they can.

I have really good friends.

My friends don't care about how things turn out for me.

My friends would be there for me if I needed them.

My friends are not willing to try to help me.

My friends aren't prepared to try to support me.

When I need them to my friends are prepared to support me in any way they can.

Strategy Beliefs for Family

The support of my family is a real advantage in life.

When things go poorly for me it is because I have not got support from my family.

The help of my family really helps me succeed.

Having the support of your family is really important to how things turn out.

Family support makes all the difference for me.

When things are hard help from my family is really important.

My family should get more recognition for my success.

Support from my family is vital to how things turn out.

A lot of my success is due to help from my family.

Capacity Beliefs for Family

My family doesn't have a big input into my life.

I don't share with my problems with my family.

My family doesn't know what's happening in my life.

My family is always there for me if I need them.

I don't keep in touch with my family.

My family has no interest in my life.

My family is willing to try to help me.

If I wanted them to my family would try to support me.

My family would be willing to support me if I asked them.

Strategy Beliefs for Ability

Doing something well depends on my ability.

If I want to do things well, I have to have the right skills.

If I'm not capable, I won't succeed.

Whether things turn out depends on my ability.

I believe that it is my ability that determines how things turn out.

If I don't have the skills for the situation things wont go well.

For me, having the right skills is the key.

When things don't turn out its because I haven't had the skills to make it work.

If I'm clever enough, things will work out.

When I do well it's because of my skills.

Capacity Beliefs for Ability

I think I'm a capable person.

I am not a capable person.

I'm clever

My memory is pretty good.

I'm a good problem solver.

I've got lots of skills.

I'm not very skilful.

I'm not very clever.

Strategy Beliefs for Boss

For my work to turn out well I have to get along well with the boss.

The best way for me to succeed at work is to get the boss to like me.

If I want to succeed at work, I have to get along with the boss.

If my boss doesn't like me, I'm bound to fail at work.

When I do something well, it is because I have a good working relationship with the boss.

If I want to succeed at work, I have to work well with the boss.

If I don't have a good working relationship with the boss I won't be able to get things done.

When I don't get something done at work it's because me boss didn't support me.

When things go poorly at work it is because of the boss doesn't like me.

For things to go well at work I just have to get the boss to like me.

Capacity Beliefs for The Boss

I am able to get a boss to like me.

I can get along with a boss.

I can't get a boss to like me.

I don't seem to be able to get a boss to like me.

I'm just not able to get along with a boss.

I can develop a good working relationship with a boss.

I can work well with a boss.

I don't seem to be able to develop a good working relationship with a boss.

The boss doesn't care about me.

The boss wants me to do well.

The boss gives me all the help they can.

Strategy Belief for God

I need to have God on my side to succeed.

If I want things to go well, I need to have God on my side.

If I don't have God on my side, I won't succeed.

Without God on my side, I can't do things well.

Things wont go well, if I don't have God on my side.
Nothing in my life happens without Gods approval.
I can do anything with the help of God.
When things go wrong for me, its because God allows it to.
For me, God is essential to things turning out OK.
God is in control of how things work out.

Capacity Belief for God

God is on my side.
God wants me to do well at things.
God does not care whether I do well at things.
God is not on my side.
God loves me.
God wants to be part of my life.
God wants the best for me.
God does not want to help me.
God cares for me.
God is too busy to care for me.

Strategy Beliefs for Time

For me to succeed, all I need is time.
If I want to do something well, I just need to have enough time.
I can do things well if I have enough time.
If I fail, it's because I didn't have enough time.
If I don't have enough time, I won't be able to do what I want.
I can do anything if I have enough time.
Anything can be done if I can give it the time it needs.
If I can't do something it is because I wasn't able to give it the time it needed.
If I am given enough time I have no excuse for failing.
When things go wrong it is because I didn't have the time to make it work.

Capacity Beliefs for Time

I generally have enough time to do things well.

I generally have enough time.

When it comes to doing things well, I don't have enough time.

I often feel rushed

My life is too busy.

I always seems to have so much to do and so little time.

I have too many things to do.

I never feel rushed for time.

Strategy Beliefs for Money

To succeed I need to have money.

Succeeding depends on how much money I have.

If I want to do something well, I need to have money.

If I don't have the money, I can't do what I want.

If I haven't got the money life is much harder.

Having money helps me do what I want to.

With money I can do anything I want.

Lack of money can't stop me doing what I want.

Not having money really limits my choices.

Capacity Beliefs for Money

I don't seem to have enough money when I need it.

I can always get hold of money.

I am pretty well off financially.

Things are pretty tight for me financially.

I'm pretty well off.

I'm always short of money.

I never seem to have the money I need.

APPENDIX THREE

Standardised instructions, a written outline of the theory and definitions of capacity beliefs and strategy beliefs for Content Analysis Study

Content Analysis Exercise For
Control Beliefs Questionnaire

The items involved in this exercise have been written as part of the development of a measure of control beliefs. The aim of this exercise to to see whether people who have a general understanding of the theory can identify which subscale the items are part of.

Some of the key features of the theory of control beliefs on which this measure is based will be briefly outlined below.

Essential to this approach is the distinction between agents of control, means of control and ends of control.

Ends refer to outcomes (desired or undesired) over which control is exerted. Agents refer to individuals or groups that exert control. Means refer to ways in which control can be exerted. The term causes is sometimes used instead of the term means.

Using this distinction, three sets of beliefs can be identified.

The relationship between the agent and the ends is the belief that is usually associated with perceived control. This is called

Control beliefs and defines it as "generalised expectancies about the extent to which self can produce desired or undesired events".

But two other relationships and beliefs can also be identified.

Strategy beliefs, which represent the relationship between the means and ends, are defined as "generalised expectancies about the extent to which certain means or causes are sufficient conditions for the production of ends or outcomes."

In other words: is there a way that the desired end can be achieved.

Different means have been identified and items written for each means. These items seek to find out the entent to which people believe that these means have an influence on outcomes.

The third belief set is

Capacity beliefs, which is the relationship between the agent and means, and is defined as "generalised expectancies about the extent to which the self possesses or has access to certain causes".

In other words: is this particular means available to me.

Capacity items were also written for each means. These items seek to find out to what extent people believe that the means are available to them.

As this diagram suggests, perceived control, as well as being measured by control beliefs, can also be measured by looking at capacity beliefs and strategy beliefs. Theoretically a combination of capacity beliefs and strategy beliefs is needed to achieve a sense of control. This makes sense as to have a perception of control it would seem necessary to believe that there is a means that can achieve the outcome (a strategy belief) and that you have access to that means (a capacity belief).

Means which people generally see as being influencial have been identified through open ended interviews and research of the literature. These means are effort, ability, unknown, family, friends, God, the boss, confidence, money, time, and luck. Items have

been writen for strategy beliefs and capacity beliefs for each of these means except for unknown beliefs. Unknown strategy beliefs relate to the extent to which people do not know or understand what influences outcomes. No capacity belief is required for unknown strategy beliefs. The the object of the exercise is for you to put the items in the subscale that you think they fit into. Any feedback at the end of the exercise would be appreciated.

Thank you for your help.

APPENDIX FOUR

Questionnaire used for Exploratory Factor Analysis

First, I would like you to indicate how much you agree with a number of statements. Please respond to all items as best you can.

These questions should be answered by circling the most appropriate answer.

		Not at all True	Not very True	Sort of True	Very True
1	Anything can be done if I can give it the time it needs.	1	2	3	4
2	How things turn out is up to me.	1	2	3	4
3	I'm not very skillful.	1	2	3	4
4	My friends are prepared to support me in any way they can.	1	2	3	4
5	My boss is not willing to help me in my job.	1	2	3	4
6	My family has no interest in my life.	1	2	3	4
7	Things go wrong when I'm out of luck.	1	2	3	4
8	I can do things well if I have enough time.	1	2	3	4
9	I can always get hold of enough money.	1	2	3	4
10	If I can't do something, it is because I am not able to give it the time it needs.	1	2	3	4
11	To do things well, all I have to do is work hard.	1	2	3	4
12	If things don't turn out well I don't know what to do next.	1	2	3	4
13	The support of my family has a big impact in my life.	1	2	3	4
14	I give things a real go.	1	2	3	4
15	I'll get nowhere without hard work.	1	2	3	4
16	I often feel rushed.	1	2	3	4
17	I am able to get my boss to like me.	1	2	3	4
18	I never seem to have the money I need.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
19	If I want to do something well, I just need to have enough time.	1	2	3	4
20	My friends don't help me.	1	2	3	4
21	If I don't have God on my side, I won't succeed.	1	2	3	4
22	God is too busy to care for me.	1	2	3	4
23	When things go wrong for me, it's because God allows it to.	1	2	3	4
24	If I don't have confidence, things won't go well.	1	2	3	4
25	If I'm not capable, I won't succeed.	1	2	3	4
26	I'm unlucky.	1	2	3	4
27	I have a good income.	1	2	3	4
28	When things don't turn out well, it's because I didn't have the skills to make it work.	1	2	3	4
29	I can't seem to try hard.	1	2	3	4
30	How things turn out depends on my ability.	1	2	3	4
31	For me to succeed, all I need is time.	1	2	3	4
32	I don't know what it takes for me to succeed.	1	2	3	4
33	The best way for me to do things well is with my friends' help.	1	2	3	4
34	God is not on my side.	1	2	3	4
35	The boss wants me to do well.	1	2	3	4
36	Luck is on my side.	1	2	3	4
37	When things don't go well, it's because I've had bad luck.	1	2	3	4
38	I can't do things well, even if I want to.	1	2	3	4
39	I can handle any situation.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
40	If I fail, it's because I ran out of time.	1	2	3	4
41	Support from my family is vital to how things in my life turn out.	1	2	3	4
42	Family support makes all the difference in my life.	1	2	3	4
43	When things go wrong it is because I didn't have the time to make it work.	1	2	3	4
44	My memory is pretty good.	1	2	3	4
45	I can't do things well no matter what I do.	1	2	3	4
46	I don't keep in touch with my family.	1	2	3	4
47	If I want to do things well, I just need to try hard.	1	2	3	4
48	My family are a big part of my life.	1	2	3	4
49	When I do well it is because I worked hard for it.	1	2	3	4
50	My family is never there for me if I need them.	1	2	3	4
51	If I want to do something well, I have to be confident.	1	2	3	4
52	I don't tell my friends about my problems.	1	2	3	4
53	If I fail, it's because I didn't try hard enough.	1	2	3	4
54	I've got lots of skills.	1	2	3	4
55	I'm just not able to get along with my boss.	1	2	3	4
56	My level of effort determines my level of success.	1	2	3	4
57	I often give up.	1	2	3	4
58	Things won't go well, if God doesn't help me.	1	2	3	4
59	Succeeding depends on how much money I have.	1	2	3	4
60	If my boss doesn't like me, I'm bound to fail at work.	1	2	3	4
61	I don't understand why things turn out well.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
62	If I want to succeed I need the support of my family.	1	2	3	4
63	When things go poorly at work, its because the boss didn't back me.	1	2	3	4
64	My family is willing to help me.	1	2	3	4
65	If I decide to do something, I can.	1	2	3	4
66	My friends would be there for me if I needed them.	1	2	3	4
67	My family care about me.	1	2	3	4
68	How things turn out for me is a matter of luck.	1	2	3	4
69	If I want to do something well, I need to have money.	1	2	3	4
70	I generally have enough time.	1	2	3	4
71	I can never tell whether I am going to do well or not.	1	2	3	4
72	God is on my side.	1	2	3	4
73	If I want to do things well, I need to have the right skills.	1	2	3	4
74	I have faith in myself.	1	2	3	4
75	For my work to go well, I need to have help from my boss.	1	2	3	4
76	Lack of money can't stop me doing what I want to do.	1	2	3	4
77	I have too many things to do.	1	2	3	4
78	If I keep on trying I will eventually achieve what I want to.	1	2	3	4
79	When I do something badly, I usually can't figure out why.	1	2	3	4
80	If I'm clever enough, things will work out.	1	2	3	4
81	I have no problem keeping on trying.	1	2	3	4
82	If my family helps me, things will go well.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
83	The best way for me to succeed at work is to have the support of my boss.	1	2	3	4
84	I have confidence in myself.	1	2	3	4
85	When I fail it's because I've been lazy.	1	2	3	4
86	Without help from my family I find it hard to achieve what I want.	1	2	3	4
87	My friends are happy to help where they can.	1	2	3	4
88	I enjoy a hard day's work.	1	2	3	4
89	Success depends on me being in the right place at the right time.	1	2	3	4
90	I don't share my problems with my family.	1	2	3	4
91	When things don't turn out, I usually don't understand why.	1	2	3	4
92	I can do anything with the help of God.	1	2	3	4
93	I'm not very clever.	1	2	3	4
94	Help from my friends would be a real asset.	1	2	3	4
95	Not having money really limits my choices.	1	2	3	4
96	I have a boss who is prepared to back me.	1	2	3	4
97	If I don't have enough time, I won't be able to do what I want.	1	2	3	4
98	My boss is willing to support me.	1	2	3	4
99	My friends don't care about how things turn out for me.	1	2	3	4
100	My friends are not willing to help me.	1	2	3	4
101	If I haven't got the money, life is much harder.	1	2	3	4
102	I can't do things well if my friends don't support me.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
103	If I don't have the skills for the situation, it won't go well.	1	2	3	4
104	I am not a capable person.	1	2	3	4
105	I am not a confident person.	1	2	3	4
106	I am uncertain about myself.	1	2	3	4
107	If I want things to go well, I need to have God on my side.	1	2	3	4
108	If I don't believe in myself, I won't do things well.	1	2	3	4
109	I need to have God on my side to succeed.	1	2	3	4
110	If I wanted them to my family would support me.	1	2	3	4
111	For me, having the right skills is the key to success.	1	2	3	4
112	If I am given enough time I have no excuse for failing.	1	2	3	4
113	If I put in the effort I will get the reward.	1	2	3	4
114	Without my friends' help, I can't achieve my goals.	1	2	3	4
115	I think I'm a capable person.	1	2	3	4
116	I am pretty well off financially.	1	2	3	4
117	I have trouble working hard.	1	2	3	4
118	I don't have any luck.	1	2	3	4
119	I can't stop myself from doing poorly.	1	2	3	4
120	To succeed I need to have money.	1	2	3	4
121	If I believe in myself I'm more than half way there.	1	2	3	4
122	God wants me to do well at things.	1	2	3	4
123	I share my problems with my friends.	1	2	3	4
124	Help from my friends is vital to my success.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
125	I am not very sure of myself.	1	2	3	4
126	I get out of life what I put into it.	1	2	3	4
127	I always seems to have so much to do and so little time.	1	2	3	4
128	With the help of my friends I can do anything.	1	2	3	4
129	It's hard to know why sometimes things go well and other times they don't.	1	2	3	4
130	If I don't have a good working relationship with the boss, I won't be able to do my job.	1	2	3	4
131	God loves me.	1	2	3	4
132	A lot of my success is due to help from my family.	1	2	3	4
133	It is my ability that determines how things turn out.	1	2	3	4
134	I'm lucky.	1	2	3	4
135	If I fail, it's because I've been unlucky.	1	2	3	4
136	If I don't have the money, I can't do what I want to do.	1	2	3	4
137	Luck is not important to how things turn out for me.	1	2	3	4
138	My boss gives me lots of assistance.	1	2	3	4
139	If I succeed, I usually don't know why.	1	2	3	4
140	I am a confident person.	1	2	3	4
141	I think I'm just lazy.	1	2	3	4
142	I don't seen to be able to develop a good working relationship with a boss.	1	2	3	4
143	I'm clever.	1	2	3	4
144	If I want to succeed at work, I have to work well with the boss.	1	2	3	4
145	Doing something well depends on my ability.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
146	With money I can do anything I want to do.	1	2	3	4
147	To do something well, I need to have the support of my friends.	1	2	3	4
148	If I don't have assistance from my boss, I can't do my job.	1	2	3	4
149	I have never been afraid of a hard day's work.	1	2	3	4
150	I need good luck to succeed.	1	2	3	4
151	When I don't get something done at work, it's because my boss doesn't support me.	1	2	3	4
152	I have a lot of self-doubt.	1	2	3	4
153	I have to be confident to succeed.	1	2	3	4
154	Having money helps me do what I want to do.	1	2	3	4
155	I have really good friends.	1	2	3	4
156	When things go well it is because I believed in myself.	1	2	3	4
157	God does not care whether I do things well.	1	2	3	4
158	I'm always short of money.	1	2	3	4
159	I don't seem to have enough money when I need it.	1	2	3	4
160	If I succeed, it's because I've been lucky.	1	2	3	4
161	I'm a good problem solver.	1	2	3	4
162	I need to have things go my way to succeed.	1	2	3	4
163	When I do something well, I usually can't figure out why.	1	2	3	4
164	My boss doesn't support me.	1	2	3	4
165	God wants the best for me.	1	2	3	4
166	For me, God is essential to things turning out OK.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
167	Things are pretty tight for me financially.	1	2	3	4
168	If I want to succeed at work, I need to have support from my boss.	1	2	3	4
169	When things go wrong, it is because my family haven't supported me.	1	2	3	4
170	I don't know how to keep myself from failing.	1	2	3	4
171	For me, the difference between success and failure is believing in myself.	1	2	3	4
172	I never feel rushed for time.	1	2	3	4
173	I can work hard.	1	2	3	4
174	I have little control over how things turn out.	1	2	3	4
175	Doing things well for me is a matter of luck.	1	2	3	4
176	When it comes to doing things well, I often run out of time.	1	2	3	4
177	God wants to be part of my life.	1	2	3	4
178	I don't have a lot of faith in myself.	1	2	3	4
179	The experience of my family can really help me succeed in the tough times.	1	2	3	4
180	I can get along well with my boss.	1	2	3	4
181	Nothing in my life happens without God's approval.	1	2	3	4
182	No problem is too hard for me.	1	2	3	4
183	My family supports me in any way they can.	1	2	3	4
184	My life is too busy.	1	2	3	4
185	Friends could give me access to heaps of help.	1	2	3	4
186	I can do anything if I have enough time.	1	2	3	4

		Not at all True	Not very True	Sort of True	Very True
187	When I do my job well, it's because I've had assistance from the boss.	1	2	3	4
188	I can always do what I want to.	1	2	3	4
189	Friends are able to help me a lot.	1	2	3	4
190	I work as hard as I can.	1	2	3	4
191	God does not want to help me.	1	2	3	4
192	My family doesn't know what's happening in my life.	1	2	3	4
193	Without God's help, I can't do things well.	1	2	3	4
194	Believing in myself is 90% of any challenge.	1	2	3	4
195	God cares for me.	1	2	3	4
196	I get no support from my friends.	1	2	3	4
197	The support of my family is really important to how things turn out.	1	2	3	4
198	I wish I had more self-confidence.	1	2	3	4
199	If I fail, it's because I haven't had the support from my friends.	1	2	3	4
200	If I don't believe in myself I'm wasting my time.	1	2	3	4
201	My boss is prepared to assist me in any way they can.	1	2	3	4
202	If I fail it is because I didn't believe in myself.	1	2	3	4
203	If I want to succeed at work, I need the backing of the boss.	1	2	3	4
204	God is in control of how things in my life turn out.	1	2	3	4
205	When I do well, it's because of my skills.	1	2	3	4
206	I generally have enough time to do things well.	1	2	3	4

The next set of items also asks you to give your rating in response to some statements. Again, I

Again these items should be answered by circling the most appropriate answer.

1. How much **influence** do these factors have on how things turn out in your life?

	Total Influence	**A Lot of Influence**	**Some Influence**	**No Influence**
Effort	1	2	3	4
Ability	1	2	3	4
Powerful Others	1	2	3	4
Luck	1	2	3	4
Friends	1	2	3	4
Family	1	2	3	4
Confidence	1	2	3	4
Money	1	2	3	4
Time	1	2	3	4
God	1	2	3	4

Are there any other things that you think influence how things turn out in your life?

_____

_____

_____

The items continue over the page.

3. Rate the extent to which you **have** these.

	A lot	**Some**	**Little**	**None**
Ability	1	2	3	4
Luck	1	2	3	4
Confidence	1	2	3	4
Money	1	2	3	4
Time	1	2	3	4

4. Rate the extent to which you can **work hard**

Very Hard	**Quite Hard**	**Not Very Hard**	**Not Hard At All**
1	2	3	4

5. How much do these possible sources of influence **want to help you**.

	A Lot	Some	Little	Not at all
Powerful others	1	2	3	4
Friends	1	2	3	4
Family	1	2	3	4
God	1	2	3	4

The items continue over the page.

So that we can be sure we have a good cross section of people in our survey, would you please answer the following questions about yourself. Remember that all responses remain STRICTLY CONFIDENTIAL.

1. What is your age in years? _____

2. What is your gender?

PLEASE CIRCLE **ONE** OPTION ONLY

Female Male

3. Which one of these categories **best** describes the amount of **formal** education you have had?

PLEASE CIRCLE **ONE** OPTION ONLY

No formal schooling	1
Primary/Intermediate up to Standard 6 or form 2	2
Secondary school for up to 3 years.	3
Secondary school for 4 years or more.	4
University/Polytechnic for up to 3 years	5
University/Polytechnic for 4 or more years	6

4. How would you describe your state of health compared to other persons your age?

PLEASE CIRCLE **ONE** OPTION ONLY

Excellent **Good** **Fair** **Poor**

Thank you very much for your participation in this study.

If you would like to receive a summary of the findings of this research please write your name and address in the space provided below. When your questionnaire is received this page will be immediately separated from your questionnaire to maintain your confidentiality.

Name:_____

Address:_____

_____

Now that you have completed the questionnaire could you please return it by placing it in the freepost self-addressed envelope provided and mail it to us at:

National Self Beliefs and Health Study
School of Psychology
Massey University
Private Bag 11222
Palmerston North

APPENDIX FIVE

First Contact Letter for Main Data Collection

1 November 2000

Massey Letterhead

School of Psychology
Massey University
Private Bag 11 222
Palmerston North

Dear

A few days from now you will receive a request to fill out a brief questionnaire for an important research project. This research, which looks at the relationship between thoughts, beliefs and health, is being conducted in the School of Psychology at Massey University.

Health is an issue that is important to all New Zealanders. As our understanding of the factors that affect our health increases, it is becoming clear that our thoughts and beliefs have some impact. However, how and why this occurs is not well understood. This research, which is part of my doctoral study, is seeking to increase this understanding. It is only through more fully understanding this area that successful steps can be taken to solve health problems.

I am writing to you in advance because we have found that many people like to know ahead of time that they will be contacted. You will receive more information with the questionnaire. However, if you have any immediate questions or concerns about the study I can be contacted by telephoning (06) 350 5799 (xtn. 2032) or Dr Christine Stephens, who is supervising the research, can be contacted by telephoning (06) 350 5799 (xtn. 2071).

Thank you for your time and consideration of this request.

Yours sincerely

Don Baken
Doctoral Researcher

APPENDIX SIX

Second Contact Letter for Main Data Collection

Massey Letterhead

Dear

Massey University Health Study

Health is an important issue for all of us and it has been shown that thoughts and beliefs have an impact on people's health. However, what factors have an impact and why this occurs is not well understood. This research is seeking to more fully understand this.

My name is Don Baken and as part of my doctorate I am conducting research in the School of Psychology at Massey University. Dr Christine Stephens, who is supervising this research, and I would like to invite you to participate in our research that aims to clarify the impact that different thoughts and beliefs have on health. Participation simply involves filling in the brief questionnaire which is attached and returning it in the freepost envelope provided. This should only take about 15 minutes.

Your name was randomly selected from the New Zealand electoral roll. All information that you may choose to give while participating in the study will be kept completely confidential. The number on the questionnaire is to allow me to delete your name once you have returned your questionnaire and ensure that I don't send you a reminder. If you do not want to participate in the study and not want to receive a reminder, simply return your questionnaire uncompleted and I will delete your name from the list. If you would like to receive a summary copy of the group results, these will be posted to you if you put your name and address on the slip provided. This will be separated from your questionnaire so that your responses remain completely confidential. If you choose to complete the questionnaire, this action will be taken as your consent to be involved in the study.

As someone invited to participate in this study, you have the right to:

Decline to take part.
Refuse to answer any particular question.
Ask questions about the study at any time.
Provide information on the understanding that your name will not be connected with the information and will not be kept once the questionnaires are collected..
Receive a summary of the findings from the study when it is completed.

This research has been approved by the Massey University Human Ethics Committee. If you have any questions or concerns about the study or would like further information, please contact either of us. I can be contacted at Massey by telephoning **(06) 3505799 (extn. 2032)**. Dr Christine Stephens can be contacted at Massey University by telephoning **(06) 3505799 (extn. 2071)**.

Thank you for taking the time to read this information and consider this request.

Sincerely

Don Baken
Doctoral Researcher

APPENDIX SEVEN

Mail-out Questionnaire for Main Data Collection

APPENDIX EIGHT

Postcard for Main Data Collection

Date

Dear

Last week I mailed a questionnaire to you. This questionnaire is part of important research on the impact of thoughts and beliefs on people's health.

If you have already returned the questionnaire please accept my sincere thanks. If not, I would like you to know that I am still keen to receive your reply.

If you did not receive a questionnaire, or if it was misplaced, please call me on (06) 350 5799 xtn. 2032, or email me at D.M.Baken@massey.ac.nz, and I will get another one in the mail to you today.

Yours sincerely

Don Baken
Doctoral Researcher

APPENDIX NINE

Final Reminder Letter for Main Data Collection

Massey Letterhead

Dear

Recently I sent you a questionnaire that looks at the impact of thoughts and beliefs on health, but so far I have not received a reply. I am writing to check that you have received the questionnaire, to remind you of the survey and to ask again for your help.

We need to better understand the type of factors that influence our health. This research, which is part of my doctorate, will help that understanding.

I am writing to you again because we need to receive replies from as many of the people who were contacted to reply as possible. This is to ensure that our information is representative of all New Zealanders.

Perhaps you haven't got around to answering the questionnaire yet, or don't have strong views on the subject. Whatever the reason, your ideas and opinions are as important as anyone else's and, without them, this survey won't properly represent the attitudes of all New Zealanders. I have included another questionnaire in case you have misplaced the one sent previously. If you choose to complete the questionnaire, this action will be taken as your consent to be involved in the study.

This research has been considered and approved by the Massey University Human Ethics Committee, however if you have any questions or concerns about the study or would like further information about the study please contact either myself on (06) 3505799 (xtn. 2032) or Dr Christine Stephens, who is supervising the research (xtn. 2071).

Thank you again for your consideration of this important issue.

Sincerely

Don Baken
Doctoral Researcher

APPENDIX TEN

Questionnaire for Main Data Collection

YOUR HEALTH

Firstly we need to establish your level of health. The following questions are designed to help us do this. Remember that all responses remain *strictly confidential.*

1 Have you ever been diagnosed with any of the following health problems?

Please tick as many boxes as are appropriate.

Heart Trouble ☐	Dental Problems ☐	Stomach problems ☐
High Blood Pressure ☐	Arthritis/Rheumatism ☐	Memory Loss ☐
Stroke ☐	Osteoporosis ☐	Head Injury ☐
Other circulation problems ☐	Bone and joint problems ☐	Headache/migraine ☐
Kidney trouble ☐	Eye trouble ☐	Fits/seizures ☐
Cancer ☐	Ear trouble ☐	Back problems ☐
Diabetes ☐	Incontinence ☐	Skin trouble ☐
Breathing problems ☐	Other bladder problems ☐	Thyroid problems ☐

Other: Please specify: _____ ☐

2 How many times have you visited your doctor in the last year? **Please tick appropriate box.**

Not at all	1
1 or 2 times	2
3 to 5 times	3
6 to 11 times	4
12 times or more	5
Don't know	6

3 The last time you saw your doctor, was it ... **Please tick appropriate box.**

Within the last 4 weeks	1
Within the last 3 months	2
Within the last 6 months	3
Within the last 12 months	4
More than 1 year ago	5
Don't know	6

he next set of questions asks you about your health in general and how this affects your daily ctivities. **Please circle the option that best represents your response.**

In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor

The following items are about activities you might do during a typical day. Does health now limit you in these activities? If so, how much?

1. Moderate activities, such a moving a table, pushing a vacuum cleaner, bowling or playing golf	Yes Limited a Lot	Yes Limited a Little	No, not Limited at All
2. Climbing several flights of stairs	Yes Limited a Lot	Yes Limited a Little	No, not Limited at All

During the past four weeks, have you had any of the following problems with your work or regular daily activities as a result of your physical health?

1. Accomplished less than you would like	Yes	No
2. Were limited in the kind of work or other activities	Yes	No

During the past four weeks have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems, (such as feeling depressed or anxious)?

1. Accomplished less than you would like	Yes	No
2. Didn't do work or other activities as carefully as usual	Yes	No

These questions are about how you feel and how things have been for you over the past four weeks. For each question, **please circle the one answer** that comes closest to the way you have been feeling. How much of the time during the past four weeks ...

	All of the Time	Most of the Time	A good bit of the Time	Some of the Time	A little of the Time	None of the Time
1. Have you felt calm and peaceful?	1	2	3	4	5	6
2. Did you have a lot of energy?	1	2	3	4	5	6
3. Have you felt downhearted and blue?	1	2	3	4	5	6

9 During the past four weeks, how much did pain interfere with your normal work, (including both work outside the home and housework)?

Not at all | A little bit | Moderately | Quite a bit | Extremely

10 During the past four weeks, how much of the time has your physical health or emotional problems interfered with your social activities, like visiting with friends, relatives?

All of the Time	Most of the Time	A good bit of the Time	Some of the Time	A little of the Time	None of the Time

If there are any other issues related to your health that you feel would be important for us to know please note them below.

_____

_____

_____

_____

_____

_____

11 **For each question, please circle Yes or No.** Do you ...

1.	Smoke cigarettes	Yes	No
2	Exercise or play sport at least once a week	Yes	No
3.	Sleep between 7 and 8 hours on average	Yes	No
4.	Eat fruit at least once per day	Yes	No
5.	Eat snacks between meals	Yes	No
6.	Eat breakfast most days	Yes	No
7.	Always wear a seat belt when travelling in a car	Yes	No
8.	Have dental check-ups at least once a year	Yes	No
9.	Perform breast or testicle self examination at least 10 times a year	Yes	No

YOUR THOUGHTS AND BELIEFS

This next section asks about your thoughts and beliefs. A number of sets of items are used in this section so that we can compare their usefulness for this research. Because of this some questions may look like others, but each one is different. Please note also that with each new set of items the response options change.

2 This first set of items asks about your thoughts and beliefs regarding your health. For each item of this set, **circle the number** that represents how much you *disagree* or *agree* with the statement.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
If I get sick, it is my own behaviour which determines how soon I get well again	1	2	3	4	5	6
No matter what I do, if I'm going to get sick, I will get sick	1	2	3	4	5	6
Having regular contact with my physician is the best way for me to avoid illness.	1	2	3	4	5	6
Most things that affect my health happen to me by accident	1	2	3	4	5	6
Whenever I don't feel well, I should consult a medically trained professional	1	2	3	4	5	6
I am in control of my health	1	2	3	4	5	6
My family has a lot to do with my becoming sick or staying healthy	1	2	3	4	5	6
When I get sick, I am to blame	1	2	3	4	5	6
Luck plays a big part in determining how soon I will recover from illness	1	2	3	4	5	6
0. Health professionals control my health	1	2	3	4	5	6
1. My health is largely a matter of good fortune.	1	2	3	4	5	6
2. The main thing which affects my health is what I myself do	1	2	3	4	5	6
3. If I take care of myself, I can avoid illness	1	2	3	4	5	6
4. When I recover from an illness, it's usually because other people, eg, doctors, nurses, family, friends, have been taking good care of me	1	2	3	4	5	6

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
15. No matter what I do, I'm likely to get sick	1	2	3	4	5	6
16. It it's meant to be, I will stay healthy	1	2	3	4	5	6
17. If I take the right actions, I can stay healthy	1	2	3	4	5	6
18. Regarding my health, I can only do what my doctor tells me to do	1	2	3	4	5	6

13 This next set of items asks about your thoughts about yourself and your abilities. For each item of this set, **please circle the number** that represents how *true* you believe each statement to be.

	Not at all True	Barely True	Moderately True	Exactly True
1. I always manage to solve difficult problems if I try hard enough	1	2	3	4
2. If someone opposes me, I can find means and ways to get what I want	1	2	3	4
3. It is easy for me to stick to my aims and accomplish my goals	1	2	3	4
4. I am confident that I could deal efficiently with unexpected events	1	2	3	4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations	1	2	3	4
6. I can solve most problems if I invest the necessary effort	1	2	3	4
7. I remain calm when facing difficulties because I can rely on my coping abilities	1	2	3	4
8. When I am confronted with a problem I usually find several solutions	1	2	3	4
9. If I am in a bind, I can usually think of something to do.	1	2	3	4
10. No matter what comes my way, I'm usually able to handle it	1	2	3	4

14 For each item of this set, **please circle the number** that best represents how much you *disagree* or *agree* with the statement.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	I am not a worrier	1	2	3	4	5
2.	I often feel inferior to others	1	2	3	4	5
3.	In uncertain times, I usually expect the best	1	2	3	4	5
4.	When I'm under a great deal of stress, sometimes I feel like I'm going to pieces	1	2	3	4	5
5.	I rarely feel lonely or blue	1	2	3	4	5
6.	I often feel tense and jittery	1	2	3	4	5
7.	If something can go wrong for me, it will	1	2	3	4	5
8.	Sometimes I feel completely worthless	1	2	3	4	5
9.	I rarely feel fearful or anxious	1	2	3	4	5
10.	I often get angry at the way people treat me	1	2	3	4	5
11.	I'm always optimistic about my future	1	2	3	4	5
12.	Too often, when things go wrong, I get discouraged and feel like giving up	1	2	3	4	5
13.	I hardly ever expect things to go my way	1	2	3	4	5
14.	I am seldom sad or depressed	1	2	3	4	5
15.	I rarely count on good things happening to me	1	2	3	4	5
16.	I often feel helpless and want someone else to solve my problems	1	2	3	4	5
17.	At times I have been so ashamed I just wanted to hide	1	2	3	4	5
18.	Overall, I expect more good things to happen to me than bad	1	2	3	4	5

15 For each item of this set, **please circle the number** that best represents how much you *disagree* or *agree* with the statement:

		Strongly Agree	Agree	Disagree	Strongly Disagree
1.	On the whole I am satisfied with myself	1	2	3	4
2.	At times I think I am no good at all	1	2	3	4
3.	I feel that I have a number of good qualities	1	2	3	4
4.	I am able to do things as well as most other people	1	2	3	4
5.	I feel I do not have much to be proud of	1	2	3	4
6.	I certainly feel useless at times	1	2	3	4
7.	I feel that I'm a person of worth, at least on an equal plane with others	1	2	3	4
8.	I wish I could have more respect for myself	1	2	3	4
9.	All in all, I am inclined to feel that I am a failure	1	2	3	4
10.	I take a positive attitude toward myself	1	2	3	4

16 For each item in this set indicate how *true* or *false* the statement is about you by **circling the appropriate number.**

		Definitely False	Mostly False	Mostly True	Definitely True
1.	I can think of many ways to get out of a jam	1	2	3	4
2.	I energetically pursue my goals	1	2	3	4
3.	There are lots of ways around any problem	1	2	3	4
4.	I can think of many ways to get the things in life that are most important to me	1	2	3	4
5.	Even when others get discouraged I know I can find a way to solve the problem	1	2	3	4
6.	My past experiences have prepared me well for my future	1	2	3	4
7.	I've been pretty successful in life	1	2	3	4
8.	I meet the goals that I set for myself.	1	2	3	4

7 This set of items asks more broadly about your thoughts and beliefs. **Please circle the number which best expresses your response.**

	Not at at all	Not very True	Sort of True	Very True
If I don't have assistance from my boss, I can't do my job. 1 2 3 4				
Without help from my family, I find it hard to achieve what I want	1	2	3	4
Doing something well depends on my ability	1	2	3	4
I'm clever	1	2	3	4
If I want to do things well, I just need to try hard	1	2	3	4
If I haven't got the money, life is much harder	1	2	3	4
God loves me	1	2	3	4
When I do well, it's because of my skills	1	2	3	4
I'm always short of money	1	2	3	4
0. God is in control of how things in my life turn out	1	2	3	4
1. The experience of my family can really help me succeed in the tough times	1	2	3	4
2. Help from my friends is vital to my success	1	2	3	4
3. To do something well, I need to have the support of my friends	1	2	3	4
4. I need good luck to succeed	1	2	3	4
5. Luck is on my side	1	2	3	4
6. My family has no interest in my life	1	2	3	4
7. I don't know how to keep myself from failing	1	2	3	4
8. My friends are happy to help where they can	1	2	3	4
9. If I want to do something well, I need to have money	1	2	3	4
0. I don't seem to be able to develop a good working relationship with a boss	1	2	3	4
1. Without God's help, I can't do things well	1	2	3	4
2. It is my ability that determines how things turn out	1	2	3	4
3. I am not a capable person	1	2	3	4
4. I share my problems with my friends	1	2	3	4

	Not at at all	Not very True	Sort of True	Very True
25. My family is willing to help me	1	2	3	4
26. If I fail, it's because I didn't try hard enough	1	2	3	4
27. When things don't turn out, I usually don't understand why	1	2	3	4
28. I'll get nowhere without hard work	1	2	3	4
29. God wants me to do well at things	1	2	3	4
30. When I do well it is because I worked hard for it	1	2	3	4
31. I need to have God on my side to succeed	1	2	3	4
32. I'm unlucky	1	2	3	4
33. God does not care whether I do things well	1	2	3	4
34. If I want to succeed I need the support of my family	1	2	3	4
35. I'm a good problem solver	1	2	3	4
36. I often give up	1	2	3	4
37. I have really good friends	1	2	3	4
38. If I want to succeed at work, I have to work well with the boss	1	2	3	4
39. Without my friends' help, I can't achieve my goals	1	2	3	4
40. My friends don't care about how things turn out for me	1	2	3	4
41. I can't do things well if my friends don't support me	1	2	3	4
42. I am pretty well off financially	1	2	3	4
43. I never seem to have the money I need	1	2	3	4
44. I have little control over how things turn out	1	2	3	4
45. It's hard to know why sometimes things go well and other times they don't	1	2	3	4
46. How things turn out is up to me	1	2	3	4
47. If I don't have a good working relationship with the boss I won't be able to do my job	1	2	3	4
48. How things turn out depends on my ability				
49. My boss doesn't support me	1	2	3	4
50. If I succeed, I usually don't know why	1	2	3	4
51. If I don't have the money, I can't do what I want to do	1	2	3	4

	Not at at all	Not very True	Sort of True	Very True
2. I'm not very clever	1	2	3	4
3. My boss is prepared to assist me in any way they can	1	2	3	4
4. I work as hard as I can	1	2	3	4
5. If I succeed, it's because I've been lucky	1	2	3	4
6. God does not want to help me	1	2	3	4
7. I think I'm just lazy	1	2	3	4
8. I don't know what it takes for me to succeed	1	2	3	4
9. My family is never there for me if I need them	1	2	3	4
0. If I want to succeed at work, I need to have support from my boss	1	2	3	4
1. Nothing in my life happens without God's approval	1	2	3	4
2. If I wanted them to, my family would support me	1	2	3	4
3. My level of effort determines my level of success	1	2	3	4
4. I've got lots of skills	1	2	3	4
5. My boss is willing to support me	1	2	3	4
6. To succeed I need to have money	1	2	3	4
7. Things won't go well, if God doesn't help me	1	2	3	4
8. The support of my family has a big impact in my life	1	2	3	4
9. God cares for me	1	2	3	4
0. If I decide to do something, I can	1	2	3	4
1. How things turn out for me is a matter of luck	1	2	3	4
2. I can get along well with my boss	1	2	3	4
3. I can always get hold of enough money	1	2	3	4
4. I can always do what I want to	1	2	3	4
5. If my family helps me, things will go well	1	2	3	4
6. I give things a real go	1	2	3	4
7. Succeeding depends on how much money I have	1	2	3	4
8. If I fail, it's because I've been unlucky	1	2	3	4
9. I don't have any luck	1	2	3	4

18 Next are some questions about the *support* that is available to you.

1. About how many close friends and close relatives do you have (people you feel at ease with and can talk to about what is on your mind).

Please write in number of close friends _____ and close relatives _____

People sometimes look to others for companionship, assistance or other types of support. How often is each of the following kinds of support available to you if you need it? **Please circle the option** that best represents your response.

		None of the Time	A Little of the Time	Some of the Time	Most of the Time	All of the Time
2.	Someone to help you if you were confined to bed	1	2	3	4	5
3.	Someone you can count on to listen to you when you need to talk	1	2	3	4	5
4.	Someone to give you good advice about a crisis	1	2	3	4	5
5.	Someone to take you to the doctor if you need it	1	2	3	4	5
6.	Someone who shows you love and affection	1	2	3	4	5
7.	Someone to have a good time with	1	2	3	4	5
8.	Someone to give you information to help you understand a situation	1	2	3	4	5
9.	Someone to confide in or talk to about yourself or your problems	1	2	3	4	5
10.	Someone who hugs you	1	2	3	4	5
11.	Someone to get together with for relaxation	1	2	3	4	5
12.	Someone to prepare your meals if you were unable to do it yourself	1	2	3	4	5
13.	Someone whose advice you really want	1	2	3	4	5
14.	Someone to do things with to help you get your mind off things	1	2	3	4	5
15.	Someone to do your daily chores if you were sick	1	2	3	4	5
16.	Someone to share your most private worries and fears with	1	2	3	4	5
17.	Someone to turn to for suggestions about how to deal with a personal problem	1	2	3	4	5
18.	Someone to do something enjoyable with	1	2	3	4	5
19.	Someone who understands your problems	1	2	3	4	5
20.	Someone to love and make you feel wanted	1	2	3	4	5

APPENDIX ELEVEN

Questionnaire for Test-Retest Reliability Study

PLEASE PUT YOUR ID NUMBER HERE

MEASURE OF CONTROL BELIEFS

This set of items asks broadly about your thoughts and beliefs. Some of these items relate to God and some to your boss. If you do not believe in God or are not presently working, you may find *some* of these items a little awkward to answer. If this is the case please feel free to miss those particular items but answer all the others. **Please circle the number which best expresses your response.**

	Not at All True	Not very True	Sort of True	Very True
1. If I don't have assistance from my boss, I can't do my job	1	2	3	4
2. Without help from my family I find it hard to achieve what I want	1	2	3	4
3. Doing something well depends on my ability	1	2	3	4
4. I'm clever	1	2	3	4
5. If I want to do things well, I just need to try hard	1	2	3	4
6. If I haven't got the money, life is much harder	1	2	3	4
7. God loves me	1	2	3	4
8. When I do well, it's because of my skills	1	2	3	4
9. I'm always short of money	1	2	3	4
10. God is in control of how things in my life turn out	1	2	3	4
11. The experience of my family can really help me succeed in the tough times	1	2	3	4
12. Help from my friends is vital to my success	1	2	3	4
13. To do something well, I need to have the support of my friends	1	2	3	4
14. I need good luck to succeed	1	2	3	4
15. Luck is on my side	1	2	3	4
16. My family has no interest in my life	1	2	3	4
17. I don't know how to keep myself from failing	1	2	3	4
18. My friends are happy to help where they can	1	2	3	4
19. If I want to do something well, I need to have money	1	2	3	4
20. I don't seen to be able to develop a good working relationship with a boss	1	2	3	4
21. Without God's help, I can't do things well	1	2	3	4
22. It is my ability that determines how things turn out	1	2	3	4
23. I am not a capable person	1	2	3	4
24. I share my problems with my friends	1	2	3	4

	Not at All True	Not very True	Sort of True	Very True
25. My family is willing to help me	1	2	3	4
26. If I fail, it's because I didn't try hard enough	1	2	3	4
27. When things don't turn out, I usually don't understand why	1	2	3	4
28. I'll get nowhere without hard work	1	2	3	4
29. God wants me to do well at things	1	2	3	4
30. When I do well it is because I worked hard for it	1	2	3	4
31. I need to have God on my side to succeed	1	2	3	4
32. I'm unlucky	1	2	3	4
33. God does not care whether I do things well	1	2	3	4
34. If I want to succeed I need the support of my family	1	2	3	4
35. I'm a good problem solver	1	2	3	4
36. I often give up	1	2	3	4
37. I have really good friends	1	2	3	4
38. If I want to succeed at work, I have to work well with the boss	1	2	3	4
39. Without my friends' help, I can't achieve my goals	1	2	3	4
40. My friends don't care about how things turn out for me	1	2	3	4
41. I can't do things well if my friends don't support me	1	2	3	4
42. I am pretty well off financially	1	2	3	4
43. I never seem to have the money I need	1	2	3	4
44. I have little control over how things turn out	1	2	3	4
45. It's hard to know why sometimes things go well and other times they don't	1	2	3	4
46. How things turn out is up to me	1	2	3	4
47. If I don't have a good working relationship with the boss, I won't be able to do my job	1	2	3	4
48. How things turn out depends on my ability	1	2	3	4
49. My boss doesn't support me	1	2	3	4
50. If I succeed, I usually don't know why	1	2	3	4
51. If I don't have the money, I can't do what I want to do	1	2	3	4
52. I'm not very clever	1	2	3	4

	Not at All True	Not very True	Sort of True	Very True
53. My boss is prepared to assist me in any way they can	1	2	3	4
54. I work as hard as I can	1	2	3	4
55. If I succeed, it's because I've been lucky	1	2	3	4
56. God does not want to help me	1	2	3	4
57. I think I'm just lazy	1	2	3	4
58. I don't know what it takes for me to succeed	1	2	3	4
59. My family is never there for me if I need them	1	2	3	4
60. If I want to succeed at work, I need to have support from my boss	1	2	3	4
61. Nothing in my life happens without God's approval	1	2	3	4
62. If I wanted them to, my family would support me	1	2	3	4
63. My level of effort determines my level of success	1	2	3	4
64. I've got lots of skills	1	2	3	4
65. My boss is willing to support me	1	2	3	4
66. To succeed I need to have money	1	2	3	4
67. Things won't go well, if God doesn't help me	1	2	3	4
68. The support of my family has a big impact in my life	1	2	3	4
69. God cares for me	1	2	3	4
70. If I decide to do something, I can	1	2	3	4
71. How things turn out for me is a matter of luck	1	2	3	4
72. I can get along well with my boss	1	2	3	4
73. I can always get hold of enough money	1	2	3	4
74. I can always do what I want to	1	2	3	4
75. If my family helps me, things will go well	1	2	3	4
76. I give things a real go	1	2	3	4
77. Succeeding depends on how much money I have	1	2	3	4
78. If I fail, it's because I've been unlucky	1	2	3	4
79. I don't have any luck	1	2	3	4

ABOUT YOURSELF

Lastly, so that we can be sure we know a little about the people in the survey, would you please answer the following questions which a little about yourself. Remember that all responses remain *STRICTLY CONFIDENTIAL.*

80 What is your age in years? _____

81 What is your gender? Male [1] Female [2]

82 What ethnic group do you most identify with?

NZ Maori [1] Asian [2]

NZ European/Pakeha [3] Pacific Islander [4]

Other (Please Specify) _____ [5]

83 What is your **highest** educational qualification?

No school qualification [1]

School certificate passes [2]

School qualifications, University entrance and above [3]

Trade certificate or Professional certificate or diploma [4]

University, diploma, or certificate [5]

Post graduate qualification [6]

WE REALLY APPRECIATE YOUR HELP
THANK YOU VERY MUCH

HAVE YOU PUT YOUR ID NUMBER ON THE FRONT OF THE QUESTIONNAIRE?