PREDICTORS OF POSITIVE AND NEGATIVE SELF-RATED HEALTH: TRANSITIONS AND SUB-POPULATION VARIATIONS

A Thesis Submitted to the Faculty of Graduate Studies
The University of Manitoba

by

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In Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Department of Community Health Sciences
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FACULTY OF GRADUATE STUDIES
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Dedicated to my husband,

Mahmood

and our children,

Arman and Rosa

for their enduring patience and understanding.

And to my advisor,

Betty

for her guidance and patience.

And to my parents, sisters and brothers

For their on-going encouragement and support.

ABSTRACT

Over the last several decades, self-ratings of overall health measured by a single question have been found to predict mortality, new morbidity, decline in functional ability, health care utilization and hospitalization, recovery from illness, and nursing home placement even after controlling for more objective measures of health. Based on these findings, today, self-rated health is accepted as measuring a subjective state that is associated with a variety of health states and consequences. But, the underlying questions remain; that is, what is it about these self-ratings that make them so predictive? What do self-ratings of general health really measure and what do they mean?

Using three waves of longitudinal data (1994/95, 1996/97, 1998/99) from the National Population Health Survey (NPHS) for a representative sample of Canadians age 25 or older (N=9,371, 5,380 females and 3,991 males), the present study explores predictors of positive (very good or excellent) and negative (fair or poor) self-rated health. Further, it explores how the underlying factors are different for men compared to women and for younger adults compared to older adults. This study also answers the question of whether the two ends of the self-rated health scale measure different dimensions of health. The present study is guided by the Evans and Stoddart (1994) population health model.

This study found factors belonged to the two categories of health and function and disease as the strongest predictors of not only negative self-rated health, but also positive health for all of the sub-populations studied. After controlling for the effects of these factors, there were significant associations between many other characteristics related to the individuals' socio-economic status, social environment, genetic endowment, and

health behaviours with the outcomes of interest. Individuals' behaviours were found to be associated with both positive and negative self-rated health for all the four sub-populations. There were however, variations in the behaviours predicting positive and negative self-rated health for men compared to women and also for middle-aged adults compared to elderly adults. Individuals' prosperity was important in predicting positive ratings of health among females, but negative self-rated health among men. For the elderly sub-population, prosperity was found to be associated with more negative ratings of health, while among middle-aged Canadians prosperity related factors were found to act as double-risk factors. Factors related to social environment were associated with positive ratings of health among men and middle-aged adults, but they were associated with more negative ratings of health among women. In the present study, there was no significant association between factors related to social environment and elderly adults' self-assessed health. Premature death of parent(s) was also found to be a significant predictor of fair or poor self-rated health among women and middle-aged adults.

This study further revealed that different patterns of transitions in the characteristics studied are associated with negative or positive self-ratings of health among men, women, middle-aged adults and elderly adults.

By comparing the components of the models predicting positive and negative self-rated health for each specific sub-population, this study concluded that at least some, although not all, of the factors associated with fair or poor health are different from factors associated with very good or excellent health.

ACKNOWLEDGEMENTS

"Data used in this analysis were obtained by special agreement with Statistics Canada to use the NPHS Master File. The analyses are the sole responsibility of the author."

"The opinion expressed do not represent the views of Statistics Canada."

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CHAPTER1: INTRODUCTION

The present study, which is a secondary analysis of Statistics Canada's National Population Health Survey (NPHS) longitudinal data focused on the self-rated health as a measure of overall health and well-being. The main goal of this study is to explore how a wide range of socioeconomic, psychosocial, lifestyle, health and functioning factors and their changes over time are associated with a poor or more positive self-ratings of health status.

Many surveys targeted at measuring the health status of populations include not only questions of illness, medically defined diseases and their functional consequences, but also ask the respondents to assess their health in more general terms. These self-assessments of general health status like other dimensions of health can be measured in several ways. However, in most of the large-scale studies, self-assessed or self-rated overall health is measured by a single question with responses along a 4- or 5-point scale from poor to excellent. Although a simple measure, this single-item indicator of self-rated health has been shown to have good test-retest reliability (Lundberg and Manderbacka, 1996; O'Brien Cousins, 1997) and construct validity. A strong correlation has been found between responses to this single-item indicator and scores on more extensive health measures, such as the Sickness Impact Profile (Bergner et al., 1976), the Perceived Well-Being Scale (O'Brien Cousins, 1997), and various sub-scales of the Short Form 36 Health Survey Questionnaire (Brazier et al., 1992). Self-ratings of general health status have also shown significant correlations with physicians' ratings, and more importantly, they have been reported to predict future ratings by physicians (Maddox and Douglass, 1973).

The use of single-item self-rated health was originally based on the need for a simple tool for assessing overall health where clinical assessments were too demanding and expensive to arrange. However, decades of epidemiological and gerontological research have shown that when individuals rate their own health, they tap into information that has important prognostic power for their future health. Numerous studies based on longitudinal data have found that self-ratings of health measured by a single question are predictive of mortality even after controlling for more objective measures of health (e.g., Mossey and Shapiro, 1982). In two recent reviews of the literature, out of 46 studies cited, 40 found evidence of the relationship between self-rated health and mortality (Benyamni 1999, Idler 1997). It is particularly noteworthy that these consistent results were found given that these studies were based on populations from various cultures across the world, involving several different age groups. Furthermore the wording of the "self-rated health" question varied somewhat from study to study suggesting that the robustness of the concept appears to override semantic and translation difficulties (Idler 1997). In addition to mortality, there is strong evidence from the literature that self-ratings of health are important predictors of new morbidity (e.g., Ferraro et al., 1997; Møller et al., 1996; Shadbolt, 1997), declines in functional ability (e.g., Idler and Kasl, 1995; Kaplan et al., 1993), health care utilization and hospitalization (e.g., Mutran and Ferraro, 1988; Wolinsky et al., 1994; Weinberger, 1986), recovery from illness (e.g., Wilcox et al., 1996), and nursing home placement (e.g., Weinberger, 1986). Again, these findings persist after controlling for more objective measures of health.

On the basis of these findings, self-rated health is no longer being considered just as a proxy measure for objective health status. Today, this measure is accepted as

measuring a subjective state that has its own health consequences. It has been recommended as a valid indicator of health, psychological well-being, and health-related quality of life; a useful tool for screening populations to identify high-risk groups and risk factors; a valid end point in psychosocial intervention studies; a predictor of illness behavior, preretirement decisions, and health care use; and as a predictor of health status change, morbidity, and mortality (Bjorner et al., 1996). But, the underlying questions remain; that is, what is it about these self-ratings that make them so predictive? What do self-ratings of general health really measure and what do they mean? There is general agreement that a better understanding of the determinants of self-rated health may shed light on its predictive power and provide relevant information for health promotion and prevention practices.

Reviewing the literature showed that over the last three decades, many researchers with training in different areas such as medicine, psychology, epidemiology, gerontology, and sociology have used diverse qualitative and quantitative research strategies to try to understand the meaning of self-ratings of health and associated factors. Although earlier studies focused on physical conditions and chronic diseases as the main criteria in evaluating health, more recent studies have showed that self-ratings of health are based on more than individuals' physical conditions. According to Blaxter (1990), people without specific health problems do not automatically rate their health at the top of the scale and as Cott and associates (1999) reported there are many people with chronic conditions or activity limitations who perceive their health as either "very good" or even "excellent". So far, self-ratings of health status have been found to be associated with a wide range of other characteristics and conditions including age (e.g., Cockerman et al., 1983), gender

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(e.g., Ferraro, 1980), psycho-social well-being (e.g., Fylkesnes and Førd, 1991), lifestyle factors and health behaviors such as leisure time activities, smoking, alcohol consumption, and diet (e.g., Schulz et al., 1994), family history (e.g., Idler and Benyamini, 1997), and presence of social and psychological resources such as social support (e.g., House et al., 1981) and self-esteem (e.g., Robinson et al., 1991).

Although many socioeconomic, social, psychological and behavioral characteristics and conditions found to be associated with individuals' ratings of their own health, the relation and contribution of these factors to self-ratings of health are still controversial. For example, some researchers such as Smith and associates (1994) reported that poor ratings of general health status are primarily related to the presence of ill health, whereas good health relates to sociodemographic and behavioral factors and only partly to absence of ill health. On the other hand, Mackenbach and associates (1994) believed that sociodemographic and behavioral determinants have a generally, similar, but mirrored association with both excellent and poor health.

The question of whether the determinants of self-rated health vary across demographic sub-populations has also been investigated using both qualitative and quantitative studies. For example, in their qualitative study, Krause and Jay (1994) concluded that the global health item is interpreted in different ways by different people. In particular, some respondents think about specific health problems when asked to rate their health; others think in terms of more general physical functioning, and still other study participants use health behavior as their frame of reference. Findings from this study also revealed that the use of a particular referent is not distributed randomly in the population. Younger people tend to use health behaviors more often, whereas those who

are older are more inclined to think of their own health problems. These results are, however, not fully consistent across studies; for example, Borawski and associates (1996) found that the oldest old were more likely to report health behaviors than medical conditions or functional abilities as their referent criteria.

As the current body of the literature on determinants of self-rated health shows many factors contribute to the individuals' ratings of their own health. However, previous studies in this area of inquiry were mainly cross-sectional, have focused on specific populations such as elderly persons, have studied the relation between a limited number of factors with self-ratings of health status, and were mainly based on small samples. Moreover, with the cross-sectional design of previous studies, it was impossible to explore not only how socioeconomic, psychosocial, and behavioural factors are associated with self-ratings of health status, but also how changes in those factors contribute to individuals' evaluations of their own health. As Idler and Benyamini (1997) suggested self-rated health is more likely to be a dynamic evaluation, judging trajectories as well as current levels of health.

As another limitation, none of the studies reviewed were guided by a comprehensive population health framework such as the Evans and Stoddart (1994) population health framework for organizing factors which are associated with self-ratings of health. Consequently, they have not discussed sub-population differences in those determinants.

Given the prognostic value of self-rated health, exploring factors that are associated with poor ratings of health versus more positive ratings is important. From a population health perspective, such findings can help health planners design more

appropriate health promotion and prevention programs. Moreover, from a health policy perspective, understanding how a wide range of socioeconomic, and psychosocial factors and their changes over time contribute to the health of men and women, both young and old, is relevant to appropriate delivery of health and social services. In addition, such an understanding is important for researchers who design large-scale surveys, which aim to measure the health of populations over time.

To address the identified policy needs and the existing gaps in the literature, the present study explores how a wide range of socioeconomic, psychosocial, lifestyle, health and functioning factors and their changes over time are associated with a poor or more positive self-rating of health status. Further, it explores how the underlying factors are different for men compared to women and for younger adults compared to older adults. This inquiry is based on longitudinal data from the National Population Health Survey (NPHS) of a national representative sample of men and women aged 25 or over. The main research questions addressed by this study are:

1) What are the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions of Canadians aged 25 or older and how they have been changed over time?

2) Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with fair or poor self-ratings of health?

3) Are the predictors of fair or poor self-rated health different for men compared to women?

4) Are the predictors of fair or poor self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to elderly adults (aged 55 or older)?

5) Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with very good or excellent self-ratings of health?

6) Are the predictors of very good or excellent self-rated health different for men compared to women?

7) Are the predictors of very good or excellent self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to elderly adults (aged 55 or older)?

8) Are the two ends of the single-item indicator of self-rated health measuring the same or different dimensions of health?

It is also the aim of this study to discuss the implications of the study findings for future research, practitioners, policy makers and program planners, and longitudinal survey designers and users.

CHAPTER 2: REVIEW OF CONCEPTS AND LITERATURE

This study focuses on self-rated health of Canadians aged 25 or older in 1994/95. The main goal of this study is to explore how a wide range of socioeconomic, psychosocial, lifestyle, health and functioning factors and their changes over time are associated with a poor or more positive self-rating of health status. It also aims to explore how the underlying factors are different for men compared to women and for younger adults compared to older adults.

Given the focus of the present study, this chapter is divided into four sections. The first section is an overview of the concept and models of health from a historical perspective. The second section describes the Evans and Stoddart (1994) population health model as the guiding conceptual framework for this study. The third section provides more in depth information on the single-item indicator of self-rated health, its historical use, its validity, reliability, and predictive value.

It is the intent of the fourth section of this chapter to review the current knowledge on determinants or predictors of self-rated health with the aim of providing insight into why these ratings are so predictive of individuals' future health. In reviewing the literature on this subject, the previously studied factors in relation to self-ratings of health status are organized and discussed using the conceptual model adopted for this study, the Evans and Stoddart (1994) population health framework. Using the current knowledge, differences in the determinants of poor versus good self-rated health and also variations in the determinants across different demographic sub-populations are discussed in this final section. This chapter closes with a summary of the information reviewed, a short discussion of methodological shortcomings and knowledge gaps within the current body

of research and then discusses the potential contribution of the present study in filling the identified gaps.

Section One: Concept and Models of Health – A Historical Perspective

Larson (1991) argued the definition of health is dependent upon the historical period in question and the culture within which it is defined. For example, for the past 150 years, rising expectations in developed countries have changed the definition of health from "survival" to "freedom from disease" to " ability to perform daily activities" to a "sense of well-being". Therefore, today many scholars in developed countries agree that health is a multidimensional concept, which encompasses not only the absence of disease and disability but also the ability to carry out normal tasks and activities and to maintain an overall sense of well being. However, health may be defined differently in less developed countries with lower levels of expectations and based on their own specific social and cultural norms. According to Young (1998) most people seem to know when they are healthy and when they are not, but there is no universal definition of health.

As Ware (1995) stated different concepts of health are reflected in the models of health at the time of their development. Although there is no universal agreement on how many models of health exist (Larson, 1991), the two most frequently mentioned models in the literature are the bio-medical model of health and the social model of health. The bio-medical model is based on the assumption that disease is generated by specific etiological agents which lead to changes in the body's structure and function. According to this model, health is seen in terms of absence of disease. This model has been criticized for its inability to capture all factors that affect people's health (Bowling, 1997; Larson, 1991).

It has been argued that it focuses too narrowly on the body and on technology, rather than on people in the social context within which they live (Larson, 1991).

Social scientists distinguish between the medical concepts of disease, illness, and sickness. Young (1998) defined disease as the underlying structural and functional disturbance of the human body, which are observable by an individual or a health care provider as signs and symptoms and labeled as deviations from the norm. According to the same author, illness is the personal and subjective experience of the disease, while sickness is the societal response to the individual's illness, affecting his/her relations with others. Health and ill-health are viewed by social scientists as a continuum along which individuals progress or regress (Ogden, 1996). The social model of health is best expressed with reference to the World Health Organization's (WHO) definition that health is not merely the absence of disease and impairments, but a state of complete physical, psychological and social well-being (WHO, 1984). Although the WHO definition of health has been recognized as a broad and positive definition that serves to orient health professionals toward thinking in terms of health promotion and not just the treatment of disease (Young, 1998), it has been criticized as being utopian (Bowling, 1997; Young, 1998). According to Evans and Stoddart (1994), such a comprehensive concept of health risks becoming the proper object for, and being affected by, all human activity.

Dictionary definitions of health also emphasize both physical and mental dimensions of health and refer to the body and bodily needs and its emotional and intellectual status. Health is defined as "completeness" and "proper function". Well-being is also part of the dictionary definition (Ware, 1995). As Ware (1987) stated among attributes of these definitions, those most important in constructing measures are

dimensionality (particularly the distinction between physical and mental components), and the full spectrum of health states ranging from disease to well-being.

In addition to the concepts of health defined in dictionaries or by professional institutions or groups, there is a wide range of different concepts of health and illness, which exist within different societies. This group of definitions is called "lay definitions of health". According to Bowling (1997) analysis of the lay definitions of health help us understand whether an offered health service will be used, consultation and service use patterns, adherence to prescribed medications and therapies, and how people generally respond to and manage particular symptoms.

According to the various qualitative and quantitative studies, lay people perceive health in different ways ranging from the "absence of disease" (consistent with the bio-medical model of health) to health as a "strength"; "being able to maintain normal role functioning"; "being fit"; "being able to cope with crises and stress"; "having healthy habits"; "vitality"; "being socially active"; and "a state of good mental and physical equilibrium" (Manderbacka, 1998; Bowling, 1997).

From reviewing all these definitions of health we can conclude that health has distinct components. To fully understand health at a single time, as well as changes in health over time, these components must be measured and interpreted separately. But what are the components of health? Ware (1987) identified five distinct dimensions of health as physical health, mental health, social functioning, role activities, and a general perception of well-being. While multidimensional, Ware (1987) argued that health is more than just the sum of its parts and it is not enough to measure just its parts. According to this author (among many others), health means different things to different

people. Physical, mental, and social dimensions of health are not valued equally by everyone. Therefore, it is suggested that a personalized and integrative concept, the perception of health in general, should be considered as well (Davies and Ware, 1981).

Conceptual Frameworks of Health Determinants

In agreement with the bio-medical conceptual model of health, one of the earliest conceptual frameworks which were used to explain the population's health status for health policy purposes was the "simple feedback model of relationship between health and health care". According to this conceptual framework, health is defined as absence of disease or injury. Based on this conceptual framework, when people become sick, they seek care by presenting themselves to the health care system that acts like a thermostat and determines the needs and responds appropriately. For getting optimum results, professional assessment of needs (by the people within the health care system and based on the state of medical technology), and the issue of access to the health care system are crucial. Regardless of how needs are defined, in this conceptual framework it is presumed that the provision of care, which is the health care system's response, reduces the level of disease and therefore improves health. Thus, in this conceptual framework, the level of health of a population is the negative or inverse of the burden of disease. One of the criticisms of this conceptual framework is that is does not tell us anything about why people get sick. Moreover, in this conceptual framework, the contributions of all of the other factors outside the health care system are being ignored.

Another conceptual framework which is called "feedback model of expansion of health care system" also focuses on the relationship between health and health care, and

defines level of health of a population as the negative or inverse of the burden of disease (which is in agreement with the traditional bio-medical conceptual model of health). However, this conceptual framework reflects two concerns namely thinking about and investing in the "health care system" as the main determinant of health. These concerns are the growing health care costs and the effectiveness with which health care services respond to the needs of individuals and populations.

In 1974, the Canadian government released a working document called *A New Perspective on the Health of Canadians*. This document was also called the Canadian white paper. The Canadian white paper introduces a conceptual framework for the analysis of health determinants, which is called the *health field concept*. This conceptual framework organizes the determinants of health status into the four fields of human biology, environment, lifestyles, and health care organization. Thus, the Canadian white paper introduces three new fields in addition to health care organization as the four main determinants of health. Indeed, the first three fields in the new conceptual framework identify some of the "other and unspecified" factors as determinants of health in the previously reviewed conceptual frameworks. As Evans and Stoddart (1994) stated, consideration of the three other fields in the white paper was very important since it drew attention to the factors which according to the existent evidence (e.g., Marmot and Wilkinson, 1999), could possibly contribute more to the improvement of human health than further expansions in the health care system. However, as Evans and Stoddart (1994) mentioned the white paper led into a period of detailed analysis of individual risk factors as contributors to "disease" in the traditional sense which, in turn, resulted in its criticism. This conceptual framework was criticized for focusing on individual risk

factors and specific diseases, which draws attention not away from but back to the health care system. The *"health field concept"* as a health determinants conceptual framework has also been criticized for not reflecting the potential significance of processes operating on health at the level of groups and populations (Buck, 1985).

Since the Canadian white paper, much has been learned that supports, and at the same time refines and expands on that proposed conceptual framework. In particular, there is growing evidence that the contribution of medicine and health care is quite limited, and that spending more on health care will not result in further improvements in population health. On the other hand, there is strong and growing evidence, which shows that other factors such as living and working conditions are important for having a healthy population. This new way of thinking about population health and its determinants differs from traditional medical and health care thinking by placing emphasis on the health of the entire population while considering a wide range of factors which affect health (Evans and Stoddart, 1990; Roos et al., 1995).

The Federal, Provincial, and Territorial Advisory Committee on Population Health (1994) has acknowledged the wide range of factors which influence individuals' or populations' health status including income, social position, social support networks, education, employment, working conditions, safe and clean physical environments, biology and genetic make-up, personal health practices and coping skills, childhood development and health services.

As explained in the report "Strategies for Population Health: Investing in the Health of Canadians" (Federal, Provincial, and Territorial Advisory Committee on Population Health, 1994), the proposed conceptual framework places "population health

status" at the top of the pyramid underpinned by five categories of "determinants of health". According to this conceptual framework, health is determined by both "collective" and "individual" factors including the social and economic environment, the physical environment, health services, personal health practices, and individual capacity and coping skills. The identified determinants of health within this conceptual framework are presented on two different levels to emphasize the idea that collective factors (e.g., the social and economic environment and health services) provide the bases for individual factors. Making up the "foundations for action" of this conceptual framework for population health are public policy, research, and information.

As we can see, compared to the previous conceptual models of health or health determinants conceptual frameworks, this population health framework is superior since it incorporates not only the determinants of health at the individual level, but also highlights the importance of socio-economic environment, physical environment and health care system as societal and organizational factors which contribute to populations' health status. Moreover, in agreement with the social conceptual model of health, this proposed conceptual framework emphasizes the contribution of many other factors outside the health care system as important determinants of health. However, as it is clear, this framework does not provide us with any clue or assumption about how the proposed determinants could interact with each other to produce a higher level of health.

In an attempt to provide a conceptual framework, which encompassed all the new forms of evidence in regards to the determinants of health, Evans and Stoddart (1994) proposed a comprehensive model, which is adopted as the guiding conceptual framework in this study. Compared to the previous conceptual frameworks for exploring the

determinants of health, the Evans and Stoddart's population health framework allows researchers to investigate more in depth the complex interrelationships between a wide range of determinants not only at the individual level, but also at the societal and organizational level.

Section Two: Guiding Conceptual Framework

It is well established that any research, qualitative or quantitative can benefit from adopting a conceptual or theoretical framework. According to Portney and Watkins (1993), conceptual models or frameworks facilitate the organization of existing knowledge, guide the selection of relevant concepts and constructs, and also help in anticipating the relationships among these concepts. A theoretical model or framework is also known as a useful tool in selecting the most appropriate study design or analytical approaches (Reed, 1984; Fawcett and Downs, 1992).

The present study explores how a wide range of socioeconomic, psychosocial, lifestyle, health and functioning factors and their changes over time are associated with a poor or more positive self-rating of health status. Further, this study explores how the underlying factors are different for men compared to women and for younger adults compared to older adults. Given the fact that factors underlying self-ratings of health status are indeed the most important determinants of health from the individuals' perspective, it is reasonable to use a population health framework for guiding this study. Population health is defined as a conceptual framework for thinking about why some people are healthier than the others (Young, 1998) and this study explores why some Canadians perceive their health better or worse than the others. According to Young

(1998), population health addresses the entire range of factors that determine health and also affects the entire population rather than only ill or high-risk individuals. This study explores how a wide range of socio-economic, psychosocial, behavioral, genetic and health-related factors are associated with a positive or negative self-ratings of health status for Canadian household residents who were age 25 or older in 1994/95.

As the review of the conceptual frameworks of health determinants in the previous section showed there are several other potential population health frameworks suitable for guiding this study, for example, the health field framework proposed by the Canadian government in 1974, or the framework proposed by the Federal, Provincial, and Territorial Advisory Committee on Population Health in 1994. However, the decision was made to use the Evans and Stoddart Population Health Model (1994) as the guiding conceptual framework because it is more comprehensive and can also be used as an analytical tool.

The Evans and Stoddart (1994) Population Health Framework

In an attempt to provide a population health conceptual framework which encompass all the new forms of evidence in regards to the determinants of health, Evans and Stoddart (1994) proposed a conceptual framework, which is presented in Figure 2.1.
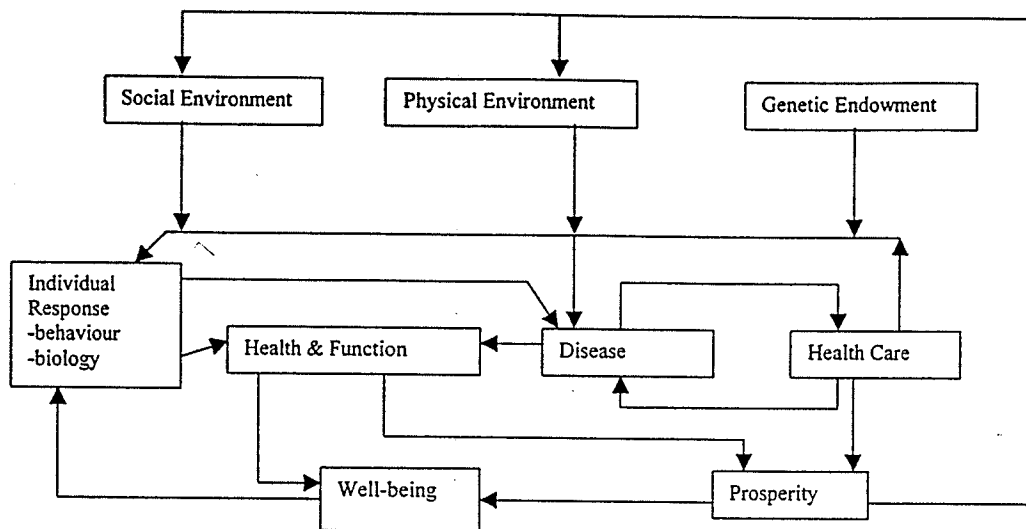
Figure (2.1): Evans and Stoddart's Population Health Model (Evans and Stoddart, 1994).

Evans and Stoddart described their proposed population health framework as a "comprehensive and flexible" framework that represents a wide range of relationships among the determinants of health. According to the authors, this model provides "meaningful categories in which to insert the various sorts of evidence that are now emerging as to the diverse determinants of health, as well as to permit a definition of health broad enough to encompass the dimensions that people -providers of care, policymakers, and particularly ordinary individuals- feel to be important" (Evans and

Stoddart, 1994, p. 32). In addition, Evans and Stoddart stated that their proposed

framework, as an analytic tool, highlights "the ways in which different types of factors

and forces can interact to bear on different conceptualizations of health" (Evans and

Stoddart, 1994, p. 32). Components of the Evans and Stoddart population health model

are described in the following section.

Health and Function: Within their proposed framework, Evans and Stoddart (1994) have

made a distinction between the two concepts of "health" and "disease". According to

them, "disease" is recognized and responded to by the health care system, but "health and

function" are the personal experiences of individuals themselves. In narrow terms, but

from the patient's perspective, health within this conceptual framework is defined as the

absence of illness or injury, of distressing symptoms or impaired capacity. To clarify this

distinction, Evans and Stoddart (1994) explained that "persons with the same disease,

from the point of view of the health care system, may experience very different levels of

symptoms and distress, and also effects on their ability to function in their various social

roles" (Evans and Stoddart, 1994, p. 47). As is clear from this statement, the component

of "health and function" within the Evans and Stoddart population health framework

(1994) can best be presented by indicators of distress, and functional ability including

Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL).

Health Care: Within this component, Evans and Stoddart (1994) referred to the health

care system and discussed issues such as "availability" and "accessibility" of services,

"equity in access to health care", "equity in health care", and their relation to individual's

or population's health status.

Disease: Within the Evans and Stoddart population health framework, (1994) "disease" is considered as a medical concept or construct, which is believed to have an important bearing on illness and thus on health, but is not the same as health. This component of the Evans and Stoddart population health framework (1994) can best be presented by medical diagnosis for specific diseases or chronic conditions.

Social Environment: Social environment is defined as "all aspects of social organization that might affect health status" (Hertzman et al., 1994, p. 78-79). Some of the potential measures of this concept at the individual level are social support, social isolation, social networks, and marital status.

Well-being: In their proposed framework, Evans and Stoddart (1994) made a distinction between "well-being" and "health". According to them, "health, even as interpreted by the individual, is not the only thing in life that matters" (Evans and Stoddart, 1994, p. 47). They defined well-being as "the sense of life satisfaction of the individual, which is or should be the ultimate objective of health policy" (Evans and Stoddart, 1994, p. 47). This component of the Evans and Stoddart population health framework (1994) can best be presented by measures such as life satisfaction, quality of life, and self-assessments of overall health status.

Individual Response (Behaviour & Biology): The concept of "individual response" within the Evans and Stoddart Population Health Framework (1994) refers to the

individual's lifestyle and behavioral habits, and also their responses to stress and social environment. Variables such as smoking, physical activity, dietary practices, drinking and self-esteem or self-efficacy can represent this component of the Evans and Stoddart Population Health Framework (1994).

Genetic Endowment: According to Baird (1994), genetic endowment consists of unmodifiable characteristics or susceptibilities with which individuals are born. These include individual characteristics such as age and sex, and also family history of specific diseases or conditions.

Physical Environment: Physical environment is described as including "the potentially harmful effects of exposure to physical, chemical, and biological agents at home, at work, and anywhere else" (Hertzman and associates, 1994, p. 78). Video display screens, electrical power lines, second-hand cigarette smoke and acid rain are given as examples of physical environment factors which have been or are now being investigated as determinants of health (Stephens and McCullough, 1991).

Prosperity: Prosperity is an economic concept, which can be measured at community or individual levels (Evans and Stoddart, 1994). At an individual level, it refers to individuals socio-economic status and at the community or population level it refers to the performance of the economy as a whole and how macro-economic decisions affect the health of communities or populations.

As Evans and Stoddart themselves stated the test of their proposed framework will be "the extent to which others find it useful as a set of categories for portraying complex causal patterns" (Evans and Stoddart, 1994, p. 59). In this study, using Evans and Stoddart's population health framework (1994), the potential determinants or predictors of self-rated health status are inserted into the different categories of the model and "self-rated health status" as the outcome of interest is considered as an indicator of "well-being". Using this conceptual framework, important factors in relation to self-ratings of general health status are investigated.

There are advantages to using the Evans and Stoddart population health Framework (1994) as the guiding conceptual framework in the present study including that it is a comprehensive model of health determinants. Thus, organizing the existent evidence regarding the determinants or predictors of self-ratings of health status within the comprehensive framework allows us to incorporate some of the potential determinants, which have not been explored sufficiently in previous studies. Moving from conceptualization to the analysis of the information, Evans and Stoddart's proposed framework (1994) serves as an analytic tool to guide the actual statistical analyses. Finally, this conceptual framework facilitates the discussion and interpretation of the analytical findings.

Section Three: The Single-item Indicator of Self-rated General Health Status

Perceived or self-ratings of general health status are among the most commonly used measures of health and well-being (Davies and Ware, 1981). These ratings are considered measures of general health for two reasons. They do not focus on a specific

dimension of health. Further, they have been linked empirically to a wide range of health concepts (Davies and Ware, 1981) and to both physical and mental health dimensions. They are considered ratings rather than reports because they reflect individual differences in the evaluation of information people have about their own health; that is, they are self-assessments.

Many surveys targeted at measuring the health status of populations include not only questions about illness, medically defined diseases and their functional consequences, but also ask the respondents to assess their health in more general terms. "Self-rated general health status" like other dimensions of health can be measured in different ways. However, in most of the large-scale studies, self-rated health status is measured by a single-item indicator with responses along a 4- or 5-point scale from poor to excellent. The use of this single-item indicator has been based on the need for a simple tool to assess health where clinical assessment is too time consuming and expensive. Ware and associates (1978) reviewed the literature published between 1959 and 1977 and found that the single-item indicator of self-rated health had been used in some studies since the late 1950s. As Ware and associates (1978) indicated, the purposes of studies that included the single-item indicator of self-rated health were broad ranging. These purposes included assessing the relationship between personal health ratings and demographic characteristics, medical evaluations of health over time, attitudinal variables over time, illness behavior, self-reported physical and psychological symptoms, physical capacity of elderly populations in various countries, use of medical services, marital status and happiness, social factors and life satisfaction. In summary, the single-item self-rated health indicator has been used to (a) study relationships among health

constructs, (b) explain health and illness behavior, (c) describe the health of populations, (d) and clarify measurement issues. In recent years in Canada, this indictor has been included in a number of population surveys including the National Population Health Survey (1994, 1996, and 1998); Canadian Community Health Survey (2000); Canada's 1990 Health Promotion Survey; Statistics Canada's Violence Against Women Survey; and the Alberta Health Promotion Survey. The self-rated health indicator has also been included in most of Statistics Canada's General Social Surveys since 1980.

Although a simple measure, the single-item indicator of self-rated health has been shown to be a reliable measure of overall health status. For example, in 1996, Lundberg and Manderbacka examined the test-retest reliability of the single-item self-rated health indicator and compared that with the reliability of health questions that were phrased more, as well as less, precisely. The results of Lundberg and Manderbacka's study show that the reliability of the self-rated health indicator is as good as, or better than, that of the more specific questions. Overall agreement rates show that between 85 and 90% of respondents gave the same answer at both interviews. Kappa values indicate good to almost excellent reliability according to the standards suggested. When they compared self-rated health with several other indicators, it appeared that the former performs as well, or even better, than more specific items. These authors also assessed the reliability of the self-rated health indicator separately for different population categories and they found that this indicator is a reliable measure of overall health in all population groups [among men aged 18-45 (Kw=0.52); among men aged 46-75 (Kw=0.82); among women aged 18-45 (Kw=0.62); among women aged 46-75 (Kw=0.58)]. Cousins (1997) also reported moderate reproducibility for the single-item self-rated health indicator in women

aged 70 and older (r=0.506). As part of the present study, the stability of the single-item self-rated health indicator between the first (1994/95) and the third (1998/99) cycles of the National Population Health Survey (NPHS) was examined and a weighted Kappa coefficient of 0.43 was obtained. As Ware and associates (1978) mentioned none of the studies that used the single-item indicator of self-rated health and was published between 1959 and 1977, reported reliability estimates.

Validity of the single-item indicator of self-rated health has also been studied in several different ways. For example, Bergner and associates (1976) examined the concurrent validity of the single-item indicator and reported a strong correlation between responses to this measure and scores on more extensive health scales, such as the Sickness Impact Profile. Similarly, Brazier and associates (1992) found a strong correlation between the self-rated health indicator and the various subscales of the Short Form 36 Health survey questionnaire. Demonstration of a significant association between self-rated health and physicians' ratings is another way of examining validity of this simple measure. According to the literature, there is not only a significant correlation between self-rated health and physician's ratings (e.g., Maddox, 1973; LaRue, 1979), but also the single-item self-rated health indicator can predict future ratings by physicians (e.g., Maddox and Douglass, 1973). Some studies have suggested that self-rated health is actually a better predictor of functional status and mortality than are physician's ratings (e.g., Mossey and Shapiro, 1982; Idler and Kasl, 1995).

Although a crude and simple measure, the single-item self-rated health indicator has been shown to have independent predictive power in prospective studies. Ratings of general health status, measured by a single question, have been found to be an important

predictor of survival, especially for the elderly population. In two excellent reviews, Idler and Benyamini (1997) and Benyamini and Idler (1999) discussed some of the main studies on this subject from all over the World. The studies reviewed in these two articles were different in a number of important ways, including: (a) the sampling strategies employed; (b) the sample size; (c) the populations under investigation; (d) the ways that respondents are asked about their perceived health and the response categories used; (e) the follow-up periods; (f) the covariates specified for adjustment purposes; and, (g) the statistical modeling approaches selected. However, the predictive value of self-rated health for mortality was consistently recognized in each of the studies. For example, the study by Mossey and Shapiro (1982) revealed that the risk of mortality associated with poor self-evaluated health was higher than that associated with prior objective health status assessed by physicians and self-reported conditions. In a 9-year follow-up of adults aged 20 and over in Alameda County, California, Kaplan and Kamacho (1983) also found that poor self-ratings were associated with increased mortality rates for respondents aged 29 and over. More importantly, Kaplan and Kamacho (1983) reported that the effect of self-evaluation on mortality was not due to its association with other variables like physical health status, health practices, social network or psychological state. In addition to mortality, there is strong evidence from the literature that self-ratings of health are important predictors of new morbidity (e.g., Ferraro et al., 1997; Møller et al., 1996; Shadbolt, 1997), decline in functional ability (e.g., Idler and Kasl, 1995; Kaplan et al., 1993; Mor et al., 1989), health care utilization and hospitalization (e.g., Mutran and Ferraro, 1988; Wolinsky et al., 1994; Weinberger,

1986), recovery from illness (e.g., Wilcox et al., 1996), and nursing home placement (e.g., Weinberger, 1986).

Focusing on the association between self-rated health and decline in functional ability, Mor and colleagues (1989) found self-rated health to be a significant predictor of functional decline among elderly adults, aged 70 or older, over a two-year period. In 1993, Kaplan and associates reported a similar result with the six-year follow-up of the Alameda County study. In 1995, Idler and Kasl raised the issue more directly of how self-assessed health affects disability and convincingly demonstrated its predictive utility for assessing change in disability with the New Haven EPESE (Established Populations for the Epidemiological Studies of the Elderly) data. More recently, Ferraro and associates (1997) raised the issue that changes in morbidity may be the true engine of change in disability and that failure to consider it might lead to incorrectly attributing increases in disability to assessed health. Therefore, they studied the dynamic relationships between disability and self-assessed health while controlling for morbidity (Ferraro et al., 1997). They used three waves of data from a 15-year longitudinal study, the National Health and Nutrition Examination Survey I (NHANES I): Epidemiologic Follow-up Study and one of their main research questions was "Do more negative health assessments lead to greater morbidity and physical disability?" Results from this longitudinal panel study showed that more negative evaluations of health might lead to more rapid increase not only in disability, but also in morbidity. Subjects with poorer ratings of health manifested incident morbidity by the second and third waves at the same time that their levels of disability grew worse.

Research findings such as these provide ample evidence of the predictive value of the single-item indicator of self-rated health, however, such demonstrations lead quite naturally to asking what is it about these self-ratings that makes them so predictive? What is it that self-ratings of general health measure and what do they mean?

Section Four: Determinants of Self-rated Health

The published papers to date illustrate some diverse research strategies addressing questions that range from the modeling self-rated health as a predictor of various outcomes, self-rated health itself as an outcome, and also explorations of the meaning component of self-rated health. The literature review presented in this chapter includes papers, which considered self-rated health itself as an outcome, and also explorations of the meaning component of self-rated health.

According to the existing literature, exploration of the determinants of self-rated health has been the focus of many studies, quantitative or qualitative, over the last several decades (Chart 2.1). In quantitative studies, following the logic of construct validation, the correlation of the global health ratings with other theoretically relevant external criterion measures has been investigated. In qualitative studies, after asking study participants to respond to the global self-rated health item by selecting a closed-ended answer (i.e., excellent, very good, good, fair, or poor), subjects are usually asked to use their own words to describe why they selected a particular closed-ended response. Reviewing the literature revealed that the qualitative studies of the meaning of self-ratings of health are rare and among the reviewed literature on the subject, there was only

one study (Idler et al., 1999) which adopted a multi-method approach (i.e., a combination of qualitative and quantitative strategies). As Chart 2.1 presents, the determinants of self-rated health have been investigated more frequently by the means of quantitative studies. The reviewed quantitative studies were, however, of a wide variety in terms of the design, the focus of their sample, and the sample size (Chart 2.1). In terms of the design, as chart 2.1 shows, in most of the reviewed quantitative studies, the independent and dependent variables were measured simultaneously (i.e., cross-sectional studies). There were only a few longitudinal studies aimed to explore factors associated with self-rated health (e.g, Farmer and Ferraro, 1997) or factors associated with change in self-rated health (e.g., Rodin and McAvay, 1992). In terms of the focus and size of their sample, most of the reviewed studies focused on a specific sub-population (e.g., elderly, specific ethnic group, women in a narrow age range) and were mostly based on the small sample sizes. The reviewed studies were also very different in terms of their independent variables. Many of the older studies considered only a few factors which were mainly related to physical health status, but, more recent studies have broadened their scope and considered a wide variety of socio-economic, physical, psychological, social, behavioral, and spiritual conditions and characteristics in relation to self-ratings of health. The outcome variable was also defined differently across the reviewed studies. In some of the reviewed studies, self-rated health is treated as an ordinal variable and in some studies as a binary variable. The variation in defining the outcome variable explains some of the observed variation in adopted analytical techniques across the reviewed studies. However, the predominant analytical tool, which was used in the reviewed studies was some form of regression.

Chart 2.1: Previous Studies of Determinants of Self-rated Health

Citation	Study Design	Focus of Sample	Sample Size
Benyamini et al., 2000	Quantitative (Longitudinal)	Elderly (65+)	851
Benyamini et al., 1999	Quantitative (Longitudinal)	Elderly (65+)	830
Blaum et al., 1994	Quantitative (Cross-sectional)	Elderly (65+)	11,497
Blazer and Houpt,1979	Quantitative (Cross-sectional)	Elderly (65+)	977
Bobak et al., 1998	Quantitative (Cross-sectional)	Adults aged 18 or older	1,599
Cairney, 2000	Quantitative (Cross-sectional)	Adults aged 55 and Older	4,480
Cockerham et al., 1983	Quantitative (Cross-sectional)	Adults aged 18 or older	660
Cott et al., 1999	Quantitative (Cross-sectional)	Adults aged 20 or older	13,995
Dalen et al., 1994	**Qualitative**	Adults aged 18 or older	196
Damian et al., 1999	Quantitative (Cross-sectional)	Elderly (65+)	677
Denton and Walters, 1999	Quantitative (Cross-sectional)	Adults aged 20 and over	15,144
Ebly et al., 1996	Quantitative (Cross-sectional)	Non-institutionalized Elderly aged 85 or older	1,239
Engle and Graney, 1985-86	Quantitative (Cross-sectional)	Women over age 60	114
Euronut SENECA Investigators, 1991	Quantitative (Cross-sectional)	Elderly men and women from 17 towns in 11 countries	2,544
Farmer and Ferraro, 1997	Quantitative (Longitudinal)	Adults aged 25 to 74	4,880
Ferraro, 1980	Quantitative (Cross-sectional)	Low-income elderly	3,402
Ferraro et al., 1997	Quantitative (Longitudinal)	Adults aged between 25 and 74 at the baseline	6,841
Fylkesness and Førd, 1991	Quantitative (Cross-sectional)	Men aged 20-61 and Women aged 20-56	(9,408) men and (9,152) women
Fylkesness and Førd, 1992	Quantitative (Cross-sectional)	Adults aged between 30 and 62	(4, 549) men and (4,360) women
Hirdes and Forbes, 1993	Quantitative (Longitudinal)	45-year-old males at the baseline	1,702
Hunt et al., 1984	Quantitative (Cross-sectional)	Adults aged between 20 and 75	2,173

Idler et al., 1999	Quantitative (Cross-sectional) And **Qualitative**	Elderly (65+)	159
Jylhä et al., 1986	Quantitative (Cross-sectional)	Men aged 31-35, 51-55 And 71-75	360
Jylhä, 1994	**Qualitative**	Elderly (60-99)	830
Kawachi et al., 1999	Quantitative (Cross-sectional)	Residents of 39 States	167,259
Kempen et al., 1998	Quantitative (Cross-sectional)	Elderly (65+)	5,279
Kivinen et al., 1998	Quantitative (Cross-sectional)	Elderly men aged Between 70 and 89	470
Krause and Jay, 1994	**Qualitative**	Adults with an average Age of 38.8	158
Leinonen et al., 1997	Quantitative (Longitudinal)	Elderly (65+)	388
Levkoff et al., 1987	Quantitative (Cross-sectional)	Adults aged 45-89	460
Liang, 1986	Quantitative (Cross-sectional)	Non-institutionalized Elderly (65+)	3,996
Mackenbach et al., 1994	Quantitative (Cross-sectional)	Women and Men Between ages 15 and 74	18,179
MacRae and Johnson, 1978	Quantitative (Cross-sectional)	Late teens to early Nineties	6,000
Maddox, 1962	Quantitative (Cross-sectional)	Elderly (aged 60-94)	251
Maddox and Douglass	Quantitative (Longitudinal)	Elderly aged 60+	270
Manderbacka et al., 1994	Quantitative (Cross-sectional)	Adults aged 25 or older	7,290
Manderbacka et al., 1999	Quantitative (Cross-sectional)	Adults aged between 18 and 75	5,306
Manderbacka, 1998	**Qualitative**	Middle-aged adults (35-64)	40
Mitrushina and Satz, 1991	Quantitative (Cross-sectional)	Elderly aged 57-85	133
MMWR, 1995	Quantitative (Cross-sectional)	Black men and women Aged 18 and over	518
Moum, 1992	Quantitative (Cross-sectional)	Adults aged between 20 and 85	7,302
Pilpel et al., 1988	Quantitative (Cross-sectional)	Elderly (65+)	606
Poikolainen et al., 1996	Quantitative (Cross-sectional)	Adults aged between 25 and 64	2,665
Ratner et al., 1998	Quantitative (Cross-sectional)	Women and Men Between ages 15 and 90	
Rodin and McAvay	Quantitative (Longitudinal)	Adults (62+)	264
Ross et al., 2002	Quantitative (Cross-sectional)	Adults aged 18 or older	48,412
Schulz et al., 1994	Quantitative (Cross-sectional)	Elderly (65+)	5,201
Segovia et al., 1989	Quantitative (Cross-sectional)	Adults aged 20 or older	3,300
Shadbolt, 1997	Quantitative (Longitudinal)	Women aged between 20 and 59	291

Smith et al., 1994	Quantitative (Cross-sectional)	Women aged between 45 And 55	1,863
Statistics Canada, 1994	Quantitative (Longitudinal)	Adults aged between 25 to 64	–
Tessler and Mechanic, 1978	Quantitative (Cross-sectional)	Four different samples: 1) adults aged 30 and over 2) students over age 18 3) Adult men 4) Adults between 45 and 69	989 1,391 339 379
Worsley, 1990	Quantitative (Cross-sectional)	Adults	677

Findings of the reviewed studies are summarized and discussed within the following nine categories of health and function, physical environment, prosperity, health care, disease, social environment, well-being, genetic endowment, and individual response. These categories correspond to the nine components of the adopted conceptual framework, the Evans and Stoddart (1994) population health model.

Genetic Endowment: Unmodifiable characteristics or susceptibilities with which individuals are born are known to reflect individual's genetic endowment (Baird, 1994). Among the factors which have been explored as potential determinants of self-rated health, factors such as age, sex, race, and history of premature death of parent(s) or a family member could be organized and discussed within the "Genetic Endowment" component of the Evans and Stoddart (1994) population health framework.

Chart 2.2: "Genetic Endowment" in Previous Studies

Studied Factors	Citation
Age	Benyamini et al., 1999; Benyamini et al., 2000; Blaum et al., 1994; Blazer and Houpt, 1979; Bobak et al., 1998; Cockerham et al., 1983; Cott et al., 1999; Damian et al., 1999; Denton and Walters, 1999; Ebly et al., 1996; Euronut SENECA Investigators, 1991; Farmer and Ferraro, 1997; Ferraro, 1980; Fylkesnes and Førd, 1991; Fylkesnes and Førd, 1992; Idler et al., 1999; Levkoff et al., 1987; Mackenbach et al., 1994 Maddox, 1962; Markides and lee, 1990; Minkler and Langhauser, 1988; Mitrushina and Satz, 1991; MMWR, 1995; Moum, 1992; Murray et al., 1982; Pilpel et al., 1988; Ratner et al., 1998; Ross, 2002; Schulz et al., 1994; Segovia et al., 1989; Shadbolt, 1996; Smith et al., 1994; Tessler and Mechanic, 1978;
Sex/gender	Benyamini et al., 1999; Benyamini et al., 2000; Blaum et al., 1994; Blazer and Houpt, 1979; Bobak et al., 1998; Cockerham et al., 1983; Cott et al., 1999; Damian et al., 1999; Ebly et al., 1996; Euronut SENECA Investigators, 1991;

	Farmer and Ferraro, 1997; Ferraro, 1980; Fylkesnes and Førd, 1992; Idler et al., 1999; Leinonen et al., 1997; Levkoff et al., 1987; Mackenbach et al., 1994 Maddox, 1962; Maddox, 1964; Mitrushina and Satz, 1991; MMWR, 1995; Moum, 1992; Pilpel et al., 1988; Poikolainen et al., 1996; Ratner et al., 1998; Ross, 2002; Schulz et al., 1994; Segovia et al., 1989; Shanas et al., 1968;
Race	Benyamini et al., 2000; Blaum et al., 1994; Blazer and Houpt,1979; Cockerham et al., 1983; Farmer and Ferraro, 1997; Linn and Linn, 1980; Maddox, 1962; MMWR, 1995; Schulz et al., 1994; Tessler and Mechanic, 1978;
Familial risk factors – Parents' longevity	Idler and Kasl, 1991; Idler and Benyamini, 1997;

Given the fact that the distribution of diseases, chronic conditions, activity limitations and other health-related characteristics varies by age and gender, the two variables of age and sex are among the most frequently studied factors in relation to self-ratings of health. Reviewing the literature showed that two kind of research questions have been explored in regards to the association between age, gender and self-rated

health. The first research question was how the distribution of self-rated health varies by age and gender? In other words, are there any age and gender gradients in self-rated health? And the other question was how the determinants of self-rated health vary by age group and gender? Research findings on the second question are discussed at the end of this chapter and here we review the research findings on the first question of "how the distribution of self-rated health varies by age and gender?" Focusing on the association between self-rated health and age, given the fact that health deteriorates with age, it might be presumed that in general, elderly people report relatively poor health. However, reviewing the literature showed that this is not always the case. For example, Cockerham and associates (1983) reported a decline in good subjective health with age before the age of 60. But they found that after age 60, people start to rate their health, compared to that of their age peers, as better than would be expected on the bases of their objective health. On the other hand, Fylkesnes and Førd (1992) reported that subjective health deteriorated markedly with increasing age in both women and men. However, they found that the most marked deterioration appeared at age 50-54 in women and 5 years later in men. In that study, between the sexes only moderate differences were revealed except for age group 50-54, where women judged their general health to be markedly lower than men. Levkoff and associates (1987) examined the differences in the appraisal of health between the aged (65-89 years) and the middle-aged (45-64) adults and found that the aged evaluated their health more pessimistically than the middle aged, when controlling for physical health, psychological distress, gender and education. Murray and associates (1982) also reported that older adults rate their health lower than do younger adults. More recently, using data from the 1994 Canadian National Population Health Survey (NPHS)

for approximately 15,000 adults aged 20 and over, Denton and Walters (1999) reported that men and women in the older age groups are less likely to perceive their health to be good or excellent. A contrary finding is reported by Smith and associates (1994). These researchers studied correlates of self-rated health among a randomly selected sample of 1,863 Australian-born women 45-55 years of age and they found that women were more likely to report better health as they aged.

Studies focusing on the elderly population, found that both institutionalized and non-institutionalized elderly persons tend to rate their health positively (Ferraro, 1980; Markides and lee, 1990; Minkler and Langhauser, 1988). Moreover, the oldest among the elderly (those aged 75 or more) express an especially positive view of their own health (Ferraro, 1980; Ebly et al., 1996).

Research on the effect of gender on self-rated health also shows conflicting results. For example, Maddox (1964) reported that optimism about health was greater for males. Shanas and associates (1968) also found that men were more likely than women to rate their health favorably. However, using data from the 1973 survey of the low-income aged in the United States, Ferraro (1980) reported that elderly males tend to report poorer health than elderly females with similar objective health conditions. A similar finding is reported by Mitrushina and Satz in 1991. These authors observed that while the women in their sample reported more physical symptoms, their self-rated health did not differ from the self-rated values provided by men. These results were interpreted as reflecting more optimistic evaluations by females. More recently, the Euronut SENECA investigators (1991) studied the association between self-perceived health, chronic diseases and use of medicine among 2,544 elderly person aged 70 to 75 living in 17 town in 11 countries

across Europe. They also found significant gender differences with more men than women judging their health to be better than that of other persons of their age. Good self-rated health among Canadians have also been linked to being male (D'Arcy and Siddique, 1985). In some studies no gender difference in the distribution of self-rated health has been observed (e.g., Moum, 1992; Leinonen et al., 1997).

It has been suggested that the link between self-rated health and mortality may derive not only from one's own health, but also from the knowledge of familial risk factors such as premature death of parents (e.g., Idler and Kasl, 1991; Idler and Benyamini, 1997). None of the reviewed studies considered this factor as an explanatory variable.

Prosperity: According to Evans and Stoddart (1994), prosperity is an economic concept, which can be measured at community or individual levels. At an individual level, prosperity could be referred to individuals socio-economic status. Individuals' socioeconomic status could be measured directly based on for example, their or their household income level or may be more in an indirect manner by collecting information on individuals' employment status or home ownership. Therefore, factors such as individual's income level, unemployment allowance, employment status, and home ownership fit into the "prosperity" component of the Evans and Stoddart (1994) population health framework.

The relationship between socio-economic status and health has been a subject of research for many years and at this point it is well established (e.g., Townsend and Davidson, 1982; Blaxter, 1990; Statistics Canada, 1994; Marmot et al., 1997; McGrail et al., 1998; Mustard et al., 1997). Whether socio-economic status measured by income,

occupational status, home ownership, access to a car or education or a combination of these, it is clear that people on the lower end of the scale are less healthy than those at the higher end. For many years it was believed that a large part of this relationship could be explained by absolute poverty. That is, the proportion of people at the lowest end of the socio-economic status spectrum were expected to have relatively poor health outcomes while everyone else would be represented from fair to excellent. However, this assumption has been challenged over the past couple decades, most notably by the Whitehall study of British civil servants (Marmot et al., 1978). This work showed that the relationship between health and socio-economic status followed a gradient, with the highest grades having the best outcomes, the next highest slightly worse health, and so on. For example, an age-specific income gradient in morbidity and mortality is shown for Manitobans in Canada (Mustard et al., 1997). Focusing on self-rated health, many of the reviewed studies showed a significant positive association between an individual's income level and his/her perceived health status. For example, Markides and Martin (1979) reported that income was positively associated with self-rated health when controlling for age, gender, ethnicity, and an "objective" health index. Similarly, in a study with a prospective design, Minkler and Langhauser (1988) found that people whose self-rated health declined over time had greater financial need. Analysis of data from the U.S. Health Interview Survey also showed that individuals in the highest quartile of a summary measure of socioeconomic status were more than three times as likely to report excellent health compared with those in the lowest quartile (Longino et al., 1989). Blaxter (1989) also reported a positive association between self-rated health and income in a cross-sectional survey in the United Kingdom. Moreover, a definite gradient in self-rated health

that corresponds to one's level of income adequacy is also reported for the Canadians. Using data from the 1994 Canadian Population Health Survey (NPHS), Denton and Walters (1999) found that compared to the middle income category, adults aged 20 and over who were in lower income categories had poorer perceived health and those in upper income categories had better perceived health status. According to the data from the 1996/97 National Population Health Survey, only 18-19% of Canadians in the two lowest income groups rated their health as excellent, compared with 33% of Canadians in the highest level of income. Further, 21% of low-income Canadians stated that their health was fair or poor, compared with only 5% of Canadians with the highest income (Federal, Provincial and Territorial Advisory Committee on Population Health, 1999). Reduced income is reported as a correlate of worse health for women aged 45-55 (Smith et al., 1994) and in a recent health report by Shields and Chen (1999), income level was associated with changes in self-rated health. Interestingly, a low level of income was associated with decline in self-rated health and a high level of income was associated with improved self-rated health.

Chart 2.3: "Prosperity" in Previous Studies

Studied Factors	Citation
Income	Blaxter, 1989; Cockerham et al., 1983; Cott et al., 1999; Denton and Walters, 1999; Farmer and Ferraro, 1997; Federal, Provincial and Territorial Advisory Committee on Population Health, 1999; Longino et al., 1989; Markides and Martin, 1979; Minkler and Langhauser, 1988; MMWR, 1995; Moum, 1992; Ratner et al., 1998; Ross, 2002; Schulz et al., 1994; Smith et al., 1994; Shields and Chen, 1999;
Unemployment allowance/on disability Pension	Fylkesnes and Førd, 1991; Poikolainen et al., 1996;
Employment status	Benyamini et al., 2000; Cott et al., 1999; Denton and Walters, 1999; Mackenbach et al., 1994 MMWR, 1995; Ross, 2002; Smith et al., 1994;
Home ownership	Shadbolt, 1996;
Financial security	MacRae and Johnson, 1978

Health and Function: A wide range of variables which have been studied as potential determinants of self-rated in the previous studies, relate to individuals' physical, psychological or emotional health. These variables could be fitted into the "health and function" component of the Evans and Stoddart (1994) population health framework. As

Chart 2.4 shows, variables within this component are of a wide variety, some are very specific and some are very generic.

Chart 2.4: "Health and Function" in Previous Studies

Studied Factors	Citation
Physical health/ physical functioning/physical condition	Benyaminin, 2000; Blaum et al., 1994; Blazer and Houpt, 1979; Damian et al., 1999; Ebly et al., 1996; Ferraro, 1980; Idler et al., 1999; Johnson and Wolinsky, 1993; Kaplan et al., 1996; Kempen et al., 1998; Levkoff et al., 1987; MacRae and Johnson, 1978; MMWR, 1995; Moum, 1992; Mutran and Ferraro, 1988; Ratner et al., 1998; Ross, 2002; Schulz et al., 1994; Segovia et al., 1989; Tessler and Mechanic, 1978; Wan, 1976;
Physical fitness/Isometric muscular strength	Jylhä et al., 1986;
Cognitive ability	Ebly et al., 1996; Schulz et al., 1994;
Life events/negative life events	Mackenbach et al., 1994 Schulz et al., 1994; Smith et al., 1994;
Menopausal status	Smith et al., 1994;
Premenstrual complaints	Smith et al., 1994;
Physical distress/Pain	Fylkesnes and Førd, 1992; Kempen et al., 1998; MacRae and Johnson, 1978; Tornstam, 1975;
Chronic stress/distress	Cott et al., 1999;

	Ross, 2002; Shadbolt, 1996;
Preoccupation with health/health concern	Blazer and Houpt, 1979; Fylkesnes and Førd, 1992; MacRae and Johnson, 1978; Maddox, 1962; Segovia et al., 1989;
Level of energy	Segovia et al., 1989;
MI risk score	Fylkesnes and Førd, 1992
Disability/Activity limitation/Functional health/Functional capacity	Benyamini et al., 1999; Benyamini et al., 2000; Blaum et al., 1994; Blazer and Houpt,1979; Damian et al., 1999; Ebly et al., 1996; Euronut SENECA Investi 1991; Farmer and Ferraro, 1997; Ferraro, 1980; Johnson and Wolinsky, 1993 Kaplan et al., 1996; Kempen et al., 1998; Levkoff et al., 1987; MacRae and Johnson, 1978; Maddox, 1962; Manderbacka et al., 1998; Manderbacka et al., 1999; Mitrushina and Satz, 1991; MMWR, 1995; Moum, 1992; Pilpel et al., 1988; Ross, 2002; Schulz et al., 1994; Segovia et al., 1989; Wan, 1976;
Duration of activity limitation	MMWR, 1995;
Psychological health/mental health /psychic well-being/feeling states	Appels et al., 1996; Apple, 1960; Baumann, 1961; Benyamini et al., 1999;

	Benyamini et al., 2000; Blaxter, 1990; Blazer and Houpt,1979; Cockerham et al., 1983; DiCicco and Apple, 1958; Farmer and Ferraro, 1997; Fylkesnes and Førd, 1991; Hennes and Wharton, 1970; Idler et al., 1999; Jylhä et al., 1986; MacRae and Johnson, 1978; Ratner et al., 1998; Schulman and Smith, 1963; Schulz et al., 1994; Segovia et al., 1989; Shadbolt, 1997; Tissue, 1972; Wan, 1976;
Spiritual/Emotional health	Idler et al., 1999; Ratner et al., 1998
Psychological distress	Blaxter, 1990; Ferraro and Farmer, 1997; Fylkesnes and Førd, 1991; Fylkesnes and Førd, 1992; Kempen et al., 1998; Levkoff et al., 1987; Moum, 1992; Tessler and Mechanic, 1978;
Sexual functioning	MacRae and Johnson, 1978; Smith et al., 1994;
Surgical history	Smith et al., 1994
Interpersonal stress	Smith et al., 1994
Positive and negative affect	Smith et al., 1994
Neuroticism, Hypercondriasis, Depression	Blazer and Houpt, 1979; Kempen et al., 1998; Levkoff et al., 1987; Maddox, 1962; Schulz et al., 1994; Zonderman et al., 1986 ;

As Chart 2.4 indicates, in many of the reviewed studies, several of the aspects related to individuals' health and functioning have been explored in relation to self-ratings of health. Given the differences that exist among the studies in terms of their design, study population and sample, measures included and the analytical methods, findings of these studies are inconsistent. In the majority of the reviewed studies, however, individuals' physical health status and functioning showed the strongest association with self-ratings of health (e.g., Ferraro, 1980; Benyamini et al., 2000; Damian et al., 1999; Mutran and Ferraro, 1988; Ebly et al., 1996; Ross, 2002; Schulz et al., 1994; Moum, 1992; Johnson and Wolinsky, 1993; Kaplan et al., 1996; Kempen et al., 1998; Wan, 1976; Segovia et al., 1989; Ratner et al., 1998; Ratner et al., 1998). In addition to physical health status and functioning, studies that have included indicators for several domains of health have shown that self-ratings provide a broader summary of health status, including psychological well-being (e.g., Jylhä et al., 1986; Blaxter, 1990; Fylkesnes and Førd, 1991; Schulz et al., 1994; Farmer and Ferraro, 1997; Cockerham et al., 1983; Shadbolt, 1997; Appels et al., 1996; Blazer and Houpt,1979; Ware et al., 1978). In examining the association between psychological well-being and self-rated health, some researchers focused on specific psychological diseases or conditions such as neuroticism, hypochondriasis, or depression (e.g., Zonderman et al., 1986; Blazer and Houpt, 1979) while others used the broader concepts of psychological distress (e.g., Fylkesnes and Førd, 1992; Tessler and Mechanic, 1978; Blaxter, 1990; Fylkesnes and Førd, 1991; Ferraro and Farmer, 1997) or feeling states (e.g., DiCicco and Apple, 1958; Apple, 1960; Baumann, 1961; Schulman and Smith, 1963; Hennes and Wharton, 1970). Although there were a few studies which reported no significant association between self-

ratings of health and psychological conditions (e.g., Tissue, 1972; Wan, 1976), the majority of the previous studies clearly indicated that psychological distress negatively affects self-rated health. In one of the earliest studies on this subject, Maddox (1962) found that depression, a poor adjustment to the environment, and preoccupation with health are related to poor self-rated health. In another study, Tessler and Mechanic (1978) examined four data sets and despite the differences in measurement of distress between the four samples, they found a consistent significant association between psychological distress and self-perceived health. In 1979, Blazer and Houpt investigated factors associated with poor perceived health among 977 community subjects who aged 65 or older and were physically healthy. These researchers found that the physically healthy elderly respondents who perceived their physical status to be poor were more depressed, more hypochondriacal, and more dissatisfied with life. Recently, the relationship between perceptions of distress and perceived health was examined within a longitudinal framework (Farmer and Ferraro, 1997) and results from structural equation modeling revealed that psychological distress leads to more negative health perceptions.

Idler and associates (1999) attempted to build on existing literature by employing qualitative and quantitative methods in the analysis of data that included both detailed measures of physical health status and open-ended data on the meanings of self-rated health. They constructed a coding scheme (for coding the qualitative data) that captured the criteria for self-ratings of health ranging from the most restrictive and biomedical to the most "holistic" and inclusive. They tested whether that scheme differentiates respondents who have overestimated and underestimated their health, given their self-ratings and medical history. The hypothesis, which was tested was that respondents who

use more expansive, holistic criteria in rating their health will be more likely to overestimate their health relative to their medical history; those who use more restrictive criteria will more likely underestimate their health. Analysis of variance showed that respondents who overestimated their health were more likely to report ratings based on psychological, emotional, or spiritual characteristics or social activities and relationships, rather than biomedical criteria. Idler and associates (1999) concluded that inclusive definitions of health facilitate more positive self-ratings of health, given a fixed health status.

Health Care: Within this component, Evans and Stoddart (1994) referred to the health care system and discussed issues such as "availability" and "accessibility" of services, "equity in access to health care", "equity in health care", and their relation to individual's or population's health status. Thus, previously studied factors such as number of medications, physician contacts, and hospitalization could be studied within this category.

Chart 2.5: "Health Care" in Previous Studies

Studied Factors	Citation
Number of medications	Benyamini et al., 1999; Benyamini et al., 2000; Damian et al., 1999; Euronut SENECA Investigators, 1991; Fillenbaum, 1979; Fylkesnes and Førd, 1992; Linn et al., 1980; Manderbacka et al., 1999; Mitrushina and Satz, 1991; MMWR, 1995; Rodin and McAvay, 1992; Schulz et al., 1994;

	Smith et al., 1994; Wan, 1976;
Physician contacts	Blaum et al., 1994; Blazer and Houpt,1979; Damian et al., 1999; Linn and Linn, 1980; Pilpel et al., 1988; Rodin and McAvay, 1992;
Hospitalization/number of hospital days	Goldstein et al., 1984; Levkoff et al., 1987; Linn et al., 1980; Pilpel et al., 1988; Tissue, 1972;

Studies that looked at the association between self-rated health and health care use are of two types. The first group includes studies that used the single-item self-rated health indicator as an explanatory variable to predict utilization of different health services. This group of studies is not included in the literature review presented in this chapter. The second group, which is included in this literature review, are those which considered different measures of health care use as predictors of self-ratings of health. One of the studied factors related to health care use was current use of prescription medication which is shown to be associated with self-ratings of health status (Benyamini et al., 2000; Damian et al., 1999; Euronut SENECA Investigators, 1991; Fillenbaum, 1979; Fylkesnes and Førd, 1992; Linn et al., 1980; Manderbacka et al., 1999; Mitrushina and Satz, 1991; MMWR, 1995; Rodin and McAvay, 1992; Schulz et al., 1994; Smith et al., 1994; Wan, 1976). For example, Schulz and associates (1994) compared predictors of perceived health status between elderly men and women who participated in the Cardiovascular Health study of the Elderly (CHS). As they reported, for both men and women, the single most important predictor of perceived health was the number of

prescribed medications. Another factor studied within the "health care" category was hospitalization. In regards to the association between this factor and self-rated health, the research findings are controversial. For example, although some of the reviewed studies (e.g., Linn et al., 1980) showed that the experience of hospitalization has an impact on people's ratings of their own health, other studies (e.g., Goldstein et al., 1984) found that changes in perceived health were not sensitive to short-term changes in health care utilization including hospitalization. The third factor related to "health care" category was physician contact(s) (Blaum et al., 1994; Blazer and Houpt, 1979; Damian et al., 1999; Linn and Linn, 1980; Rodin and McAvay, 1992). In this regard, more positive ratings of health status are found to be associated with no contact with a doctor in the past few months (e.g., Tissue, 1972). On the other hand, elderly people who have a poor perceived health status were found to visit the doctor most (e.g., Linn and Linn, 1980).

Social Environment: Social environment is defined as "all aspects of social organization that might affect health status" (Hertzman et al., 1994, p. 78-79). Some of the potential measures of this concept at the individual level are social support, social isolation, social networks, and marital status. Thus, a wide range of factors such as marital status, support from spouse or family in case of problems, sense of community belonging, living arrangements, perceived social support, social networks, social capital, sensory or speech impairment, and loneliness, which have been studied as potential determinants of self-rated health could be included and discussed within this component of the Evans and Stoddart (1994) population health framework.

Chart 2.6: "Social Environment" in Previous Studies

Studied Factors	Citation
Social capital	Bobak et al., 1998; Kawachi et al., 1999;
Sensory or speech impairment	Dalen et al., 1994; Havens, 2001 MacRae and Johnson, 1978; Pilpel et al., 1988; Shanas et al., 1968;
Marital status/ Living arrangements/ household composition/family structure	Benyamini et al., 2000; Bobak et al., 1998; Cockerham et al., 1983; Cott et al., 1999; Denton and Walters, 1999; Ebly et al., 1996; Fylkesnes and Førd, 1992; Idler et al., 1999; Mackenbach et al., 1994 Moum, 1992; Pilpel et al., 1988; Poikolainen et al., 1996; Renne, 1971; Ross, 2002; Schulz et al., 1994; Smith et al., 1994; Tessler and Mechanic, 1978;
Support from spouse or family in case of Problems	Fylkesnes and Førd, 1991;
Sense of community belonging	Ross, 2002;
Loneliness	Fylkesnes and Førd, 1991; Shanas et al., 1968;
Social isolation	Blaum et al., 1994; Chappell and Badger, 1989;
Age at immigration	Pilpel et al., 1988;
Perceived social support	Benyamini et al., 1999; Cott et al., 1999; Denton and Walters, 1999; Ebly et al., 1996; Hirdes and Forbes, 1993; Markides and Lee, 1990;

	Minkler and Langhauser, 1988; Moum, 1992; Poikolainen et al., 1996; Schulz et al., 1994;
Social resources/social involvement	Blazer and Houpt, 1979; Cutler, 1973
Social networks	Bobak et al., 1998; Cott et al., 1999; Fylkesnes and Førd, 1992; Hirdes and Forbes, 1993; Markides and Lee, 1990; Minkler and Langhauser, 1988; Pilpel et al., 1988; Schulz et al., 1994; Segovia et al., 1989;

Research has shown that people who feel attached to and interact with others enjoy better health than do those who are more isolated (Berkman and Syme, 1979; House and Landis, 1988; Berkman, 1995). Some of the best evidence of the benefits of social connections comes from a large study of residents of Alameda County, California through the late 1960s and 1970s. This research indicated that people who reported ties to the community (measured by the members of friends and acquintances, and volunteer and religious affiliations) experienced lower rates of disease and death, compared with people without such links. This difference persists even when taking into account differences in socio-economic status, health behaviors and health care services (Berkman and Syme, 1979). The association between social resources (such as social support, social network and social involvement variables) and self-rated health has been examined in many studies (e.g., Schulz et al., 1994; Denton and Walters, 1999; Blazer and Houpt, 1979; Cutler, 1973; Fylkesnes and Førd, 1992; Minkler and Langhauser, 1988; Cott et al., 1999; Markides and Lee, 1990; Hirdes and Forbes, 1993). In most of the reviewed studies, the association between self-rated health and measures of social resources or network

variables was not significant. For example, Hirdes and Forbes (1993) did not find any significant association between several indicators of social relationships (including marital status, number of children, frequency of family visits, and membership in voluntary associations) and maintaining good self-rated health. Similarly, Markides and Lee (1990) found no association between marital status and self-rated health. In another study, 10 indicators of social isolation were not significantly associated with self-rated health (Chappell and Badger, 1989). However, there are some other studies, which found a significant association between measures of social environment and self-rated health. For example, Shanas and associates (1968) found less favorable ratings of general health among respondents who felt lonely. Similarly, Culter (1973) reported that membership in voluntary organizations among the aged was significantly associated with self-rated health, those rated their health favorably had significantly higher scores on an index of voluntary participation in organizations. In a longitudinal study, Minkler and Langhauser (1988) also found that people whose self-rated health declined over time had fewer social support resources five years earlier (controlling for the other potential explanatory variables). Similarly, Moum (1992) used data from a large nation-wide sample of Norwegian adults to estimate the relative predictive power of "medical" variables versus "socio-cultural" variables on self-rated health. He concluded that even when a sufficiently fine-grained array of medical information is available, socio-cultural factors still contribute (although marginally) to self-assessments of health. Using data from the 1994 Canadian National Population Health Survey (NPHS) for approximately 15,000 adults aged 20 and over, Denton and Walters (1999) also found perceived social support as a determinant of health for both males and females, but they found that the effect was over

twice as large for women as for men. They also found family structure as a determinant of self-rated health for women, but not for men. According to this study, compared to women living with a partner and children, unattached women living alone were more likely to be in better health, while women living with a spouse or partner only, or adult women still living with their family of birth were more likely to be in poorer health. Satisfaction with marriage may explain such a finding. For example, in 1971, Renne found that unhappily married women tended to rate their health less favorably than did divorced women of the same age. In the same study, satisfaction with marriage was not associated with self-rated health among men.

More recently, the association between other social environment-relevant concepts such as "social capital" and "sense of belonging to community" and self-rated health has been explored. For example, In an ecological study, Kawachi and associates (1999) found a significant contextual effect of low social capital on ratings of health status after adjusting for potential explanatory variables at the individual-level. According to the results from this study, the odds ratio for fair or poor health associated with living in areas with the lowest levels of social trust was 1.41 compared with living in high-trust states. Ross (2002) studied the relationship between "sense of belonging to community" and self-perceived health. She used data from the first half of cycle 1.1 of the Canadian Community Health Survey (CCHS) for 48,412 respondents aged 18 and older. To measure connection to the community, the CCHS asks respondents to rank, on a four-point Likert scale, their sense of belonging to their local community. Analysis of the CCHS data in this study showed a significant association between individual's sense of belonging to the local community and their perceived health status when controlling for

socio-economic status, the presence of chronic disease, health behaviors, and stress. Ross (2002) found that compared with people reporting a very or somewhat weak sense of belonging to their local community, those who felt very strongly connected had nearly twice the odds of reporting excellent or very good health. Indeed, leaving aside the "very weak" sense of community belonging, for every step up this scale, the odds of reporting excellent or very good health increased with the strength of sense of community belonging.

Sensory impairments (hearing, speech, etc) are also found to influence self-ratings of health. For example, Dalen and associates (1994) and Shanas and associates (1968) found that people with a higher degree of sensory impairment rate their health less favorable. It has been suggested that any kind of sensory impairment including hearing or speech problems decreases individuals' socialization abilities and leads to social isolation (Havens, 2001).

Individual Response (Behaviour & Biology): The concept of "individual response" within the Evans and Stoddart Population Health Framework (1994) refers to the individual's lifestyle and behavioral habits, and also their responses to stress and social environment. Variables such as smoking, physical activity, dietary practices, drinking and self-esteem or self-efficacy can represent this component of the Evans and Stoddart Population Health Framework (1994).

Chart 2.7: "Individual Response" in Previous Studies

Studied Factors	Citation
Smoking	Benyamini et al., 1999; Benyamini et al., 2000; Bobak et al., 1998; Cott et al., 1999; Damian et al., 1999; Denton and Walters, 1999; Fylkesnes and Førd, 1991; Mackenbach et al., 1994 Manderbacka et al., 1999; MMWR, 1995; Poikolainen et al., 1996; Ross, 2002; Schulz et al., 1994; Shadbolt, 1996; Smith et al., 1994;
Alcohol Consumption	Bobak et al., 1998; Cott et al., 1999; Damian et al., 1999; Denton and Walters, 1999; Fylkesnes and Førd, 1991; Mackenbach et al., 1994 Manderbacka et al., 1998; Manderbacka et al., 1999; Poikolainen et al., 1996; Schulz et al., 1994; Smith et al., 1994;
Body Weight/Body Mass Index/obesity	Denton and Walters, 1999; Ferraro and Yu, 1995; Fylkesnes and Førd, 1991; Mackenbach et al., 1994 Manderbacka et al., 1998; Manderbacka et al., 1999; Smith et al., 1994;
Diet/Dietary habits	Benyamini et al., 2000; Manderbacka et al., 1999;
Preventive health behaviors	Smith et al., 1994;
Education	Ferraro, 1980; Fylkesnes and Førd, 1991; Benyamini et al., 1999; Benyamini et al., 2000; Blaum et al., 1994; Blaxter, 1989; Cockerham et al., 1983;

	Cott et al., 1999; Denton and Walters, 1999; Ebly et al., 1996; Farmer and Ferraro, 1997; Federal, Provincial and Territorial Advisory Committee on Population Health, 1999; Fylkesnes and Førd, 1991; Hirdes et al., 1986; Idler and Angel, 1990; Idler et al., 1999; Krause and Jay, 1994; Mackenbach et al., 1994; Manderbacka et al., 1998; Markides and Lee, 1990; Markides and Martin, 1979; Pilpel et al., 1988; Ross (2002); Schulz et al., 1994; Segovia et al., 1989; Smith et al., 1994; Statistics Canada, 1999; Tessler and Mechanic, 1978;
Coping problem	Fylkesnes and Førd, 1991;
Physical Activity/Leisure exercise	Benyamini et al., 2000; Blazer and Houpt, 1979; Cott et al., 1999; Denton and Walters, 1999; Fylkesnes and Førd, 1991; Fylkesnes and Førd, 1992; Grayson, 1993; Lamb et al., 1990; Mackenbach et al., 1994 MacRae and Johnson, 1978; Manderbacka et al., 1999; Manderbacka et al., 1999; Mitrushina and Satz, 1991; Parkatti et al., 1998; Schulz et al., 1994; Smith et al., 1994;
Mastery	Cott et al., 1999;
Self-esteem	Cott et al., 1999;
Control beliefs	Menec et al., 1999; Robinson et al., 1991;

Accumulated evidence shows that educational attainment is positively associated with health status and health behaviors (Miller and Stephens, 1992). A consistent positive association has also been reported between educational attainment and self-ratings of health status. For example, based on the data from a probability sample of 660 adults in Illinois, Cockerham and associates (1983) concluded that the more education a respondent has, the more likely health will be perceived in a positive fashion. Focusing on the elderly population, Ferraro (1980) also found that older persons with higher levels of education are more likely than others to report better health. Similarly, in an 8-year follow-up study, education continued to be positively associated with self-rated health in a multivariate model (Markides and Lee, 1990). For Ontario males also subjects in lower education groups were less likely to report good health (Hirdes et al., 1986). In another Canadian study, Cott and associates (1999) observed that self-rated level of health varied by education, with those with lower education being less likely to report excellent or very good health. Using data from the 1994 Canadian National Population Health Survey (NPHS), Denton and Walters (1999) also found years of education as an important predictor of self-rated health for both men and women. As reported by the Federal, provincial, and Territorial Advisory Committee on Population Health (1999), in the 1996-97 National Population Health survey, only 19% of respondents with less than high school education rated their health as "excellent", compared with almost 30% of university graduates. In a recent health report by Statistics Canada (Shields and Chen, 1999), a significant association between low level of education and subsequent decline in self-perceived health is reported.

In regards to lifestyle factors and health behaviors, more recent studies have shown that physical activity, maintaining a healthy weight, and refraining from smoking positively affect perceived health (e.g., Mackenbach et al., 1994; Smith et al., 1994; Krause and Jay, 1994; Fylkesnes and Førd, 199; Ferraro and Yu, 1995; Fylkesnes and Førd, 1992; Worsley, 1990; Goldstein et al., 1984; Jylhä et al., 1986; Manderbacka, 1998; Manderbacka et al., 1994; Manderbacka et al., 1999; Wolinsky et al., 1995; Denton and Walters, 1999). For example, in a qualitative study, the importance of 33 aspects of health was evaluated by 677 people in South Australia (Worsley, 1990) and results revealed that the respondents' evaluations of their own health is based on four dimensions: the avoidance of illness; feeling healthy; healthy lifestyle; and disease prevention activities.

In another study, Manderbacka and associates (1994) examined the relative importance of five risk factors and health behaviours including dietary habits, leisure time exercise, smoking, alcohol consumption and body mass index on self-ratings of health among the Swedish adult population aged between 18 and 75 years. They found that with the exception of the consumption of dietary fat, all the risk factors and health behaviors studied were associated with self-rated health. However, when adjusted for health problems and functional limitations, most of the observed associations between health behaviors and self-rated health weakened or disappeared, except for smoking and use of vegetables in the diet. In this study, Manderbacka and associates (1994) also found that self-ratings of young adults (aged between 18 and 34) were related to body mass index even when health problems were adjusted for, with both obesity and underweight contributing to less than good self-rated health. As a result, these researchers concluded

that risk factors and health behaviors do not, in general, directly contribute to self-ratings of health. Instead, their effect is mediated by more specific health problems and their functional consequences. But, they concluded that smoking and not consuming vegetables, as well as obesity and underweight among young respondents have an independent association with self-rated health. Being a daily smoker was also associated with poorer perceived health among Canadians aged 20 or older, both men and women (Denton and Walters, 1999).

Focusing on the body weight, although body weight is not a personal health practice, to a large extent, determined by eating and physical activity practices. Body weights above the healthy weight range (i.e., a Body Mass Index over 27) are linked to a variety of health problems, including cardiovascular disease, diabetes, and some forms of cancer. Body weights below the healthy weight range (i.e., a Body Mass Index under 20) may also be a sign of current or impending health problems including eating disorders (Health and Welfare Canada, 1989). In regards to the relationship between obesity and self-ratings of general health status, Ferraro and Yu (1995) found that obese persons (BMI>30.5) rated their health more negatively than others, even after controlling for a variety of indicators of ill health and physical functioning. Likewise, Smith and associates (1994) who studied the correlates of self-rated health for 1,863 Australian-born women 45-55 years of age reported a decline in probability of reporting better health with increasing body mass index. Manderbacka and associates (1999) also reported a significant association between self-rated health and body mass index. Using the 1994/95 data from the Canadian National Population Health Survey (NPHS), Denton and Walters (1999) also found body weight as a determinant of self-rated health. They found that

compared to those who were in acceptable weight range, both men and women who were overweight and women who had some excess weight had poorer self-rated health.

Lack of physical activity is recognized as a significant risk factor for coronary heart disease and other serious health problems. Conversely, active living is known to provide many health benefits including a reduced risk of cancer, diabetes, heart disease and osteoporosis, and an enhanced feeling of well-being (Bouchard et al., 1994). Accordingly, the literature review showed a consistent positive association between physical activity and self-rated health (e.g., Fylkesnes and Førd, 1991; Benyamini et al., 2000; Cott et al., 1999; Fylkesnes and Førd, 1992; Schulz et al., 1994; Smith et al., 1994; Grayson, 1993; Manderbacka et al., 1999; Parkatti et al., 1998; Lamb et al., 1990; Denton and Walters, 1999). For example, Smith and associates (1994) reported that for women aged between 45 and 55, increasing frequency of exercise and engaging in swimming is positively associated with better health. Lamb and associates (1990) found that self-ratings of health among sports participants was, in general, more favourable than that of non-participants. Denton and Walters (1999) also found that compared with the reference category of moderate activity, Canadian adults who aged 20 or older and are more active, rate their health better and Canadians over age 20 who are inactive, rate their health poorer.

In regards to alcohol consumption, there is increasing evidence which shows that heavy drinking adversely affects health, while moderate alcohol consumption may have some beneficial effects (e.g., Hart et al., 1999; Gaziano et al., 2000; Feskanich et al., 1999). In a study from Finland, Poikolainen and associates (1996) found a J-shaped association between alcohol consumption and sub-optimal (average or poor) self-rated

health, with the best health reported by moderate users, after controlling for disability pension, smoking, lack of close friends and sociodemographic background factors. Controlling for other social, structural and behavioral factors, Denton and Walters (1999) also found that moderate drinking appears to promote women's perceived health status while for both men and women, being a former drinker is negatively associated with perceived health status.

Psychological resources such as self-esteem, sense of coherence, mastery and control beliefs are also found to be associated with people's ratings of their own health status (e.g., Cott et al., 1999; Menec et al., 1999; Robinson et al., 1991).

As the review of the literature showed, although the relationship between a variety of health-related behaviours and self-rated health has been the focus of many studies, only a few discussed variations across the demographic sub-populations (e.g., Blaxter, 1990; Krause and Jay, 1994). This is not surprising, given the restricted age range or other characteristics of their study samples.

Well-being : Although the association between self-rated health and other measures of general well-being such as life satisfaction has been investigated for a long time, research findings are still inconclusive. For example, Palmore and Luikart (1972) found self-rated health as the strongest correlate of life satisfaction for the adults aged 45-64. Larson (1978) also reported that when self-rated health has been included as a variable, it has consistently taken first or second position among those variables most highly related to life satisfaction. Campbell and associates (1976) also reported that people dissatisfied with their health are also less likely to have a strong sense of well-being. Similarly,

Blazer and Houpt (1979) studied the correlates of poor perceived health among the healthy older adults and they found that the healthy older adults who perceived their overall health as poor had a lower average score on the life satisfaction scale. In a more recent longitudinal study, investigating factors associated with the maintenance of good self-rated health, the strongest association was reported for an index of life satisfaction (Hirdes and Forbes, 1993). However, in another longitudinal study, Markides and Lee (1990) did not find a significant association between life satisfaction and self-rated health over time after controlling for initial health.

Chart 2.8: "Well-being" in Previous Studies

Studied Factors	Citation
Life satisfaction	Blazer and Houpt, 1979; Campbell et al., 1976; Hirdes and Forbes, 1993; Larson, 1978; Markides and Lee, 1990; Palmore and Luikart, 1972;

Disease: Within the Evans and Stoddart (1994) population health framework, "disease" is considered as a medical concept or construct, which is believed to have a significant bearing on illness and thus on health, but is not the same as health. This component of the Evans and Stoddart (1994) population health framework can best be presented by medical diagnosis for specific diseases or chronic conditions. Thus, specific diseases or chronic conditions, number of chronic conditions and also number of self-reported symptoms or health problems all are discussed within this category.

Chart 2.9: "Disease" in Previous Studies

Studied Factors	Citation
Self-reported symptoms/health problems	Blazer and Houpt, 1979; Cockerham et al., 1983; Ebly et al., 1996; Euronut SENECA Investigators, 1991; Fillenbaum, 1979; Fylkesnes and Førd, 1991; Jylhä et al., 1986; Kempen et al., 1998; MacRae and Johnson, 1986; Manderbacka et al., 1998; Mitrushina and Satz, 1991; Murray et al., 1982; Smith et al., 1994; Tissue, 1972;
Specific chronic conditions	Blaum et al., 1994; MMWR, 1995; Shadbolt, 1996; Smith et al., 1994;
Number of chronic conditions/illnesses	Benyamini et al., 1999; Benyamini et al., 2000; Cott et al., 1999;

	Euronut SENECA Investigators, 1991; Farmer and Ferraro, 1997; Ferraro, 1980; Fillenbaum, 1979; Fylkesnes and Førd, 1991; Fylkesnes and Førd, 1991; Garrity, 1973; Goldstein et al., 1984; Idler, 1999; Jylhä et al., 1986; Kempen et al., 1998; Levkoff et al., 1987; Liang, 1986; Linn and Linn, 1980; Mackenbach et al., 1994 Maddox, 1962; Madow, 1967; Moum, 1992; Osborn, 1973; Pilpel et al., 1988; Renne, 1971; Ross, 2002 Segovia et al., 1989; Smith et al., 1994; Tissue, 1972; Wan, 1976; Zonderman, 1986;
Increase in number of chronic conditions	Rodin and McAvay, 1992

In regards to the association between chronic conditions and self-rated health,

previous research has consistently shown that self-ratings of health reflect serious, chronic

conditions, but are not affected by acute, transitory illnesses even when they require use of

health care services or impose short-term restrictions on activity (Madow, 1967; Garrity,

1973; Osborn, 1973; Renne, 1971; Fillenbaum, 1979; Liang, 1986; Linn & Linn, 1980;

Tissue, 1972; Wan, 1976; Zonderman, 1986; Cott et al., 1999; Goldstein et al., 1984;

Kempen et al., 1998). Number of chronic conditions is found not only to be associated

with self-rated health, but in some studies it is reported as the strongest correlate. For example, to elicit lay concepts of health and to see whether these are related to various sociodemographic factors, Dalen and associates (1994) interviewed 196 adults aged 18 and over. They found that although people employ many different concepts for poor and good health in self and others, the biomedical dimension is an important one. Similarly, Kempen and associates (1998) studied the associations between nine domain-specific measures of health and the single-item measure of perceived overall health for a community-based sample of elderly persons and they found chronic conditions and bodily pain as the strongest correlates.

As Chart 2.9 shows, in some of the reviewed studies, the association between self-rated health and some specific chronic conditions such as high blood pressure or rheumatism or arthritis has been examined. For example, Smith and associates (1994) analyzed the data for 1,863 Australian-born women 45-55 years of age and found that a diagnosis of high blood pressure or for rheumatism or arthritis was associated with a reduced likelihood of reporting better health. Similarly, Blaum and associates (1994) examined the association between specific chronic conditions and self-rated health and they found that among the elderly population, arthritis and other comorbid diseases, heart diseases and diabetes mellitus had major effect, but cancer and hypertension had very little impact on self-rated health. However, as chart 2.9 presents in most of the studies reviewed, instead of focusing on specific diseases or chronic conditions, a summary scale of total number of chronic conditions or illnesses has been used. Change in number of chronic conditions was used as a potential predictor of decline in self-rated health (Rodin and McAvay, 1992). These researchers found that increase in new illnesses and

worsening of preexisting conditions are associated with decline in perceived health for the older adults aged 62 and over.

Studied chronic conditions in the reviewed literature were cardiac disease, epilepsy, cancer, hypertension, diabetes, pulmonary conditions, renal failure, osteoarthritis, cataracts, back problems, bronchitis, asthma, prostate disorders, heart disease, nervous problems, depression, difficulty holding urine, varicose veins in the legs, hip fracture, stroke, migraine, emphysema or chronic obstructive pulmonary disease, Alzheimer's disease or any other dementia, glaucoma, thyroid condition, Parkinson's disease, multiple sclerosis, chronic fatigue syndrome.

Self-reported symptoms was another disease-related factor considered in the previous studies. The studied self-reported symptoms varied from one study to another including unexplained loss of weight (10 pounds in 1 week), repeated chest pains in or near the heart, kidney trouble, shortness of breath on even mild exertion, repeated pains or swelling in any joint, abdominal pains, trouble with feet or ankles, cough lasting 3 or more weeks, diarrhea or constipation, dizzy spells, lack of energy, feeling sad or downhearted, backaches, upset stomach, headaches, stiff joints, difficulty in concentration, nervous tension, hot flushes.

Health concerns are also found to be associated with self-ratings of health status. For example, using data for approximately 6,000 employees and Pensioners of a major Canadian bank, aged from late teens to early nineties, MacRae and Johnson (1986) found health ratings to be associated with health concerns in the physical and lifestyle categories, with fewest concerns among those in excellent health.

Physical Environment: Physical environment is described as including "the potentially harmful effects of exposure to physical, chemical, and biological agents at home, at work, and anywhere else" (Hertzman and associates, 1994, p. 78). In the reviewed literature, the only factor studied in relation to self-rated health that can be part of the "physical environment" category was "residential area" defined as urban versus rural area (Ross, 2002). Ross (2002) used data from the Canadian Community Health Survey to explore the relationship between sense of belonging and self-perceived health and she found that people living in urban areas had lower odds of reporting excellent or very good health. As the review of the literature showed the contribution of many different aspects of physical environment to how people assess their overall health and well-being remained unexplored.

Chart 2.10: "Physical Environment" in Previous Studies

Studied Factors	Citation
residential area (urban versus rural)	Ross, 2002;

Summary and Gaps in the Literature on Determinants of Self-rated Health

In existing literature on determinants, the association between self-rated health and a wide range of factors has been examined. Although providing important insights about the diverse nature of the variables that predict self-rated health, the prior studies are limited in that they include a relatively restricted range of explanatory variables, their sample sizes have been small or the samples are restricted to respondents within a very

narrow age range (e.g., the elderly) or specific sub-population (e.g., women). The restricted range of explanatory variables prevented the prior studies to explore self-rated health as a multidimensional concept. As the review showed in most of the older studies (1950s – 1970s) factors explored in relation to self-ratings of health were related to physical health and functioning or they were disease related. Recently, with inclusion of a wide range of explanatory variables related to individuals' physical, psycho-social, behavioral, and socio-economic status, more in-depth exploration of determinants of self-rated health has become possible. For example, more recent studies have attempted to answer the question of whether the positive end of self-rated health (excellent or very good) is a mirror image of the negative end (fair or poor) or whether the positive end and negative end measure separate dimensions of health (Mackenbach et al., 1994; Smith et al., 1994; Manderbacka et al., 1998). According to Mackenbach and associates (1994), sociodemographic and behavioral determinants have a generally, similar, but mirrored association with excellent and poor health. On the other hand, Smith and associates (1994) concluded that poor ratings of general health status are almost entirely related to the physical experience of adverse health - current symptoms, the use of medications, and past surgery - whereas good health relates mainly to sociodemographic and behavioral factors and are only to a limited extent concerned with absence of illness. Smith and associates (1994) believed that good rated health (better than the average) is a more complex and holistic construct that involves socioeconomic advantage and self-image. According to these authors, good health is much more than the simple absence of the disease states which is the marking of a negative perception of health (worse than the

average). Both of these studies focused on the differences between excellent and poor self-rated health status using average health as a reference group.

Another limitation of the previous studies was the restriction of their study sample to specific sub-populations. This prevented the ability of the previous studies to explore the differences and variations in the determinants of self-rated health among different sub-populations (e.g., men compared to women and younger adults compared to the older adults). According to the literature, there have been only a few studies which analyzed whether different models predict health among women and men; at best studies have tended to control for sex rather than analyzing the importance of gender. As Messing (1995) argues, because gender is a proxy for the differences in the lives of men and women, it is never sufficient to simply control for sex in statistical analysis. According to this author, controlling for sex masks gender roles and prohibits a fuller understanding of the nature and influence of gender differences.

Although limited in number, studies that looked at the variation in the determinants of self-rated health across the demographic sub-populations, men compared to women and younger adults compared to the elderly revealed interesting results. For example, Krause and Jay (1994) conducted a qualitative study, interviewed 158 respondents with an average age of 38.8 years. In that study, the self-rated health question was followed by another question of "Tell me why you say that." Results from this study showed that there were age differences but no sex, race, or education differences in the referents used and that those who compared their health to others were especially likely to rate their own health as excellent. In terms of differences in the referents used, Krause and Jay (1994) found that the use of a particular referent is not distributed randomly in the population.

Younger people tend to use health behaviors more often, whereas those who are older are more inclined to think of their own health problems. These results are, however, not fully consistent across studies and, for example, Borawski et al. (1996) found that the oldest old were more likely to report health behaviors than medical conditions or functional abilities as criteria.

As another example, Blaxter (1990) found that fitness is a concept associated with the young and with men. But, Dalen and associates (1994) found health as "positive fitness" as the most favored dimension among both sexes and the younger and middle aged groups alike. Schulz and associates (1994) found interesting gender differences in terms of socio-demographic factors. For men, both lower incomes and education were strongly predictive of lower perceived health status, but for women, only lower education predicted lower perceived health. Differences in the factors that predict women's and men's self-rated health status are also reported for Canadians aged 20 and older (Denton and Walters, 1999). These researchers found that social structural factors (including family structure, education, occupational status, income adequacy, social support, and employment status) play a more important role in determining women's health. For example, they found that family structure is a determinant of self-rated health for women but not for men. They also found that although perceived social support is a significant determinant of health for both males and females, the effect is over twice as large for women as for men. In terms of health behaviors, Denton and Walters (1999) found that being a daily smoker is associated with poorer self-rated health for both men and women, but its effect on self-rated health is much stronger for men. On the other hand, body

weight appears to be a more important determinant of self-rated health for women than men.

Using data for approximately 6,000 employees and Pensioners of a major Canadian bank, aged from late teens to early nineties, MacRae and Johnson (1986) also studied the influences of age and gender on self-perceived components of health. Organizing self-perceived components of health within two categories of physical and psychosocial, they did not find any association between age and physical components of health. On the other hand, gender seemed to have a stronger influence than age on what one considers important components of health. In this study, more women mentioned financial security as important to their psychosocial health than any other factor, but this factor did not appear at all in the men's "top ten" list. Investigating factors associated with self-rated excellent and very good health among blacks in Kansas, the largest racial/ethnic group in the state showed that among women, factors negatively associated with excellent or very good health included diabetes, any limitations, annual household income less than $25,000, hypertension, and having smoked at least 100 cigarettes. Among men, those with health insurance and an annual household income equal or more than $25,000 were 17 times more likely than those with no health insurance and an annual household income less than $25,000 to report very good or excellent self-rated health. Factors negatively associated with excellent or very good health among men included the duration of activity limitations in years and hypertension (MMWR, 1995). Jylhä and associates (1986) studied self-rated health and associated factors among men of different ages (31-35, 51-55, and 71-75). Using different methods of analysis, they concluded that in the youngest age group, men aged between 31 and 35, self-rated health

was best explained by symptoms and an index of physical fitness; among the middle-aged, men aged between 51 and 55, by symptoms and psychic well-being; and among the oldest, men aged between 71 and 75, by chronic diseases.

As another limitation, most of the reviewed studies on the subject had cross-sectional design and therefore they were not able to examine how transitions in individuals' physical, psycho-social, behavioral and socio-economic status are associated with self-ratings of health. As Idler and Benyamini (1997) suggested self-rated health is more likely to be a dynamic evaluation, judging trajectories as well as current levels of health. Thus, this is another gap in knowledge, which calls for studies of broader scope and with a longitudinal design. Given the accumulated evidence on the association between self-ratings of health status and other health-related outcomes (e.g., decline in functional health status, hospitalizations, health care utilization, nursing home placement, and mortality), understanding not only which factors, but also which transitions in those factors leads to a poor or a more positive rating of health is of value to health planners and policy makers.

To address the existing gaps in the literature and policy needs, the present study uses a comprehensive population health model, the Evans and Stoddart (1994) population health framework, to explore how a wide range of socioeconomic, psychosocial, lifestyle, health and functioning factors and their changes over time are associated with a poor or more positive self-rating of health status. Further, it explores how the underlying factors are different for men compared to women and for younger adults compared to older adults. The main research questions addressed by this study are:

1) What are the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions of Canadians aged 25 or older and how they have been changed over time?

2) Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with fair or poor self-ratings of health?

3) Are the predictors of fair or poor self-rated health different for men compared to women?

4) Are the predictors of fair or poor self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to elderly adults (aged 55 and over)?

5) Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with very good or excellent self-ratings of health?

6) Are the predictors of very good or excellent self-rated health different for men compared to women?

7) Are the predictors of very good or excellent self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to elderly adults (aged 55 or older)?

8) Are the two ends of the single-item indicator of self-rated health measuring the same or different dimensions of health?

CHAPTER 3: METHODS

This study is a secondary analysis of Statistics Canada's National Population Health Survey (NPHS) longitudinal data, weighted to represent the population of the 10 provinces in Canada. Since the National Population Health Survey (NPHS) has different components and has a complex design, the first section of this chapter provides an overview of the survey itself and the longitudinal sample. This provides the necessary background information for understanding and evaluating the quantitative methods used to analyze the data in this study and also for the interpretation of the final results.

The second section of this chapter describes the quantitative methods used to analyze the longitudinal data from the first three cycles of the NPHS with the aim of addressing the study research questions.

Part I: Statistics Canada's National Population Health Survey

The NPHS, which began in 1994/95, collects information about the health of the Canadian population every two years. The NPHS target population (for the household component) includes household residents in all provinces and territories, except persons living on Indian Reserves, on Canadian Forces Bases, and in some remote areas. An institutional component of the survey covers long-term residents of hospitals and residential care facilities. The NPHS has both a longitudinal and a cross-sectional component. Respondents who are part of the longitudinal component will be followed for up to 20 years.

Figure (3.1): Different Components of the National Population Health Survey

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                    ┌─────────────┐
                    │    NPHS     │
                    └─────────────┘
                           │
        ┌──────────────────┼──────────────────┐
┌───────────────┐  ┌───────────────┐  ┌───────────────┐
│  Household    │  │   Yukon,      │  │  Health Care  │
│  Component    │  │   NWT,        │  │  Institutions │
│  (Provincial) │  │   Nunavut     │  │               │
└───────────────┘  └───────────────┘  └───────────────┘
```
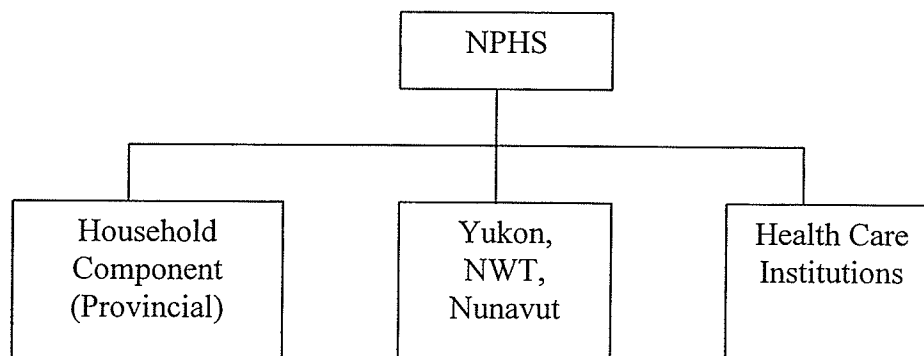
The broad objectives of the NPHS are to:

- aid in the development of public policy by providing measures of the health status of the population;

- provide data that will assist in understanding the determinants of health;

- collect data on the economic, social, demographic, occupational, and environmental correlates of health;

- increase understanding of the relationship between health status and health care utilization, including alternative as well as traditional services;

- follow a panel of people over time to provide information on the dynamic process of health and illness;

- provide the provinces and territories and other clients with health survey capacity that permits supplemental content and/or sample;

- allow survey data to be linked to routinely collected administrative data such as vital statistics, environmental measures, community variables, and health services utilization (Catlin and Will, 1992).

The NPHS individual data are organized into two files: General and Health. Socio-demographic and some health information was obtained for each member of participating households. These data are found in the General file. Additional, in-depth health information was collected for one randomly selected household member. The in-depth health information, as well as the information in the General file pertaining to that individual, is found in the Health file.

Sample Design for the Household Component

The design of the household component sample was based on the following four factors:

- The targeted national and provincial/territorial sample sizes*;

- The decision to select one member per household to create the NPHS longitudinal panel;

- The choice of the Labour Force Survey (LFS) as a tool for selecting the sample; and

- The decision to integrate the NPHS with the National Longitudinal Survey of Children and Youth (NLSCY). This decision was made following the first two cycles of the NPHS.

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* One of the main objectives of the 1994/95 NPHS was to provide the provinces with cross-sectional estimates. The original sample size, 22,000 households, was later increased to 26,000 through provincial buy-ins by some provinces to allow for sub-provincial estimates.

The next step in the selection of the NPHS household sample was the selection rule for the respondent(s) within each household. Some health surveys such as the 1990 Canadian Health Promotion Survey collect information on only one household member. On the other hand, there are other surveys such as the 1990 Ontario Health Survey, which interview all members of the selected household. As discussed by Tambay and Catlin (1995), each approach has several advantages and disadvantages.

For the NPHS, the selection rule for the respondent within each selected household was a compromise between the one-member and all-member approaches. The NPHS, household component, collects most information from and about a single randomly selected household member, but also, limited health-related information including health care utilization, restriction of activities, chronic conditions, demographic and socioeconomic characteristics, are collected about all members of the selected household.

Although the NPHS approach results in having a disaggregated sample with respect to household characteristics and simplifies the longitudinal follow up, this approach itself has several disadvantages. For example, defining the NPHS longitudinal panel as one randomly selected member per household, while collecting limited information from all household members, incurs the cost of contacting enough households to secure the required number of panel respondents. Another potential disadvantage of the NPHS approach is that the longitudinal panel could contain a disproportionately higher number of people living in small households, because an individual's chance of being the selected panel respondent is inversely related to the

number of persons in the household. This problem was partially resolved by rejecting some households that did not include anyone under age 25 (The rejective approach, for more detailed information see Tambay and Catlin, 1995). According to Havens (2001), this "rejective approach" itself produces an under-representation of older persons as most of them live in small households and few such households include someone under age 25.

In all provinces except Quebec, the NPHS used the multi-purpose sampling methodology developed for the 1994 redesign of the Labour Force Survey (LFS). The basic LFS design is a multi-stage stratified sample of dwellings selected within clusters. In Quebec, the NPHS sample was selected from dwellings participating in a 1992-93 health survey organized by Santé Québec: the Enquête sociale et de santé (ESS). This approach was mutually beneficial, because Santé Québec gets longitudinal coverage of households agreeing to share their NPHS data, and the NPHS can use ESS data to improve the representativeness of its sample without having to screen out households. (For more detailed information, see Tambay and Catlin, 1995).

The National Longitudinal Survey of Children and Youth (NLSCY) is a household survey that will follow a sample of about 25,000 children under age 12 over time. The sample was obtained from households with children that were currently in, or recently rotated out of, the Labour Force Survey (LFS). The first round of data collection took place in December 1994 and February 1995, and selected children are being followed up every two years. Since the content that relates to children is similar in the NLSCY and NPHS, these two surveys have been analytically integrated. In the territories, the surveys use common questionnaires and household samples. However,

integration in the provinces is limited to collection of common data for children and use of a common computer-assisted personal interview (CAPI) application.

Variables included in the NPHS

The content of the NPHS was based on several criteria including the following:

- Information gathered by means of the survey should help monitor the health goals and objectives of the provinces and territories.

- Information available from other sources should not be duplicated. Information should be collected in areas that have not been adequately studied.

- The survey should collect information on factors related to good health, not just illness.

- The information collected should increase our understanding of health and its determinants.

- The survey should focus on behaviours or conditions amenable to prevention, treatment, or other intervention.

- The survey should collect information about conditions that impose the greatest burden, in terms of suffering and/or cost, on individuals, the general population, or the health care system.

The content of the NPHS can be divided into the three categories of core, focus, and buy-in. The core content of the NPHS consists of two components: "General" and the "Health" components. NPHS General core content includes Two-week Disability, Health Care Utilization, Restriction of Activities, Chronic Conditions, and Socio-demographic

Characteristics.

The NPHS core Health content includes Self-perceived Health, Blood Pressure, Women's Health, Height and Weight, Health Status, Physical Activity, Repetitive Strain (96 and 98), Injuries, Use of Medications, Smoking, Alcohol, Mental Health, Social Support, Sense of Coherence (94 and 98), Alcohol Dependence (96), and Self-esteem (94).

The core, focus and buy-in components of the NPHS over the first 3 cycles of the NPHS are summarized in Appendix I.

Part II: Quantitative Methods - Addressing the First Research Question
Population

The NPHS, provincial household component, target population was household residents in 10 provinces of Canada in 1994/95, except persons living on Indian Reserves, on Canadian Forces Bases, and in some remote areas.

Study Sample – The NPHS Longitudinal Panel

The NPHS longitudinal sample was selected at a given time (1994/95) and interviewed over time (every two years). The 1994/95 provincial, non-institutional sample consisted of 27, 263 households, of which 88.7% agreed to participate in the survey. After the application of a screening rule to keep the sample representative, 20,725 households remained in scope. In 18,342 of these households, the selected person was age 12 or older. Their response rate to the in-depth health questions was 96.1%, or 17,626

respondents. Of these 17,626 randomly selected respondents, 17,276 were eligible for re-interview in 1996/97. A response rate of 93.6% was achieved for the longitudinal panel in 1996/97. Of these 16,168 respondents, 15,670 provided full information; that is, general and in-depth health information for both cycles of the survey. The corresponding number for 1998/99 was 14,619 respondents. More detailed descriptions of the NPHS design, sample, and interview procedures can be found in published reports including Tambay (1995) and Swain (1999).

Thus, the 1998/99 longitudinal master file has 14,619 records, with complete responses to both the general and health components of cycles 1, 2 and 3, or who died or became institutionalized in cycle 2 and or 3. The study sample for the current study is defined as respondents age 25 or older who rated their general health status in one of the five defined categories (excellent, very good, good, fair, poor), who answered all the health-related questions by themselves (i.e., proxy answers were excluded from the analysis, in total 493 records, 5%) and have answered questions for each of the first three cycles of the NPHS (i.e., excluding those who died or were institutionalized). The total sample size for this study is 9,371, with 5,380 females and 3,991 males. As stated earlier, the NPHS has a complex design (stratification, multiple stages of selection, and clustering) which means that respondents were selected with unequal probabilities and therefore have varying weights. By applying the final survey weights, the selected study sample (9,371 adults age 25 or older) represent 16,664,000 Canadians age 25 or older.

Methodological Considerations in Analysis of the NPHS Data

Weighting and Estimation

Estimation is defined as "the act of using the results from a sample to learn about the characteristics of a population" (Hassard, 1991, p. G-2). In other words, with estimation, we can draw conclusions about a population based on information gathered from a sample. Since there is a direct association between the probability sampling methods and estimation, consideration of "sampling weight" which is related to the probability of selecting a unit in the sample is important. As was mentioned in the previous section, the NPHS has a complex design (stratification, multiple stages of selection, and clustering). This means that respondents were selected with unequal probabilities and therefore have varying weights. Therefore, to draw correct conclusions about the population of interest based on the NPHS data, sampling weights should be used in all the statistical analyses. The final survey weights incorporate the sampling weights adjusted for non-response and are included as a variable in the NPHS data sets. Also see Yeo and Mantel (1999) for the details of the weighting methodology for the different cycles of the NPHS and for the cross-sectional and longitudinal files.

Design Effect and Variance Estimation

Another methodological issue in the analysis of the NPHS data is consideration of the "design effect" for "variance estimation". The estimated variance for a specific variable that is calculated based on the survey data and the complex NPHS design is different

from the estimated variance for the same variable based on survey data with the same sample size in a simple random design. This difference can be quantified by a measure called the "design effect". The design effect shows the impact of the complex survey design on the variance estimation and in statistical language, it can be shown as follows:

Design effect (θ)=VARIANCE derived by the complex design / VARIANCE derived by simple random sampling design

As discussed by Roberts (1999), a methodologist at Statistics Canada, both stratification and clustering, typically the main components of complex survey designs (such as the design of the NPHS), have some impact on the estimation of variance. According to this methodologist, stratification if chosen efficiently, can reduce the variance of estimates (for example, stratification by provinces, and then by geographic and/or socio-economic factors as was used in the design of the NPHS). On the other hand, clustering can increase the variance estimates as one obtains the ultimate units through choosing clusters as a result of positive intracluster correlations (for example selection of households or neighbourhoods as the larger units and then individuals within those households as the ultimate units in the design of the NPHS). As acknowledged by Roberts (1999) and Yeo and Mantel (1999), in analyzing data from surveys with complex design, ignoring the issue of "the design effect" and assuming a simple random sample can result in misleading conclusions.

To overcome this problem, a "re-sampling" method can be used to estimate variance for complex surveys. The NPHS is the first Statistics Canada survey to disseminate "bootstrap weights" for variance estimation. Calculation of the bootstrap

weights needs to be done only once and is done by Statistics Canada methodologists. The bootstrap weights incorporate the design effect for the NPHS and there is no further need for design effect information. The NPHS bootstrap weights for variance estimation are available to all researchers with access to the NPHS master data files at the Statistics Canada regional offices or using the share files through the remote access program. Although the necessity of applying the bootstrap weights for the derivation of unbiased estimates of the variance is clear, it should be noted that the application of the bootstrap weights forces certain limitations on the data analysis. For example, in predictive studies such as the present study, application of the bootstrap weights without adequate software development prevents the researcher from using the most appropriate statistical techniques to build the final predictive model.

As another example, application of the bootstrap weights makes it impossible for the researcher to examine the significance of the interaction effects between Time I and Time II in the analysis of the longitudinal data. Having faced these difficulties in the first stage of the data analysis, in consultation with my advisor and Dr. Bob Tate from the Biostatistics Unit, I decided to use "normalized weights" instead of the "bootstrap weights". This substitution removes the identified limitations for the purpose of this study while partially reducing the potential bias in the variance estimation. The final weights included in the data file were normalized by dividing each weight by the global average weight, therefore the average normalized weight is set to 1. In addition to using the normalized weights in this study, statistical tests with p-values less than 0.01 (instead of 0.05) were employed to determine significance. This decision partially accounts for

the larger variance estimates that would have been obtained if it were possible to take full account of the survey design. However, it is important to note that odds ratios reported in this study should be viewed with caution as their standard errors and therefore, their confidence intervals may be underestimated.

Preparing the Data

As Rothman and Greenland (1998) stated preparation of the data, which includes data editing, data description and summarization, and the handling of missing values is essential for appropriate data analysis. To address the research questions of this study, the preparation of the data started by reviewing the response categories for the variables within the 1998/99 NPHS longitudinal data file. After running the weighted and unweighted frequencies, where it was necessary, the response categories for some variables were collapsed and each variable was clearly defined.

Creation of new variables by combining two or more variables was the next step. For example, the new variable for measuring "functional health status" was created from two original measures: "activity restrictions" and "functional dependency". Since the focus of this study is on the baseline characteristics and also their transitions over time in relation to the outcome of interest, it was necessary to ensure the comparability of the variables from the first and the second cycles of the survey. To ensure this comparability, in the next step, the consistency of coding the variables from the first and the second cycle of the survey was checked and where necessary variables were re-coded.

Handling the missing data was the next step of the data preparation. Two

strategies were adopted in dealing with the missing data. First, using PROC FORMAT in

the SAS program, variables with non-response categories were recoded as binary

variables with two possible response categories, known and unknown. The recoded

binary variables were then crosstabulated with the outcome of the interest (e.g., fair or

poor self-rated health) to examine whether there were any significant associations

between these variables and the outcome. Where there was a significant association, the

unknown category was coded as a response category for that variable and included in the

analysis, even if the number of records with missing data were not large. Irrespective of

their association with the outcome, variables with large amounts of missing data were

recoded and included in the data analysis (e.g., body weight and household income level).

Variables of Interest for this Study

As indicated in the previous section, the National Population Health Survey

provides us with a wide range of information on the health of Canadians, their health care

utilization and also the determinants of health. Variables used in this study to address

the research questions were selected based on the review of the 1994/95, 1996/97, and

1998/99 NPHS questionnaires and the relevant literature review. The selected variables

were then categorized to fit into one of the components of the Evans and Stoddart (1994)

population health framework, the conceptual framework adopted in this study (Table 3.1).

Table 3.1: Variables Selected for Addressing the Research Questions and the Corresponding Conceptual Framework Component

Variable	Framework Component
Age	Genetic Endowment
Sex	Genetic Endowment
Premature Death of Parent(s)	Genetic Endowment
Household Income Level	Prosperity
Functional Health Status	Health and Function
Level of Pain	Health and Function
Cognitive Ability	Health and Function
Level of Psychological Distress	Health and Function
Marital Status	Social Environment
Hearing Ability	Social Environment
Perceived Emotional Support	Social Environment
Level of Social Involvement	Social Environment
Average Frequency of Social Contacts	Social Environment
Education	Individual Behaviour
Self-esteem	Individual Behaviour
Smoking	Individual Behaviour
Drinking	Individual Behaviour
Frequency of Physical Activity	Individual Behaviour
Body Weight	Individual Behaviour
Number of Chronic Conditions	Disease

Variable Definitions

Prosperity

Household Income Level: Household income was defined based on the number of people in the household and total household income from all sources in the 12-month period before the 1994/95 survey [original variable: INC4DIA5).

Household income group	People in household	Total household income
Lowest	1 to 4	Less than $10,000
	5 or more	Less then $15,000
Lower-middle	1 or 2	$10,000 to $14,999
	3 or 4	$10,000 to $19,999
	5 or more	$15,000 to $29,999
Middle	1 or 2	$15,000 to $29,999
	3 or 4	$20,000 to $39,999
	5 or more	$30,000 to $59,999
Upper middle	1 or 2	$30,000 to $59,999
	3 or 4	$40,000 to $79,999
	5 or more	$60,000 to $79,999
Highest	1 or 2	$60,000 or more
	3 or more	$80,000 or more

Income groups Low, Lower-middle, and Middle were collapsed and considered as one category; income groups Upper middle and Highest) were also collapsed and considered as the next category. Since there was a large number of non-responses to the income question, a separate category designated as "income unknown" was also created.

Household income level in 1996/97 was also defined based on the number of people in the household and total household income from all sources in the 12-month

period before the 1996/97 survey [original variable: INC6DIA5)]. Similar to the

household income level in 1994/95, respondents were assigned to one of the following

income groups based on their response to the relevant questions:

1. "Low, lower-middle or middle" income group
2. "Upper middle or highest" income group
3. "Unknown" income group

Health and Function

Functional Health Status: Questions on activity limitations and functional dependency

were used to define *functional health* status. The combined measure of functional health

status as a proxy measure for severity of disability has also been used in other studies

based on the NPHS data (Statistics Canada, 1998; Statistics Canada, 1999). To measure

activity limitation respondents were asked about health limitations that affect their daily

activities. If they indicated that, because of a long-term physical or mental condition or

health problem (one that has lasted or was expected to last six months or more), they

were limited in the kind or amount of activity they could do at home [original variable:

RAC4_1a], at school [original variable: RAC4_1b], at work [original variable:

RAC4_1c] or in other activities such as transportation to or from work or leisure time

activities [original variable: RAC4_1d], they were considered to have an activity

limitation . To measure *functional dependency* respondents were asked about the need for

help (for health reasons) in activities of daily living (ADL) and instrumental activities of

daily living (IADL). If respondents indicated that they required the help of another

person in preparing meals [original variable: RAC4_6a], shopping for groceries or other

necessities [original variable: RAC4_6b], in doing everyday housework [original variable: RAC4_6c], in personal care activities such as washing, dressing or eating [original variable: RAC4_6e], or in moving about inside the house [original variable: RAC4_6f], they were classified as being functionally dependent. If respondents indicated that they required the help of another person in doing heavy household chores such as washing walls or yard work, they were not classified as being functionally dependent. The two newly created binary variables (Having Activity Limitation: Yes/No) and (Being functionally dependent: Yes/No) were used to define "functional health status" in 1994/95. Based on their functional health status, respondents were assigned to one of the following four categories:

1. No activity limitation and no dependency;

2. Having activity limitation, but not being functionally dependent;

3. No activity limitation, but being functionally dependent;

4. Having activity limitation and being functionally dependent.

Functional Health status in 1996/97 was measured and re-coded in the same way [original variables: RAC6_1a, RAC6_1b, RAC6_1c, RAC6_1d, RAC6_6a, RAC6_6b, RAC6_6c, RAC6_6e, and RAC6_6f].

Pain: *Pain* was assessed by asking respondents "Are you usually free from pain or discomfort?" Respondents who answered "no" were then asked to rank their usual pain intensity level as mild, moderate or severe [original variable: HSC4_29]. Pain level in 1994/95 was classified as "no pain or mild pain" verses "moderate or severe pain". Level

of pain in 1996/97 was measured and re-coded in the same way [original variable: HSC6_29].

Psychological Distress: Psychological distress was based on responses to the following questions:

- During the past month, about how often did you feel so sad that nothing could cheer you up?
- During the past month, how often did you feel nervous?

- ... restless or fidgety?

- ... hopeless?

- ... worthless?

- During the past month how often did you feel that everything was an effort?

Each question was answered on a five-point scale from "all of the time" (4) to "none of the time" (0). Responses to all six items were scored and summed [original variable: MHC4DDS]; the total possible range of scores was 0 to 24, with a higher score indicating more distress. The items and scores used to derive the distress score are based on the work of Kessler and Mroczek (Statistics Canada, 1995). The index is based on a subset of items from the Composite International Diagnostic Interview (CIDI). The CIDI is a structured diagnostic instrument that was designed to produce diagnoses according to the definitions and criteria of both DSM-III-R and the Diagnostic Criteria for Research of the ICD-10. Respondents with a score of 7 or more in 1994/95 (i.e., an average score per item of greater than 1) were categorized as having a high emotional distress level. Based

on the 1998/99 longitudinal file, 13.2% of Canadians aged 25 or older reported high emotional distress in 1994/95. Level of psychological distress in 1996/97 was measured and re-coded in the same way for each member of the longitudinal panel [original variable: MHC6DDS].

Cognitive Ability: Cognition (memory and thinking) was one of the eight attributes, which were measured and included as part of a generic health status index called "Health Utility Index (HUI)"*. The following two questions were used to assess respondents' cognitive ability:

- How would you describe your usual ability to remember things?

- How would you describe your usual ability to think and solve day to day problems?

Individuals who reported no cognitive problem were classified as one category. Respondents who reported "some difficulty thinking, somewhat forgetful, somewhat forgetful/some difficulty thinking, very forgetful/great deal of difficulty thinking, unable to remember/to think" were classified as having "cognitive problem" [original variable: HSC4DCOG]. Respondents' cognitive ability in 1996/97 was measured [original variable: HSC6DCOG] and re-coded in the same way as in 1994/95.

Disease

Number of Chronic Conditions: To determine the presence of *chronic conditions*, respondents were asked if they had "any long-term health conditions that have lasted or

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* The Health Utility Index developed at McMaster University's Centre for Health Economics and Policy Analysis is based on the Comprehensive Health Status Measurement System (CHSMS). It provides a description of an individual's overall functional health, based on eight attributes: vision, hearing, speech, mobility, dexterity, cognition, emotion, and pain and discomfort (Statistics Canada, 1995).

are expected to last six months or more that have been diagnosed by a health professional." A checklist of conditions was read to respondents. Chronic conditions considered in this analysis include asthma, arthritis or rheumatism, back problems (excluding arthritis), high blood pressure, migraine headaches, chronic bronchitis or emphysema, diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, the effects of a stoke, urinary incontinence, Alzheimer's disease, cataracts and glaucoma [original variables CCC4_1c, CCC4_1d, CCC4_1e, CCC4_1f, CCC4_1g, CCC4_1h, CCC4_1j, CCC4_1k, CCC4_1l, CCC4_1m, CCC4_1n, CCC4_1o, CCC4_1p, CCC4_1r, CCC4_1s, CCC4_1t]. Sinusitis and allergies other than food allergies were not part of the selected chronic conditions in this study because of the controversial nature of their diagnosis. After creating a new variable, "total number of chronic conditions", respondents were then classified as having "none or one", "two or three", or "four or more" of these conditions in 1994/95. For each respondent, number of chronic conditions in 1996/97 was established based on the same checklist and categorized in the same way [original variables CCC6_1c, CCC6_1d, CCC6_1e, CCC6_1f, CCC6_1g, CCC6_1h, CCC6_1j, CCC6_1k, CCC6_1l, CCC6_1m, CCC6_1n, CCC6_1o, CCC6_1p, CCC6_1r, CCC6_1s, CCC6_1t].

Genetic Endowment

Age: Respondents were categorized into six *age groups* based on their age on the day of the 1994/95 interview: 25-34, 35-44, 45-54, 55-64, 65-74 and 75 years or older [original variable: DHC4_AGE].

Sex: Respondents sex was determined as male or female in 1994/95 [original variable: SEX].

Premature Death of Parent: *Premature death of parent* was assessed by asking respondents if their biological parents were still alive. If either parent was no longer living, the age at death was asked. If either parent died before the age of 65, the respondent was classified as having had a parent die prematurely. These questions on family history were only asked in 1998/99 [original variables: FH_8_18, FH_8_17, FH_8_28, FH_8_27].

Social Environment

Marital Status: To establish *marital status* in 1994/95, respondents were asked for their current marital status [original variable: DHC4_MAR]. Those who chose the "now married", "common-law" or "living with a partner" options were grouped together as "married". Individuals who answered single were classified as "never married" and "widowed", "separated" and "divorced" were combined as "previously married".

Respondents once again were classified as "married", "never married", and "previously married" in 1996/97 based on their marital status in 1996/97 [original variable: DHC6_MAR].

Perceived Emotional Support: Four "yes/no" questions were used to measure *Perceived emotional support* in 1994/95 (Statistics Canada, 1995). Respondents were asked:

- Do you have someone you can talk to about your private feelings or concerns?
- Do you have someone you can really count on in a crisis situation?
- Do you have someone you can really count on to give you advice when you are

making important personal decisions?

- Do you have someone who makes you feel loved and cared for?

If the answer to any of these questions was "no", the respondent was classified as having low emotional support [original variable: SSC4D1, range 0-4, <4 defined as low emotional support]. Based on the 1998/99 longitudinal file, 15% of Canadians aged 25 or older perceived their emotional support as low in 1994/95. Respondents' perceived emotional support in 1996/97 was measured [original variable: SSC6D1] and re-coded in the same way as in 1994/95.

Average Frequency of Social Contacts: The average frequency of contact index measures the average number of contacts in the past 12 months with family members and friends who are not part of the household and neighbours (Statistics Canada, 1995). A higher number indicates more contacts [original variable: SSC4D3, Range: 0-6]. Respondents with an average social contact of once a month or less were classified as having "low social contacts". Respondents with an average of 2 or 3 social contacts per month were classified as having "moderate social contacts". Individual's who reported on average at least one contact per week, were considered as having "high social contacts". Respondents' average frequency of social contacts in 1996/97 was measured [original variable: SSC6D3, Range: 0-6] and re-coded in the same way as in 1994/95.

Level of Social Involvement: Level of social involvement is measured by two items that reflect the frequency of participation in associations or voluntary organizations and the frequency of attendance at religious services in the last year. Higher score indicates

greater social involvement [original variable: SSC4D2, Range: 0-8]. Individuals who scored less than 4 on this scale, were considered as having a "low level of social involvement". Respondents who scored 4 on this scale were considered as having a "moderate level of social involvement" and those who had a score of 5 or more considered as having a "high level of social involvement". Level of social involvement in 1996/97 was measured [original variable: SSC6D2, Range: 0-8] and re-coded in the same way as in 1994/95.

Hearing: Hearing was one of the eight attributes, which were measured and included as part of a generic health status index called "Health Utility Index (HUI)"*. Five yes/no questions were used to assess respondents' hearing ability [original variable: HSC4DHER]. Respondents who reported no hearing problem were considered as one category and respondents with any kind of hearing problem corrected or uncorrected were classified as having a "hearing problem". Respondent's hearing ability in 1996/97 was measured [original variable: HSC6DHER] and re-coded in the same way as in 1994/95. Given that any kind of sensory impairment including hearing problems are known to be associated with a decrease in individuals' socialization abilities and therefore lead to social isolation (Havens, 2001), in this study the variable of "hearing ability" is classified within the social environment component.

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* The Health Utility Index developed at McMaster University's Centre for Health Economics and Policy Analysis is based on the Comprehensive Health Status Measurement System (CHSMS). It provides a description of an individual's overall functional health, based on eight attributes: vision, hearing, speech, mobility, dexterity, cognition, emotion, and pain and discomfort (Statistics Canada, 1995).

Individual's Behaviour

Level of Education: Respondents were grouped into two *educational* categories based on the highest level of education attained as of 1994/95: less than high school graduation or high school graduation or more [original variable: EDC4D3]. Given that pursuing further education requires some sort of personal decisions and intention, this variable is classified within the individual's behaviour category.

Smoking Behaviour: Respondents were classified into three groups of: daily smokers, occasional smokers and those who do not smoke at all, based on their smoking patterns in 1994/95 [original variables: SMC4_2]. The respondents' smoking pattern was re-assessed with the same question in 1996/97 [original variables: SMC6_2].

Drinking Behaviour: To establish *frequency of alcohol use* in 1994/95, respondents were asked "During the past 12 months, how often did you drink alcoholic beverages". Individuals who reported drinking alcoholic beverages at least once a week were categorized as being weekly drinkers. Those who reported drinking alcoholic beverages less than once a week were classified as occasional drinkers and those who reported never drinking alcoholic beverages were categorized as abstainers [original variable: ALC4_2]. The respondents' drinking behaviour in 1996/97 was measured [original variable: ALC6_2] and re-coded in the same way as in 1994/95.

Physical Activity: *Frequency of physical activity* in 1994/95 was based on the number of times in the previous three months that respondents had participated in leisure-time physical activity that lasted more than 15 minutes. Monthly frequency was derived as the number of times in the past three months divided by 3. Respondents were classified as

regular if the number of times per month was 12 or more, as occasional if the number of times per month was 4-11 and as infrequent if the number of times per month was 3 or less [original variable: PAC4DFR]. Respondents' level of physical activity in 1996/97 was measured and re-coded in the same way as in 1994/95 [original variable: PAC6DFR].

Body Weight: The Canadian Guidelines for Healthy Weights use body mass index (BMI) to determine an acceptable range of healthy weights and to identify conditions of excess weight and underweight (National Health and Welfare, 1988). BMI is calculated by dividing weight in kilograms by height in metres squared. Four weight categories were identified based on BMI in 1994/95 [original variables: HWC4_HT, HWC4_3KG, HWC4DBMI, DHC4_AGE]:

    1. Underweight (BMI less than 20)

    2. Acceptable weight (BMI 20 to 24.9)

    3. Some excess weight (BMI 25 to 27)

    4. Overweight (BMI greater than 27)

       Respondents who were pregnant had their BMI measure set to missing. Since the Body Mass Index for the respondents aged 65 or older was not calculated as a derived variable in the 1998/99 NPHS longitudinal master file, for the purpose of this study, the BMI for this age group was created and used to classify those respondents aged 65 and over into the same four body weight categories. Limitations of calculating the BMI for the older age groups and applying the same criteria for classifying them into the four different weight categories will be discussed in the "Limitations section". Respondents'

body weight in 1996/97 was measured [original variables: HWC6_HT, HWC6_3KG, HWC6DBMI, DHC4_AGE] and re-coded in the same way as in 1994/95.

Self-esteem: Self-esteem was defined from the following 6 items (Statistics Canada, 1995). On a five point scale from "strongly disagree" (score 0) to "strongly agree" (score 4) respondents replied to the following six statements:

- You feel that you have a number of good qualities.

- You feel that you're a person of worth at least equal to others.

- You are able to do things at least as well as most other people.

- You take a positive attitude toward yourself.

- On the whole, you are satisfied with yourself.

- All in all, you're inclined to feel you're a failure (reverse scale on this item.)

If respondents scored less than 18 (i.e., an average score per item of less than three), they were deemed to have low self-esteem [original variable PY_4DE1, range: 0-24]. Based on the 1998/99 longitudinal file, 11.1% of the Canadians aged 25 or over reported low self-esteem in 1994/95.

Well-being

Self-rated General Health Status: In the National Population Health Survey (NPHS), "general health status" is measured based on a single item [variable GHC4_1 for the first cycle, variable GHC6_1 for the second cycle, and variable GHC8_1 for the third cycle]. Individuals were asked to rate their general health on a five-point scale as excellent (1), very good, good, fair, or poor (5). For the purpose of this study, respondents who rated their general health status as either excellent or very good were considered as one

category. The second category consists of respondents who rated their general health status as good. The third category consists of respondents who rated their general health status either as fair or poor.

Statistical Methods for Research Questions 1-7

As mentioned in the previous chapters, the present study explores how a wide range of socioeconomic, psychosocial, lifestyle and health and function related factors and their changes over time are associated with a poor or more positive ratings of health status. Moreover, it explores how the underlying factors are different for men compared to women and for the younger adults compared to the elderly. The main research questions addressed by this study are:

1) What are the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions of Canadians aged 25 or older and how they have been changed over time?

2) Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with fair or poor self-ratings of health?

3) Are the predictors of fair or poor self-rated health different for men compared to women?

4) Are the predictors of fair or poor self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to elderly adults (aged 55 or older)?

5) Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with very good or excellent self-ratings of health?

6) Are the predictors of very good or excellent self-rated health different for men compared to women?

7) Are the predictors of very good or excellent self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to older adults (55 or older)?

Methods for Research Question One

Research question one has two parts. The first part of the question focused on the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions of Canadians aged 25 or older and the second part focused on the transitions in those characteristics and conditions over time.

To address the first part of the research question one, data from the first and the second cycles of the NPHS (1994/95, and 1996/97) included in the 1998/99 longitudinal master file were used. Before doing any analyses, the study sample was clearly defined and then two sets of frequency distributions were run for the variables of interest. In the first set of frequency distributions, no weights were applied to the data and therefore, the output provided us with the sample information. In the second set of frequency distributions, by applying the population weights for the 1998/99 longitudinal data, the population estimates were obtained. Results from these descriptive analyses are summarized in the frequency distribution tables presented in the next chapter. Having the longitudinal data from three different time periods (1994/95, 1996/97 and 1998/99) for a representative sample of Canadians aged 25 or older in 1994/95, it was possible to address the second part of research question one, which focused on changes over time. However before doing any analysis of the data, there were several fundamental questions to be answered including the following: Which aspects of change are important in this study? Only describing change versus no change? Or should we also discuss the direction of the observed changes? How about the magnitude of the changes? What is

the most appropriate measure of the defined changes? Having information from three different time periods for the same individuals, what is the most appropriate time frame to be used for measuring changes? Is the most appropriate time frame a two-year period between the first and the second cycle of the survey? Or is it a two-year period between the second and the third cycle? Or a four-year period between the first and the third cycle of the survey? These questions were raised relative to the analyses of the data in addressing the second part of the research question one. The decision to measure changes over the two-year period between the first and second cycles of the NPHS was made since they also served as potential explanatory variables in addressing research questions 2-7. But, which aspects of change should be measured in this study? By reviewing the objectives stated for the present study, it seemed reasonable to measure changes from a qualitative perspective which means describing whether there has been a change in the value of a variable of interest, describing the direction, but not necessarily the magnitude of the observed changes. To develop the most appropriate measures of change in this study, a process of three steps was involved. In the first step, for each variable, its measurement at Time I (1994/95) was cross-tabulated with its measurement at Time II (1996/97). These cross-tabulations show the status of each individual in terms of a particular condition or characteristic (e.g., marital status) during the first cycle of the survey and then how this condition or characteristic changed over a two-year period. In the next step, these cross-tabulations were summarized in frequency distribution tables describing all the potential transition patterns for each individual variable between the first and the second cycle of the survey. As the last step, a series of multi-categorical

variables were created to reflect these observed transition patterns.

Methods for Research Question 2, 3, and 4

Research question two asked if there is any association between individuals'

socioeconomic, physical, social, psychological, lifestyle and genetic endowment

characteristics and conditions or their transitions over time with fair or poor self-ratings

of health. Research questions three and four explored whether there is any gender or age

group differences in these predictors.

In addressing research questions two, three and four, there were several decisions to

be made including the type of longitudinal models to be developed. To answer these

research questions, it was decided to develop longitudinal models so that the value of the

dependent variable (self-rated health status in 1998/99) was expressed as a function of the

baseline value (measures from the first cycle of the NPHS in 1994/95 –Time I) and the

potential changes in the selected independent variables between the first two cycles of the

survey [between 1994/95 (Time I) and 1996/97 (Time II)]. Another important decision

involved how to define and re-code self-rated general health status as the outcome of the

interest. How we measure and define the outcome has implications for the steps in the

analysis, including the choice of the statistical procedures. As mentioned earlier in the

section on "variable definitions", in the National Population Health Survey (NPHS), self-

rated general health status was measured on a 5-point scale from excellent to poor and

therefore, self-rated health was an ordinal variable in its original format in the 1998/99

NPHS longitudinal file [original variable: GHC8_1]. However, since the main focus of this research was to explore whether the predictors of poor or fair self-rated health are different from the predictors of excellent or very good health, the five possible response categories for self-rated health were collapsed into the following three categories:

1. Excellent or very good self-rated health;

2. Good self-rated health;

3. Fair or poor self-rated health

In the next step, two new dichotomous variables were created; one was fair or poor self-rated health in 1998/99 (FP98: coded as 1 for a poor or fair rating of health and 0 for a good rating of health) and the other one was very good or excellent self-rated health in 1998/99 (EXVG98: coded as 1 for a very good or excellent rating of health and 0 for a good rating of health). The creation of the two dichotomous outcome variables (FP98 and EXVG98) permitted use of logistic regression analyses as the major analytical technique in addressing research questions 2-7. The dichotomous variable of fair or poor self-rated health in 1998/99 (FP98) was the outcome of interest in answering research questions 2,3, and 4 and the other dichotomous variable (very good or excellent self-rated health in 1998/99 – EXVG98) was the outcome of interest in answering research questions 5,6 and 7. Factors with a significant odds ratio greater than 1 were considered as "risk factors" and those with a significant odds ratio less than 1 were considered as "protective factors".

In developing the appropriate multivariate logistic regression models to address

research questions 2, 3 and 4, the following steps were taken:

Step One: The potential explanatory variables were crosstabulated with the outcome of interest (FP98: fair or poor self-rated health versus good) to confirm appropriate cell counts.

Step Two: This step was a filtration process to select independent variables for inclusion in the multivariate logistic regression models. This selection process was based on comparing two models; a basic model including only age and sex regressed against the outcome of interest and another model including age, sex, and one of the potential explanatory variables regressed against the outcome of the interest. Since each of the potential explanatory variables were measured at two different times (Time I: 1994/95 and Time II: 1996/97) two models were run for each explanatory variable and compared with the Basic Model. Where the amount of missing data varied from Time I to Time II and excluded from the analysis, two separate basic models were run and compared with the more complex models which led to a fair comparison based on the same sample sizes.

Using this filtration process, four groups of potential explanatory variables were identified:

Group 1 consisted of variables, which either at Time I or Time II did not help to predict the outcome of interest (i.e., fair or poor self-rated health in 1998/99) and therefore were excluded from the analyses at this stage.

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Group 2 consisted of variables, which only at Time I helped to predict the outcome of interest. Thus by excluding the Time II measures of these variables, it was concluded that transitions over time (between Time I and Time II) represented by the variables in this group are not important in predicting fair or poor self-rated health.

Group 3 consisted of variables, which only at Time II helped to predict the outcome of interest. Thus by excluding the Time I measures of these variables, it was concluded that transitions over time (between Time I and Time II) represented by the variables in this group are not important in predicting fair or poor self-rated health.

Group 4 consisted of variables, which their measures at both times (Time I and Time II) helped to predict the outcome of interest. These variables, were further explored to determine whether knowing their value or level at two times (Time I and Time II) is better than knowing their value or level at the baseline, only (Time I). This test was done for each of the variables included in the fourth group by developing two models: one model regressing age, sex, and the value of explanatory variable at Time I against the outcome of interest and the other model including age, sex, the variable's value at Time I and Time II.

Where adding the Time II measure to the Time I measure did not increase the predictive ability of our model, it was concluded that the transitions over time (between Time I and Time II, or the first and the second cycle of the survey) in that particular condition or characteristic are not important in predicting fair or poor self-rated health two years later in 1998/99. On the other hand, an increased predictive ability confirmed the importance of the transitions in relation to the outcome of interest.

Step Three: Results from the previous step helped to identify a limited number of variables, which at both times (during the first and the second cycle of the survey) were important in predicting fair or poor self-rated health during the third cycle of the survey (in 1998/99). For each of those variables, further testing was done to determine whether their effect at Time I, in relation to the outcome of the interest, is independent from their effect at Time II. This was the test for significance of the *interaction effect* and as Hassard (1998) stated, an interaction exists between two explanatory variables if the influence that one of them has on the outcome is modified by or is dependent on the value of the other.

To test for the significance of the interaction effect, for each explanatory variable identified in the previous step, the following two models were compared:

-   A model which regressed age, sex, and Time I and Time II main effects of the explanatory variable against the outcome of the interest (FP98), and

-   another model which included not only age, sex and the main effects of the same variable from Time I and Time II, but also included an interaction term.

Comparing the overall fit of the two models allowed testing the null hypothesis that "there is no significant interaction between the Time I measure and Time II measure of each explanatory variable". If the hypothesis was accepted for a variable, it was concluded that transitions over time in that particular condition or characteristic are important in relation to the outcome of interest, however, the information on the association between the main effect measures of that variable with the outcome are

enough to discuss the impact of the transitions on the outcome. On the other hand, rejecting the hypothesis meant that information on the association between the main effect measures of a particular variable with the outcome are indeed not enough to discuss the impact of the transitions. In the case of significant interaction effects, the appropriate "measures of change" as described earlier in this chapter, were included in the multivariate models.

Step Four: The univariate analyses summarized in step 1 to 3 helped to identify variables which predict one of the outcomes of interest in this study (fair or poor self-rated health in 1998/99). In this step, using the conceptual framework adopted in this study (Evans and Stoddart's Population Heath Framework, 1994), the significant explanatory variables were classified into the following six categories:

Genetic Endowment category included age, sex, and premature death of parent(s);

Prosperity category included household income level;

Health and Function category included functional health status, level of pain, cognitive ability, and level of psychological distress;

Social Environment category included marital status, hearing ability, perceived emotional support, level of social involvement and average frequency of social contacts;

Individual Behavior category included highest level of education, self-esteem, smoking, drinking, physical activity, and body weight;

Disease category included number of chronic conditions.

To identify the within component explanatory variables, six different multivariate logistic regression models were developed, each regressed age, sex, and one of the

defined categories of the explanatory variables against the outcome of interest, i.e., fair or poor self-rated health in 1998/99. In **Model (1)** respondents' age, sex, and other characteristics related to their "Genetic Endowment" were regressed against the outcome of interest, fair or poor self-rated health in 1998/99. In **Model (2)** respondents' age, sex, and household income level were regressed against the outcome of interest, fair or poor self-rated health in 1998/99. In **Model (3)** respondents' age, sex, and several other characteristics related to their "Health and Function" were regressed against the outcome of interest, fair or poor self-rated health in 1998/99. In **Model (4)** respondents' age, sex, and several other characteristics related to their "Social Environment" were regressed against the outcome of interest, fair or poor self-rated health in 1998/99. In **Model (5)** respondents' age, sex, and several other characteristics related to their "Behavior" were regressed against the outcome of interest, fair or poor self-rated health in 1998/99. In **Model (6)** respondents' age, sex, and their number of chronic conditions as an indicator of their "Disease" were regressed against the outcome of interest, fair or poor self-rated health in 1998/99.

After running the six defined multivariate regression models (Model 1-6), using the backward approach, the non-significant explanatory variables were taken out of the models and only variables with significant predictive value within each category were kept for further analyses.

Step Five: After determining the explanatory (or independent) variables with significant predictive value for the outcome of the interest within each defined category, it was

important to decide how each of the six categories of variables should be introduced into the final multivariate predictive model. This decision is typically made by basing on the p-values for each of the models developed in the previous step. The category of variables with the smallest p-value was introduced first into the final multivariate predictive model.

In addressing research question 2, all of the five steps were followed for the whole study sample aged 25 or older. In addressing research question 3, the five steps were followed in developing two multivariate regression models; one for male respondents aged 25 or older in 1994/95 and another one for female respondents aged 25 or older in 1994/95. In addressing research question 4, the five steps were followed in developing two multivariate regression models; one for respondents aged between 25 and 54 in 1994/95 and another one for respondents aged 55 or older in 1994/95.

Since the outcome of interest in addressing research questions 2, 3, and 4 was a dichotomous variable of FP98 (fair or poor self-rated health versus good health), in all five of the multivariate regression models, the population was restricted to those who reported fair or poor, or good self-rated health in 1998/99. Those respondents who rated their health status as very good or excellent in 1998/99 were excluded in all the analyses addressing research questions 2, 3, and 4. Moreover, all the analyses were based on the weighted data. To identify significant predictors, the final adjusted odds ratios for each of the independent variables within the final predictive model and their 99% Confidence Intervals were used.

Methods for Research Questions 5, 6, and 7

Research question five asked if there is any association between individuals'

socioeconomic, physical, social, psychological, lifestyle and genetic endowment

characteristics and conditions or their transitions over time with very good or excellent

self-ratings of health. Research questions six and seven further explored if there is any

gender or age group differences in these predictors.

Statistical methods used in addressing these three questions were exactly the same

as the methods addressing questions 2, 3, and 4, except for the outcome. The outcome of

interest in addressing research questions 5,6, and 7 was the dichotomous variable of very

good or excellent self-rated health in 1998/99 (EXVG98: coded as 1 for a very good or

excellent rating of health and 0 for a good rating of health). Therefore, in all of these five

multivariate regression models, the population was restricted to those who reported very

good or excellent, or good self-rated health in 1998/99. Those respondents who rated

their health status as fair or poor in 1998/99 were excluded in all the analyses addressing

research questions 5, 6, and 7. All of the analyses were again based on the weighted data.

To identify significant predictors, the final adjusted odds ratios for each of the

independent variables within the final predictive model and their 99% Confidence

Intervals were used.

Methods for Research Questions 8

This section addresses research question eight which asks whether the two ends of

the single-item indicator of self-rated health measures the same or different dimensions of

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health. In other words, are the predictors of fair or poor self-rated health the same factors that predict very good or excellent health, only in opposite directions? To answer this question, the significant risk factors and protective factors within the two final predictive logistic regression models, one predicting fair or poor self-rated health in 1998/99 (FP98) and the other one predicting very good or excellent health were compared.

Summary

This study is a secondary analysis of Statistics Canada's National Population Health Survey (NPHS) longitudinal data, weighted to represent the population of the 10 provinces in Canada. Members of the NPHS longitudinal panel who were aged 25 or older during the first cycle of the survey, who rated their general health status in one of the five defined categories (excellent, very good, good, fair, poor), who answered all the health-related questions by themselves (i.e., proxy answers were excluded from the analysis, in total 493 records, 5%) and answered questions for each of the first three cycles of the NPHS (i.e., excluding those who died or were institutionalized) constituted the study sample. Variables used in this study to address the stated research questions were selected based on the review of the 1994/95, 1996/97, and 1998/99 NPHS questionnaires and the relevant literature review. The selected variables were then categorized to fit into one of the components of the Evans and Stoddart (1994) population health framework, the conceptual framework adopted in this study. Since it was the main objective of the present study to compare the predictors of fair or poor self-rated health with the predictors of very good or excellent health, two new dichotomous outcome

variables were created based on the single-item indictor of self-rated health included in the survey. One of the dichotomous outcome variables was fair or poor self-rated health in 1998/99 (FP98: coded as 1 for a poor or fair rating of health and 0 for a good rating of health) and the other one was very good or excellent self-rated health in 1998/99 (EXVG98: coded as 1 for a very good or excellent rating of health and 0 for a good rating of health). The creation of the two dichotomous outcome variables (FP98 and EXVG98) permitted use of logistic regression analyses as the major analytical technique. The descriptive information on health status, socio-economic status, lifestyle and health behaviours for Canadians who were aged 25 or older in 1994/95 are presented in the next chapter. The next chapter also informs us of how those characteristics and conditions have changed over the study period. The baseline characteristics and their changes over time were the independent variables in the predictive models developed to explore the determinants of self-rated health.

CHAPTER 4: DESCRIPTIVE FINDINGS

This study is distinguished from the previous work in this area of inquiry because it uses a comprehensive population health framework to explore the association between a wide range of socio-economic, individual and environmental characteristics and conditions with people's ratings of their own health. Moreover, it examines these associations from a longitudinal perspective, which means it aims not only to answer the question of which factors, but also how different patterns of transition and change in those factors are associated with the outcome of interest. The detailed analytical findings will be presented and discussed in the next two chapters. To better understand and interpret these results, it is useful to know who the study population was, what was their socio-economic, lifestyle, and health status at the beginning of the study and how these changed over time. This is the main purpose of this chapter, which ends with a summary of the descriptive findings.

Demographic Profile of the Study Population

Out of 14,619 members of the 1998/99 National Population Health Survey (NPHS) longitudinal panel, the 9,371 respondents aged 25 or older in 1994/95 who were still residing in households in 1998/99 and met the other inclusion criteria were selected for the purpose of this study. The selected members of the NPHS longitudinal panel represent an estimated 16, 644,000 Canadians who were aged 25 or older in 1994/95. The distribution of this selected sample and the target population by age group is shown in Table 4.1.

Table 4.1: Distribution of the Study Sample and
Population by Age Group

	Total sample size	Estimated population '000	%
Total	9,371	16,644	100.0
Age in 1994/95			
25-34	2,312	4,314	25.9
35-44	2,257	4,655	28.0
45-54	1,695	3,129	18.8
55-64	1,326	2,216	13.3
65-74	1,176	1,649	9.9
75+	605	681	4.3

According to the data presented in Table 4.1, an estimated 25.9% of the

Canadians who were at least age 25 in 1994/95 were between the age of 25 and

34; 28% were between age 35 and 44; 18.8% between 55 and 64; less than 10%

were between age 65 and 74; and about 4% of the target population were age 75

or older. In regards to gender, an estimated 52.9% of the target population were

female and 47.1% were male. The average age of the study population in 1994/95

was 45 years and 11 months (sd=14 years and 7 months) with women being

slightly older (46 years and 8 months versus 45 years and 1 month).

Socio-economic Characteristics

Table 4.2 summarizes information on household income level as a proxy

measure of prosperity at the individual level.

Table 4.2: Distribution of Study Sample and Population by Household Income Levels in the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Household Income Levels	Total sample size	Estimated population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Household Income Levels 1994/95			
Lowest/Lower-middle/Middle	4,556	7,079	42.5
Upper-middle/Highest	4,446	8,817	53.0
Unknown	369	748	4.5
Household Income Levels 1996/97			
Lowest/Lower-middle/Middle	4,429	6,845	41.1
Upper-middle/Highest	4,401	8,816	53.0
Unknown	541	983	5.9

Note: Details may not add to total due to rounding.

As shown in Table 4.2, an estimated 53%, or 8,817,000 Canadians who were age 25 or older in 1994/95 were from upper-middle or highest income families and an estimated 42.5%, (or 7,079,000 individuals in the population) were from the lowest, lower-middle or middle income families (see section on Variable definitions). Information on household income level in 1994/95 was missing for 4.5% of the target population.

Two years later, during the second cycle of the NPHS (1996/97), information on household income was missing for a higher proportion of the study population (6% or 983,000 individuals in the population). However, the same proportion of the target population reported their household income level as

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upper-middle or the highest (53% or an estimated 8,816,000 Canadians). The

observed transition patterns in household income between the first and the second

cycles of the NPHS are shown in Table 4.3.

Table 4.3: Distribution of the Study Sample and Population by Transition Patterns
in Household Income Level between the First and the Second Cycles of the NPHS
(1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable (Low/lower middle/middle)	3,514	5,178	31.1
Increase	775	1,466	8.8
Low/lower middle/middle to Unknown	267	435	2.6
Decrease	788	1,443	8.7
Stable (Upper middle/highest)	3,465	6,965	41.8
Upper middle/highest to Unknown	193	409	2.5
Unknown to Low/lower middle/middle	127	224	1.3
Unknown to Upper middle/highest	161	385	2.3
Unknown to Unknown	81	140	0.8

Note: Details may not add to total due to rounding.

As shown in table 4.3, between the first and the second cycle of the NPHS

the level of household income remained stable for the majority of Canadians who

were age 25 or older in 1994/95; there were about 5 million people who were

from low/lower middle/middle income families during the first cycle of the

survey whose household income level was the same two years later in 1996/97.

This group constituted 31% of the total population who were age 25 or older in

1994/95. There were almost 7 million people who had an upper-middle or highest household income level during the first cycle of the study, whose household income level was the same when they were re-interviewed two years later in 1996/97. This group constituted 41.8% of the total population. In total, then, almost three-quarters (72.9%) of Canadians age 25 or older experienced income stability during this period (1994/95 to 1996/97). As indicated in table 4.3, between the first and the second cycles of the survey, just over two years, an estimated 8.7% of the target population (or 1,443,000 individuals) experienced a decrease and an estimated 8.8%, (or 1,466,000 individuals) of Canadians age 25 or older in 1994/95 experienced an increase in their household income level.

Health and Functioning Characteristics

Functional Health Status

As mentioned in the section on "variable definitions", questions on activity limitations and functional dependency were used to define each individual's functional health status. The distribution of the study sample and population by functional health status during the first and the second cycles of the NPHS is shown in Table 4.4.

Table 4.4: Distribution of Study Sample and Population by Functional Health Status in the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Functional Health Status	Total sample size	Estimated population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Functional health status 1994/95			
No activity limitation and no dependency	7,536	13,810	83.0
Activity limitation, but no dependency	1,324	2,100	12.6
No activity limitation, but dependency	71	99	0.6
Activity limitation and dependency	439	631	3.8
Unknown	-----	-----	----
Functional health status 1996/97			
No activity limitation and no dependency	7,576	13,826	83.1
Activity limitation, but no dependency	1,125	1,801	10.8
No activity limitation, but dependency	110	169	1.0
Activity limitation and dependency	529	807	4.8
Unknown	31	41	0.2

Note: Details may not add to total due to rounding.

Data from the first two cycles of the NPHS show 16 different patterns of transition in functional health status among household residents aged 25 or older in 1994/95 (Table 4.5). Out of the 16 transitional patterns in functional health, 4 were defined as stable including "stable: No AL/No D", "stable: AL/No D", "stable: No AL/D" and "stable: AL/D". There were 6 transitional patterns which were defined as decline in functional health including "No AL/No D to AL/No

D", "No AL/No D to No AL/D", "No AL/No D to AL/D", " AL/No D to No AL/D", "AL/No D to AL/D" and "No AL/D to AL/D". There were 6 other patterns which were defined as improvement in functional health including "AL/No D to No AL/No D", "No AL/D to No AL/No D", "No AL/D to AL/No D", "AL/D to No AL/No D", "AL/D to AL/No D", "AL/D to No AL/D".

As Table 4.5 shows, between the first and the second cycles of the survey, stable functional status without activity limitation or functional dependency was the predominant transitional pattern, which was observed for an estimated 76.1% of the target population. Change in functional health status from "having activity limitation, but not being functionally dependent" to "not having activity limitation and being functionally independent" was the second most frequently experienced pattern. This improvement in functional health status was observed for an estimated 5.9% or 985,000 household residents who were at least 25 years of age in 1994/95. Between the two cycles of the survey, the least frequent transitional pattern was "stable functional dependency in the absence of activity limitation", which occurred for about 5,000 individuals aged 25 or older in 1994/95.

Table 4.5: Distribution of Study Sample and Population by Type of Transition Patterns in Functional Health Status between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable (No AL/No D)	6853	12,664	76.1
Decline (No AL/No D to AL/No D)	493	830	5.0
Decline (No AL/No D to No AL/D)	76	130	0.8
Decline (No AL/No D to AL/D)	109	179	1.1
Improvement (AL/No D to No AL/No D)	606	985	5.9
Stable (AL/No D)	507	794	4.8
Decline (AL/No D to No AL/D)	13	17	0.1
Decline (AL/No D to AL/D)	174	271	1.6
Improvement (No AL/D to No AL/No D)	34	54	0.3
Improvement (No AL/D to AL/No D)	10	18	0.1
Stable (No AL/D)	5	5	0.0
Decline (No AL/D to AL/D)	22	22	0.1
Improvement (AL/D to No AL/No D)	82	120	0.7
Improvement (AL/D to AL/No D)	115	159	1.0
Improvement (AL/D to No AL/D)	16	16	0.1
Stable (AL/D)	224	334	2.0
Unknown	32	45	0.3

Notes:
No AL/No D: Not having activity limitations and not being functionally dependent
AL/No D: Having activity limitations, but not being functionally dependent
No AL/D: Not having activity limitations, but being functionally dependent
AL/D: Having activity limitations and being functionally dependent
Details may not add to total due to rounding.

Level of Pain

As mentioned in the section on "variable definitions", in the National

Population Health Survey, information on pain was obtained by asking

respondents "Are you usually free from pain or discomfort?" Respondents who

answered "no" were then asked to rank their usual pain intensity level as mild,

moderate or severe. Level of pain during the first and the second cycle of the

survey was then classified as "no pain or mild pain" verses "moderate or severe

pain".

Table 4.6: Distribution of Study Sample and Population by Level of Pain during
the First (1994/95) and the Second (1996/97) Cycles of the NPHS

	Total sample size	Estimated population '000	%
Total	**9,371**	**16,644**	**100.0**
Level of Pain 1994/95			
Moderate or severe pain	1,233	2,139	12.8
Mild or no pain	8,104	14,429	86.7
Unknown	34	77	0.5
Level of Pain 1996/97			
Moderate or severe pain	1,041	1,743	10.5
Mild or no pain	8,327	14,887	89.4
Unknown	3	14	0.1

Note: Details may not add to total due to rounding.

As Table 4.6 displays during the first cycle of the NPHS, an estimated

86.7% or 14,429,000 household residents age 25 or older were free of pain or

reported mild pain. At that time there were about 2 million adults aged 25 or older

who reported having moderate or severe pain (an estimated 12.8% of the target population). By the next cycle of the survey a higher proportion of people aged 25 or older in 1994/95 reported mild or no pain and a lower proportion reported moderate or severe pain.

Table 4.7 summarizes the four transition patterns in the level of pain between the first and the second cycle of the survey.

Table 4.7: Distribution of Study Sample and Population by Transition Patterns in Level of Pain between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population '000	%
Total	9,371	16,644	100.0
Stable (No pain or mild pain)	7,645	13,668	82.1
Increase	456	746	4.5
Decrease	651	1,144	6.9
Stable (Moderate or severe pain)	582	995	6.0
Unknown	37	91	0.5

Note: Details may not add to total due to rounding.

Cognitive Ability (memory and thinking)

As mentioned in the section on "variable definitions", two questions were used in the NPHS to assess respondents' cognitive ability, one measured respondents' ability to remember things and the other measured respondents' ability to think and solve day to day problems. For the purpose of the present study, individuals who reported no cognitive problem were classified as one

category and respondents who reported any degree of difficulty thinking or remembering were classified as having a "cognitive problem".

According to the NPHS 1998/99 longitudinal panel data presented in Table 4.8, an estimated 69.6% or 11,583,000 Canadians aged 25 or older did not have any cognitive problem during the first cycle of the NPHS. However, there were about 5 million individuals aged 25 or older who reported having a cognitive problem. The proportion of the target population who reported having a cognitive problem decreased over time (Table 4.8).

Table 4.8: Distribution of Study Sample and Population by Cognitive Status during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Cognitive Status	Total sample size	Estimated population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Cognitive Status in 1994/95			
No cognitive problem	6,422	11,583	69.6
Having cognitive problem	2,913	4,976	29.9
Unknown	36	84	0.5
Cognitive Status in 1996/97			
No cognitive problem	7,423	13,522	81.2
Having cognitive problem	1,945	3,112	18.7
Unknown	-----	-----	----

Note: Details may not add to total due to rounding.

Transition patterns in the cognitive status of the Canadian population aged 25 or older between the first two cycles of the NPHS are summarized in Table 4.9.

Table 4.9: Distribution of Study Sample and Population by Transition Patterns in Cognitive Ability between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable (no cognitive problem at both cycles)	5,653	10,327	62.0
New Cognitive Problem	767	1,246	7.5
Cognitive Problem Gone	1,741	3,121	18.8
Stable (Having Cognitive Problem at both cycles)	1,171	1,855	11.1
Unknown	39	95	0.6

Note: Details may not add to total due to rounding.

As this table shows, an estimated 62% or 10,327,000 Canadians aged 25 or older in 1994/95 did not have any cognitive problem during either first or second cycles of the survey. There were about 1,246,000 people who reported not having any cognitive problem during the first cycle of the survey, but did have a problem two years later. On the other hand, there were more than 3 million Canadians aged 25 or older who reported having a cognitive problem during the first cycle of the survey, but reported not having a cognitive problem two years

later. As Table 4.9 shows, an estimated 11.1% of the target population reported having a cognitive problem during both the first and the second cycles.

Psychological Distress

In the NPHS, psychological distress is measured on a scale with the possible range of scores between 0 and 24, with a higher score indicating more distress. As mentioned in the section on "variable definitions", for the purpose of this study, respondents with a score of 7 or more in 1994/95 (i.e., an average score per item of greater than 1) were categorized as having a high level of psychological distress. Based on the 1998/99 NPHS longitudinal file, an estimated 13.2% of Canadians, aged 25 or older, reported high psychological distress in 1994/95 (Table 4.10). As presented in the same table, the proportion of Canadians who reported high psychological distress decreased over time (between the first and the second cycles of the survey).

Table 4.10: Distribution of Study Sample and Population by Degree of Psychological Distress during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Psychological Distress	Total sample size	Estimated population '000	%
Total	**9,371**	**16,644**	**100.0**
Psychological distress 1994/95			
High	1,240	2,200	13.2
Low/moderate	8,044	14,260	85.7
Unknown	87	184	1.1
Psychological distress 1996/97			
High	929	1,717	10.3
Low/moderate	8,378	14,802	88.9
Unknown	64	125	0.7

Note: Details may not add to total due to rounding.

As Table 4.11 displays there were four main transition patterns in the level of psychological distress between the first and the second cycles of the survey.

Table 4.11: Distribution of Study Sample and Population by Transition Patterns in Level of Psychological Distress between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population '000	%
Total	**9,371**	**16,644**	**100.0**
Stable: low psychological distress	7,509	13,215	79.4
Increase	488	953	5.7
Decrease	798	1,444	8.7
Stable: High psychological distress	427	728	4.4
Unknown (at any time)	149	304	1.8

Note: Details may not add to total due to rounding.

Premature Death of Parent(s)

Premature death of either parent was assessed by asking respondents if their biological parents were still alive. If either parent was no longer living, the age at death was asked. If either parent died before the age of 65, the respondent was classified as having had a parent die prematurely. These questions on family history were asked in 1998/99.

As presented in Table 4.12, according to the 1998/99 NPHS data file, an estimated 73.4% of the household population aged 25 or older did not have a parent die prematurely. Out of the 16,644,000 household residents, slightly over 4 million reported having a family history of premature death of at least one parent.

Table 4.12: Distribution of the Study Sample and Population by the Premature Death of Parent during the Third Cycle (1998/99)

	Total sample size	Estimated population '000	%
Total	**9,371**	**16,644**	**100.0**
Premature death of parent(s)			
Yes	2,502	4,388	26.4
No	6,855	12,212	73.4
Unknown	14	43	0.3

Note: Details may not add to total due to rounding.

Social Environment Characteristics

The marital status of the target population during the first and the second cycles of the survey is summarized in Table 4.13.

Table 4.13: Distribution of the Study Sample and Population by Marital Status in the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Marital Status	Total sample size	Estimated population '000	%
Total	**9,371**	**16,644**	**100.0**
Marital Status 1994/95			
Married	5,957	12,125	72.9
Never married	1,313	2,049	12.3
Previously married	2,101	2,469	14.8
Marital Status 1996/97			
Married	5,950	11,957	71.8
Never married	1,214	1,932	11.6
Previously married	2,207	2,756	16.6

Note: Details may not add to total due to rounding.

As shown in Table 4.13, in 1994/95 more than 70% of the Canadian household residents, aged 25 or older, were married; 12.3% were single and about 15% indicated their marital status as "previously married" (see section on variable definitions). During the second cycle of the survey, the proportion of people who indicated their marital status as "married", "single", or "previously married" was nearly the same. However, as summarized in Table 4.14, there were some changes in individuals' marital status over the two years.

Table 4.14: Distribution of the Study Sample and Population by Transition Patterns in Marital Status between the First and the Second Cycles of the NPHS (1994/95-1996/97)*

Transition Patterns	Total Sample Size	Estimated Population '000	%
Total	**9,371**	**16,644** **100.0**	
Stable: married	5,702	11,606 69.7	
Stable: never married	1,210	1,928 11.6	
Married to previously married	224	451 2.7	
Never married to married	134	190 1.1	
Previously married to married	114	160 1.0	
Stable: previously married	1,987	2,309 13.9	

* There was a small number of cases (n=4) where the pattern indicated was judged to be either an error in responding or coding. These cases were assigned to the most similar categories.
Note: Details may not add to total due to rounding.

Hearing Ability

As presented in Table 4.15, during the first cycle of the NPHS only an estimated 4.5% or 753,000 Canadians aged 25 or older reported "having a hearing problem". This proportion was even lower two years later during the second cycle of the survey.

Table 4.15: Distribution of the Study Sample and Population by Hearing Ability during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Hearing Ability	Total sample size	Estimated population '000	%
Total	9,371	16,644	100.0
Hearing Ability 1994/95			
No hearing problem	8,824	15,764	94.7
Having hearing problem	483	753	4.5
Unknown	64	126	0.8
Hearing Ability 1996/97			
No hearing problem	8,916	15,972	96.0
Having hearing problem	419	626	3.8
Unknown	36	46	0.3

Note: Details may not add to total due to rounding.

The creation and coding of the respondents' hearing ability is explained in the section on "variable definitions" as having two possible categories for hearing ability in 1994/95 (no hearing problem vs. having corrected or uncorrected hearing problem) and the same two categories in 1996/97. All the potential transition patterns for hearing ability are shown in Table 4.16.

Table 4.16: Distribution of the Study Sample and Population by Transition Patterns in Hearing Ability between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable: no hearing problem either cycles	8,601	15,422	92.7
New hearing problem	199	316	1.9
Hearing problem gone	262	440	2.6
Stable: having hearing problem at both cycles	212	303	1.8
Unknown	97	163	1.0

Note: Details may not add to total due to rounding.

Perceived Emotional Support

As explained in the section on "variable definitions", in the NPHS, four "yes/no" questions were used to measure "perceived emotional support". If the answer to any of these questions was "no", the respondent was classified as having "low emotional support". The minimum possible score on this scale was 0 and the maximum was 4. For the purpose of this study, a total score of less than 4 on this scale is defined as "low emotional support". Based on the 1998/99 NPHS longitudinal data, an estimated 17.5% of Canadians, aged 25 or older, perceived their emotional support as low in 1994/95 (Table 4.17). However, as this table displays, the proportion of Canadians who perceived their emotional support as "low" decreased over time.

Table 4.17: Distribution of the Study Sample and Population
by Perceived Emotional Support during the First (1994/95)
and the Second (1996/97) Cycles of the NPHS

Perceived Emotional Support	Total sample size	Estimated population	
		'000	%
Total	9,371	16,644	100.0
Perceived emotional support 1994/95			
Low	1,595	2,914	17.5
Enough	7,685	13,567	81.5
Unknown	91	163	1.0
Perceived emotional support 1996/97			
Low	1,371	2,501	15.0
Enough	7,939	14,021	84.2
Unknown	61	121	0.7

Note: Details may not add to total due to rounding.

The four main transition patterns in the level of "perceived emotional support" between the first and the second cycles of the survey are summarized in Table 4.18. As presented in this table, the majority of Canadians, aged 25 or older (an estimated 73%), perceived their emotional support as "sufficient" during both the first and the second cycle of the survey.

Table 4.18: Distribution of the Study Sample and Population by Transition Patterns in Perceived Emotional Support between the First and the Second Cycle of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable: low emotional support at both cycles	644	1,125	6.8
Increased: low emotional support to sufficient emotional support	930	1,742	10.5
Decreased: sufficient emotional support to low emotional support	708	1,347	8.1
Stable: sufficient emotional support at both cycles	6,938	12,146	73.0
Unknown (at either time)	151	284	1.6

Note: Details may not add to total due to rounding.

Average Frequency of Social Contacts

As mentioned in the section on "variable definitions", the average frequency of social contact index measures the average number of contacts in the past 12 months with family members or friends who are not part of the household and neighbours. Scores on this scale range between 0 and 6, with a higher number indicating more contacts. For the purpose of this study, respondents with an average of one or less of these social contacts in a month were classified as having "low social contacts". Respondents with an average of 2 or 3 of these social contacts per month were classified as having "moderate social contacts". Individual's who reported on average at least one of these contacts per week, were considered as having "high social contacts".

According to the 1998/99 NPHS longitudinal data presented in Table 4.19, during the first cycle of the survey, an estimated 23% of Canadians, aged 25 or older, had "low", 40.5% had "moderate" and an estimated 35.4% had "high" average frequencies of these social contacts. As shown in the same Table, the proportion of people with a "low average frequency of social contacts" increased and proportion of people with a "moderate" or "high" average frequency of social contacts decreased over time.

Table 4.19: Distribution of the Study Sample and Population by Average Frequency of Social Contacts during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Average Frequency of Social Contacts	Total sample size	Estimated population	
		'000	%
Total	9,371	16,644	100.0
Average Frequency of Social Contacts 1994/95			
Low	1,843	3,821	23.0
Moderate	3,600	6,735	40.5
High	3,841	5,898	35.4
Unknown	87	190	1.1
Average Frequency of Social Contacts 1996/97			
Low	2,038	4,193	25.2
Moderate	3,577	6,617	39.8
High	3,697	5,715	34.3
Unknown	59	119	0.7

Note: Details may not add to total due to rounding.

In regards to the "average frequency of social contacts", a total of 9 transition patterns were observed between the first and the second cycles of the NPHS (Table 4.20).

Table 4.20: Distribution of the Study Sample and Population by Transition Patterns in Average Frequency of Social Contacts between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable: low average frequency of social contacts at both cycles	919	1,938	11.6
Increase: low to moderate	671	1,345	8.1
Increase: low to high	236	485	2.9
Increase: moderate to high	1,066	1,851	11.1
Stable: moderate average frequency of social contacts at both cycles	1,687	3,170	19.0
Decrease: moderate to low	826	1,677	10.1
Decrease: high to low	273	531	3.2
Decrease: high to moderate	1,189	2,029	12.2
Stable: high average frequency of social contacts at both cycles	2,360	3,314	19.9
Unknown at either time	144	304	1.8

Note: Details may not add to total due to rounding.

Individual Behavior and Lifestyle Characteristics

Education

In regards to the highest level of education attained as of 1994/95 (the first cycle of the survey), an estimated 76% of the Canadian population aged 25 or older were at least high school graduates and less than 25% of the target population reported their highest level of education as "less than high school graduation". Only information on the "highest level of education" during the first cycle of the survey was used in this study since no substantial changes in

individuals' educational level are expected after age of 25, the minimum age of the NPHS longitudinal panel selected for this study.

Table 4.21: Distribution of the Study Sample and Population by Education during the First cycle of the National Population Health survey (1994/95)

	Total sample size	Estimated population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Educational Attainment 1994/95			
Less than high school graduation	2,635	3,968	23.8
At least high school graduation	6,721	12,644	76.0
Unknown	15	32	0.2

Note: Details may not add to total due to rounding.

Self-esteem

As mentioned in the section on "variable definitions", in the NPHS, self-esteem was defined based on 6 items, each item contained a five point scale from "strongly disagree" (score 0) to "strongly agree" (score 4). If respondents scored less than 18 (i.e., an average score per item of less than three), they were deemed to have low self-esteem. Based on the 1998/99 NPHS longitudinal data presented in Table 4.22, an estimated 11.1% of the Canadians aged 25 or older reported low self-esteem in 1994/95. Respondents' self-esteem was not measured during the second cycle of the survey.

Table 4.22: Distribution of the Study Sample and Population by Self-esteem during the First cycle of the National Population Health survey (1994/95)

	Total sample size	Estimated population '000	%
Total	9,371	16,644	100.0
Self-esteem 1994/95			
Low	1,127	1,855	11.1
Not low	8,169	14,629	87.9
Unknown	75	160	1.0

Note: Details may not add to total due to rounding.

Smoking

As mentioned in the section on "variable definitions", information on smoking patterns during each cycle of the NPHS was used to classify Canadians aged 25 or older into the three groups of daily smokers, occasional smokers and those who do not smoke. As presented in Table 4.23, during the first cycle of the NPHS, the majority of Canadians aged 25 or older were non-smokers (an estimated 70.1% or 11,670,000 adults aged 25 or older in 1994/95); an estimated 25.4% or slightly over 4 million Canadians aged 25 or older were daily smokers and an estimated 4.3% were occasional smokers. As shown in the same table, the proportion of Canadians who do not smoke had increased and the proportion of those who were daily or occasional smokers decreased over time.

Table 4.23: Distribution of the Study Sample and Population by Smoking Behavior during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Smoking Behavior	Total sample size	Estimated population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Smoking behavior 1994/95			
Daily Smoker	2,481	4,232	25.4
Occasional Smoker	386	721	4.3
Non-smoker	6,499	11,670	70.1
Unknown	5	21	0.1
Smoking behavior 1996/97			
Daily Smoker	2,400	4,157	25.0
Occasional Smoker	270	519	3.1
Non-smoker	6,689	11,948	71.8
Unknown	12	19	0.1

Note: Details may not add to total due to rounding.

Having three possible categories for smoking behaviour in 1994/95 (daily, occasional, not at all) and in 1996/97 (daily, occasional, not at all), a total of 9 transition patterns were observed in smoking behaviour between the first and the second cycles of the survey (Table 4.24). As this table displays, there was a substantial proportion of Canadians aged 25 or older whose smoking behaviour did not change over the two cycles of the survey. This group consists of those who were non-smokers at both times (an estimated 67.8%); those who were daily smokers at both times (an estimated 22.5%), and those who were occasional smokers at both times (an estimated 1.5%). For the purpose of this study, some

transition patterns in smoking behavior are defined as "improvement in smoking behavior" including the following:

- Being a daily smoker in 1994/95, but an occasional smoker in 1996/97 (observed for an estimated 0.6% or 108,000 Canadians aged 25 or older in 1994/95)

- Being a daily smoker in 1994/95, but a non-smoker in 1996/97 (observed for an estimated 2.3% or 375,000 Canadians aged 25 or older in 1994/95)

- Being an occasional smoker in 1994/95, but a non-smoker in 1996/97 (observed for an estimated 1.6% or 264,000 Canadians aged 25 or older in 1994/95). There was a total of 4.5% of respondents for whom smoking behavior improved.

Some transition patterns, which for the purpose of this study were defined as being a "decline in smoking behavior", included the following:

- Being a non-smoker in 1994/95, but an occasional smoker in 1996/97 (observed for an estimated 1.0% or 161,000 Canadians aged 25 or older in 1994/95)

- Being a non-smoke in 1994/95, but a daily smoker in 1996/97 (observed for an estimated 1.3% or 212,000 Canadians aged 25 or older in 1994/95)

- Being an occasional smoker in 1994/95, but a daily smoker in 1996/97 (observed for an estimated 1.3% or 208,000 Canadians aged 25 or older in 1994/95). There was a total of 3.6% of respondents for whom their smoking behavior declined.

Table 4.24: Distribution of the Study Sample and Population by Transition Patterns in Smoking Behavior between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable (daily smoker)	2,178	3,737	22.5
Improvement (daily→occasional)	67	108	0.6
Improvement (daily→not at all)	230	375	2.3
Improvement (occasional→not at all)	163	264	1.6
Stable (occasional smoker)	121	249	1.5
Decline (occasional→ daily)	102	208	1.3
Decline (not at all→ daily)	120	212	1.3
Decline (not at all→ occasional)	81	161	1.0
Stable (do not smoke at all)	6,292	11,290	67.8
Unknown	17	41	0.2

Note: Details may not add to total due to rounding.

Drinking

As mentioned in the section on "variable definitions", for the purpose of this research, Canadians who reported drinking alcoholic beverages at least once a week were categorized as being weekly drinkers. Those who reported drinking alcoholic beverages less than once a week were classified as occasional drinkers and those who reported never drinking alcoholic beverages were categorized as abstainers.

According to the data from the NPHS longitudinal file, during the first cycle of the survey, an estimated 41.5% of the Canadians aged 25 or older were

occasional drinkers; 38.5% were regular weekly drinkers, and an estimated 19.9% were abstainers (Table 4.25). As shown in the same table, over time there has been an increase in the proportion of people who drink occasionally or do not drink alcoholic beverages at all, and a decrease in the proportion of those who drink on a regular (weekly) basis.

Table 4.25: Distribution of the Study Sample and Population by Drinking Behavior during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Drinking Behavior	Total sample size	Estimated population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Drinking behavior 1994/95			
Regular - Weekly drinker	3,344	6,402	38.5
Not regular - Less than once a week	3,943	6,901	41.5
Abstainer	2,072	3,312	19.9
Unknown	12	29	0.1
Drinking behavior 1996/97			
Regular - Weekly drinker	3,085	6,020	36.2
Not regular - Less than once a week	4,033	7,038	42.3
Abstainer	2,225	3,521	21.2
Unknown	28	65	0.4

Note: Details may not add to total due to rounding.

Having three possible categories for drinking behaviour in 1994/95 (regular, not regular, abstainer) and the same three possible categories for drinking behaviour in 1996/97, a total of 9 transition patterns were observed in Canadians' drinking behavior between the first and the second cycles of the survey (Table 4.26). As this table displays, there was an important proportion of Canadians aged 25 or older whose drinking behaviour did not change over the

two cycles of the survey. This group consists of those who were abstainer at both times (an estimated 14.5%); those who were regular drinker at both times (an estimated 28.6%) and those who were occasional drinker at both times (an estimated 29.2%). For the purpose of this study, some patterns of transition in drinking behavior are defined as an "improvement in drinking behavior" including the following:

- Being a regular drinker in 1994/95, but an occasional drinker in 1996/97 (observed for an estimated 8.6% or 1,425,000 Canadians aged 25 or older in 1994/95)

- Being a regular drinker in 1994/95, but an abstainer in 1996/97 (observed for an estimated 1.2% or 200,000 Canadians aged 25 or older in 1994/95)

- Being an occasional drinker in 1994/95, but an abstainer in 1996/97 (observed for an estimated 5.5% or 913,000 Canadians aged 25 or older in 1994/95). In total improvement patterns were observed for 15.3% of respondents.

There were some transition patterns, which for the purpose of this study were defined as a "decline in drinking behavior" including the following:

- Being an abstainer in 1994/95, but an occasional drinker in 1996/97 (observed for an estimated 4.4% or 735,000 Canadians aged 25 or older in 1994/95)

- Being an abstainer in 1994/95, but a regular drinker in 1996/97 (observed for an estimated 0.9% or 153,000 Canadians aged 25 or older in 1994/95)

- Being an occasional drinker in 1994/95, but a regular drinker in 1996/97 (observed for an estimated 6.6% or 1,099,000 Canadians aged 25 or older in

1994/95). There was a total of 11.9% of respondents whose drinking behavior declined.

Table 4.26: Distribution of the Study Sample and Population by Transition Patterns in Drinking Behavior between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable: weekly drinker at both cycles	2,442	4,756	28.6
Improvement: weekly to occasional	795	1,425	8.6
Improvement: weekly to not at all	97	200	1.2
Improvement: occasional to not at all	540	913	5.5
Stable: occasional drinker at both cycles	2,820	4,866	29.2
Decline: occasional to weekly	575	1,099	6.6
Decline: not at all to weekly	63	153	0.9
Decline: not at all to occasional	413	735	4.4
Stable: do not drink at all at both cycles	1,586	2,406	14.5
Unknown	40	93	0.6

Note: Details may not add to total due to rounding.

Frequency of Physical Activity

As explained in the section on "variable definitions" for the purpose of this study, physical activity 12 times or more per month is defined as "regular"; between 4 and 11 times per month is defined as "occasional", 3 times or less per month is defined as "infrequent".

According to the data from the NPHS 1998/99 longitudinal file, slightly more than 50% of the Canadians aged 25 or older in 1994/95 had regular physical activity; an estimated 22.1% had occasional physical activity and an estimated 25.6% had infrequent physical activity (Table 4.27). As presented in the same table, over time there was an increase in the proportion of Canadians who had "regular" physical activity and a decrease in the proportion of those who had "occasional" or "infrequent" physical activity.

Table 4.27: Distribution of the Study Sample and Population by Frequency of Physical Activity during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Frequency of Physical Activity	Total sample size	Estimated population '000	%
Total	9,371	16,644	100.0
Frequency of physical activity 1994/95			
Regular	4,952	8,646	51.9
Occasional	2,009	3,678	22.1
Infrequent	2,379	4,268	25.6
Unknown	31	53	0.3
Frequency of physical activity 1996/97			
Regular	5,244	9,384	56.4
Occasional	1,840	3,394	20.4
Infrequent	2,274	3,839	23.1
Unknown	13	27	0.2

Note: Details may not add to total due to rounding.

Having three possible categories for frequency of physical activity in 1994/95 (regular, occasional, infrequent) and the same three possible categories for frequency of physical activity in 1996/97, a total of 9 transition patterns were

observed in Canadians' physical activity behavior between the first and the second cycles of the survey (Table 4.28). As this table displays, most Canadians aged 25 or older exhibited no change in frequency of physical activity did not change over the two cycles of the survey. These were individuals who had regular physical activity at both times (an estimated 38.0%); those who had occasional physical activity at both times (an estimated 6.5%) and those who had infrequent physical activity at both times (an estimated 11.5%). Some transition patterns in frequency of physical activity reflect an "increase in the frequency of physical activity over time" including the following:

- Having infrequent pattern of physical activity in 1994/95, but a regular pattern in 1996/97 (observed for an estimated 8.1% or 1,343,000 Canadians aged 25 or older in 1994/95)

- Having an occasional pattern of physical activity in 1994/95, but a regular pattern in 1996/97 (observed for an estimated 10.2% or 1,698,000 Canadians aged 25 or older in 1994/95)

- Having an infrequent pattern of physical activity in 1994/95, but an occasional pattern in 1996/97 (observed for an estimated 6.0% or 1,001,000 Canadians aged 25 or older in 1994/95). A total of 24.3% of respondents exhibited increased physical activity.

There were some transition patterns, which reflect "decrease in the frequency of physical activity over time" including the following:

- Having a regular pattern of physical activity in 1994/95, but an occasional pattern in 1996/97 (observed for an estimated 7.8% or 1,290,000 Canadians aged 25 or older in 1994/95)

- Having a regular pattern of physical activity in 1994/95, but an infrequent pattern in 1996/97 (observed for an estimated 6.1% or 1,021,000 Canadians aged 25 or older in 1994/95)

- Having an occasional pattern of physical activity in 1994/95, but an infrequent pattern in 1996/97 (observed for an estimated 5.3% or 884,000 Canadians aged 25 or older in 1994/95). A total of 19.2% of respondents exhibited decreased physical activity.

Table 4.28: Distribution of the Study Sample and Population by Transition Patterns in Frequency of Physical Activity between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total	Estimated Population	
	Sample Size	'000	%
Total	**9,371**	**16,644**	**100.0**
Stable (regular)	3,595	6,320	38.0
Decrease (regular→occasional)	724	1,290	7.8
Decrease (regular→infrequent)	626	1,021	6.1
Decrease (occasional→infrequent)	479	884	5.3
Stable (occasional)	585	1,087	6.5
Increase (occasional→ regular)	943	1,698	10.2
Increase (infrequent→ regular)	690	1,343	8.1
Increase (infrequent→ occasional)	522	1,001	6.0
Stable (infrequent)	1,163	1,919	11.5
Unknown	44	80	0.5

Note: Details may not add to total due to rounding.

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Body Weight

As mentioned in the section on "variable definitions", information on the Body Mass Index (BMI) was used to identify the following four body weight categories according to the Canadian Guidelines for Healthy Weights:

1. Underweight (BMI less than 20)

2. Acceptable weight (BMI 20 to 24.9)

3. Some excess weight (BMI 25 to 27)

4. Overweight (BMI greater than 27)

Based on the NPHS 1998/99 longitudinal data, during the first cycle of the survey, an estimated 40.2% of Canadians aged 25 or older had acceptable weight; 6.8% were underweight; 19.3% had some excess weight and 31.4% were overweight (Table 4.29). As presented in the same table, the proportion of Canadians aged 25 or older with acceptable weight or underweight decreased and proportion of Canadians with some excess weight or overweight increased over time.

Table 4.29: Distribution of the Study Sample and Population by Body Weight during the First (1994/95) and the Second (1996/97) Cycles of the NPHS

Body Weight	Total sample size	Estimated population '000	%
Total	9,371	16,644	100.0
Body weight 1994/95			
Underweight	606	1,132	6.8
Acceptable weight	3,689	6,689	40.2
Some excess weight	1,813	3,213	19.3
Overweight	3,057	5,219	31.4
Unknown	206	392	2.4
Body weight 1996/97			
Underweight	565	1,020	6.1
Acceptable weight	3,586	6,518	39.2
Some excess weight	1,883	3,325	20.0
Overweight	3,097	5,356	32.2
Unknown	240	424	2.5

Note: Details may not add to total due to rounding.

Having four possible categories for body weight in 1994/95 (underweight, acceptable, some excess weight and overweight) and the same four possible categories for body weight in 1996/97, a total of 16 transition patterns in Canadians' body weight were expected. However, because of the low cell sizes, some potential patterns were collapsed and descriptive findings on the final 13 patterns are presented in Table 4.30. As this table displays, for most Canadians aged 25 or older body weight did not change over the two cycles of the survey. These included individuals who were underweight at both times (an estimated 4.0 %); those who had acceptable weight at both times (an estimated 31.1%); those

who had some excess weight at both times (an estimated 11.0%) and those who were overweight at both times (an estimated 25.9%). Across the first two cycles of the NPHS, there were some patterns of "increased body weight" including the following:

- Being underweight in 1994/95, but having acceptable weight in 1996/97 (observed for an estimated 2.5% or 408,000 Canadians aged 25 or older in 1994/95)

- Being underweight in 1994/95, but having some excess weight or being overweight in 1996/97 (observed for only an estimated 8,000 Canadians aged 25 or older in 1994/95)

- Having acceptable weight in 1994/95, but having some excess weight in 1996/97 (observed for an estimated 5.1% or 850,000 Canadians aged 25 or older in 1994/95)

- Having acceptable weight in 1994/95, but being overweight in 1996/97 (observed for an estimated 1.4% or 226,000 Canadians aged 25 or older in 1994/95)

- Having some excess weight in 1994/95, but being overweight in 1996/97 (observed for an estimated 4% or 671,000 Canadians aged 25 or older in 1994/95). A total of 13% of respondents exhibited increased body weight.

There were some patterns of "decreased body weight" between the first and the second cycles of the NPHS including the following:

- Having acceptable weight in 1994/95, but being underweight in 1996/97 (observed for an estimated 1.8% or 307,000 Canadians aged 25 or older in 1994/95)

- Having some excess weight or being overweight in 1994/95, but being underweight in 1996/97 (observed for an estimated 4% or 671,000 Canadians aged 25 or older in 1994/95)

- Being overweight in 1994/95, but having acceptable weight or being underweight in 1996/97 (observed for an estimated 1.1% or 178,000 Canadians aged 25 or older in 1994/95)

- Being overweight in 1994/95, but having some excess weight in 1996/97 (observed for an estimated 3.6% or 603,000 Canadians aged 25 or older in 1994/95). A total of 10.5% of respondents exhibited decreased body weight.

Table 4.30: Distribution of the Study Sample and Population by Transition Patterns in Body Weight between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable: underweight	360	672	4.0
Increase: underweight to acceptable	212	408	2.5
Increase: underweight to some excess weight or over weight	9	8	0.0
Increase: acceptable to some excess	476	850	5.1
Increase: acceptable to overweight	110	226	1.4
Increase: some excess to overweight	382	671	4.0
Stable: acceptable	2,848	5,170	31.1
Decrease: some excess or overweight to underweight	376	671	4.0
Stable: some excess	1,024	1,830	11.0
Decrease: acceptable to underweight	180	307	1.8
Decrease: overweight to underweight or acceptable weight	98	178	1.1
Decrease: overweight to Some excess	360	603	3.6
Stable: overweight	2,527	4,304	25.9
Unknown at either time	409	748	4.5

Note: Details may not add to total due to rounding.

Disease

Number of Chronic Conditions

As mentioned in the section on "variable definitions", for each respondent, number of chronic conditions was established based on a checklist of chronic conditions and diseases which included asthma, arthritis or rheumatism, back problems (excluding arthritis), high blood pressure, migraine headaches, chronic bronchitis or emphysema, diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, the effects of a stoke, urinary incontinence, Alzheimer's disease, cataracts and glaucoma. Total number of chronic conditions", then classified as having "none or one", "two or three", or "four or more" of these conditions. The distribution of the study sample and population by number of chronic conditions during the first and the second cycles of the NPHS is shown in Table 4.31

Table 4.31: Distribution of the Study Sample and Population by Number of Chronic Conditions during the First (1994/95) and the Second (1996/97) Cycles

Number of Chronic Conditions	Total sample size	Estimated population '000	%
Total	9,371	16,644	100.0
Number of Chronic Conditions 1994/95			
0 or 1 chronic condition	7,338	13,635	81.9
2 or 3 chronic conditions	1,640	2,458	14.8
4 or more chronic conditions	382	533	3.2
Unknown	11	18	0.1
Number of Chronic Conditions 1996/97			
0 or 1 chronic condition	6,920	12,880	77.4
2 or 3 chronic conditions	1,977	3,114	18.7
4 or more chronic conditions	474	651	3.9

Note: Details may not add to total due to rounding.

As Table 4.31 displays, during the first cycle of the NPHS, more than 80% of the household population who was aged 25 or older reported that they do not have any chronic conditions. This proportion was decreased over time and there were higher proportions of the population who reported "2 or 3" or even "4 or more" chronic conditions (Table 4.31).

Table 4.32 summarizes the transition patterns in the number of chronic conditions between the first and the second cycle of the survey.

Table 4.32: Distribution of the Study Sample and Population by Transition Patterns in Number of Chronic Conditions between the First and the Second Cycles of the NPHS (1994/95-1996/97)

Transition Patterns	Total Sample Size	Estimated Population	
		'000	%
Total	**9,371**	**16,644**	**100.0**
Stable: none or one	6,436	12,111	72.8
Increase: none or one to 2 or 3	836	1,424	8.6
Increase: none or one to 4 or more	66	99	0.6
Decrease: 2 or 3 to none or one	466	739	4.4
Stable: 2 or 3	990	1,488	8.9
Increase: 2 or 3 to 4 or more	184	232	1.4
Decrease: 4 or more to none or one	9	12	0.1
Decrease: 4 or more to 2 or 3	149	201	1.2
Stable: 4 or more	224	319	1.9
Unknown	11	18	0.1

Note: Details may not add to total due to rounding.

General Well-being

According to the 1998/99 NPHS longitudinal data, in 1998/99, the majority of Canadians aged 25 or older (61.5%) reported very good or excellent

health. Just an estimated 10.8% reported fair or poor health, and the remaining

27.7% described their health as good. Not surprisingly, at older ages the

proportion of those who reported very good/excellent health declined and the

proportion of those who reported fair/poor health rose (Figure 4.1). By age 65,

individuals reporting very good or excellent health were in the minority (42.65%

at ages 65 to 74; 38.88% at age 75 or older). However, more seniors reported

very good or excellent health than fair/poor health.

Figure 4.1: Self-rated Health by age group
household population 25 or older, Canada excluding the territories, 1998/99
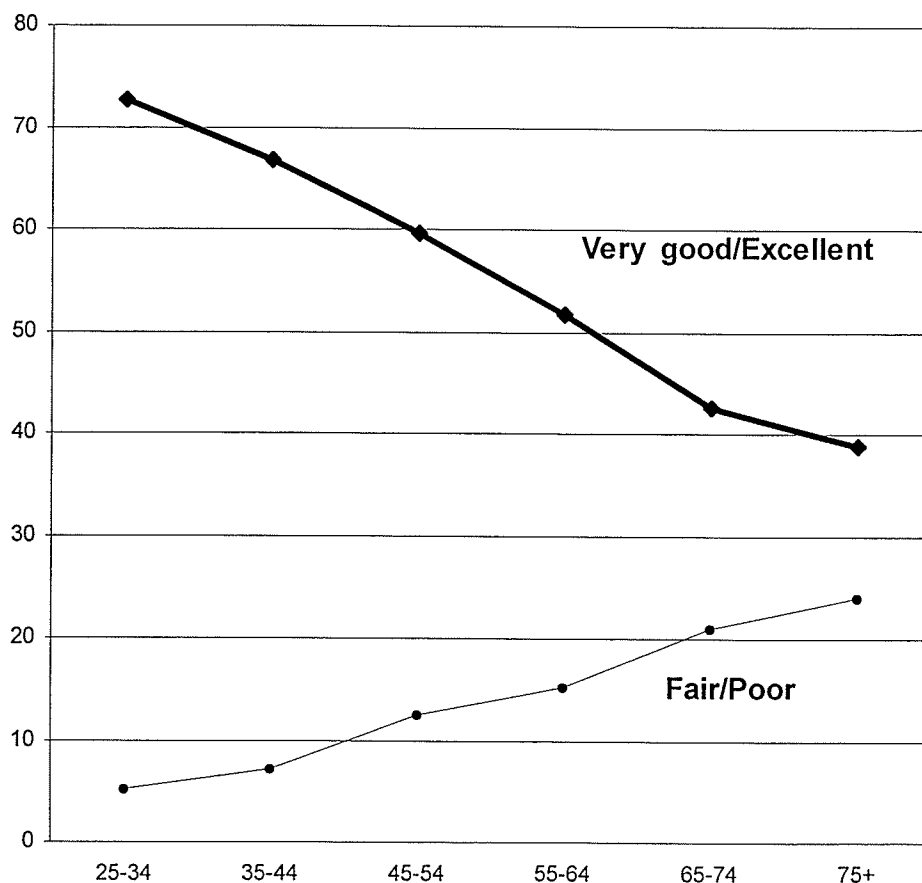
Overall, men were more likely than women to describe their health as very good/excellent (63.6% versus 59.5%). Conversely, a higher percentage of women than men described their health as fair/poor (11.5% versus 10.0% - Table 4.33).

Table 4.33: Distribution of Self-rated Health in 1998/99, by Sex, Household Population Aged 25 or Older in 1994/95, Canada Excluding Territories

Self-rated Health	Men			Women		
	Sample Size	Estimated Population '000	%	Sample Size	Estimated Population '000	%
Total	3,991	7,832	100.0	5,380	8,812	100.0
Very Good/Excellent	2,439	4,983	63.6	3,144	5,246	59.5
Good	1,099	2,065	26.4	1,531	2,552	29.0
Fair/Poor	453	785	10.0	705	1,013	11.5

Distribution of self-rated health by age and sex is shown in Table 4.34. According to the data presented in this table, for men and women both, the proportion of individuals aged 25 or older who reported fair or poor health in 1998/99 increases as age increases. In other words, subjective health deteriorated markedly with increasing age in both women and men. However, the most marked deterioration appeared at age 45-54 in women and at age 65-74 in men.

Table 4.34: Distribution of Self-rated Health in 1998/99, by Sex and Age Group, Household Population Aged 25 or Older in 1994/95, Canada Excluding Territories

	Female				Male			
	Self-rated Health 1998/99				Self-rated Health 1998/99			
Age Group	Very Good/ Excellent (%)	Good (%)	Fair/Poor (%)	Total (%)	Very Good/ Excellent (%)	Good (%)	Fair/ Poor (%)	Total (%)
25-34	71.99	21.43	6.59	100.00	73.61	22.61	3.78	100.00
35-44	66.19	26.11	7.70	100.00	67.47	25.87	6.65	100.00
45-54	55.95	30.94	13.11	100.00	63.28	24.76	11.96	100.00
55-64	51.51	32.56	15.93	100.00	51.89	33.91	14.21	100.00
65-74	39.19	41.72	19.08	100.00	47.64	28.61	23.74	100.00
75+	39.75	37.72	22.53	100.00	37.42	36.23	26.35	100.00

Using the NPHS 1998/99 longitudinal data, the issue of stability in self-ratings of health over the four-year period from 1994/95 to 1998/99 among Canadians aged 25 or older was also examined and a weighted Kappa coefficient of 0.43 was obtained.

Summary

This chapter has described the study sample and population. It has also addressed both parts of research question 1 by providing information on socio-economic, lifestyle, genetic endowment, social environment and health-related conditions and characteristics for the target population across and between the first two cycles of the survey. According to the detailed descriptive analyses presented in this chapter, over time, a lower proportion of Canadians who were aged 25 or older in 1994/95 had moderate or severe pain, had cognitive problem, had high psychological distress, perceived their emotional support to be low, were daily or occasional smokers, had acceptable weight or were underweight, and were regular drinkers. On the other hand, over time, a higher proportion of Canadians who were aged 25 or older in 1994/95 reported having 2 or more chronic conditions, regular physical activity and had a low average frequency of social contacts. The proportion of the population from households with upper middle or highest income levels was the same across the first two cycles of the survey. The proportion of the population who had a good functional status and were married was also the same across the survey cycles.

In regards to the observed transitions between the first and the second cycles of the survey, although the predominant observed pattern was "stability in good condition/status", the descriptive findings as presented in this chapter highlights the changes that occurred, even within the short period of two years. How the baseline characteristics and their changes over time relate to self-ratings of health will be addressed in the next chapter.

CHAPTER 5: PREDICTORS OF NEGATIVE AND POSITIVE SELF-RATED HEALTH - VARIATIONS ACROSS DEMOGRAPHIC SUB-POPULATIONS

Chapter 4 addressed research question one by describing the study sample and population, their socio-economic, lifestyle, and health-related conditions and characteristics at the baseline and over time. Within the context provided, this chapter addresses research questions two to eight, which are as follows:

Research Question Two: Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with fair or poor self-ratings of health?

Research Question Three: Are the predictors of fair or poor self-rated health different for men compared to women?

Research Question Four: Are the predictors of fair or poor self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to elderly adults (aged 55 or older)?

Research Question Five: Is there any association between the socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with very good or excellent self-ratings of health?

Research Question Six: Are the predictors of very good or excellent self-rated health different for men compared to women?

Research Question Seven: Are the predictors of very good or excellent self-rated health different for young and middle-aged adults (aged between 25 and 54) compared to elderly adults (aged 55 or older)?

Research Question Eight: Are the two ends of the single-item indicator of self-rated health measuring the same or different dimensions of health?

This chapter is divided into five major sections. In the first section, some evidence of the construct validity for the single-item self-rated health indicator is presented. Section two focuses on the bi-variate associations between the self-

rated health indicator and other measures included in this study as potential explanatory variables. Bi-variate analyses served as a filtering process to select among the many variables within the data file those which 1) according to the existing literature are known to be associated with self-ratings of health and 2) were associated with self-rated health for the target population of this study. The third section focuses on the multivariate analyses used to address research questions two, three, and four, which explore the predictors of poor or fair self-rated health and compare the predictors between the genders and the two age groups, middle-aged adults and elderly adults. The fourth section of this chapter addresses research questions five, six, and seven to explore the predictors of very good and excellent self-rated health. Comparing predictors of fair or poor self-rated health with predictors of very good or excellent health allowed us to answer research question eight, which is the focus of the last section of this chapter.

Section I: Establishing the Construct Validity of the Single-item Self-rated Health Indicator

In the present study, the single-item self-rated health indicator is considered as a measure of overall health status and well-being and therefore, to establish its construct validity, this measure should be associated with other measures of general health and well-being (the same construct) or measures of related constructs. This study is based on the National Population Health Survey data, which included scores derived from the Health Utility Index (HUI), a psychological distress scale and information on chronic conditions. These three

measures were used to examine the construct validity of self-rated health with the following hypotheses:

1. There is a positive association between mean scores on the Health Utility Index (HUI) and self-ratings of health with those who rated their overall health status at a higher level have higher mean scores on the HUI.

2. There is a negative association between level of psychological distress and self-rated health with a higher proportion of those who have high scores on the psychological distress scale rate their overall health and well-being as fair or poor.

3. There is a negative association between self-rated health and number of chronic conditions; i.e., those who have a higher number of chronic conditions and diseases are more likely to rate their overall health and well-being as fair or poor.

The first hypothesis was examined by calculating the mean score on the Health Utility Index (HUI) for each level of self-rated health and then comparing the means using Analysis of Variance (ANOVA). As hypothesized, respondents who rated their overall health and well-being at a higher level had significantly higher mean scores on the Health Utility Index (Chart 5.1). Results from the post hoc ANOVA tests revealed significant differences between the mean scores on HUI for each of the five response categories of Self-rated Health (F=451, df=4, 9286, p=0.0001).

Chart 5.1: Mean Score on Health Utility Index (HUI) by Self-rated Health

Self-rated Health 1998/99	Mean Score on Health Utility Index (HUI) 1998/99
Excellent	0.93
Very Good	0.90
Good	0.84
Fair	0.71
Poor	0.55

Data source: National Population Health survey, longitudinal file, 1994/95 to 1998/99

The second hypothesis was tested by cross-tabulating self-rated health against level of psychological distress (Table 5.1) and since both self-rated health and psychological distress were ordinal variables, a Spearman test was performed to examine the significance of the association. Results from the Spearman test revealed a significant association in the expected direction with those who had experienced high psychological distress in 1994/95 being more likely to rate their overall health and well-being as fair or poor in 1998/99 compared to those who had low psychological distress (Spearman Correlation Coefficient: 0.16). Although this association was not particularly strong, it was consistent with previous knowledge and occurred in the expected direction.

Table 5.1: Distribution of Self-rated Health by Level of Psychological Distress

	Self-rated Health 1998/99			
Level of Psychological Distress 1994/95	Excellent /Very Good (%)	Good (%)	Fair/Poor (%)	Total
Low	64.37	27.12	8.52	100.0
High	44.21	31.74	24.05	100.0

Data source: National Population Health survey, longitudinal file, 1994/95 to 1998/99

The third hypothesis was that there is a negative association between self-rated health and number of chronic conditions. According to the data presented in Table 5.2, an association was found between the two measures in the expected direction with those who had a higher number of chronic conditions being more likely to rate their overall health and well-being as fair or poor. The significance of this association was further explored using the Spearman test and was found to be significant (Spearman Correlation Coefficient: 0.30).

Table 5.2: Distribution of Self-rated Health by Number of Chronic Conditions

Number of Chronic Conditions 1994/95	Self-rated Health 1998/99			
	Excellent/Very Good (%)	Good (%)	Fair/Poor (%)	Total
None	72.34	22.79	4.86	100.0
One	56.30	31.49	12.21	100.0
Two or More	35.24	37.63	27.13	100.0

Data source: National Population Health survey, longitudinal file, 1994/95 to 1998/99

In addition to the association with functional ability, psychological distress and number of chronic disease, it was hypothesized that if the single item indicator is a valid measure of overall health and well-being, like other measures of health and well-being, it should show strong associations with socio-economic status. Therefore, two other hypotheses were:

4. There is a positive association between household income level and self-rated health with those who have higher household income level being more likely to rate their overall health at a higher level.

5. There is a positive association between individuals' level of education and self-rated health with those who have higher education being more likely to rate their overall health at a higher level.

To test hypotheses number four and five, respondents' self-rated health in 1998/99 was cross-tabulated with their household income level in 1994/95 (Table 5.3) and also with their level of education in 1994/95 (Table 5.4). According to

the data presented in Table 5.3, those respondents who were from households with the lowest, lower middle or middle income levels were more than twice as likely to rate their overall health and well-being as either fair or poor compared to respondents from households with upper middle or the highest income levels (15.95% vs 6.58%). Compared to the same group, they were also less likely to rate their overall health as either very good or excellent (53.18% vs 68.36%). Results from the Mantel-Haenszel Chi-squared test revealed a significant association between respondents' self-rated health and their household income level ($X^2 = 188.296$, d.f. =1, p=0.001); therefore hypothesis number four was supported.

Table 5.3: Distribution of Self-rated Health by Household Income Level

	Self-rated Health 1998/99			
Household Income Level 1994/95	Excellent/Very Good (%)	Good (%)	Fair/Poor (%)	Total
Lowest\ Lower Middle\ Middle	53.18	30.86	15.95	100.0
Upper Middle\Highest	68.36	25.07	6.58	100.0
Unknown	58.48	29.57	11.95	100.0

Data source: National Population Health survey, longitudinal file, 1994/95 to 1998/99

To examine hypothesis number five, information on self-rated health in 1998/99 for the household population age 25 or older in 1994/95 cross-tabulated against their level of education in 1994/95. As hypothesized, those with higher

levels of education in 1994/95 were 1.5 times more likely to rate their overall health as either very good or excellent (66.18% vs 46.47%) and 2.5 times less likely to rate their overall health as either fair or poor (7.85% vs 20.12). Results from the Mantel-Haenszel Chi-squared test confirmed the significance of the observed association ($X^2 = 373.74$, d.f. =1, p=0.001) and therefore, hypothesis number five was also supported.

Table 5.4: Distribution of Self-rated Health by Level of Education

Level of Education 1994/95	Self-rated Health 1998/99			
	Excellent/Very Good (%)	Good (%)	Fair/Poor (%)	Total
Less than high school graduation	46.47	33.40	20.12	100.0
High school graduation or more	66.18	25.97	7.85	100.0

Data source: National Population Health survey, Longitudinal file, 1994/95 to 1998/99

Section II: Factors Associated with Self-rated Health – Examining Bi-variate Associations

As mentioned in the Methods chapter, variables for this study were originally selected based on the review of the 1994/95, 1996/97, and 1998/99 National Population Health Survey questionnaires and the existing literature. However, given that the original list of selected variables was very long and many

of the variables on the list were highly correlated with each other, the bi-variate association between each one of those variables and self-rated health was examined to select a limited number of factors strongly associated with the outcome of interest. Results of the bi-variate analyses are summarized in Table 5.5. It is important to note that given the large size of the study sample, the direction of the associations rather than the values of Chi-squared or other measures of association should be emphasized.

Table 5.5: Distribution of Self-rated Health by Selected Variables

	Self-rated Health 1998/99			
	EX/VG	Good	Fair/Poor	
	(%)	(%)	(%)	
Functional Health Status 1994				Spearman Correlation Coefficient=0.32
No Activity Limitation and No Dependency	67.63	25.85	6.52	
Activity Limitation or Dependency	31.31	36.97	31.73	
Level of Pain 1994				Spearman Correlation Coefficient=0.28
No pain or mild	66.07	26.52	7.40	
Moderate or Severe Pain	31.05	35.68	33.27	
Marital Status in 1994				Mantel-Haenszel Chi-Squared (df=1, X2=86.23, P=0.001)
Now married/ common-law/ living with a partner	63.14	27.29	9.57	
Single	64.98	25.30	9.73	
Widowed/separated/ Divorced	50.29	31.95	17.76	
Sex				Mantel-Haenszel Chi-Squared (df=1, X2=15.472, P=0.001)
Female	59.54	28.96	11.50	
Male	63.62	26.36	10.02	
Perceived Emotional Support in 1994				Mantel-Haenszel Chi-Squared (df=1, X2=72.094, P=0.001)
High perceived emotional supprot	63.09	27.55	9.36	
Low perceived emotional support	54.72	28.57	16.72	
Level of Social Involvement in 1994/95				Spearman Correlation Coefficient=0.001

Low	61.03	27.90	11.07	
Moderate	62.87	27.02	10.11	
High	60.99	28.16	10.85	
Average Frequency of Social Contacts in 1994/95				Spearman Correlation Coefficient=-0.01
Low	59.94	27.68	12.38	
Moderate	62.12	27.84	10.04	
High	62.31	27.55	10.14	
Level of Psychological Distress in 1994				Spearman Correlation Coefficient=0.16
Low/moderate psychological distress	64.37	27.12	8.52	
High psychological distress	44.21	31.74	24.05	
Level of Self-esteem in 1994				Spearman Correlation Coefficient= -0.16
High self-esteem	64.01	27.08	8.91	
Low self-esteem	43.36	32.28	24.36	
Body Weight in 1994				Spearman Correlation Coefficient= 0.11
Under weight	60.91	28.01	11.07	
Acceptable weight	66.62	24.59	8.79	
Some excess weight	65.06	26.49	8.45	
Overweight	52.57	32.72	14.70	
Smoking Behavior in 1994				Spearman Correlation Coefficient= -0.08
Daily smoker	54.14	32.70	13.17	
Occasional smoker	66.35	22.47	11.18	
Non-smoker	63.83	26.22	9.95	
Drinking Behavior in 1994				Spearman Correlation Coefficient= 0.13
Weekly drinker	67.46	25.84	6.71	
Occasional drinker	59.53	28.64	11.83	
Abstainer	50.53	30.09	19.38	
Frequency of Physical Activity in 1994				Spearman Correlation Coefficient= 0.10
Regular	65.49	25.46	9.05	
Occasional	61.21	29.39	9.39	
Infrequent	53.70	30.83	15.47	
Respondent's Age in 1994				Spearman Correlation Coefficient= 0.22
25 to 34	72.76	21.99	5.24	
35 to 44	66.82	25.99	7.19	
45 to 54	59.65	27.82	12.53	
55 to 64	51.68	33.15	15.17	
65 to 74	42.65	36.36	20.99	
75+	38.88	37.16	23.96	
Premature Death of Parent(s) in 1998				Mantel-Haenszel Chi-Squared (df=1, X2=39.245, P=0.001)
No	62.93	27.47	9.60	
Yes	57.43	28.44	14.13	
Respondent is an Immigrant				Mantel-Haenszel Chi-Squared (df=1, X2=8.273, P=0.004)

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Yes	58.37	29.98	11.65	
No	62.28	27.13	10.59	
Age at Immigration				Spearman Correlation Coefficient= 0.09
<20	65.33	26.20	8.47	
20-39	61.27	25.91	12.82	
40-64	57.18	31.79	11.02	
65+	8.33	91.67	0.00	
Length of Immigration				Spearman Correlation Coefficient= 0.009
Less than 10 years	60.07	26.99	12.94	
At least 10 years	58.08	30.66	11.26	
Geographic Area				Mantel-Haenszel Chi-Squared (df=1, X2=8.693, P=0.003)
Rural	58.61	28.86	12.52	
Urban	62.05	27.50	10.45	
Cognition Component of HUI				Mantel-Haenszel Chi-Squared (df=1, X2=145.00, P=0.001)
No cognitive problem	65.05	26.28	8.67	
Having Cognitive Problem	53.39	31.06	15.56	
Dexterity trouble Component of HUI			.	Spearman Correlation: 0.04
No dexterity problems	61.84	27.61	10.55	
dext. Probl.- No help required	52.78	27.26	19.96	
dext. Probl.- require special equipment	0.00	0.00	100.00	
dext. Probl.- help with some tasks	18.97	42.62	38.40	
dext. Probl.- help with most tasks	42.61	18.63	38.77	
dext. Probl.- help with all tasks	0.00	100.00	0.00	
Emotional Problem Component of HUI				Spearman Correlation: 0.17
Happy and interested in life	65.78	25.48	8.74	
Somewhat happy	52.24	33.88	13.88	
Somewhat Unhappy	30.04	35.52	34.45	
Very unhappy	8.68	44.72	46.60	
So unhappy that life is not worthwhile	11.50	28.37	60.13	
Mobility Trouble Component of HUI				Spearman Correlation: 0.18
No mobility Problems	62.90	27.52	9.58	
Problem- No aid required	38.16	27.10	34.74	
Problem- requires mechanical support	12.39	36.42	51.19	
Problem- requires wheelchair	0.00	12.33	87.67	
Problem- requires help from people	2.87	17.38	79.75	
Cannot walk	16.77	55.03	28.20	
Hearing Problem Component of HUI				Mantel-Haenszel Chi-Squared (df=1, X2=92.121, P=0.001)
No hearing problem	62.58	27.21	10.21	
Having hearing problem	41.66	36.52	21.82	

Speech Trouble Component of HUI				Spearman Correlation: 0.03
No speech trouble	61.80	27.57	10.64	
Partially understood by strangers	45.89	35.20	18.91	
Partially understood by friends	48.70	27.71	23.59	
Not understood by strangers	54.93	45.07	0.00	
Not understood by friends				
Vision Trouble Component of HUI				Spearman Correlation: 0.13
No visual problems	67.89	24.83	7.28	
Problems corrected by lenses	57.36	29.49	13.16	
Problem seeing distance- not correctred	60.09	27.95	11.96	
Problem seeing close- not corrected	44.05	37.26	18.69	
problem close& Distance- not corrected	34.86	31.29	33.85	
No sight at all	10.25	74.73	15.02	
Chronic Conditions				
Asthma				Mantel-Haenszel Chi-Squared (df=1, X2=32.11, P=0.001)
No	62.01	27.55	10.44	
Yes	51.07	31.43	17.50	
Arthritis or rheumatism				Mantel-Haenszel Chi-Squared (df=1, X2=532.00, P=0.001)
No	65.73	25.95	8.32	
Yes	36.72	38.14	25.14	
Back problems excluding arthritis				Mantel-Haenszel Chi-Squared (df=1, X2=204.503, P=0.001)
No	64.04	26.90	9.06	
Yes	47.44	32.37	20.19	
High blood pressure				Mantel-Haenszel Chi-Squared (df=1, X2=296.271, P=0.001)
No	64.09	26.54	9.37	
Yes	38.11	38.42	23.47	
Migrain headaches				Mantel-Haenszel Chi-Squared (df=1, X2=89.651, P=0.001)
No	62.55	27.48	9.98	
Yes	48.29	31.06	20.66	
Chronic bronchitis or emphysema				Mantel-Haenszel Chi-Squared (df=1, X2=122.783, P=0.001)
No	62.11	27.81	10.08	
Yes	40.51	25.98	33.51	
Diabetes				Mantel-Haenszel Chi-Squared (df=1, X2=242.358, P=0.001)
No	62.61	27.41	9.98	
Yes	25.94	38.29	35.77	
Epilepsy				Mantel-Haenszel Chi-Squared (df=1, X2=8.639, P=0.003)
No	61.51	27.78	10.71	
Yes	50.91	24.07	25.02	
Heart disease				Mantel-Haenszel Chi-Squared (df=1, X2=288.469, P=0.001)

No	62.76	27.45	9.79	
Yes	26.85	35.65	37.50	
Cancer				Mantel-Haenszel Chi-Squared (df=1, X2=80.227, P=0.001)
No	61.95	27.54	10.51	
Yes	30.13	40.94	28.93	
Stomach or intestinal ulcers				Mantel-Haenszel Chi-Squared (df=1, X2=89.514, P=0.001)
No	62.14	27.62	10.24	
Yes	41.89	31.51	26.60	
Effects of a stroke				Mantel-Haenszel Chi-Squared (df=1, X2=75.584, P=0.001)
No	61.68	27.80	10.52	
Yes	28.53	21.37	50.09	
Urinary incontinence				Mantel-Haenszel Chi-Squared (df=1, X2=64.484, P=0.001)
No	61.73	27.74	10.52	
Yes	33.28	28.92	37.80	
Alzheimer's disease or other dementia				Mantel-Haenszel Chi-Squared (df=1, X2=0.08, P=0.7)
No	61.43	27.76	10.81	
Yes	82.99	0.00	17.01	
Cataracts				Mantel-Haenszel Chi-Squared (df=1, X2=91.984, P=0.001)
No	62.04	27.61	10.34	
Yes	37.13	33.41	29.46	
Glaucoma				Mantel-Haenszel Chi-Squared (df=1, X2=43.339, P=0.001)
No	61.73	27.68	10.60	
Yes	36.42	34.55	29.03	

Data source: National Population Health survey, longitudinal file, 1994/95 to 1998/99

Using the selected independent variables, the demographic, socio-economic, lifestyle, and health-related profile of Canadians age 25 or older who rated their general health status as "very good or excellent" is compared with the profile of Canadians who rated their general health status as "fair or poor" (Table 5.6).

Table 5.6: Profile of Canadians Who Rated their Health as "Very Good or Excellent" in 1998/99 Compared to the Profile of those Who Rated their Health as "Fair or Poor" in 1998/99, Household Population aged 25 or Older (excluding Territories)

	Profile of Canadians aged 25 or Older Who Rated their Health as "Very good/Excellent"	Profile of Canadians aged 25 or Older Who Rated their Health as "Fair/Poor"
Baseline Characteristics	(%)	(%)
Age in 1994/95		
25-34	30.69	12.58
35-44	30.41	18.61
45-54	18.25	21.81
55-64	11.19	18.69
65-74	6.88	19.25
75+	2.59	9.07
Sex		
Female	51.29	56.35
Male	48.71	43.65
Premature Death of Parent(s)		
Yes	24.70	34.6
No	75.30	65.40
Marital Status in 1994/95		
Married	74.84	64.53
Never married	13.02	11.08
Previously married	12.14	24.39
Hearing Ability 1994/95		
No hearing problem	96.92	90.73
Having hearing problem	3.08	9.27
Perceived Emotional Support 1994/95		
Low	15.58	27.08
Enough	83.67	70.63
Average Frequency of Social Contacts 1994/95		
Low	22.39	26.31
Moderate	40.90	37.60
High	35.92	33.26
Level of Social Involvement 1994/95		
Low	31.24	32.65

Moderate	31.69	29.35
High	37.07	37.99
Functional Health Status 1994/95		
No activity limitation and no dependency	91.33	50.06
Activity limitation, but no dependency	7.24	32.22
No activity limitation, but dependency	0.39	0.91
Activity limitation and dependency	1.05	16.81
Level of Pain 1994/95		
Moderate or severe pain	6.51	39.98
Mild or no pain	93.49	60.02
Cognitive Ability in 1994/95		
No cognitive problem	73.93	56.47
Having cognitive problem	26.07	43.53
Psychological Distress 1994/95		
High	9.51	29.42
Low/moderate	89.73	67.54
Household Income 1994/95		
Upper-middle/Highest	58.92	32.24
Lowest/Lower-middle/Middle	36.80	62.79
Unknown	4.28	4.97
Educational Attainment 1994/95		
Less than secondary school graduation	18.06	44.60
Graduated from high school	81.94	55.40
Self-Esteem 1994/95		
Low	7.86	25.12
Not low	91.54	72.47
Smoking Behavior 1994/95		
Daily Smoker	22.42	30.98
Occasional Smoker	4.68	4.48
Non-smoker	72.90	64.54
Drinking Behavior 1994/95		
Regular - Weekly drinker	42.29	23.93
Occasional Drinker	41.39	40.69
Abstainer	16.32	35.38
Frequency of Physical Activity 1994/95		
Regular	55.48	43.75
Occasional	22.06	19.32

Infrequent	22.46	36.93
Body weight 1994/95		
Underweight	6.91	7.15
Acceptable weight	44.65	33.55
Some excess weight	20.95	15.50
Overweight	27.49	43.80
Number of Chronic Conditions 1994/95		
0 or 1 chronic condition	89.68	54.84
2 or 3 chronic conditions	9.15	30.07
4 or more chronic conditions	1.17	15.09

Comparing the two profiles presented in Table 5.6 revealed that the distribution of all the selected independent variables is in the expected direction. The unique influence of each of the identified factors on self-ratings of health for Canadians age 25 or older and four major sub-populations, women, men, middle-aged adults and elderly adults is explored in the following sections of this chapter.

Section III: Factors Predicting Fair or Poor Self-rated Health – Variations across Demographic Sub-populations

This section addresses research question two, which asks if there is any association between individuals' socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with fair or poor self-ratings of health. Also it addresses research questions three and four, which ask if there is any variations in predictors across demographic sub-populations. As described in the Methods chapter, there were several decisions made before going through the five steps for answering these questions and developing the appropriate multivariate predictive model that fits

the data for Canadian adults who were age 25 or older in 1994/95. Those decisions were:

1. To develop a longitudinal model so that the value of the dependent variable (fair or poor self-rated health status in 1998/99) was expressed as a function of the baseline value (measures from the first cycle of the NPHS in 1994/95 – Time I) and the potential changes in the selected independent variables between the first two cycles of the survey [between 1994/95 (Time I) and 1996/97 (Time II)].

2. To use the dichotomous variable of "fair or poor self-rated health in 1998" as the outcome of interest, therefore being able to use logistic regression as the major analytical technique. The two response categories for the outcome variable consist of "1" for those who rated their overall health either as fair or poor in 1998/99 and "0" for those who rated their health as "good".

The complete non-proxy health-rated information was available for 9,371 respondents aged 25 and over in the 1998/99 NPHS longitudinal file. Given that the outcome of interest in addressing research question two was "fair or poor self-rated health in 1998/98", respondents who rated their overall health and well-being either as very good or excellent were excluded from the analyses. This resulted in a sample size of 3,788; of whom 2,630 rated their overall health as good and 1,158 rated their health as either fair or poor in 1998/99. These respondents represented 6.4 million Canadians who were aged 25 or older in 1994/95. To keep the sample size the same in all the analyses, records with missing data for any of the potential explanatory variables were excluded, except

in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level, body weight, psychological distress and self-esteem were defined as a separate category and included in the analyses. In total, 142 records were excluded and the remaining 3,646 records were used to build the final predictive model. As explained in the Methods chapter, in addressing research question two there were five major analytical steps taken that corresponded to the following questions:

1) In cross-tabulating the selected independent variables with the outcome (fair or poor self-rated health in 1998/99), do we have large enough cell sizes to undertake multivariate analyses?

2) After adjusting for respondents' age and sex, does the Time I measure of each potential explanatory variable help to explain the observed variation in the outcome?

3) After adjusting for respondents' age and sex, does the Time II measure of each potential explanatory variable help to explain the observed variation in the outcome?

4) Where both Time I and Time II measures of a variable are associated with the outcome, do we need both measures to predict the outcome? In other words, if both Time I and Time II measures of an independent variable are associated with the outcome, does inclusion of both measures increase our predictive ability?

5) For the independent variables, which are found to be associated with the outcome at both Times (Time I and Time II), do their Time I and Time II measures act separately or do they interact to produce the outcome?

6) What should be done to overcome the problem of multi-colinearity in multivariate analyses given that there are high correlations among independent variables?

7) In what order should the six defined categories of independent variables with significant predictive value be entered to develop the final multivariate predictive model?

The detailed analytical findings from step 1 to 3 for identifying the significant independent variables are not presented in this section. However, Chart 5.2 summarizes the final decisions made for each one of the independent variables.

Chart 5.2: A Summary of Decisions about Independent Variables
Outcome Fair/Poor in 1998, Total Population Aged 25 or Older

Variable	Time I	Time II	Adding Time II to Time I	Interaction	Final Decision
Age	Kept				
Sex	Kept				
Marital Status	SIG	NS	NS		Kept (Time I)
Hearing	NS	SIG			Kept (Time II)
Perceived Emotional Support	SIG	NS	NS		Kept (Time I)
Functional Health Status	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Level of Pain	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Cognitive Ability	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Psychological Distress	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Education	SIG				Kept (Time I)
Premature Death of Parents					(SIG) Kept
Household Income Level	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Self-esteem	SIG				Kept
Level of Social Involvement	NS	NS			Dropped
Average Frequency of Social Contacts	SIG	SIG	NS		Kept (Time I)
Smoking	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Drinking	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Physical Activity	SIG	SIG	SIG	NS	Kept (Time I and Time II)
Body Weight	NS	SIG			Kept (Time II)
No. of Chronic Conditions	SIG	SIG	SIG	NS	Kept (Time I and Time II)

As this Chart presents the potential explanatory variables can be classified into the following four groups:

Group (1) included "level of social involvement" for which its measure at neither Time I nor Time II helped to predict "fair or poor self-rated health in 1998/99". Therefore, this variable is excluded from the analyses at this stage. **Group (2)** included "marital status" and "perceived emotional support" for which only their measure at Time I helped to predict the outcome. Therefore, Time II measures of these variables were excluded and it was concluded that transitions in marital status and perceived emotional support over time (between Time I and Time II) were not important in predicting fair or poor self-rated health two years later in 1998/99. **Group (3)** included ""hearing ability" and "body weight" for which only their measure at Time II helped to predict fair or poor self-rated health in 1998/99. Thus, by excluding their measure at Time I, it was concluded that transitions in hearing ability and body weight over time (between Time I and Time II) were not important in predicting fair or poor self-rated health in 1998/99. **Group (4)** included "functional health status", "level of pain", "cognitive ability", "psychological distress", "household income level", "average frequency of social contacts", "smoking", "drinking", "physical activity", and "number of chronic conditions" for which their measures at both times (Time I and Time II) helped to predict fair or poor self-rated health in 1998/99.

These group (4) variables were further explored to determine whether knowing their value or level at two times (Time I and Time II) is better than

knowing their value or level at the baseline only. Results from this test revealed that knowing about the respondents' functional health status, level of pain, cognitive ability, level of psychological distress, their household income level, smoking and drinking behaviour, physical activity, and number of chronic conditions during the second cycle of the survey in addition to the baseline information, helps to explain why some of the respondents rated their overall health as either fair or poor and some good. Therefore, for these variables, their measures at both Times (Time I and Time II) were included in the next steps of the multivariate analyses and it was concluded that their transitions over time (between Time I and Time II) were important in relation to the outcome. On the other hand, for the variable "average frequency of social contacts", knowing its value at Time II did not add to the predictive value of the baseline information. Thus, by excluding the Time II measure of this variable, it was concluded that transitions over time in average frequency of social contacts were not important in predicting fair or poor self-rated health.

Respondents' age, sex, level of education, and self-esteem from the first cycle of the survey and information on their family history of premature death of parent(s) from the third cycle of the survey (in 1998/99) were also considered in the next steps of developing the multivariate predictive model. For each of the variables within the fourth group (except for average frequency of social contacts), further testing was done to determine whether their effect at Time I, in relation to the outcome of interest, is independent from their effect at Time II. In brief, no significant interaction effects were found between Time I and Time II

measures of the relevant variables. Therefore, it was concluded that although transitions over time in those particular characteristics and conditions are important in relation to the outcome, the information on the association between the main effect measures of these variables with the outcome is enough to discuss the impact of the transitions on the outcome.

With decisions made about each of the independent variables, the next step involved using the conceptual model adopted, Evans and Stoddart's Population Health Framework (1994), to classify the selected independent variables into the following six categories:

1. *Genetic Endowment* included respondents' age in 1994/95, sex, and premature death of parent(s) measured in 1998/99.

2. *Prosperity* included household income level measured in 1994/95 and 1996/96.

3. *Health and Function* included functional health status measured in 1994/95 and 1996/97, level of pain measured in 1994/95 and 1996/97, cognitive ability measured in 1994/95 and 1996/97, and level of psychological distress measured in 1994/95 and 1996/97.

4. *Social Environment* included marital status in 1994/95, hearing ability measured in 1996/97, perceived emotional support measured in 1994/95 and average frequency of social contacts measured in 1994/95.

5. *Individual Behavior* included highest level of education measured in 1994/95, self-esteem measured in 1994/95, smoking measured in 1994/95

and 1996/97, drinking measured in 1994/95 and 1996/97, physical activity measured in 1994/95 and 1996/97, and body weight measured in 1996/97.

6. *Disease* included number of chronic conditions measured in 1994/95 and 1996/97.

Since high correlations among the selected independent variables within each category could cause a multi-colinearity problem in multivariate analyses, six logistic regression models were developed, each regressed age, sex, and one of the defined categories of the independent variables against the outcome of interest to select the independent variables with the highest predictive value within each category. Each one of those models was compared with the base model which regressed only respondents' age and sex against the outcome of interest. The Base Model (FP98= AGE + SEX) had a significant X^2 value of 87.165, with d.f=6 (p=0.0001). The overall fit of the other six models was as follows:

Model (1) FP98 = AGE + SEX + Premature Death of Parent(s) [X^2 =103.318, with d.f=7, p=0.0001]

Model (2) FP98 = AGE + SEX + Measures within the Prosperity category [X^2 =620.453, d.f=20, p=0.0001]

Model (3) FP98 = AGE + SEX + Measures within the Health and Function category [X^2 =620.453, d.f=20, p=0.0001]

Model (4) FP98 = AGE + SEX + Measures within the Social Environment category [X^2 =141.846, d.f=14, p=0.0001]

Model (5) FP98 = AGE + SEX + Measures within the Individual Behavior category [X^2 =347.066, d.f=25, p=0.0001]

Model (6) FP98 = AGE + SEX + Measures within the Disease category [X^2 =349.665, d.f=10, p=0.0001]

Comparing the overall fit of the six developed models with the overall fit of the base model revealed that they each have significantly higher predictive values. Therefore, it was concluded that having other information for each respondent beyond his/her sex and age increases our ability to explain why some respondents rated their health worse than the others. However, statistical results from this step revealed that in some categories there were variables with non-significant p values ($p>0.01$). Using the backward stepwise approach, the non-significant variables were dropped if their exclusion did not significantly decrease the overall fit of that model. In total, the following six independent variables were dropped at this stage:

- Cognitive ability measured in 1994/95 and 1996/97 from the "health and function" category;

- Average frequency of social contacts in 1994/95 from the "social environment" category;

- Physical activity in 1994/95, smoking in 1994/95 and drinking in 1994/95 from the "individual behaviour" category.

After selecting variables with the most predictive value within each category, the six categories of variables were used as building blocks to build the final multivariate logistic regression for predicting fair or poor self-rated health in 1998/99. But, the important question at this stage was which category of variables should be introduced first? The common method is to rank the six models according to their p values. However, given that all six models had p values of 0.0001 (using SAS system for Windows), it was not possible to use that

method for ranking the categories. Another suggested method was to divide the overall fit of each model by its degrees of freedom and use that value to rank the categories from 1 to 6 (Mary Chang, 2001). Using this approach, the "disease" category was the first to be introduced, followed by health and function, prosperity, individual behavior, genetic endowment and social environment categories. The statistical results from this step are summarized in Chart 5.3.

Chart 5.3: Results of Testing the Significance of the Predictive Value of Each Category of Independent Variables, Outcome Fair/Poor 1998, Total Population Aged 25 or Older

Model	Independent Variables	Overall Fit of the Model	The Two Models Compared	Difference between the Overall Fit of the Two Models	Final Decision
Base Model	Age SEX	X^2 =87.16 d.f=6 p=0.0001			Keep [Age and Sex]
First Model	Age SEX "Disease"	X2=349.66 d.f=10 p=0.0001	First Model and the Base Model	X^2 =262.5 d.f=4 P<0.001 (SIG)	Keep [Age, Sex, and "Disease" category]
Second Model	Age SEX "Disease" "Health and Function"	X^2 =670.07 d.f=22 p=0.0001	Second Model and the First Model	X^2 =320.407 d.f=12 P<0.001 (SIG)	Keep [Age, Sex, "Disease" and "Health and Function" Categories]
Third Model	Age SEX ' "Disease" "Health and Function" "Prosperity"	X^2 =714.44 d.f=26 p=0.0001	Third Model and the Second Model	X^2 =44.366 d.f=4 P<0.001 (SIG)	Keep [Age, Sex, "Disease", "Health and Function" and "Prosperity" Categories]
Fourth Model	Age SEX "Disease "Health and Function" "Prosperity" "Individual Behaviour"	X^2 =783.92 d.f=39 p=0.0001	Fourth Model and the Third Model	X^2 =69.48 d.f=13 P<0.001 (SIG)	Keep [Age, Sex, "Disease", "Health and Function", "Prosperity" and "Individual Behaviour" Categories]
Fifth Model	Age SEX "Disease" "Health and Function" "Prosperity" "Individual Behaviour" "Genetic Endowment"	X^2 =789.94 d.f=40 p=0.0001	Fifth Model and the Fourth Model	X^2 =6.027 d.f=1 p>0.01 (NS)	Drop ["Genetic Endowment" category] Keep [Age, Sex, "Disease", "Health and Function", "Prosperity" and "Individual Behaviour" Categories]
Sixth Model	Age SEX "Disease" "Health and Function" "Prosperity" "Individual Behaviour" "Social Environment"	X^2 =787.68 d.f=44 p=0.0001	Sixth Model and the Fourth Model	X^2 =3.76 d.f=5 p>0.1 (NS)	Drop ["Social Environment" category] Keep [Age, Sex, "Disease", "Health and Function", "Prosperity" and "Individual Behaviour" Categories]

According to the results presented in this chart, variables within the four categories of "Disease", "Health and Function", "Prosperity" and "Individual Behaviour" had significant predictive value and therefore were kept in the final multivariate model which predicts "fair or poor self-rated health in 1998/99"for the Canadian population who age 25 or older in 1994/95. The two non-significant categories of variables were "genetic endowment" and "social environment" which were dropped at this stage. Therefore, the fourth model was considered as the final predictive model with an overall fit of X^2 =783.92, d.f=39, and p=0.0001.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model which predicts the outcome of fair or poor self-rated health in 1998/99 for the household population who were age 25 or older in 1994/95 are summarized in Table 5.7.

Table 5.7: Adjusted Odds Ratios for those Age 25 or Older in 1994/95 for Fair or Poor Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	0.9		0.6	1.4
45-54	1.6	*	1.2	2.3
55-64	1.2		0.8	1.7
65-74	1.4		0.9	2.0
75+	1.1		0.7	1.9
Sex				
Female	1.0		.....	.....
Male	1.6	.*	1.2	2.0
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	0.9		0.7	1.2

4 or more chronic conditions	1.7	*	1.0	2.9
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	1.6	*	1.2	2.2
4 or more chronic conditions	2.1	*	1.3	3.4
Functional health status 1994/95				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	1.3		0.9	1.7
No activity limitation, but dependency	0.7		0.2	2.3
Activity limitation and dependency	1.3		0.8	2.0
Functional health status 1996/97				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	1.7	*	1.2	2.2
No activity limitation, but dependency	1.7		0.8	3.9
Activity limitation and dependency	2.8	*	1.9	4.2
Level of Pain 1994/95				
Moderate or severe pain	1.3	*	1.0	1.8
Mild or no pain	1.0		.....	.....
Level of Pain 1996/97				
Moderate or severe pain	1.3		0.9	1.7
Mild or no pain	1.0		.....	.....
Psychological distress 1994/95				
High	1.3	*	1.0	1.8
Low/moderate	1.0		.....	.....
Unknown				
Psychological distress 1996/97				
High	1.7	*	1.3	2.4
Low/moderate	1.0		.....	.....
Unknown	1.4		0.4	4.8
Household Income 1994/95				
Lowest/Lower-middle/Middle	1.2		0.9	1.6
Upper-middle/Highest	1.0		.....	.....
Unknown	1		0.6	1.8
Household Income 1996/97				
Lowest/Lower-middle/Middle	1.4	*	1.1	1.9
Upper-middle/Highest	1.0		.....	.....
Unknown	1.5		0.9	2.5
Educational Attainment 1994/95				
Less than secondary school graduation	1.4	*	1.1	1.7
Graduated from high school	1.0		.....	.....
Self-esteem 1994/95				
Low	1.4	*	1.1	1.9
Not low	1.0		.....	.....
Unknown	0.8		0.1	4.0
Smoking behavior 1996/97				
Daily Smoker	1.2		0.9	1.5
Occasional Smoker	0.6		0.3	1.4
Non-smoker (not at all)	1.0		.....	.....

Drinking behavior 1996/97				
Regular - Weekly drinker	0.5	*	0.4	0.7
Not regular – Less than once a week	0.7	*	0.5	0.9
Abstainer	1.0		.....	.....
Frequency of physical activity 1996/97				
Regular	1.0		.....	.....
Occasional	0.9		0.6	1.2
Infrequent	1.2		0.9	1.6
Body weight 1996/97				
Underweight	1.5		0.9	2.5
Acceptable weight	1.0		.....	.....
Some excess weight	1.2		0.9	1.7
Overweight	1.2		0.9	1.6
Unknown	1.7		0.8	3.4

Notes:
The model for fair or poor self-rated health is based on 3,646 respondents age 25 or older, 1,158 rated their overall health either as fair or poor and 2,630 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. "Missing" categories for household income and body weight were included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.

* $p < 0.01$
.... Not appropriate

Main Findings

Logistic regression analyses revealed that there are many factors, which help to explain why some of the Canadians who were age 25 or older in 1994/95 rated their overall health and well-being as being worse than others four years later in 1998/99. Among those factors, number of chronic conditions had the highest explanatory power followed by factors related to individuals' health and functioning. Individuals' prosperity, lifestyle and behaviours were also important. However, family history of premature death of parent(s) and information on individuals' social environment did not help to explain the

observed variations in the outcome (fair or poor self-rated health versus good). Factors related to "health and function" included functional health status, level of pain, and level of psychological distress. Factors related to "prosperity" included household income level and factors related to individuals' lifestyle and behaviour included level of education, self-esteem, smoking, drinking, level of physical activity and body weight (Table 5.7). To explain the observed variation in the outcome, information on two-year transitions in number of chronic conditions, functional health status, level of pain, level of psychological distress and household income level were also important.

Using adjusted odds ratios to identify the unique influence of each independent variable within the final model, a significant association was found between the following factors and fair or poor self-ratings of health in 1998/99 among Canadians who were age 25 or older in 1994/95.

Factors Related to Genetic Endowment

Age: According to the information presented in Table 5.7, after controlling for the effects of functional health status, number of chronic conditions, health behaviours and psychological factors, there was no longer a significant linear association between age and fair or poor self-rated health.

Sex: Men age 25 or older in 1994/95, compared to the women in the same age group were more likely to rate their overall health as either fair or poor compared to those who rate their health as good [OR=1.6, (CI= 1.2, 2.3)].

Factors Related to Disease

Number of Chronic Conditions: Number of chronic conditions in 1994/95 and 1996/97 was found to be a significant predictor of fair or poor self-rated health in 1998/99. According to the information presented in Table 5.7, Canadians who had two or three chronic conditions in 1994/95 were more likely to rate their overall health and well-being as either fair or poor compared to those who had none or one chronic condition at that time. Similarly, those who had two or three chronic conditions in 1996/97 had higher odds of rating their overall health in 1998/99 as either fair or poor compared to those who had none or one chronic condition at that time [OR=1.6, (CI=1.2, 2.2)]. Those who had 4 or more chronic conditions in 1996/97 had also higher odds of reporting fair or poor health [OR=2.1, (CI=1.3, 3.4)].

Regression analyses also revealed that the two-year transitions in number of chronic conditions are associated with fair or poor ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of number of chronic conditions, the odds ratios associated with observed transitions are not reported.

Factors Related to Health and Function

Functional Health Status: The ability to carry out daily activities without limitation or dependence on others was found to be a powerful determinant of fair or poor self-rated health for Canadian adults who were age 25 or older in 1994/95. According to the information presented in Table 5.7, Canadians who

had activity limitations, but were not dependent on others were more likely to rate their overall health as either fair or poor compared to those who did not have activity limitations and were not functionally dependent. Those who had activity limitations and were also functionally dependent had also higher odds of rating their overall health as either fair or poor [OR=2.8, (CI=1.9, 4.2)].

Regression analyses also revealed that the two-year transitions in functional health status are associated with fair or poor ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of functional health status, the odds ratios associated with the observed two-year transitions are not reported.

Level of Pain: There was a significant association between level of pain in 1994/95 and fair or poor self-rated health in 1998/99. Those who suffered from moderate or severe pain during the first cycle of the survey in 1994/95 were significantly more likely to report fair or poor health in 1998/99 compared to those who did not have any pain or experienced mild pain [OR=1.3, (CI=1.0, 1.8)].

Regression analyses also revealed that the two-year transitions in level of pain are associated with fair or poor ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of pain, the odds ratios associated with the observed two-year transitions are not reported.

Level of Psychological Distress: High psychological distress also increased the odds of reporting fair or poor health. Those who experienced high psychological distress in 1994/95 had odds of rating their overall health as either fair or poor that were higher than for those who were not highly distressed [OR=1.3, (CI=1.0, 1.8)]. Those who experienced high psychological distress in 1996/97 had higher odds of rating their overall health as either fair or poor as well [OR=1.7, (CI=1.3, 2.4)].

Regression analyses also revealed that the two-year transitions in level of psychological distress are associated with fair or poor ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of distress, the odds ratios associated with the observed two-year transitions are not reported.

Factors Related to Prosperity

Household Income Level: A significant association was found between household income level and fair or poor self-rated health. According to the regression analyses results presented in Table 5.7, Canadians who were from households with the lowest/lower middle and middle income level were more likely to rate their overall health as either fair or poor compared to those who were from families with the highest or upper-middle income levels [OR=1.4, (CI=1.1, 1.9)].

Regression analyses also revealed that the two-year transitions in household income level are associated with fair or poor ratings of health in

1998/99. However, since there was no significant interaction effect between Time I and Time II measures of distress, the odds ratios associated with the observed two-year transitions are not reported.

Factors Related to Individual Behaviour

Highest Level of Education: Odds of reporting fair or poor health were significantly higher for adults age 25 or older who had not graduated from high school compared to those who were also 25 or older in 1994/95, but had graduated from high school [OR=1.4, (CI=1.1, 1.7)].

Self-esteem: Low self-esteem in 1994/95 was associated with fair or poor self-rated health in 1998/99 [OR=1.4, (CI=1.1, 1.9)].

Drinking Behaviour: A negative association was found between drinking behaviour and fair or poor self-rated health with those who were occasional drinkers in 1996/97 having decreased odds of reporting fair or poor health in 1998/99 compared to those who were abstainers [OR=0.7, (CI=0.5, 0.9)]. The odds of reporting fair or poor health was also lower for those who were regular weekly drinkers [OR=0.5, (CI=0.4, 0.7)].

Are the Predictors of Fair or Poor Self-rated Health Different for Men Compared to Women?

This part of section III addresses research question three, which asks if predictors of fair or poor self-rated health are different for men and women. Answering this question required developing two separate logistic regression models, one fitting the longitudinal data for male respondents who were age 25 or older in 1994/95 and another model fitting the longitudinal data for female respondents who were age 25 or older in 1994/95. In developing the two models, the decisions which were made and the steps taken were the same as those used to develop the predictive model for the total population age 25 or older.

Longitudinal Model Predicting Fair or Poor Self-rated Health for Males Age 25 or Older

In developing a longitudinal model which predicts the outcome of interest, fair or poor self-rated health in 1998/99, for males age 25 or older, all the records for the male respondents who rated their overall health and well-being in 1998/99 as either fair or poor or good were selected. Records for the respondents who rated their overall health and well-being as either very good or excellent were excluded from the analyses (2,439 records). This resulted in a sample size of 1,552; of whom 1,099 rated their overall health as good and 453 rated their health as either

fair or poor in 1998/99. These respondents represented 2.85 million male Canadians who were age 25 and over in 1994/95. To keep the sample size the same in all the analyses, missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level, body weight, and self-esteem were defined as separate categories and included in the analyses. In total, 41 records were excluded and the remaining 1,511 records were used to build the final predictive model. As mentioned earlier all the major analytical steps, which were taken to fit a longitudinal model to the data for the respondents age 25 or older, were also taken in building the predictive model for male respondents.

The detailed analytical findings from steps 1 to 3 for identifying the significant independent variables are not presented in this section. However, many of the characteristics and conditions which were associated with negative ratings of health (fair or poor) among the total population age 25 or older were also associated with the same outcome among the male population age 25 or older.

The next step involved selection of the variables with the most predictive value within the five categories of *Prosperity, Health and Function, Social Environment, Individual Behaviour, and Disease* (the category of genetic endowment was dropped at the earlier stage). Following a stepwise approach,

these five categories of variables were ranked and used as the building blocks to specify the final predictive model.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model that predicts the outcome of fair or poor self-rated health in 1998/99 for the male household population age 25 or older in 1994/95 are summarized in Table 5.8.

Table 5.8: Adjusted Odds Ratios for Males Age 25 or Older in 1994/95 for Fair or Poor Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	1.7		0.4	1.3
45-54	1.9	*	1.1	3.2
55-64	1.2		0.7	2.2
65-74	2.1	*	1.2	3.9
75+	1.6		0.8	3.6
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	0.7		0.4	1.1
4 or more chronic conditions	1.6		0.6	4.2
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	1.8	*	1.1	2.8
4 or more chronic conditions	2.7	*	1.2	6.0
Functional health status (Main effects from 1994/95 and 1996/97+ Interaction between them)				
Stable (no activity limitation and no dependency)	1.0		.....	.....
Decline (no activity limitation and no dependency to activity limitation, but no dependency)	2.3	*	1.3	4.0
Decline (no activity limitation and no dependency to activity limitation and dependency) or (no activity limitation and no dependency to no activity limitation, but dependency)	2.4		0.9	6.4
Improvement (activity limitation and no dependency to no activity limitation and no dependency)	1.8	*	1.0	3.2

Stable (activity limitation, but no dependency)	3.5	*	2.0	6.1
Decline (activity limitation and no dependency to no activity limitation and dependency) or (activity limitation, no dependency to activity limitation and dependency)				
Improvement (no activity limitation and dependency to no activity limitation and no dependency) or Improvement (no activity limitation and dependency to activity limitation, no dependency) or Stable (no activity limitation, but dependency) or Decline (no activity limitation and dependency to activity limitation and dependency)	1.3		0.1	23.0
Improvement (activity limitation and dependency to no activity limitation, no dependency)				
Improvement (activity limitation and dependency to activity limitation, but no dependency)	1.5		0.4	5.6
Improvement (activity limitation and dependency to no activity limitation, but dependency or Stable (activity limitation and dependency)	4.9	*	1.8	13.7
Psychological distress 1994/95				
High	1.4		0.9	2.3
Low/moderate	1.0		.....	.....
Psychological distress 1996/97				
High	1.9	*	1.2	3.1
Low/moderate	1.0		.....	.....
Household Income 1996/97				
Lowest/Lower-middle/Middle	1.7	*	1.2	2.5
Upper-middle/Highest	1.0		.....	.....
Unknown	1.6		0.7	3.5
Educational Attainment 1994/95				
Less than secondary school graduation	1.7	*	1.2	2.4
Graduated from high school	1.0		.....	.....
Self-esteem 1994/95				
Low	1.3		0.8	2.1
Not low	1.0		.....	.....
Unknown				
Drinking behavior 1994/95				
Regular – Weekly drinker	0.4	*	0.3	0.7
Not regular - Less than once a week	0.6	*	0.4	0.9
Abstainer	1.0		.....	.....
Frequency of physical activity 1996/97				
Regular	1.0		.....	.....
Occasional	0.8		0.5	1.4
Infrequent	1.3		0.8 ·	1.9

Notes:
The model for fair or poor self-rated health is based on 1,511 male respondents age 25 or older, 435 rated their overall health as either fair or poor and 1,076 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. The "Missing" category for household income was included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.

* p<0.01
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.8 with the regression results presented in Table 5.7 revealed significant differences in the factors predicting fair or poor health among the total population age 25 or older with those predicting the same outcome among the male sub-population. These differences are discussed within the relevant components of the conceptual framework.

Genetic Endowment

Age: When controlling for the effects of other factors in the multivariate regression model, there was no significant linear association between age and fair or poor self-rated health among the two target populations (total population age 25 or older and the male sub-population age 25 or older). In both populations, those who were between 45 and 54 were significantly more likely to rate their overall health and well-being as either fair or poor compared to those who were between 25 and 34. Among the male sub-population, however, those who were

between age 65 to 74 also had increased odds of reporting fair or poor health when compared to those aged 25 to 34 [OR=2.1, (CI= 1.2, 3.9)].

Health and Function

Functional Health Status: Among both target populations, those who had activity limitation or were functionally dependent on others were more likely to report fair or poor self-rated health. However, for the male sub-population, there was a significant interaction effect between functional health status measured during the first cycle of the survey and functional health status measured two years later during the second cycle of the survey. Among men there were increased odds associated with the transitions in functional health status presented in Table 5.8 compared to those who had "stable functional health status at the best level" in 1998/99. However, the odds ratio was significant for only the following four groups: those who experienced a decline in their functional health from not having activity limitation and not being dependent in 1994/95 to having activity limitation, but no dependency; those who experienced improvement in their functional health from having activity limitation, but no dependency in 1994/95 to not having activity limitation and not being dependent in 1996/97; those who had stable functional health with activity limitation, but no dependency; and those who had stable functional health with activity limitation and dependency. In regards to the unexpected results, given the high number of variables, even with p=0.01, it is still possible to get 1 significant result out of each100 simply by chance.

Level of Pain: Moderate or severe pain was a risk factor for reporting fair or poor health among the total population, but not among the male sub-population.

Prosperity

Household Income Level: A significant association was found between household income level and fair or poor self-rated health among the total population and the male sub-population. However, transitions in household income level between the two cycles of the survey were important in predicting the outcome of interest among the total population, but not among the male sub-population.

Factors Related to Individual Behaviour

Self-esteem: Low self-esteem was a significant predictor of fair or poor self-rated health among the total population, but not among the male-sub-population.

Longitudinal Model Predicting Fair or Poor Self-rated Health for Females Age 25 or Older

In developing a longitudinal model which predicts the outcome of interest, fair or poor self-rated health in 1998/99, for females age 25 or older, all the records for the female respondents who rated their overall health and well-being in 1998/99 as either fair or poor or good were selected. Records for the

respondents who rated their overall health and well-being as either very good or excellent were excluded from the analyses (3,144 records). This resulted in a sample size of 2,236; of whom 1,531 rated their overall health as good and 705 rated their health as either fair or poor in 1998/99. These respondents represented 3.6 million female Canadians who were age 25 or older in 1994/95. To keep the sample size the same in all the analyses, records with missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level, and body weight were defined as separate categories and included in the analyses. In total, 96 records were excluded and the remaining 2,140 records were used to build the final predictive model. As mentioned earlier all the analytical steps, which were taken to fit a longitudinal model to the data for the respondents age 25 or older were also taken in building the predictive model for females.

The detailed analytical findings from steps 1 to 3 for identifying the significant independent variables are not presented in this section. However, many of the characteristics and conditions which were associated with a negative rating of health (fair or poor) among the total population age 25 or older were also associated with the same outcome among the female sub-population age 25 or older.

The next step involved selection of the variables with the most predictive value within the six categories of *Genetic Endowment, Prosperity, Health and*

Function, Social Environment, Individual Behavior, and Disease. Following a stepwise approach, these six categories of variables were ranked and used as the building blocks to specify the final predictive model.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model that predicts the outcome of fair or poor self-rated health in 1998/99 for the female household population age 25 or older in 1994/95 are summarized in Table 5.9.

Table 5.9: Adjusted Odds Ratios for Females Age 25 or Older in 1994/95 for Fair or Poor
Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	1.0		0.6	1.6
45-54	1.4		0.9	2.3
55-64	1.1		0.7	1.9
65-74	1.0		0.6	1.7
75+	0.8		0.4	1.6
Functional health status 1996/97				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	1.4		0.9	2.1
No activity limitation, but dependency	1.3		0.5	3.6
Activity limitation and dependency	3.1	*	1.9	5.0
Level of Pain 1994/95				
Moderate or severe pain	1.4		0.9	2.0
mild or no pain	1.0		.....	.....
Level of Pain 1996/97				
Moderate or severe pain	1.3		0.9	2.0
mild or no pain	1.0		.....	.....
Psychological distress 1994/95				
High	1.4	*	1.0	2.1
Low/moderate	1.0		.....	.....
Psychological distress 1996/97				
High	1.6	*	1.1	2.4

Low/moderate	1.0		.....	.....
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	1.0		0.7	1.5
4 or more chronic conditions	1.7		0.9	3.2
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	1.5	*	1.0	2.3
4 or more chronic conditions	2.2	*	1.1	4.0
Self-esteem 1994/95				
Low	1.4		0.9	2.0
Not low	1.0		.....	.....
Smoking behavior 1994/95				
Daily Smoker	1.2		0.9	1.8
Occasional Smoker	1.0		0.4	2.4
Non-smoker (not at all)	1.0		.....	.....
Drinking Behavior (Including Interaction Effect)				
Stable (Weekly drinker in 1994/95 and 1996/97)	1.0		.....	.....
Weekly drinker in 1994/95, but Occasional drinker in 1996/97	0.3	*	0.2	0.5
Weekly drinker in 1994/95, but No drinking at all in 1996/97	0.9		0.5	1.7
Occasional drinker in 1994/95, but Weekly drinker in 1996/97	1.4		0.4	4.8
Stable (Occasional drinker in 1994/95 and 1996/97)	1.0		0.4	2.1
Occasional drinker in 1994/95, but No Drinking at all in 1996/97	0.6	*	0.4	0.9
No drinking at all in 1994/95, but Weekly drinker in 1996/97	1.2		0.7	2.0
No drinking at all in 1994/95, but Occasional drinker in 1996/97	0.8		0.2	3.8
Stable (No Drinking at all in 1994/95 and 1996/97)	0.9		0.5	1.7
Frequency of physical activity 1996/97				
Regular	1.0		.....	.....
Occasional	1.0		0.7	1.6
Infrequent	1.4	*	1.0	2.0
Marital Status (Including Interaction Effect)				
Stable (Married in 1994/95 and 1996/97)	1.0		.....	.....
Never married or married in 1994/95 and never married in 1996/97 (Stable never married)	2.3	*	1.4	3.9

Married or never married in 1994/95 and previously married in 1996/97	1.8		0.8	3.8
Never married in 1994/95 and married in 1996/97	0.8		0.1	5.4
Previously married in 1994/95 and married in 1996/97	2.5		0.6	10.5
Stable previously married (also includes 4 people who reported previously married in 1994/95 and never married in 1996/97)	1.5	*	1.0	2.1
Perceived Emotional Support in 1994/95				
Enough	1.0		.....	.....
Low	1.1		0.7	1.6
Premature Death of Parent(s)				
No	1.0		.....	.....
Yes	1.5	*	1.1	2.1

Notes:
The model for fair or poor self-rated health is based on 2,140 female respondents age 25 or older, 666 rated their overall health as either fair or poor and 1,474 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99.
"Missing" categories for household income and body weight were included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.
* $p < 0.01$
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.9 with the regression results presented in Table 5.7 revealed significant differences in the factors predicting fair or poor health among the total population aged 25 or older with those predicting the same outcome among the female sub-population. These differences are discussed within the relevant components of the conceptual framework.

Genetic Endowment

Age: After controlling for the effects of other factors in the multivariate regression model, there was no significant association between age and fair or poor self-rated health among the female sub-population. However, analysis of the aggregated data showed that among the total population age 25 or older, those between ages of 45 and 54 were more likely to rate their overall health fair or poor compared to the youngest age group (those aged between 25 and 34).

Premature Death of Parents: Although there was no significant association between premature death of parent(s) and fair or poor rating of health among the total population, analysis of the disaggregated data showed that women age 25 or older in 1994/95 and had a family history of premature death of parent(s) were 1.5 times more likely to rate their overall health and well-being as either fair or poor compared to those who did not have such a family history [OR=1.5, (CI=1.1, 2.1)].

Factors Related to Health and Function

Functional Health Status: The ability to carry out daily activities without limitation or dependence on others was associated with fair or poor ratings of health among both the total and the female populations age 25 or older in 1994/95. However, according to the results presented in Table 5.9, only functional health status measured during the second cycle of the survey was associated with the outcome of interest among the women. This leads to the

conclusion that two-year transitions in functional health status are important predictors of the fair or poor health among the total population, but not specifically among females.

Level of Pain: level of pain was found as a significant predictor of fair or poor health among the total population, but not among the female sub-population.

Prosperity

Household Income Level: Household income level was associated with negative ratings of health among the total population, but not among females.

Factors Related to Individual Behaviour

Level of Education: Level of education was a significant predictor of fair or poor health among the total population, but not specifically among females.

Level of Self-esteem: Low level of self-esteem was associated with increased odds of reporting fair or poor health among the total population, but not among the female sub-population.

Drinking Behaviour: As discussed earlier, among the total population, those who were regular or occasional drinkers during the second cycle of the survey were significantly less likely to report fair or poor health. In predicting the same outcome among the women, not only their drinking behaviour during the first and

the second cycles of the survey, but also the two-year transitions in drinking behaviour between the two cycles were important. According to the results presented in Table 5.9, out of the nine transition patterns in drinking behaviour between 1994/95 and 1996/97, only two were significantly associated with the negative ratings of health among women.

Frequency of Physical activity: Although there was no significant association between frequency of physical activity and negative ratings of health among the total population, women who had a low level of physical activity in 1996/97 were significantly more likely to rate their overall health and well-being as either fair or poor compared to those who were regularly active [OR=1.4, (CI=1.0, 2.0)].

Factors Related to Social Environment

Marital Status: Analysis of the aggregated data, for the total population, showed no significant association between marital status and negative ratings of health. Analysis of the data for women, however, revealed that not only women's marital status during the first and the second cycles of the survey, but also changes in marital status between the two cycles help explain why some female Canadians age 25 or older in 1994/95 rated their overall health as being fair or poor. According to the results presented in Table 5.9, two of the transition patterns in marital status between the first and the second cycles of the survey were significantly associated with fair or poor self-rated health among women age 25 or older.

Summary

Longitudinal analyses of the National Population Health Survey data revealed that there are many factors related to genetic endowment, social environment, disease, prosperity, health and function and individual behaviour which are associated with negative ratings (fair or poor) of health among Canadians age 25 and over.

Analyses of the disaggregated data showed significant differences in the factors predicting fair or poor health for men and women. The two logistic regression models, one of which predicts fair or poor self-rated health among the females and the other predicting the same outcome among the males were different in terms of their building blocks and also the predictive factors within each block. The three blocks of "health and function", "disease", and "individual behaviour" were common between the two models but in different orders. The block of "prosperity" remained significant only within the predictive model for men and the two blocks of "genetic endowment" and "social environment" showed significant predictive value only among women. Longitudinal analysis of the data also revealed that the two-year transitions in number of chronic conditions, functional health status and psychological distress are important in predicting fair or poor health among both men and women. The two-year transitions in the level of pain, drinking behaviour and marital status were only important in predicting the outcome among women. The significant predictors of

fair or poor health (both risk factors and protective factors) for men and women

are compared in Chart 5.4.

Chart 5.4: Comparing Predictors of Fair/Poor Self-rated Health between
Male Household Population Age 25 or Older and Female Household
Population Age 25 or Older

MALE HOUSEHOLD POPULATION AGED 25 OR OLDER	FEMALE HOUSEHOLD POPULATION AGED 25 OR OLDER
RISK FACTORS	RISK FACTORS
1) Ages between 45 and 54 or 65 and 74	1) Having activity limitation and being functionally dependent in 1996/97
2) Having 2 or more chronic conditions in 1996/97	2) High psychological distress in 1994/95
3) Following transitions in functional health status between 1994/95-1996/97: Decline (No AL/No D→ AL/No D); Improvement (AL/No D→ No AL/No D); Stable (AL/No D); Decline (AL/No D→ No AL/D) or (AL/No D→ AL/D); Improvement (AL/D→ No AL/D) or Stable (AL/D)	3) High psychological distress in 1996/97
4) High psychological distress in 1996/97	4) Having 2 or more chronic conditions in 1996/97
5) Low household income level in 1996/97	5) Infrequent physical activity in 1996/97
6) Less than secondary school graduation	6) Following transitions in marital status between 1994/95 and 1996/97: Stable never married; Stable previously married
	7) Premature death of parent(s)
PROTECTIVE FACTORS	PROTECTIVE FACTORS
1) Being a regular or occasional drinker in 1994/95	1) Following transitions in drinking behavior: Being weekly drinker in 1994/95, but occasional drinker in 1996/97; Being occasional drinker in 1994/95, but abstainer in 1996/97

Are the Predictors of Fair or Poor Self-rated Health Different for Middle-aged Adults (age between 25 and 54) Compared to Older Adults (age 55 or older)?

This part of section III addressed research question four, which asks if predictors of fair or poor health are different for middle-aged adults (age between 25 and 54) compared to older adults (age 55 or older). Answering this question required developing two separate logistic regression models, one fitting the longitudinal data for respondents who were between ages 25 and 54 in 1994/95 and another model fitting the longitudinal data for respondents who were age 55 or older in 1994/95. In developing the two models, the decisions which were made and the steps taken were the same as those used to develop the predictive model for the total population age 25 or older.

Longitudinal Model Predicting Fair or Poor Self-rated Health for Middle-aged Adults

In developing a longitudinal model which predicts the outcome of interest, fair or poor self-rated health in 1998/99 for middle-aged adults, all the records for the respondents who were between ages 25 and 54 in 1994/95 and rated their overall health and well-being in 1998/99 as either fair or poor or good were selected. Records for the respondents age 55 or older in 1994/95 or who rated their overall health and well-being as either very good or excellent were excluded from the analyses. This resulted in a sample size of 2,110; of whom 1,588 rated their overall health as good and 522 rated their health as either fair or poor in

1998/99. These respondents represented an estimated 4 million Canadians who were between ages 25 and 54 in 1994/95. To keep the sample size the same in all the analyses, missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level and body weight were defined as separate categories and included in the analyses. In total, 148 records were excluded and the remaining 1,962 records were used to build the final predictive model. As mentioned earlier all the analytical steps, which were taken to fit a longitudinal model to the data for the respondents age 25 or older were also taken in building the predictive model for respondents between ages 25 and 54. The detailed analytical findings from steps 1 to 3 for identifying the significant independent variables are not presented in this section. However, many of the characteristics and conditions which were associated with a negative rating of health among middle-aged Canadians were also associated with the same outcome among the total population age 25 or older.

The next step involved selection of the variables with the most predictive value within the six categories of *Genetic Endowment, Prosperity, Health and Function, Social Environment, Individual Behaviour*, and *Disease*. Following a stepwise approach, these six categories of variables were ranked and used as the building blocks to specify the final predictive model.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model that predicts

the outcome of fair or poor self-rated health in 1998/99 for the household

population who were between ages 25 and 54 in 1994/95 are summarized in Table

5.10.

Table 5.10: Adjusted Odds Ratios for those between Ages 25 and 54 in 1994/95 for Fair or Poor Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	0.9		0.6	1.4
45-54	1.7	*	1.1	2.7
Sex				
Female	1.0		.....	.....
Male	1.4	*	1.0	2.0
Functional health status (Main effects from the year 1994/95, 1996/97 and their interaction)				
Stable (No AL/No D)	1.0		.....	.....
Decline (No AL/No D→ AL/No D)	1.3		0.7	2.4
Decline (No AL/No D→ No AL/D)	1.6		0.4	6.3
Decline (No AL/No D→ AL/D)	2.5	*	1.0	6.6
Improvement (AL/No D→ No AL/No D)	1.0		0.5	2.0
Stable (AL/No D)	2.2	*	1.3	3.7
Decline (AL/No D→ No AL/D) or Decline (AL/No D→ AL/D) or Stable (No AL/D) or Decline (No AL/D→ AL/D)	7.7	*	3.0	19.4
Improvement (No AL/D→ No AL/No D) or Improvement (No AL/D→ AL/No D)	1.6		0.2	15.3
Improvement (AL/D→ No AL/No D)	3.7	*	1.0	12.9
Improvement (AL/D→ AL/No D) or Improvement (AL/D→ No AL/D)	2.0		0.7	5.6
Stable (AL/D)	2.3		0.9	5.8
Level of Pain 1996/97				
Moderate or severe pain	2.0	*	1.3	3.0
Mild or no pain	1.0		.....	.....
Cognitive Ability in 1996/97				
No Cognitive Problem	1.0		.....	.....
Having Cognitive Problem	1.3		0.9	2.0
Psychological distress 1994/95				
High	1.3		0.9	2.0
Low/moderate	1.0		.....	.....
Psychological distress 1996/97				
High	1.9	*	1.3	2.9
Low/moderate	1.0		.....	.....

Number of chronic conditions (Main effects from the year 1994/95, 1996/97 and their interaction)				
Stable (none or one)	1.0		.....	.....
Increase (none or one →2 or 3)	1.9	*	1.2	3.2
Increase (none or one →4 or more)	0.6		0.1	3.0
Decrease (2 or 3 → none or one)	1.2		0.5	2.6
Stable (2 or 3)	1.1		0.7	1.9
Increase (2 or 3 →4 or more)	4.4	*	1.3	14.8
Decrease (4 or more → none or one) or (4 or more → 2 or 3)	8.3	*	2.8	25
Stable (4 or more)	3.3	*	1.0	10.7
Household Income 1996/97				
Lowest/Lower-middle/Middle	1.4	*	1.0	2.0
Upper-middle/Highest	1.0		.....	.....
Unknown	2.9	*	1.4	6.0
Premature Death of Parent(s)				
No	1.0		.....	.....
Yes	1.9	*	1.3	2.7
Educational Attainment 1994/95				
Less than secondary school graduation	1.2		0.8	1.8
Graduated from high school	1.0		.....	.....
Self-esteem 1994/95				
Low	1.6	*	1.0	2.4
Not low	1.0		.....	.....
Smoking behavior 1996/97				
Daily Smoker	1.1		0.8	1.6
Occasional Smoker	0.4		0.1	1.5
Non-smoker (not at all)	1.0		.....	.....
Drinking behavior (Main effects from the year 1994/95, 1996/97 and their interaction)				
Stable (weekly drinker at both cycles)	0.4	*	0.2	0.7
Decrease (weekly →occasional)	0.6		0.3	1.1
Decrease (weekly →not at all)	0.3		0.1	2.2
Increase (occasional→ weekly)	0.4		0.2	1.0
Stable (occasional drinker at both cycles)	0.7		0.4	1.1
Decrease (occasional →not at all)	1.3		0.6	2.5
Increase (not at all → weekly)	6.4	*	1.5	27.9
Increase (not at all → occasional)	0.8		0.3	1.9
Stable (do not drink at all at both cycles)	1.0		.....	.....
Frequency of physical activity 1996/97				
Regular	1.0		.....	.....
Occasional	1.0		0.6	1.5
Infrequent	1.5	*	1.1	2.2

Notes:

The model for fair or poor self-rated health is based on 2,110 respondents between ages 25 and 54 in 1994/95; 522 rated their overall health as either fair or poor and 1,588 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. "Missing" categories for household income and body weight were included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.
* $p<0.01$
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.10 with the regression results presented in Table 5.7 revealed differences in the factors predicting fair or poor health among the total population aged 25 or older with those predicting the same outcome among the middle-aged sub-population. These differences are discussed within the relevant components of the conceptual framework.

Genetic Endowment

Premature Death of Parent(s): Middle-aged Canadians who had a family history of premature death of parent(s) had odds that were almost twice those who did not have such a family history to rate their overall health and well-being as either fair or poor [OR=1.9, (CI= 1.3, 2.7)]. Premature death of parent(s) was not a significant predictor of fair or poor health among the total population age 25 or older.

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Factors Related to Health and Function

Functional Health Status: The ability to carry out daily activities without limitation or dependence on others was found to be a significant predictor of fair or poor self-rated health among both the total and the middle-aged populations. However, for the middle-aged population, there was a significant interaction effect between functional health status measured during the first cycle of the survey and functional health status measured two years later during the second cycle of the survey. According to the results presented in Table 5.10, out of the 11 transition patterns in functional health status between 1994/95 and 1996/97, only four were significantly associated with the outcome. In regards to the unexpected results, given the high number of variables, even with p=0.01, it is still possible to get 1 significant result out of each 100 results simply by chance.

Level of Pain: There was a significant association between level of pain in 1996/97 and fair or poor self-rated health in 1998/99 among middle-aged Canadians. Level of pain measured in 1994/95 was a significant predictor of fair or poor self-rated health among the total population age 25 or older. Transitions in level of pain between the first and the second cycles of the survey were important in predicting the outcome of interest among the total population, but not among the middle-aged sub-population.

Disease

Number of Chronic Conditions: Number of chronic conditions was found to be a significant predictor of fair or poor self-rated health among both target populations. However, for the middle-aged sub-population, there was a significant interaction effect between number of chronic conditions measured during the first cycle of the survey and number of chronic conditions measured two years later during the second cycle of the survey. According to the results presented in Table 5.10, out of the eight transition patterns in number of chronic conditions between 1994/95 and 1996/97, only four were significantly associated with the outcome.

Prosperity

Household Income Level: Compared to middle-aged adults who were from families with upper-middle or highest income levels, those with unknown household income level were more likely to rate their overall health as either fair or poor [OR=2.9, (CI= 1.4, 6.0)]. Compared to the same reference group, middle-aged Canadians who were from families with the lowest, lower-middle or middle income levels also had higher odds of reporting fair or poor health [OR=1.4, (CI= 1.0, 2.0)]. A low household income level was also associated with increased odds of reporting fair or poor health among the total population. The two-year transitions in household income level were important in predicting a negative rating of health among the total population, but not among the middle-aged sub-population.

Factors Related to Individual Behaviour

Highest Level of Education: Highest level of education was found to be a significant predictor of fair or poor health among the total population, but not among the middle-aged sub-population.

Drinking Behaviour: Drinking behaviour was found to be a significant predictor of fair or poor self-rated health among both target populations. However, only for the middle-aged sub-population, there was a significant interaction effect between drinking behaviour during the first cycle of the survey and drinking behaviour measured two years later during the second cycle of the survey. According to the results presented in Table 5.10, out of the nine transition patterns in drinking behaviour between 1994/95 and 1996/97, only two were significantly associated with negative ratings of health.

Frequency of Physical Activity: Infrequent Physical activity was associated with increased odds of reporting fair or poor health in 1998/99 among middle-aged Canadians [OR=1.5, (CI=1.1, 2.2)], but not among the total population age 25 and over.

Longitudinal Model Predicting Fair or Poor Self-rated Health for Elderly

Adults

In developing a longitudinal model which predicts the outcome of interest, fair or poor self-rated health in 1998/99 for elderly adults, all the records for the respondents who were aged 55 or older in 1994/95 and rated their overall health and well-being in 1998/99 as either fair or poor or good were selected. Records for the respondents under age 55 in 1994/95 or who rated their overall health and well-being as either very good or excellent were excluded from the analyses. This resulted in a sample size of 1,678; of whom 1,042 rated their overall health as good and 636 rated their health as either fair or poor in 1998/99. These respondents represented an estimated 2.4 million Canadians who were age 55 or over in 1994/95. To keep the sample size the same in all the analyses, missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level was defined as a separate category and included in the analyses. In total, 84 records were excluded and the remaining 1,594 records were used to build the final predictive model. As mentioned earlier all the analytical steps, which were taken to fit a longitudinal model to the data for the respondents age 25 or older were also taken in building the predictive model for respondents age 55 or over.

The detailed analytical findings from steps 1 to 3 for identifying the significant independent variables are not presented in this section. However,

many of the characteristics and conditions which were associated with negative

ratings of health (fair or poor) among the total population age 25 or older were

also associated with the same outcome among the elderly sub-population.

The next step involved selection of the variables with the most predictive

value within the five categories of *Prosperity, Health and Function, Social*

Environment, Individual Behavior and Disease. Following a stepwise approach, these

five categories of variables were ranked and used as the building blocks to specify

the final predictive model.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for

each of the independent variables within the final multivariate model that predicts

the outcome of fair or poor self-rated health in 1998/99 for the household

population who were age 55 or older in 1994/95 are summarized in Table 5.11.

Table 5.11: Adjusted Odds Ratios for those Age 55 or Older in 1994/95 for Fair or Poor Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
55-64	1.0		.....	.....
65-74	1.1		0.8	1.6
75+	0.9		0.5	1.5
Sex				
Female	1.0		.....	.....
Male	1.9	*	1.3	2.8
Functional health status 1996/97				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	1.9	*	1.2	2.9
No activity limitation, but dependency or Activity limitation and dependency	2.8	*	1.8	4.6
Level of Pain 1994/95				
Moderate or severe pain	1.5	*	1.0	2.3
mild or no pain	1.0		.....	.....
Psychological distress 1996/97				

High	2.0	*	1.2	3.3
Low/moderate	1.0		.....	.....
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	0.9		0.6	1.4
4 or more chronic conditions	1.4		0.7	2.7
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	1.7	*	1.1	2.6
4 or more chronic conditions	2.4	*	1.3	4.5
Household Income 1994/95				
Lowest/Lower-middle/Middle	2.1	*	1.4	3.0
Upper-middle/Highest	1.0		.....	.....
Unknown	1.1		0.5	2.7
Educational Attainment 1994/95				
Less than secondary school graduation	1.5	*	1.1	2.2
Graduated from high school	1.0		.....	.....
Self-esteem 1994/95				
Low	1.2		0.8	2.0
Not low	1.0		.....	.....
Drinking behavior 1996/97				
Regular - Weekly drinker	0.6	*	0.4	1.0
Not regular - Less than once a week	0.9		0.6	1.3
Abstainer	1.0		.....	.....
Frequency of physical activity 1996/97				
Regular	1.1		0.7	1.9
Occasional	1.2		0.8	1.7
Infrequent	1.0		.....	.....

Notes:

The model for fair or poor self-rated health is based on 1,594 respondents age 55 or older in 1994/95; 596 rated their overall health either as fair or poor and 998 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. A "Missing" category for household income was included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.
* $p < 0.01$
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.11 with the regression results presented in Table 5.7 revealed significant differences in the factors predicting fair or poor health among the total population age 25 or older with those predicting the same outcome among the elderly sub-population. These differences are discussed within the relevant components of the conceptual framework.

Genetic Endowment

Age: Among the total population, those between ages 45 and 54 were more likely to rate their overall health as either fair or poor compared to those between ages 25 and 34 in 1994/95. However, among the elderly sub-population, there was no significant association between age and negative ratings of health.

Health and Function

Level of Pain: There was a significant association between level of pain in 1994/95 and fair or poor self-rated health in 1998/99 among the total population [OR=1.3, (CI=1.0, 1.8)] and the elderly sub-population [OR=1.5, (CI=1.0, 2.3)]. However, the two-year transitions in level of pain were important in predicting

fair or poor health among the total population, but not among the elderly sub-population.

Level of Psychological Distress: High psychological distress increased the odds of reporting fair or poor health among elderly Canadians. Those who experienced high psychological distress in 1996/97 had an odds ratio of rating their overall health as either fair or poor that was two times higher than among those who were not highly distressed [OR=2.0, (CI=1.2, 3.3)]. Among the total population, those who were highly distressed were also significantly more likely to rate their overall health and well-being as either fair or poor. The two-year transitions in level of psychological distress were important in predicting fair or poor health among the total population, but not among the elderly sub-population.

Factors Related to Disease

Number of Chronic Conditions: Having more than two chronic conditions in 1996/97 was associated with a negative rating of health among both target populations. Number of chronic conditions during the first cycle of the survey was also associated with this outcome among the total population, but not among the elderly sub-population.

Prosperity

Household Income Level: Compared to the older adults who were from families with the upper-middle or highest income level in 1994/95, those who were from

families with the lowest, lower-middle or middle income level had significantly higher odds of reporting fair or poor health [OR=2.1, (CI= 1.4, 3.0)]. Among the total population, compared to the same reference category, those who were from families with the lowest, lower-middle or middle-income level in 1996/97, also had significantly higher odds of reporting fair or poor health [OR=1.4, (CI= 1.1, 1.9)]. The two-year transitions in household income levels were important in predicting fair or poor health among the total population, but not among the elderly sub-population.

Individual Behaviour

Self-esteem: Low level of self-esteem was a risk factor for reporting fair or poor health among the total population, but not among the elderly sub-population.

Drinking Behaviour: Among the total population, those who were occasional and regular drinkers in 1996/97 were significantly less likely to report fair or poor health compared to those who were abstainers. Among the elderly sub-population, only those who were regular drinkers in 1996/97 were significantly less likely to rate their overall health as either fair or poor compared to the same reference category [OR=0.6, (CI= 0.4, 1.0)].

Summary

The two logistic regression models, one of which predicts fair or poor self-rated health for middle-aged Canadians and the other for elderly Canadians were different in terms of their building blocks, which are based on the components of the Evans and Stoddart (1994) Population Health Framework. The blocks of "health and function", "disease", "individual behaviour" and "prosperity" were common between the two models but in a different order. Factors related to "Social Environment" were not associated with this outcome among either sub-populations. Premature death of parent(s) was associated with negative ratings of health only among middle-aged adults. Longitudinal analysis of the data also revealed that the two-year transitions in functional health status, level of psychological distress, number of chronic conditions and drinking behaviour are important in predicting fair or poor health in 1998/99 among the middle-aged sub-population, but only transitions in number of chronic conditions were important in predicting the same outcome among the elderly sub-population. The significant predictors of fair or poor health (both risk factors and protective factors) are presented in Chart 5.5.

Chart 5.5: Comparing Predictors of Fair/Poor Self-rated Health between the Middle-aged Adults (aged between 25 and 54 in 1994/95) and the Older Adults (aged 55 or older in 1994/95)

HOUSEHOLD POPULATION AGED 25- 54	HOUSEHOLD POPULATION AGED 55 OR OLDER
RISK FACTORS	RISK FACTORS
1) Age between 45 and 54	1) Being Male
2) Being Male	2) Having Activity limitation, but no dependency; No activity limitation, but dependency or Activity limitation and dependency in 1996/97
3) Following transitions in functional health status between 1994/95-1996/97:Decline (No AL/No D→ AL/D); Stable (AL/No D); Decline (AL/No D→ No AL/D) or Decline (AL/No D→ AL/D) or Stable (No AL/D) or Decline (No AL/D→ AL/D); Improvement (AL/D→ No AL/No D)	3) Moderate or severe pain in 1994/95
4) Moderate or severe pain in 1996/97	4) High psychological distress in 1996/97
5) High psychological distress in 1996/97	5) Having two or more chronic conditions in 1996/97
6) Following transition in number of chronic conditions between 1994/95-1996/97:Increase (none or one →2 or 3); (2 or 3 →4 or more); Decrease (4 or more →none or one) or (4 or more→2 or 3); Stable (4 or more)	6) Low household income level in 1994/95
7) Low or unknown household income level in 1996/97	7) Less than secondary school graduation
8) Premature death of parent(s)	
9) Low self-esteem	
10) Following transition in drinking behaviour between 1994/95-1996/97:Increase (not at all→ weekly)	
11) Infrequent physical activity	
PROTECTIVE FACTORS	PROTECTIVE FACTORS
1) Following transition in drinking behaviour between 1994/95-1996/97: Stable (weekly drinker at both cycles)	1) Being regular weekly drinker in 1996/97

Section IV: Factors Predicting Very Good or Excellent Self-rated health – Variations Across Demographic Sub-populations

This section addresses research question five, which asks if there is any association between individuals' socioeconomic, physical, social, psychological, lifestyle and genetic endowment characteristics and conditions or their transitions over time with very good or excellent self-ratings of health. Also it addresses research questions six and seven, which ask if there is any variation in predictors across demographic sub-populations. As described in the Methods chapter, there were several decisions made before going through the five steps for answering these questions and developing the appropriate multivariate predictive model which fits the data for the Canadian adults who were age 25 or older in 1994/95. Those decisions also apply to this section.

The complete non-proxy health-related information was available for 9,371 respondents age 25 and over in the 1998/99 NPHS longitudinal file. Given that the outcome of interest in addressing research question five was "very good or excellent self-rated health in 1998/99", respondents who rated their overall health and well-being as either fair or poor were excluded from the analyses. This resulted in a sample size of 8,213; of whom 2,630 rated their overall health as good and 5,583 rated their health as either very good or excellent in 1998/99. These respondents represented an estimated 14.8 million Canadians who were age 25 or older in 1994/95. To keep the sample size the same in all the analyses, records with missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data

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for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level, cognitive ability, hearing ability and self-esteem were defined as separate categories and included in the analyses. In total, 220 records were excluded and the remaining 7,993 records were used to build the final predictive model. As explained in the Methods chapter, in addressing research questions two to seven, five analytical steps were taken. Chart 5.6 summarizes the final decisions made for each of the independent variables.

Chart 5.6: A Summary of Decisions about Independent Variables
Outcome Excellent/Very Good 1998, Total Population Aged 25 or Older

Variable	Time I	Time II	Adding Time II to Time I	Interaction	Final Decision
Age	Kept				
Sex	Kept				
Marital Status	NS	NS			Dropped
Hearing	SIG	NS			Kept (Time I)
Perceived Emotional Support	NS	SIG			Kept (Time II)
Functional Health Status	SIG	SIG	SIG	NS	Kept (Time I + Time II)
Level of Pain	SIG	SIG	SIG	NS	Kept (Time I + Time II)
Cognitive Ability	SIG	SIG	SIG	NS	Kept (Time I + Time II)
Psychological Distress	SIG	SIG	SIG	NS	Kept (Time I + Time II)
Education	SIG				Kept
Premature Death of Parents					Dropped
Household Income Level	SIG	SIG	SIG	NS	Kept (Time I + Time II)
Self-esteem	SIG				Kept
Level of Social Involvement	NS	SIG			Kept (Time II)
Average Frequency of Social Contacts	NS	NS			Dropped
Smoking	SIG	SIG	NS		Kept (Time I)
Drinking	SIG	SIG	SIG	NS	Kept (Time I + Time II)
Physical Activity	SIG	SIG	SIG	SIG	Kept (Time I + Time II + Interaction)
Body Weight	SIG	SIG	NS		Kept (Time I)
No. of Chronic Conditions	SIG	SIG	SIG	NS	Kept (Time I + Time II)

As this chart presents, the potential explanatory variables can be classified

into the following four groups:

Group (1) included "marital status", "premature death of parents", "average frequency of social contacts" for which their measure at neither Time I nor Time II helped to predict "very good or excellent self-rated health in 1998/99". Therefore, these variables were excluded from the analyses at this stage. **Group (2)** included "hearing ability" for which only its measure at Time I helped to predict the outcome. Therefore, the Time II measure of this variable was excluded and it was concluded that transitions in hearing ability over time (between Time I and Time II) were not important in predicting very good or excellent self-rated health two years later in 1998/99. **Group (3)** included "perceived emotional support" and "level of social involvement" for which only their measure at Time II helped to predict very good or excellent self-rated health in 1998/99. Thus, by excluding their measures at Time I, it was concluded that transitions in perceived emotional support and level of social involvement over time (between Time I and Time II) were not important in predicting very good or excellent self-rated health in 1998/99. **Group (4)** included "functional health status", "level of pain", "cognitive ability", "psychological distress", "household income level", "smoking", "drinking", "physical activity", "body weight" and "number of chronic conditions" for which their measures at both Times I and II helped to predict very good or excellent self-rated health in 1998/99. These variables were further explored to determine whether knowing their value or level at two times was better than knowing their value or level at the baseline only. Results from this test revealed that knowing about the respondents' functional health status, level of pain, cognitive ability, level of psychological distress, their

household income level, drinking behaviour, physical activity, and number of chronic conditions during the second cycle of the survey in addition to the baseline information, helped to explain why some of the respondents rated their overall health either as very good or excellent and others as good. Therefore, for these variables, their measures at both Times I and II were included in the next steps of the multivariate analyses and it was concluded that their transitions over time (between Time I and Time II) were important in relation to the outcome. On the other hand, for the variables of "smoking" and "body weight", knowing their value at Time II did not add to the predictive value of the baseline information. Thus, by excluding Time II measures of these variables, it was concluded that transitions over time in smoking and body weight were not important in predicting very good or excellent self-rated health.

Respondents' age, sex, level of education, and self-esteem from the first cycle of the survey were also considered in the next steps of developing the multivariate predictive model. For each of the variables within the fourth category (except for smoking and body weight), further testing was done to determine whether their effect at Time I, in relation to the outcome of interest, is independent from their effect at Time II. In brief, only one significant interaction effect was found between Time I and Time II measures, specifically in physical activity. The significant interaction effect meant that information on the association between the main effect measures of physical activity with the outcome are not enough to discuss the impact of the transitions. Therefore, to

measure the impact of the main effects and all the possible transitions, a multi-categorical variable was created and included in the next steps of the analyses.

With decisions made about each of the independent variables, the next step involved using the adopted conceptual model, Evans and Stoddart's Population Health Framework (1994), to classify the selected independent variables into the following six categories:

1. *Genetic Endowment* included respondents' age in 1994/95 and sex.

2. *Prosperity* included household income level measured in 1994/95 and 1996/96.

3. *Health and Function* included functional health status measured in 1994/95 and 1996/97, level of pain measured in 1994/95 and 1996/97, cognitive ability measured in 1994/95 and 1996/97, and level of psychological distress measured in 1994/95 and 1996/97.

4. *Social Environment* included hearing ability measured in 1994/95, perceived emotional support measured in 1996/97, level of social involvement measured in 1996/97.

5. *Individual Behavior* included highest level of education measured in 1994/95, self-esteem measured in 1994/95, smoking measured in 1994/95, drinking measured in 1994/95 and 1996/97, physical activity measured in 1994/95 and 1996/97 and their transitions between 1994/95 and 1996/97, and body weight measured in 1994/95.

6. *Disease* included number of chronic conditions measured in 1994/95 and 1996/97.

Since high correlations among the selected independent variables within each category could cause a multi-colinearity problem in multivariate analyses, five logistic regression models were developed, each regressed age, sex, and one of the defined categories of the independent variables against the outcome of interest to select the independent variables with the highest predictive value within each category. Each of those models was compared with the base model which regressed only respondents' age and sex against the outcome. The Base Model (EXVG98= AGE + SEX) had a significant X^2 value of 202.965, with d.f=6 (p=0.0001). The overall fit of the other five models was as follows:

Model (1) EXVG98 = AGE + SEX + Measures within the Prosperity category [X^2 =282.035, d.f=10, p=0.0001]

Model (2) EXVG98 = AGE + SEX + Measures within the Health and Function category [X^2 =720.477, d.f=18, p=0.0001]

Model (3) EXVG98 = AGE + SEX + Measures within the Social Environment category [X^2 =259.303, d.f=11, p=0.0001]

Model (4) EXVG98 = AGE + SEX + Measures within the Individual Behavior category [X^2 =564.734, d.f=27, p=0.0001]

Model (5) EXVG98 = AGE + SEX + Measures within the Disease category [X^2 =513.355, d.f=10, p=0.0001]

Comparing the overall fit of the five models with the overall fit of the base model revealed that they have significantly higher predictive values. Therefore, it was concluded that having other information for each respondent beyond his/her

sex and age increased our ability to explain why some respondents rated their health better than others did. However, as statistical results from this step revealed in some of the categories, there were variables with non-significant p values (p>0.01). Using the backward step-wise approach, the non-significant variables were dropped if their exclusion did not significantly decrease the overall fit of that model. In total, the following two independent variables were dropped at this stage:

- Cognitive ability measured in 1996/97 from the "health and function" category;

- Drinking behaviour in 1994/95 from the "individual behaviour" category.

After selecting variables with the most predictive values within each category, the five categories of variables were used as the building blocks to build the final multivariate logistic regression for predicting very good or excellent self-rated health in 1998/99. Using the practical method explained earlier in this chapter, categories were ranked and the "disease" category was the first to be introduced followed by health and function, prosperity, social environment and individual behaviour categories. The statistical results from this step are summarized in Chart 5.7.

Chart 5.7: Results of Testing the Significance of the Predictive Value of Each Category of Independent Variables, Outcome Excellent\Very Good Self-rated Health in 1998/99, Total Population Aged 25 or Older

Model	Independent Variables	Overall Fit of the Model	The Two Models Compared	Difference between the Overall Fit of the Two Models	Final Decision
Basic Model	Age SEX	X^2 =202.965 d.f=6 p=0.0001			Keep [Age and Sex]
First Model	Age SEX "Disease"	X2=513.35 d.f=10 p=0.0001	First Model and the Basic Model	X^2 =310.4 d.f=4 P<0.001 (SIG)	Keep [Age, Sex, and "Disease" category]
Second Model	Age SEX "Disease" "Health and Function"	X^2 =824.71 d.f=21 p=0.0001	Second Model and the First Model	X^2 =311.4 d.f=11 P<0.001 (SIG)	Keep [Age, Sex, "Disease" and "Health and Function" Categories]
Third Model	Age SEX ' "Disease" "Health and Function" "Prosperity"	X^2 =874.40 d.f=25 p=0.0001	Third Model and the Second Model	X^2 =49.7 d.f=4 P<0.001 (SIG)	Keep [Age, Sex, "Disease", "Health and Function" and "Prosperity" Categories]
Fourth Model	Age SEX "Disease "Health and Function" "Prosperity" "Social Environment"	X^2 =905.76 d.f=30 p=0.0001	Fourth Model and the Third Model	X^2 =31.36 d.f=5 P<0.001 (SIG)	Keep [Age, Sex, "Disease", "Health and Function", "Prosperity" and "Social Environment" Categories]
Fifth Model	Age SEX "Disease "Health and Function" "Prosperity" "Social Environment" "Individual Behaviour"	X^2 =1082.2 d.f=49 p=0.0001	Fifth Model and the Fourth Model	X^2 =176.42 d.f=19 P<0.001 (SIG)	Keep [Age, Sex, "Disease", "Health and Function", "Prosperity", "Social Environment" and "Individual Behaviour" Categories]

According to the results presented in this chart, variables within the five categories of "Disease", "Health and Function", "Prosperity", "Social Environment" and "Individual Behaviour" had significant predictive values and

were kept in the final multivariate model which predicts "very good or excellent self-rated health in 1998/99" for the Canadian population age 25 or older in 1994/95. The fifth model was considered as the final predictive model with an overall fit of X2 =1082.2, d.f=49, and p=0.0001.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model that predicts the outcome of very good or excellent self-rated health in 1998/99 for the household population who were aged 25 or older in 1994/95 are summarized in Table 5.12.

Table 5.12: Adjusted Odds Ratios for those Age 25 or Older in 1994/95 for Very Good or Excellent Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	1.3	*	1.1	1.5
45-54	0.9		0.7	1.1
55-64	0.8		0.7	1.1
65-74	0.7	*	0.6	1.0
75+	0.9		0.6	1.3
Sex				
Female	1.0		.....	.....
Male	1.0		0.9	1.1
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	0.8	*	0.7	1.0
4 or more chronic conditions	1.6		0.9	2.7
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	0.6	*	0.5	0.7
4 or more chronic conditions	0.4	*	0.3	0.7
Functional health status				

1994/95				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.7	*	0.5	0.8
No activity limitation, but dependency	0.5		0.2	1.2
Activity limitation and dependency	0.6	*	0.4	1.0
Functional health status 1996/97				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.6	*	0.5	0.7
No activity limitation, but dependency	0.8		0.4	1.5
Activity limitation and dependency	0.5	*	0.3	0.8
Level of Pain 1994/95				
Moderate or severe pain	0.8	*	0.6	1.0
Mild or no pain	1.0		.....	.....
Level of Pain 1996/97				
Moderate or severe pain	0.7	*	0.5	0.9
Mild or no pain	1.0		.....	.....
Cognition in 1994/95				
No cognitive problem	1.0		.....	.....
Having cognitive problem	0.8	*	0.7	1.0
Unknown	0.8		0.7	1.1
Psychological distress 1994/95				
High	0.8		0.6	1.1
Low/moderate	1.0		.....	.....
Psychological distress 1996/97				
High	0.8	*	0.7	1.0
Low/moderate	1.0		.....	.....
Household Income 1994/95				
Lowest/Lower-middle/Middle	0.9	*	0.7	1.0
Upper-middle/Highest	1.0		.....	.....
Unknown	0.8		0.6	1.2
Household Income 1996/97				
Lowest/Lower-middle/Middle	0.7	*	0.5	0.9
Upper-middle/Highest	1.0		.....	.....
Unknown	1.0		0.7	1.3
Hearing Ability 1994/95				
No hearing problem	1.0		.....	.....
Having hearing problem	0.5		0.1	2.1

Unknown	0.9		0.7	1.1
Perceived emotional support 1996/97				
Low	0.9		0.8	1.1
Enough	1.0		.....	.....
Level of Social Involvement 1996/97				
Low	0.9		0.8	1.1
Moderate	0.8	*	0.7	1.0
High	1.0		.....	.....
Educational Attainment 1994/95				
Less than secondary school graduation	0.7	*	0.6	0.9
Graduated from high school	1.0		.....	.....
Self-esteem 1994/95				
Low	0.7	*	0.6	0.8
Not low	1.0		.....	.....
Unknown	⎯⎯		⎯⎯	⎯⎯
Smoking behavior 1994/95				
Daily Smoker	1.0		0.7	1.4
Occasional Smoker	1.3	*	1.0	1.6
Non-smoker (not at all)	1.0		.....	.....
Drinking behavior 1996/97				
Regular - Weekly drinker	1.2	*	1.0	1.4
Not regular - Less than once a week	1.0		0.8	1.4
Abstainer	1.0		.....	.....
Frequency of physical activity				
Stable (regular at both cycles)	1.0		.....	.....
Decrease (regular→occasional)	0.6	*	0.5	0.9
Decrease (regular→ infrequent)	0.7	*	0.6	0.9
Increase (occasional→ regular)	0.7	*	0.6	1.0
Stable (occasional at both cycles)	0.8		0.6	1.1
Decrease (occasional→ infrequent)	0.9		0.7	1.2
Increase (infrequent→ regular)	0.8	*	0.6	1.0
Increase (infrequent→ occasional)	0.6	*	0.5	0.8
Stable (infrequent at both cycles)	0.9		0.6	1.5
Body weight 1994/95				
Underweight	0.8	*	0.6	1.0

Acceptable weight	1.0		.....	.....
Some excess weight	0.9		0.7	1.1
Overweight	0.7	*	0.6	0.8

Notes:

The model for very good or excellent self-rated health is based on 7,993 respondents age 25 or older, 5,383 rated their overall health either as very good or excellent and 2, 610 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. "Missing" categories for household income and body weight were included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.

* $p < 0.01$
.... Not appropriate

Main Findings

Logistic regression analyses revealed that there are many factors, which help to explain why some of the Canadians who were age 25 or older in 1994/95 rated their overall health and well-being as being better than the others four years later in 1998/99. Among those factors, number of chronic conditions had the greatest explanatory power followed by factors related to individuals' health and functioning. Individuals' prosperity, social environment, individuals' lifestyle and behaviours were also important. Family history of premature death of parent(s) as an indictor of individual(s) genetic endowment did not help to explain the observed variation in the outcome (very good or excellent self-rated health versus good). Factors related to "health and function" included functional health status, level of pain, cognitive ability, and level of psychological distress. Factors related to "prosperity" included household income level and factors related to social environment included hearing ability, perceived emotional support, and level of

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social involvement. Factors related to individuals' lifestyle and behaviour included level of education, self-esteem, smoking behaviour, drinking behaviour, level of physical activity and body weight (Table 5.12). To explain the variations observed in the outcome, information on two-year transitions in number of chronic conditions, functional health status, level of pain, level of psychological distress, household income level and level of physical activity were also important. Using adjusted odds ratios to identify the unique influence of each independent variables within the final model, a significant association was found between the following factors and very good or excellent ratings of health in 1998/99 among Canadians who were age 25 or older in 1994/95.

Factors Related to Genetic Endowment

Age: According to the information presented in Table 5.12, when controlling for the effects of functional health status, number of chronic conditions, individuals' prosperity, social environment health behaviours and psychological distress there was no longer a significant linear association between age and very good or excellent self-rated health. Compared to the youngest age group, people in the successive age groups had decreased odds of rating their overall health and well-being as either very good or excellent. The exceptions were those between ages 35 and 44. This age group compared to the youngest age group was more likely to rate their overall health as either very good or excellent [OR=1.3, (CI= 1.1, 1.5)]. People between ages 65 and 74 had odds of reporting very good or excellent health, which was significantly lower than the odds for the youngest age group [OR=0.7, (CI= 0.6, 1.0)].

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Factors Related to Disease

Number of Chronic Conditions: Number of chronic conditions was a significant

predictor of very good or excellent self-rated health in 1998/99. According to the

information presented in Table 5.12, Canadian adults age 25 or older in 1994/95

who had two or three chronic conditions were significantly less likely to rate their

overall health and well-being as either very good or excellent compared to those

who had none or one chronic condition at that time [OR=0.8, (CI=0.7, 1.0)].

Similarly, those who had two or three chronic conditions in 1996/97 had

decreased odds of rating their overall health in 1998/99 as either very good or

excellent compared to those who had none or one chronic condition at that time

[OR=0.6, (CI=0.5, 0.7)]. Those who had four or more chronic conditions in

1996/97 had also lower odds of reporting very good or excellent health [OR=0.4,

(CI=0.3, 0.7)].

Regression analyses also revealed that the two-year transitions in number

of chronic conditions are associated with very good or excellent ratings of health

in 1998/99. However, since there was no significant interaction effect between

Time I and Time II measures of number of chronic conditions, the odds ratios

associated with the transitions are not reported.

Factors Related to Health and Function

Functional Health Status: The ability to carry out daily activities without

limitation or dependence on others was associated with very good or excellent

self-rated health for Canadian adults age 25 or older in 1994/95. According to the information presented in Table 5.12, Canadians who had activity limitations, but were not dependent on others in 1994/95 were less likely to rate their overall health either as very good or excellent compared to those who did not have activity limitations and were not functionally dependent [OR=0.7, (CI=0.5, 0.8)]. Those who had activity limitations and were also functionally dependent in 1994/95 also had lower odds of rating their overall health as either very good or excellent [OR=0.6, (CI=0.4, 1.0)]. Similar association was found between functional health status in 1996/97 and very good or excellent self-rated in 1998/99.

Regression analyses also revealed that two-year transitions in functional health status are associated with very good or excellent ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of functional health status, the odds ratios associated with the two-year transitions are not reported.

Level of Pain: There was a significant association between level of pain in 1994/95 and very good or excellent self-rated health in 1998/99. Those who suffered from moderate or severe pain during the first cycle of the survey in 1994/95 were significantly less likely to report very good or excellent health in 1998/99 compared to those who did not have any pain or experienced mild pain [OR=0.8, (CI=0.6, 1.0)]. Similarly, those who suffered from moderate or severe pain during the second cycle of the survey in 1996/97 were also significantly less

likely to report very good or excellent health in 1998/99 compared to those who did not have any pain or experienced mild pain [OR=0.7, (CI=0.5, 0.9)]. Regression analyses also revealed that two-year transitions in level of pain are associated with very good or excellent ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of pain, the odds ratios associated with the observed two-year transitions are not reported.

Cognitive Ability: Having any kind of cognitive problem was associated with decreased odds of reporting very good or excellent self-rated health. Adults who were 25 or older in 1994/95 and had cognitive problem were significantly less likely to rate their overall health and well-being as either very good or excellent [OR=0.8, (CI=0.7, 1.0)].

Level of Psychological Distress: High psychological distress also decreased the odds of reporting very good or excellent health. Those who experienced high psychological distress in 1996/97 were significantly less likely to rate their overall health as either very good or excellent compared to those who were not highly distressed [OR=0.8, (CI=0.7, 1.0)].

Regression analyses also revealed that two-year transitions in level of psychological distress are associated with very good or excellent ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of distress, the odds ratios associated with the observed two-year transitions are not reported.

Factors Related to Prosperity

Household Income Level: A significant association was found between household income level and very good or excellent self-rated health. According to the regression analyses results presented in Table 5.12, Canadians who were from households with the lowest/lower middle and middle income level in 1994/95 were significantly less likely to rate their overall health as either very good or excellent compared to those who were from families with the highest or upper-middle income level [OR=0.9, (CI=0.7, 1.0)]. Similar associations were found between household income level in 1996/97 and very good or excellent health in 1998/99.

Regression analyses also revealed that two-year transitions in household income level are associated with very good or excellent ratings of health in 1998/99. However, since there was no significant interaction effect between Time I and Time II measures of household income level, the odds ratios associated with the observed two-year transitions are not reported.

Factors Related to Social Environment

Level of Social Involvement: Canadian adults who were age 25 or older in 1994/95 and had a moderate level of social involvement in 1996/97 were significantly less likely to rate their overall health and well-being as either very good or excellent compared to those who were highly involved and participated in associations, voluntary organizations or attended religious services [OR=0.8, (CI=0.7, 1.0)]

Factors Related to Individual Behaviour

Highest Level of Education: Odds of reporting very good or excellent health were significantly lower for adults age 25 or older who had not graduated from high school compared to those who were also 25 or older in 1994/95, but had graduated from high school [OR=0.7, (CI=0.6, 0.9)].

Self-esteem: People with low self-esteem were less likely to rate their overall health and well-being as either very good or excellent compared to those who had high self-esteem [OR=0.7, (CI=0.6, 0.8)].

Smoking Behaviour: Adults age 25 or older in 1994/95 and were occasional smokers were more likely to rate their overall health and well-being as either very good or excellent compared to those who were non-smokers [OR=1.3, (CI=1.0, 1.6)].

Drinking Behaviour: The odds of rating overall health as either very good or excellent was significantly higher for adults age 25 or older who were regular weekly drinkers compared to those who were abstainers [OR=1.2, (CI=1.0, 1.4)].

Level of Physical Activity: Level of physical activity was a significant predictor of very good or excellent self-rated health among Canadian adults age 25 or older in 1994/95. Since there was a significant interaction effect between level of physical activity in 1994/95 and in 1996/97, all the potential transition patterns

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were defined and included in the logistic regression model. According to the results presented in Table 5.12, any change from "regular physical activity during both cycles of the survey" was associated with a decreased rating of the overall health as either very good or excellent. However, as Table 5.12 presents, the odds ratio was significant only for five of the transition patterns.

Body Weight: Canadian adults who were underweight or overweight in 1994/95 had significantly decreased odds of rating their overall health and well-being as either very good or excellent compared to those who had acceptable weight.

Are the predictors of Fair or Poor Self-rated Health Different for Men Compared to Women?

This part of section IV addresses research question six, which asks if predictors of very good or excellent self-rated health are different for men compared to women. Answering this question required developing two separate logistic regression models, one fitting the longitudinal data for male respondents age 25 or older in 1994/95 and another model fitting the longitudinal data for female respondents age 25 or older in 1994/95. In developing the two models, the decisions which were made and the steps taken were the same as those used to develop the predictive model for the total population age 25 or older.

Longitudinal Model Predicting Very Good or Excellent Self-rated Health for

Males age 25 or Older

In developing a longitudinal model which predicts the outcome of very good or excellent self-rated health in 1998/99 among males age 25 or older in 1994/95, all the records for male respondents who rated their overall health and well-being in 1998/99 as either very good or excellent or good were selected. Records for the male respondents who rated their overall health and well-being as either fair or poor were excluded from the analyses (453 records). This resulted in a sample size of 3,538; of whom 1,099 rated their overall health as good and 2,439 rated their health as either very good or excellent in 1998/99. These respondents represented an estimated 7 million male Canadians who were age 25 or older in 1994/95. To keep the sample size the same in all the analyses, missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level and body weight were defined as separate categories and included in the analyses. In total, 134 records were excluded and the remaining 3,404 records were used to build the final predictive model. As mentioned earlier all the analytical steps, which were taken to fit a longitudinal model to the data for all respondents age 25 or older, were also taken in building the predictive model for male respondents.

The detailed analytical findings from steps 1 to 3 for identifying the significant independent variables are not presented in this section. However,

many of the characteristics and conditions which were associated with positive ratings of health (very good or excellent) among the total population age 25 or older were also associated with the same outcome among the male sub-population age 25 or older.

The next step involved selection of the variables with the most predictive values within the five categories of *Prosperity, Health and Function, Social Environment, Individual Behaviour,* and *Disease.* Following a stepwise approach, these five categories of variables were ranked and used as the building blocks to specify the final predictive model.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model that predicts the outcome of very good or excellent self-rated health in 1998/99 for the male household sub-population age 25 or older in 1994/95 are summarized in Table 5.13.

Table 5.13: Adjusted Odds Ratios for Males Age 25 or Older in 1994/95 for Very Good or Excellent Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	1.3	*	1.0	1.8
45-54	1.1		0.8	1.5
55-64	0.7	*	0.5	1.0
65-74	0.9		0.6	1.4
75+	0.6		0.3	1.2
Functional health status 1994/95				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.6	*	0.5	0.9
Being functionally dependent	0.5		0.2	1.2
Functional health status 1996/97				

No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.5	*	0.3	0.7
Being functionally dependent	0.4	*	0.2	0.8
Level of Pain 1996/97				
Moderate or severe pain	0.7		0.5	1.1
mild or no pain	1.0		.....	.....
Cognition in 1994/95				
No cognitive problem	1.0		.....	.....
Having cognitive problem	0.7	*	0.6	0.9
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or more chronic conditions	0.8		0.6	1.2
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or more chronic conditions	0.7	*	0.5	0.9
Self-esteem 1994/95				
Low	0.7	*	0.5	1.0
Not low	1.0		.....	.....
Smoking behavior 1994/95				
Daily Smoker	0.6	*	0.5	0.7
Occasional Smoker	1.2		0.7	2.0
Non-smoker (not at all)	1.0		.....	.....
Frequency of physical activity 1996/97				
Regular	1.0		.....	.....
Occasional	0.9		0.7	1.1
Infrequent	0.7	*	0.5	0.9
Body weight 1994/95				
Underweight	0.7		0.4	1.2
Acceptable weight	1.0		.....	.....
Some excess weight	1.4	*	1.1	1.8
Overweight	1.4	*	1.1	1.8
Hearing Ability 1994/95				
No hearing problem	1.0		.....	.....
Having hearing problem	0.5	*	0.3	0.9
Perceived emotional support 1996/97				
Low	0.8	*	0.6	1.0
Enough	1.0		.....	.....
Level of Social Involvement 1996/1997				
Low	0.8		0.7	1.1
Moderate	0.8		0.6	1.1
High	1.0		.....	.....

Notes:
The model for very good or excellent self-rated health is based on 3,404 male respondents age 25 or older, 2,359 rated their overall health as either very good or excellent and 1,045 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in

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1994/95, 1996/97 and 1998/99. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.

* p<0.01
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.13 with the regression results presented in Table 5.12 revealed significant differences in the factors predicting very good or excellent health among the total population age 25 or older with those predicting the same outcome among the male sub-population. These differences are discussed within the relevant components of the conceptual framework.

Genetic Endowment

Age: According to the information presented in Table 5.13, when controlling for the effects of functional health status, number of chronic conditions, health behaviours, social environment and psychological factors there was no longer a significant linear association between age and very good or excellent self-rated health. The odds ratio was significant only for two age groups. Compared to the youngest age group, those between ages 35 and 44 had significantly higher odds of reporting very good or excellent self-rated health [OR=1.3, (CI= 1.0, 1.8)] and those between ages 55 and 64 had lower odds of reporting very good or excellent health [OR=0.7, (CI= 0.5, 1.0)]. Among the total population age 25 or older,

those between ages 35 and 44 had significantly higher odds of reporting very good or excellent health compared to the youngest age group. But, compared to the same reference category, those between ages 65 and 74 had significantly lower odds of reporting very good or excellent health.

Health and Function

Functional Health Status: Having activity limitations in the presence or absence of functional dependency during the first or the second cycles of the NPHS was negatively associated with positive ratings of health status among the total population aged 25 or older. Among the male sub-population, however, only activity limitations in the absence of functional dependency during the first cycle of the survey and activity limitations in the absence or presence of functional dependency during the second cycle of the survey were associated with the same outcome. The two-year transitions in functional health status were important in predicting positive ratings of health among both populations.

Level of Psychological Distress: High psychological distress in 1996/97 was found to be a significant protective factor for reporting very good or excellent health among the total population. But, this characteristic was not associated with the same outcome among the male sub-population. The two-year transitions in level of psychological distress were also important in predicting the outcome among the total population, but not among the males.

Level of Pain: Level of pain was found to be a significant predictor of positive ratings of health among the total population, but not among the male sub-population. The two-year transitions in level of pain were also important in predicting the same outcome only among the total population.

Disease

Number of Chronic Conditions: According to the information presented in Table 5.13, men who had two or more chronic conditions in 1996/97 were significantly less likely to rate their overall health and well-being as either very good or excellent compared to those who had none or one chronic condition [OR=0.7, (CI=0.5, 0.9)]. Among the total population, those who had two or three chronic condition in 1994/95 and those who had two or more chronic conditions in 1996/97 were significantly less likely to rate their overall health as either very good or excellent. The two-year transitions in number of chronic conditions were important in predicting the outcome among both populations.

Prosperity

Household Income Level: A significant association was found between household income level and positive ratings of health status among the total population, but not among the male sub-population. The two-year transitions in household income level were also important in predicting the outcome among the total population, but not among the males.

Individual Behaviour

Level of Education: Among the total population aged 25 or older, low level of education was found to be a protective factor for positive ratings of health. There was no significant association between level of education and this outcome among the men.

Smoking Behaviour: Men age 25 or older and who were daily smokers in 1994/95 were significantly less likely to rate their overall health as either very good or excellent compared to those who were non-smokers [OR=0.6, (CI=0.5, 0.7)]. Among the total population, those who were occasional smokers were more likely to rate their overall health as either very good or excellent compared to those who were non-smokers.

Drinking Behaviour: Regular weekly drinking was a risk factor for positive ratings of health among the total population. There was no significant association between drinking behaviour and very good or excellent ratings of health among the male sub-population.

Level of Physical Activity: Men with infrequent physical activity during the second cycle of the survey were less likely to report very good or excellent health compared to those who were regularly active [OR=0.7, (CI=0.5, 0.9)]. Only among the total population, was there a significant interaction effect between

Time I and Time II measures of level of physical activity and five transition patterns were found to be protective factors for positive ratings of health.

Body Weight: Compared to those who had acceptable weight, men who had some excess weight or were overweight were significantly more likely to rate their overall health and well-being as either very good or excellent [OR=1.4, (CI=1.1, 1.8)]. Among the total population, those who were underweight or overweight were less likely to report very good or excellent health compared to those who had acceptable weight.

Social Environment

Hearing Ability: Men with a hearing problem were less likely to rate their overall health as either very good or excellent compared to those who did not have any hearing problem [OR=0.5, (CI=0.3, 0.9)]. Hearing ability was not a significant predictor of positive ratings of health among the total population.

Perceived Emotional Support: Men with low perceived emotional support had lower odds of reporting very good or excellent health compared to those who had high emotional support [OR=0.8, (CI=0.6, 1.0)]. Perceived emotional support was not a significant predictor of positive ratings of health among the total population.

Level of Social Involvement: A moderate level of social involvement was a protective factor for positive ratings of health among the total population. There was no significant association between this characteristic and very good or excellent health among men.

Longitudinal Model Predicting Very Good or Excellent Self-rated Health for Females Age 25 or Older

In developing a longitudinal model which predicts very good or excellent self-rated health in 1998/99, for females age 25 or older, all the records for the female respondents who rated their overall health and well-being in 1998/99 as either very good or excellent or good were selected. Records for female respondents who rated their overall health and well-being as either fair or poor were excluded from the analyses (705 records). This resulted in a sample size of 4,675; of whom 1,531 rated their overall health as good and 3,144 rated their health as either very good or excellent in 1998/99. These respondents represented 7.8 million female Canadians who were age 25 or older in 1994/95. To keep the sample size the same in all the analyses, missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level and body weight were defined as separate categories and included in the analyses. In total, 267 records

were excluded and the remaining 4,408 records were used to build the final predictive model.

As mentioned earlier all the analytical steps, which were taken to fit a longitudinal model to the data for the respondents age 25 or older were also taken in building the predictive model for female respondents. The detailed analytical findings from steps 1 to 3 for identifying the significant independent variables are not presented in this section. However, many of the characteristics and conditions which were associated with a positive rating of health (very good or excellent) among the total population age 25 or older were also associated with the same outcome among the female population age 25 or older.

The next step involved selection of the variables with the most predictive value within the five *categories of Prosperity, Health and Function, Social Environment, Individual Behavior, and Disease* (the category of genetic endowment was dropped at the earlier stage). Following a stepwise approach, these five categories of variables were then ranked and used as the building blocks to specify the final predictive model.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model which predicts the outcome of very good or excellent self-rated health in 1998/99 for the female household population age 25 or older in 1994/95 are summarized in Table 5.14.

Table 5.14: Adjusted Odds Ratios for Females Age 25 or Older in 1994/95 for Very Good or Excellent Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	1.2		0.9	1.6
45-54	0.8	*	0.6	1.0
55-64	1.0		0.7	1.4
65-74	0.7	*	0.5	1.0
75+	1.0		0.6	1.7
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	0.8		0.6	1.1
4 or more chronic conditions	1.1		0.5	2.3
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or 3 chronic conditions	0.5	*	0.4	0.7
4 or more chronic conditions	0.4	*	0.2	0.8
Functional health status 1994/95				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.7	*	0.5	1.0
Being functionally dependent	0.6	*	0.4	1.0
Functional health status 1996/97				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.7	*	0.5	1.0
Being functionally dependent	0.7		0.4	1.2
Level of Pain 1994/95				
Moderate or severe pain	0.7	*	0.5	0.9
mild or no pain	1.0		.....	.....
Level of Pain 1996/97				
Moderate or severe pain	0.7		0.5	1.1
mild or no pain	1.0		.....	.....
Cognitive Ability in 1996/97				
No cognitive problem	1.0		.....	.....
Having cognitive problem	0.8	*	0.6	1.0
Psychological distress 1994/95				
High	0.7	*	0.5	0.9
Low/moderate	1.0		.....	.....
Psychological distress 1996/97				
High	0.8		0.6	1.1
Low/moderate	1.0		.....	.....
Household Income 1994/95				
Lowest/Lower-middle/Middle	0.7	*	0.6	0.9
Upper-middle/Highest	1.0		.....	.....
Unknown	0.8		0.5	1.3

Household Income 1996/97				
Lowest/Lower-middle/Middle	0.9		0.7	1.1
Upper-middle/Highest	1.0		.....	.....
Unknown	0.8		0.6	1.3
Educational Attainment 1994/95				
Less than secondary school graduation	0.8	*	0.6	1.0
Graduated from high school	1.0		.....	.....
Self-esteem 1994/95				
Low	0.7	*	0.5	0.9
Not low	1.0		.....	.....
Smoking behavior 1994/95				
Daily Smoker	0.8	*	0.6	1.0
Occasional Smoker	0.8		0.5	1.3
Non-smoker (not at all)	1.0		.....	.....
Drinking behavior 1996/97				
Regular - Weekly drinker	1.5	*	1.1	2.0
Not regular - Less than once a week	1.4	*	1.1	1.7
Abstainer	1.0		.....	.....
Frequency of physical activity 1994/95				
Regular	1.0		.....	.....
Occasional	0.8	*	0.6	1.0
Infrequent	0.8	*	0.6	1.0
Frequency of physical activity 1996/97				
Regular	1.0		.....	.....
Occasional	1.1		0.8	1.4
Infrequent	0.8		0.7	1.1
Body weight 1994/95				
Underweight	1.4	*	1.0	2.0
Acceptable weight	1.0		.....	.....
Some excess weight	1.7	*	1.3	2.1
Overweight	1.3	*	1.0	1.8
Unknown				

Notes:

The model for very good or excellent self-rated health is based on 4,408 female respondents age 25 or older, 2,978 rated their overall health as either very good or excellent and 1,430 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. "Missing" categories for household income and body weight were included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.

* p<0.01
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.14 with the regression results presented in Table 5.12 revealed variations in the factors predicting very good or excellent health among the total population aged 25 or older with those predicting the same outcome among the female sub-population. These differences are discussed within the relevant components of the conceptual framework.

Genetic Endowment

Age: According to the information presented in Table 5.14, when controlling for the effects of functional health status, number of chronic conditions, health behaviours, and individuals' prosperity, there was no longer a significant linear association between age and very good or excellent self-rated health. The odds ratio was significant only for two age groups. Compared to the youngest age group, women between ages 45 and 54 in 1994/95 as well as those between 65 and 74 had significantly lower odds of reporting very good or excellent health. Among the total population, compared to the youngest age group, those between ages 35 and 44 had significantly higher and those who aged between 65 and 74 had significantly lower odds of reporting very good or excellent health.

Disease

Number of Chronic Conditions: There was a significant association between number of chronic conditions in 1996/97 and very good or excellent health in

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1998/99 among women. Among the total population, having two or three chronic conditions in 1994/95 and also two or more chronic conditions in 1996/97 was associated with decreased odds of reporting very good or excellent health. The two-year transitions in number of chronic conditions were important in predicting the outcome of interest among both target populations.

Health and Function

Level of Pain: There was a significant association between level of pain in 1994/95 and very good or excellent self-rated health in 1998/99 among women. Among the total population, moderate or severe pain during both cycles of the survey was associated with decreased odds of reporting very good or excellent health. The two-year transitions in level of pain were important in predicting this outcome among both target populations.

Cognitive Ability: Women who had cognitive problem in 1996/97 were significantly less likely to rate their overall health and well-being as either very good or excellent compared to those who did not have any cognitive problem [OR=0.8, (CI=0.6, 1.0)]. Among the total population, having cognitive problem during the first cycle of the survey (in 1994/95) was associated with decreased odds of reporting very good or excellent health.

Level of Psychological Distress: Females age 25 or older with high scores on the psychological distress scale in 1994/95 were significantly less likely to rate their overall health and well-being as either very good or excellent compared to those who had low or moderate psychological distress [OR=0.7, (CI=0.5, 0.9)]. Among the total population age 25 or older, those who reported high psychological distress during the second cycle of the survey were significantly less likely to rate their health as either very good or excellent. The two-year transitions in level of psychological distress were associated with this outcome among both populations.

Prosperity

Household Income Level: Females who were from families with the lowest/lower-middle and middle income levels during the first cycle of the survey had significantly lower odds of rating their overall health as either very good or excellent compared to those who were from families with upper-middle and highest income levels [OR=0.7, (CI=0.6, 0.9)]. Low household income level during both cycles of the survey was associated with decreased odds of reporting very good or excellent health among the total population. The two-year transitions in household income levels were associated with this outcome among both populations.

Individual Behaviour

Smoking Behaviour: Women who were daily smokers in 1994/95 were significantly less likely to rate their overall health as either very good or excellent compared to those who were non-smokers [OR=0.8, (CI=0.6, 1.0)]. Occasional

smoking was associated with increased odds of reporting very good or excellent health among the total population.

Drinking Behaviour: Women who were occasional drinkers in 1996/97 were significantly more likely to rate their overall health and well-being as either very good or excellent compared to those who were abstainers [OR=1.4, (CI=1.1, 1.7)]. Those who were regular drinkers in 1996/97 had higher odds of rating their overall health as either very good or excellent compared to the same reference category [OR=1.5, (CI=1.1, 2.0)]. Among the total population, only those who were regular weekly drinkers in 1996/97 were significantly more likely to rate their overall health as either very good or excellent.

Level of Physical Activity: Women with occasional or infrequent patterns of physical activity in 1994/95 were less likely to report very good or excellent health compared to those who were regularly active [OR=0.8, (CI=0.6, 1.0)]. Among the total population, there were significant interaction effects between Time I and Time II measures of level of physical activity with five transition patterns found to be protective factors for positive ratings of health.

Body Weight: Compared to those who were in the acceptable weight range, women who were underweight or overweight or had some excess weight were significantly more likely to rate their overall health as either very good or

excellent. Among the total population, those who were underweight or overweight had decreased odds of reporting very good or excellent health.

Social Environment

Level of Social Involvement: A moderate level of social involvement was a protective factor for positive ratings of health among the total population. There was no significant association between this characteristic and very good or excellent health among women.

<u>Summary</u>

The two logistic regression models, one of which predicts very good or excellent self-rated health for women and the other for men age 25 or older, were different in terms of their building blocks based on the components of the Evans and Stoddart (1994) Population Health Framework. The blocks of "health and function", "disease", and "individual behaviour" were common between the two models but in a different order. "Social environment" helped to explain very good or excellent self-rated health only among men and "prosperity" helped to explain very good or excellent self-rated health only among women. The significant predictors of very good or excellent self-rated health (both risk factors and protective factors) are compared in Chart 5.8.

Chart 5.8: Comparing Predictors of Very Good/Excellent Self-rated Health between the Male and Female Household Sub-populations Age 25 or Older

MALE HOUSEHOLD POPULATION AGED 25 OR OLDER	FEMALE HOUSEHOLD POPULATION AGED 25 OR OLDER
RISK FACTORS	**RISK FACTORS**
1) Age between 35 and 44	1) Being a weekly or occasional drinker in 1996/97
2) Having some excess weight or being overweight in 1994/95	2) Being underweight, having some excess weight or being overweight in 1994/95
PROTECTIVE FACTORS	**PROTECTIVE FACTORS**
1) Age between 55 and 64	1) Age between 45 and 54 or age between 65 and 74
2) Having activity limitation in 1994/95	2) Having two or more chronic conditions in 1996/97
3)Having activity limitation or being functionally dependent in 1996/97	3) Having activity limitation and being functionally dependent in 1994/95
4) Having cognitive problem in 1994/95	4) Having activity limitation in 1996/97
5) Having two or more chronic conditions in 1996/97	5) Moderate or severe pain in 1994/95
6) Low self-esteem in 1994/95	6) Having cognitive problem in 1996/97
7) Being a daily smoker in 1994/95	7) High psychological distress in 1994/95
8) Infrequent physical activity in 1996/97	8) Low income in 1994/95
9) Having hearing problem	9) Less than secondary school graduation in 1994/95
10) Low level of perceived emotional support in 1996/97	10) Low self-esteem in 1994/95
	11) Being a daily smoker in 1994/95
	12) Occasional or infrequent physical activity in 1994/95

Are the Predictors of Very Good or Excellent Self-rated Health Different for Middle-aged Adults (age between 25 and 54) Compared to Older Adults (Age 55 or Older)?

This part of section IV addresses research question seven, which asks if predictors of very good or excellent self-rated health are different for middle-aged adults (ages between 25 and 54) compared to older adults (age 55 or older). Answering this question required developing two separate logistic regression models, one fitting the longitudinal data for respondents between ages 25 and 54 in 1994/95 and another model fitting the longitudinal data for respondents age 55 or older in 1994/95. In developing the two models, the decisions which were made and the steps taken were the same as those used to develop the predictive model for the total population age 25 or older.

Longitudinal Model Predicting Very Good or Excellent Self-rated Health for Middle-aged Adults

In developing a longitudinal model which predicts very good or excellent self-rated health in 1998/99 for middle-aged adults, all the records for the respondents who were between ages 25 and 54 in 1994/95 and rated their overall health in 1998/99 as either very good or excellent or good were selected. Records for the respondents age 55 or older in 1994/95 or who rated their overall health as either fair or poor were excluded from the analyses. This resulted in a sample size of 5,742; of whom 1,588 rated their overall health as good and 4,154

rated their health as either very good or excellent in 1998/99. These respondents represented 11.1 million Canadians who were between ages 25 and 54 in 1994/95. To keep the sample size the same in all the analyses, missing data for any of the potential explanatory variables were excluded, except under two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level and body weight were defined as separate categories and included in the analyses. In total, 175 records were excluded and the remaining 5,567 records were used to build the final predictive model. As mentioned earlier all the analytical steps taken to fit a longitudinal model to the data for the total population age 25 or older were also taken in building the predictive model for the middle-aged sub-population. The detailed analytical findings from step 1 to 3 for identifying the significant independent variables are not presented in this section. However, many of the characteristics and conditions which were associated with a positive rating of health (very good or excellent) among the total population aged 25 or older were also associated with the same outcome among the middle-aged sub-population.

The next step involved selection of the variables with the most predictive value within the five categories of *Prosperity, Health and Function, Social Environment, Individual Behavior, and Disease*. Following a stepwise approach, these five categories of variables were ranked and used as the building blocks to specify the final predictive model.

The final adjusted odds ratios and their 99% Confidence Intervals (CI) for

each of the independent variables within the final multivariate model that predicts

the outcome of very good or excellent self-rated health in 1998/99 for the

household population between ages 25 and 54 in 1994/95 are summarized in

Table 5.15.

Table 5.15: Adjusted Odds Ratios for those between Ages 25 and 54 in 1994/95 for
Very Good or Excellent Self-rated Health in 1998/99 by Selected Characteristics in
1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
25-34	1.0		.....	.....
35-44	0.8	*	0.7	1.0
45-54	0.7	*	0.6	0.9
Sex				
Female	1.0		.....	.....
Male	1.1		0.9	1.3
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or more chronic conditions	0.8		0.6	1.1
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or more chronic conditions	0.6	*	0.5	0.8
Functional health status 1994/95				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.7	*	0.5	1.0
Being functionally dependent	0.7		0.4	1.2
Functional health status 1996/97				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.5	*	0.4	0.7
Being functionally dependent	0.4	*	0.2	0.7
Level of Pain 1994/95				
Moderate or severe pain	0.7	*	0.5	1.0
Mild or no pain	1.0		.....	.....
Level of Pain 1996/97				
Moderate or severe pain	0.8		0.6	1.2

Mild or no pain	1.0		.....	.....
Cognitive Ability in 1994/95				
No Cognitive Problem	1.0		.....	.....
Having Cognitive Problem	0.9	*	0.7	1.0
Psychological distress 1994/95				
High	0.9		0.7	1.1
Low/moderate	1.0		.....	.....
Psychological distress 1996/97				
High	0.9		0.7	1.1
Low/moderate	1.0		.....	.....
Household Income 1994/95				
Lowest/Lower-middle/Middle	0.8	*	0.6	0.9
Upper-middle/Highest	1.0		.....	.....
Unknown	0.7		0.5	1.1
Household Income 1996/97				
Lowest/Lower-middle/Middle	0.8	*	0.7	1.0
Upper-middle/Highest	1.0		.....	.....
Unknown	1.1		0.7	1.6
Educational Attainment 1994/95				
Less than secondary school graduation	0.8	*	0.6	1.0
Graduated from high school	1.0		.....	.....
Self-esteem 1994/95				
Low	0.7	*	0.5	0.9
Not low	1.0		.....	.....
Smoking behavior 1994/95				
Daily Smoker	0.7	*	0.6	0.9
Occasional Smoker	1.1		0.7	1.6
Non-smoker (not at all)	1.0		.....	.....
Drinking behavior 1996/97				
Regular - Weekly drinker	1.1		0.9	1.4
Not regular - Less than once a week	1.0		0.8	1.3
Abstainer	1.0		.....	.....
Physical Activity (Main effects from 1994/95 and 1996/97 and their interaction)				
Stable (regular at both cycles)	1.0		.....	.....
Decrease (regular→ occasional)	0.9		0.7	1.3
Decrease (regular→ infrequent)	0.5	*	0.4	0.8
Increase (occasional→ regular)	0.7	*	0.5	0.9
Stable (occasional at both cycles)	0.7	*	0.5	1.0
Decrease (occasional→ infrequent)	0.9		0.6	1.4
Increase (infrequent→ regular)	0.9		0.7	1.3
Increase (infrequent→ occasional)	0.8		0.6	1.2
Stable (infrequent at both cycles)	0.6	*	0.4	0.8
Body weight 1994/95				
Underweight	0.7		0.4	1.2
Acceptable weight	1.0		.....	.....
Some excess weight	0.9		0.5	1.5
Overweight	0.5	*	0.3	0.9

Unknown	0.7		0.4	1.2
Perceived emotional support 1996/97				
Low	0.9		0.7	1.2
Enough	1.0		.....	.....
Level of social Involvement 1996/97				
Low	0.8	*	0.7	1.0
Moderate	0.9		0.7	1.1
High	1.0		.....	.....
Average Frequency of Social Contacts 1996/97				
Low	0.8	*	0.7	1.0
Moderate	0.9		0.7	1.1
High	1.0		.....	.....

Notes:

The model for very good or excellent self-rated health is based on 5,567 respondents between ages 25 and 54 in 1994/95; 4,042 rated their overall health as either very good or excellent and 1,525 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. "Missing" categories for household income and body weight were included in the model to maximize sample size. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.
* p<0.01
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.15 with the regression results presented in Table 5.12 revealed significant differences in the factors predicting very good or excellent health among the total population aged 25 or older with those predicting the same outcome among the middle-aged sub-population. These differences are discussed within the relevant components of the adopted conceptual framework.

Genetic Endowment

Age: According to the information presented in Table 5.15, when controlling for the effects of all other factors, there was a significant linear association between age and very good or excellent self-rated health in 1998/99 with those in older age groups being less likely to rate their overall health as either very good or excellent. Among the total population, those between ages 35 and 44 were significantly more likely and those between ages 65 and 74 were significantly less likely to rate their overall health as either very good or excellent as compared to those between ages 25 and 34.

Disease

Number of Chronic Conditions: Middle-aged adults who had two or more chronic conditions in 1996/97 were significantly less likely to rate their health as either very good or excellent [OR=0.6, (CI=0.5, 0.8). Among the total population, having two or three chronic conditions in 1994/95 and also two or more chronic conditions in 1996/97 was associated with decreased odds of reporting very good

or excellent health. The two-year transitions in number of chronic conditions were important in predicting the outcome of interest among both target populations.

Health and Function

Functional Health Status: The ability to carry out daily activities without limitation or dependence on others was found to be a significant predictor of very good or excellent self-rated health for middle-aged Canadians. Having activity limitations in the presence or absence of functional dependency during the first or the second cycles of the NPHS was negatively associated with positive ratings of health status among the total population age 25 or older. The two-year transitions in functional health status were important in predicting positive ratings of health among both populations.

Level of Pain: Middle-aged Canadians who suffered from moderate or severe pain during the first cycle of the survey (in 1994/95) were significantly less likely to report very good or excellent health in 1998/99 compared to those who had no or mild pain [OR=0.7, (CI=0.5, 1.0)]. But, moderate or severe pain during both cycles of the survey was associated with decreased odds of reporting very good or excellent health among the total population. The two-year transitions in level of pain were important in predicting positive ratings of health among both populations.

Level of Psychological Distress: Although high psychological distress was not found to be a significant predictor of very good or excellent health, the two-year transitions in level of psychological distress were important in predicting very good or excellent ratings of health in 1998/99 among middle-aged adults. High psychological distress during the second cycle of the survey was negatively associated with positive ratings of health among the total population.

Factors Related to Individual Behaviour

Smoking Behaviour: Middle-aged adults who were daily smokers were significantly less likely to rate their overall health and well-being as either very good or excellent compared to those who were non-smokers [OR=0.7, (CI=0.6, 0.9)]. Among the total population, occasional smoking was associated with increased odds of reporting very good or excellent health.

Drinking Behaviour: There was no significant association between drinking behaviour and positive ratings of health among middle-aged adults. Among the total population, regular weekly drinking was associated with increased odds of reporting very good or excellent health.

Body Weight: Compared to those who were in an acceptable weight range, middle-aged adults who were overweight were significantly less likely to rate their overall health as either very good or excellent [OR=0.5, (CI=0.3, 0.9)]. Among the total population, those who were underweight or overweight were

significantly less likely to rate their overall as either very good or excellent compared to those who were in acceptable weight range.

Factors Related to Social Environment

Level of Social Involvement: Middle-aged adults with a low level of social involvement had significantly lower odds of reporting very good or excellent health compared to those who were highly socially involved [OR=0.8, (CI=0.7, 1.0)]. Among the total population, a moderate level of social involvement was associated with decreased odds of reporting very good or excellent health.

Average Frequency of Social Contacts: A low frequency of social contacts was also associated with decreased odds of reporting very good or excellent health among middle-aged Canadians [OR=0.8, (CI=0.7, 1.0)]. This characteristic was not associated with positive ratings of health among the total population age 25 or older.

Longitudinal Model Predicting Very Good or Excellent Self-rated Health for Older Adults

In developing a longitudinal model, which predicts very good or excellent self-rated health in 1998/99 for older adults, all the records for the respondents age 55 or older in 1994/95 who rated their overall health and well-being in 1998/99 as either very good or excellent or good were selected. Records for the respondents who were under age 55 in 1994/95 or rated their overall health and

well-being as either fair or poor were excluded from the analyses. This resulted in a sample size of 2,471; of whom 1,042 rated their overall health as good and 1,429 rated their health as either very good or excellent in 1998/99. These respondents represented 3.7 million Canadians age 55 or older in 1994/95. To keep the sample size the same in all the analyses, missing data for any of the potential explanatory variables were excluded, except in two conditions: if there was a high percentage of missing data for a variable or if there was a significant association between the missing data for a variable and the outcome. Following this rationale, missing values for household income level was defined as a separate category and included in the analyses. In total, 91 records were excluded and the remaining 2,380 records were used to build the final predictive model.

As mentioned earlier all the analytical steps that were taken to fit a longitudinal model to the data for the respondents age 25 or older were also taken in building the predictive model for respondents age 55 or older. The detailed analytical findings from steps 1 to 3 for identifying the significant independent variables are not presented in this section. However, many of the characteristics and conditions which were associated with positive ratings of health (very good or excellent) among the total population age 25 or older were also associated with the same outcome among the elderly sub-population.

The next step involved selection of the variables with the most predictive value within the three categories of *Health and Function, Individual Behavior, and Disease.* Following a stepwise approach, these three categories of variables were ranked and used as the building blocks to specify the final predictive model.

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The final adjusted odds ratios and their 99% Confidence Intervals (CI) for each of the independent variables within the final multivariate model that predicts the outcome of very good or excellent self-rated health in 1998/99 for the household population age 55 or older in 1994/95 are summarized in Table 5.16.

Table 5.16: Adjusted Odds Ratios for those Age 55 or Older in 1994/95 for Very Good or Excellent Self-rated Health in 1998/99 by Selected Characteristics in 1994/95 and 1996/97

Explanatory variables that remained in the final predictive model	Odds Ratio		99% Confidence Interval	
Age 1994/95				
55-64	1.0		.....	.....
65-74	0.9		0.6	1.1
75+	0.9		0.6	1.3
Sex				
Female	1.0		.....	.....
Male	0.9		0.7	1.2
Number of chronic conditions in 1994/95				
0 or 1 chronic condition	1.0		.....	.....
2 or more chronic conditions	0.9		0.7	1.3
Number of chronic conditions in 1996/97				
0 or 1 chronic condition	1.0		.....	.....
2 or more chronic conditions	0.5	*	0.4	0.7
Functional health status 1994/95				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.6	*	0.4	0.9
No activity limitation, but dependency or Activity limitation and dependency (Being functionally dependent)	0.5	*	0.3	1.0
Functional health status 1996/97				
No activity limitation and no dependency	1.0		.....	.....
Activity limitation, but no dependency	0.7	*	0.4	1.0
No activity limitation, but dependency or Activity limitation and dependency (Being functionally dependent)	0.9		0.5	1.6
Level of Pain 1996/97				
Moderate or severe pain	0.5	*	0.3	0.8
Mild or no pain	1.0		.....	.....
Cognitive Ability in 1994/95				

	1.0		.....	.....
No Cognitive Problem	1.0		.....	.....
Having Cognitive Problem	0.8		0.6	1.1
Psychological distress 1996/97				
High	0.7		0.4	1.2
Low/moderate	1.0		.....	.....
Self-esteem 1994/95				
Low	0.7		0.4	1.2
Not low	1.0		.....	.....
Smoking behavior 1994/95				
Daily Smoker	0.6	*	0.4	0.8
Occasional Smoker	0.9		0.4	2.0
Non-smoker (not at all)	1.0		.....	.....
Drinking behavior 1996/97				
Regular - Weekly drinker	1.9	*	1.3	2.6
Not regular - Less than once a week	1.5	*	1.1	2.0
Abstainer	1.0		.....	.....
Frequency of physical activity 1994/95				
Regular	1.0		.....	.....
Occasional	0.7	*	0.5	1.0
Infrequent	0.7	*	0.5	1.0
Body weight 1994/95				
Underweight	1.0		0.5	1.9
Acceptable weight	1.0		.....	.....
Some excess weight	1.1		0.8	1.6
Overweight	0.8		0.6	1.1

Notes:

The model for very good or excellent self-rated health is based on 2,380 respondents age 55 or older in 1994/95; 1,392 rated their overall health as either very good or excellent and 988 rated their health as good. The analysis is based on longitudinal respondents for whom non-proxy information was available in 1994/95, 1996/97 and 1998/99. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant.
* p<0.01
.... Not appropriate

Main Findings

Comparing the results presented in Table 5.16 with the regression results presented in Table 5.12 revealed significant differences in the factors predicting very good or excellent health among the total population age 25 or

older with those predicting the same outcome among the elderly sub-population. These differences are discussed within the relevant components of the conceptual framework

Genetic Endowemnt

Age: No significant association between age and positive ratings of health was found among the elderly sub-population, but among the total population, those between ages 35 and 44 were significantly more likely and those between 65 and 74 were significantly less likely to rate their overall health as either very good or excellent.

Disease

Number of Chronic Conditions: Older adults who had two or more chronic conditions in 1996/97 were significantly less likely to rate their overall health as either very good or excellent [OR=0.5, (CI=0.4, 0.7). Among the total population, having two or three chronic conditions in 1994/95 and also two or more chronic conditions in 1996/97 was associated with decreased odds of reporting very good or excellent health. The two-year transitions in number of chronic conditions were important in predicting the outcome of interest among both target populations.

Health and Function

Functional Health Status: The ability to carry out daily activities without limitation or dependence on others was found to be a significant predictor of very good or excellent self-rated health for elderly adults. Having activity limitations in the presence or absence of functional dependency during the first or the second cycles of the NPHS was negatively associated with positive ratings of health status among the total population age 25 or older. The two-year transitions in functional health status were important in predicting positive ratings of health among both populations.

Level of Pain: There was a significant association between level of pain in 1996/97 and very good or excellent self-rated health in 1998/99 among the elderly sub-population. Those who were suffered from moderate or severe pain during the second cycle of the survey (in 1996/97) were significantly less likely to report very good or excellent health in 1998/99 compared to those who did not have any pain or experienced only mild pain [OR=0.5, (CI=0.3, 0.8)]. But moderate or severe pain during both cycles of the survey was negatively associated with positive ratings of health among the total population. The two-year transitions in level of pain were associated with this outcome among the total population, but not among the elderly sub-population.

Cognitive Ability: Cognitive ability was found to be a significant predictor of positive ratings of health among the total population, but not among the elderly sub-population.

Level of Psychological Distress: High psychological distress during the second cycle of the survey was negatively associated with positive ratings of health among the total population. However, this characteristic was not associated with the same outcome among the elderly sub-population. The two-year transitions in level of psychological distress were also important in predicting very good or excellent ratings of health among the total population, but not among the elderly sub-population.

Prosperity

Household Income Level: Low household income level was negatively associated with positive ratings of health among the total population, but not among the elderly sub-population. The two-year transitions in household income level were also important only in predicting this outcome among the total population.

Individual Behaviour

Level of Education: Low level of education (less than secondary school graduation) was negatively associated with positive ratings of health among the total population, but not among the elderly sub-population.

Self-esteem: Low self-esteem was associated with decreased odds of reporting very good or excellent health among the total population, but not among the elderly sub-population.

Smoking Behaviour: Older adults who were daily smokers were significantly less likely to rate their overall health as either very good or excellent compared to those who were non-smokers [OR=0.6, (CI=0.4, 0.8)]. Among the total population, those who smoked occasionally during the first cycle of the survey were significantly more likely to rate their overall health as either very good or excellent compared to the non-smokers.

Drinking Behaviour: Older adults who were occasional drinkers were more likely to rate their overall health as either very good or excellent compared to those who were abstainers [OR=1.5, (CI=1.1, 2.0)]. Those who were regular weekly drinkers had even higher odds of rating their overall health as either very good or excellent [OR=1.9, (CI=1.3, 2.6)]. Among the total population, only regular weekly drinking was associated with increased odds of reporting very good or excellent health.

Physical Activity: Older adults who had patterns of occasional or infrequent physical activity in 1994/95 were less likely to rate their overall health as either very good or excellent compared to those who were regularly active [OR=0.7, (CI=0.5, 1.0)]. Only among the total population, was there a significant

interaction effect between Time I and Time II measures of level of physical activity and there were five transition patterns found to be protective factors for positive ratings of health.

Body Weight: There was no significant association between body weight and positive ratings of health among the elderly sub-population. But, among the total population, those who were underweight or overweight were significantly less likely to rate their overall as either very good or excellent compared to those who had an acceptable weight.

Social Environment

Social Involvement: There was no significant association between this characteristic and positive ratings of health among the elderly sub-population. Among the total population, a moderate level of social involvement was associated with decreased odds of reporting very good or excellent health.

Summary

The two logistic regression models one that predicts very good or excellent self-rated health for middle-aged Canadians and the other for older adults age 55 or older in 1994/95 were different in terms of their building blocks, which are based on the components of the Evans and Stoddart (1994) Population Health Framework. The blocks of "health and function", "disease", and "individual behaviour" were common between the two models in slightly different orders. But, "social environment" and "prosperity" helped to explain very good or excellent self-rated health only among middle-aged adults. The significant predictors of very good or excellent self-rated health (both risk factors and protective factors) are compared in Chart 5.9.

Chart 5.9: Comparing Predictors of Very Good/Excellent Self-rated Health between Middle-aged Adults (between Ages 25 and 54) and Elderly Adults (age 55 or Older) in 1994/95

HOUSEHOLD POPULATION BETWEEN AGES 25 AND 54	HOUSEHOLD POPULATION AGE 55 OR OLDER
RISK FACTORS	RISK FACTORS
	1) Being a regular or occasional drinker in 1996/97
PROTECTIVE FACTORS	PROTECTIVE FACTORS
1) Age between 35 and 44 or between 45 and 54	1) Having two or more chronic conditions in 1996/97
2) Having two or more chronic conditions in 1996/97	2) Having activity limitation or being functionally dependent in 1994/95
3) Having activity limitation in 1994/95	3) Having activity limitation in 1996/97
4) Having activity limitation or being functionally dependent in 1996/97	4) Moderate or severe pain in 1996/97
5) Moderate or severe pain in 1994/95	5) Being a daily smoker in 1994/95
6) Having cognitive problem in 1994/95	6) Occasional or infrequent physical

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	activity in 1994/95
7) Low household income level in 1994/95	
8) Low household income level in 1996/97	
9) Less than secondary school graduation in 1994/95	
10) Low self-esteem in 1994/95	
11) Being a daily smoker in 1994/95	
12) Following transitions in level of physical activity between 1994/95-1996/97: Decrease (regular→ infrequent); Increase (occasional→ regular); Stable (occasional at both cycles); Stable (infrequent at both cycles)	
13) Being overweight in 1994/95	
14) Low level of social involvement in 1996/97	
15) Low average frequency of social contacts in 1996/97	

Section V: Comparing Predictors of Fair or Poor Self-rated Health with Predictors of Very Good or Excellent Self-rated Health

This section addresses research question eight which asks whether the two

ends of the single-item indicator of self-rated health measures the same or

different things. In other words, are the predictors of fair or poor self-rated

health the same factors that predict very good or excellent health, only in opposite

directions? To answer this question, the significant risk factors and protective

factors within the two final predictive logistic regression models, one predicting

fair or poor self-rated health in 1998/99 (FP98) and the other one predicting very

good or excellent health (EXVG98) are compared for each demographic sub-

population.

The significant risk factors and protective factors within the two logistic

regression models, one predicting fair or poor self-rated health in 1998/99 (FP98)

and the other one predicting very good or excellent health (EXVG98) for women are compared in Chart 5.10.

Chart 5.10: Comparing Significant Predictors, Female Household Population Age 25 or Older in 1994/95

OUTCOME: FP98	OUTCOME: EXVG98
RISK FACTORS	**RISK FACTORS**
1) Having activity limitation and being functionally dependent in 1996/97	1) Being a weekly or occasional drinker in 1996/97
2) High psychological distress in 1994/95	2) Being underweight, having some excess weight or being overweight in 1994/95
3) High psychological distress in 1996/97	
4) Having 2 or more chronic conditions in 1996/97	
5) Infrequent physical activity in 1996/97)	
6) Following transitions in marital status between 1994/95 and 1996/97: Stable never married; Stable previously married)	
7) Premature death of parent(s)	
PROTECTIVE FACTORS	**PROTECTIVE FACTORS**
Following transitions in drinking behavior: Being weekly drinker in 1994/95, but occasional drinker in 1996/97; Being occasional drinker in 1994/95, but abstainer in 1996/97	1) Age between 45 and 54 or age between 65 and 74
	2) Having two or more chronic conditions in 1996/97
	3) Having activity limitation and being functionally dependent in 1994/95
	4) Having activity limitation in 1996/97
	5) Moderate or severe pain in 1994/95
	6) Having cognitive problem in 1996/97
	7) High psychological distress in 1994/95
	8) Low income in 1994/95
	9) Less than secondary school graduation in 1994/95

	10) Low self-esteem in 1994/95
	11) Being a daily smoker in 1994/95
	12) Occasional or infrequent physical activity in 1994/95

As Chart 5.10 indicates functional health status, chronic conditions, psychological distress, drinking behaviour and level of physical activity were associated with both end of the self-rated health indicator.   Having activity limitations and being functionally dependent in 1996/97 was associated with higher odds of reporting fair or poor self-rated health among women in 1998/99 while having activity limitations and being functionally dependent in 1994/95 or having activity limitation in 1996/97 were associated with lower odds of reporting very good or excellent health. Similarly, having two or more chronic conditions in 1996/97 was associated with increased odds of reporting fair or poor health while the same condition was associated with decreased odds of reporting very good or excellent health. High psychological distress in 1994/95 or in 1996/97 was associated with significantly higher odds of reporting fair or poor self-rated health while high psychological distress in 1994/95 was significantly associated with decreased odds of reporting very good or excellent health. Women whose amount of alcohol consumption decreased between the two cycles of the survey were less likely to report fair or poor health while regular or occasional drinking was associated with increased odds of reporting very good or excellent health. Infrequent physical activity in 1996/97 was associated with increased odds of reporting fair or poor health while less than frequent physical activity in 1994/95 was found to be a protective factor for very good or excellent ratings of health.

There were other factors related to "health and function" which were only associated with the upper end of the indicator including experiencing moderate or severe pain in 1994/95, and having a cognitive problem in 1996/97. Highest level of education, level of self-esteem, body weight and smoking behaviour are four other factors related to "Individual Behaviour" and they were only associated with the upper end of the self-rated health indicator.

Another important difference between the significant predictors within the two models is the contribution of the two-year transitions. According to the results from the stepwise regression analyses, two-year transitions (between the first and the second cycles of the survey) in functional health status were significant predictors of very good or excellent health. The two-year transitions in level of psychological distress, marital status and drinking behaviour were only significant in predicting the lower end of the self-rated health indicator.

The significant risk factors and protective factors within the two logistic regression models, one predicting fair or poor self-rated health in 1998/99 (FP98) and the other one predicting very good or excellent health (EXVG98) for men are compared in Chart 5.11.

Chart 5.11: Comparing Significant Predictors, Male Household Population Aged 25 or Older in 1994/95

Outcome: FP98	Outcome: EXVG98
Risk Factors	**Risk Factors**
1) Age between 45 and 54 or between 65 and 74	1) Age between 35 and 44
2) Having 2 or more chronic conditions in 1996/97	2) Having some excess weight or being overweight in 1994/95
3) Following transitions in functional health status between 1994/95-1996/97: Decline (No AL/No D→ AL/No D); Improvement (AL/No D→ No AL/No D); Stable (AL/No D); Decline (AL/No D→ No AL/D) or (AL/No D→ AL/D); Improvement (AL/D→ No AL/D) or Stable (AL/D)	
4) High psychological distress in 1996/97	
5) Low household income level in 1996/97	
6) Less than secondary school graduation	
Protective Factors	**Protective Factors**
1) Being regular or occasional drinker in 1994/9	1) Age between 55 and 64
	2) Having activity limitation in 1994/95
	3) Having activity limitation or being functionally dependent in 1996/97
	4) Having cognitive problem in 1994/95
	5) Having two or more chronic conditions in 1996/97
	6) Low self-esteem in 1994/95
	7) Being a daily smoker in 1994/95
	8) Infrequent physical activity in 1996/97
	9) Having hearing problem
	10) Low level of perceived emotional support in 1996/97

As Chart 5.11 indicates functional health status, and number of chronic conditions are the only factors that were associated with both ends of the self-rated health indicator among men. Some specific transitions in functional health status were associated with increased odds of reporting fair or poor health while having low functional health status either during the first or second cycle of the survey was associated with significantly decreased odds of reporting very good or excellent health. Similarly, having two or more chronic conditions in 1996/97 was associated with increased odds of reporting fair or poor health while the same condition was associated with decreased odds of reporting very good or excellent health. A high level of psychological distress was associated only with the lower end of the self-rated health indicator while cognitive ability, another factor within the "Health and Function" category, was associated only with the upper end of the self-rated health indicator. Among factors related to "Individual Behaviour", there were significant associations between the highest level of education and drinking behaviour with fair or poor self-rated health. Within the same category of variables, body weight, self-esteem, smoking behaviour and level of physical activity were associated with the upper end of the indicator. The only significant transitions in predicting fair or poor self-rated health and also very good or excellent health were the two-year transitions in functional health status.

The significant risk factors and protective factors within the two logistic regression models, one predicting fair or poor self-rated health in 1998/99 (FP98) and the other one predicting very good or excellent health (EXVG98) for middle-aged adults are compared in Chart 5.12.

Chart 5.12: Comparing Significant Predictors, Middle-aged Population (Age 25 – 54 in 1994/95)

OUTCOME: FP98	OUTCOME: EXVG98
RISK FACTORS	RISK FACTORS
1) Age between 45 and 54	
2) Being Male	
3) Following transitions in functional health status between 1994/95-1996/97:Decline (No AL/No D→ AL/D); Stable (AL/No D); Decline (AL/No D→ No AL/D) or Decline (AL/No D→ AL/D) or Stable (No AL/D) or Decline (No AL/D→ AL/D); Improvement (AL/D→ No AL/No D)	
4) Moderate or severe pain in 1996/97	
5) High psychological distress in 1996/97	
6) Following transition in number of chronic conditions between 1994/95-1996/97:Increase (none or one → 2 or 3); (2 or 3 → 4 or more); Decrease (4 or more→ none or one) or (4 or more→ 2 or 3); Stable (4 or more)	
7) Low or unknown household income level in 1996/97	
8) Premature death of parent(s)	
9) Low self-esteem	
10) Following transition in drinking behaviour between 1994/95-1996/97:Increase (not at all→ weekly)	
11) Infrequent physical activity 1996/97	
PROTECTIVE FACTORS	PROTECTIVE FACTORS
1) Following transition in drinking behaviour between 1994/95-1996/97: Stable (weekly drinker at both cycles)	1) Age between 35 and 44 or between 45 and 54
	2) Having two or more chronic conditions in 1996/97
	3) Having activity limitation in 1994/95
	4) Having activity limitation or being functionally dependent in 1996/97
	5) Moderate or severe pain in 1994/95
	6) Having cognitive problem in 1994/95
	7) Low household income level in 1994/95

	8) Low household income level in 1996/97
	9) Less than secondary school graduation in 1994/95
	10) Low self-esteem in 1994/95
	11) Being a daily smoker in 1994/95
	12) Following transitions in level of physical activity: Decrease (regular→ infrequent); Increase (occasional→ regular); Stable (occasional at both cycles); Stable (infrequent at both cycles)
	13) Being overweight in 1994/95
	14) Low level of social involvement in 1996/97
	15) Low average frequency of social contacts in 1996/97

As this Chart indicates the number of chronic conditions was associated with both ends of the self-rated health indicator. Some specific transitions in number of chronic conditions between the first and the second cycles of the survey were associated with increased odds of reporting fair or poor health while having two or more chronic conditions was associated with decreased odds of reporting very good or excellent health. Among factors related to "Health and Function", only the two factors of functional health status and moderate or severe pain were associated with both ends of the self-rated health indicator among middle-aged adults. Two-year transitions in functional health status were significant in predicting only fair or poor health. Within the category of "Health and Function", high psychological distress was associated only with increased odds of reporting fair or poor health and having cognitive problem was associated only with lower odds of reporting very good or excellent health. Low household income level was a risk factor for fair or poor self-rated health and a protective

factor for very good or excellent health. Two-year transitions in household income level were only significant in predicting very good or excellent health. Among factors related to "Individual Behaviour", level of self-esteem and level of physical activity were associated with both ends of the self-rated health indicator. Level of education, smoking behaviour and body weight were only associated with the upper end of self-rated health and drinking behaviour was only associated with the lower end of the indicator.

The significant risk factors and protective factors within the two logistic regression models, one predicting fair or poor self-rated health in 1998/99 (FP98) and the other one predicting very good or excellent health (EXVG98) for older adults (age 55 or older) are compared in Chart 5.13.

Chart 5.13: Comparing Significant Predictors, Elderly Population
(Age 55 or Older in 1994/95)

OUTCOME: FP98	OUTCOME: EXVG98
RISK FACTORS	RISK FACTORS
1) Being Male	1) Being a regular or occasional drinker in 1996/97
2) Functional health status in 1996/97:Activity limitation, but no dependency; No activity limitation, but dependency or Activity limitation and dependency	
3) Moderate or severe pain in 1994/95	
4) High psychological distress in 1996/97	
5) Having two or more chronic conditions in 1996/97	
6) Low household income level in 1994/95	
7) Less than secondary school graduation	
PROTECTIVE FACTORS	PROTECTIVE FACTORS
1) Being regular weekly drinker in 1996/97	1) Having two or more chronic conditions in 1996/97
	2) Having activity limitation or being functionally dependent in 1994/95
	3) Having activity limitation in 1996/97
	4) Moderate or severe pain in 1996/97
	5) Being a daily smoker in 1994/95
	6) Occasional or infrequent physical activity in 1994/95

As this chart indicates the number of chronic conditions was associated with both ends of the self-rated health indicator. Having two or more chronic conditions was associated with increased odds of reporting fair or poor self-rated health and decreased odds of reporting very good or excellent health. Functional health status during the first and the second cycles of the NPHS and also between the two cycles of the survey were significant predictors of both of the study

outcomes. Among other factors related to "Health and Function", level of pain was associated with both ends of the self-rated health indicator. Moderate or severe pain in 1994/95 was associated with increased odds of reporting fair or poor self-rated health and moderate or severe pain in 1996/97 was associated with decreased odds of reporting very good or excellent health. Among factors related to "Individual Behaviour", drinking behaviour was associated with both lower and upper ends of the self-rated health indicator. Elderly adults who were regular weekly drinkers had decreased odds of reporting fair or poor health and increased odds of reporting very good or excellent health. Smoking behaviour and level of physical activity were associated with only the upper end of self-rated health and level of education was only associated with the lower end of the indicator.

Summary

Models predicting fair or poor self-rated health and very good or excellent health for each specific sub-population had some factors in common. The common factors were mainly those related to the "Disease", "Health and Function" and "Individual Behaviour" categories. If the common factors acted as risk factors for fair or poor health, they were protective factors for very good or excellent health. On the other hand, if they were protective factors for fair or poor health, they were risk factor for very good or excellent health. There were also predictive factors that were associated with only one end of the self-rated health indicator.

CHAPTER 6: DISCUSSION AND CONCLUSIONS

This chapter is divided into three sections. In the first section, findings presented in chapters four and five are discussed relative to the literature and research questions. The second section focuses on the implications of the study findings for future research, clinical practice, health policy and planning. The last section is an overview of the limitations of the study.

Section I: Discussion

The overall purpose of this research was to explore factors predicting positive and negative self-rated health. Using three waves of longitudinal data (1994/95, 1996/97, 1998/99) from the National Population Health Survey for a representative sample of Canadians age 25 or older, models predicting positive (very good or excellent) and negative (fair or poor) self-rated health in 1998/99 (during the third cycle of the survey) were specified based on the respondents' socio-economic, behavioural and health and functioning related characteristics at the baseline (during the first cycle of the survey in 1994/95), at Time II (during the second cycle of the survey in 1996/97) and their transitions between the first and the second cycles of the survey.

Exploring how predictors of positive and negative self-rated health are different for men compared to women and for younger adults compared to older adults was another objective of this study. This objective was addressed by developing two sets of five models; the first set predicted positive self-rated health in 1998/99 as a function of baseline characteristics and transitions between the first and the second cycles of the survey for the total population and each specific sub-populations including men, women,

middle-aged adults and older adults. The second set predicted negative self-rated health during the third cycle of the survey (in 1998/99) as a function of baseline characteristics and transitions between the first and the second cycles of the survey for the total population and also each specific sub-population.

Given the longitudinal nature of the data used in this study, it was possible to examine the consistency of self-ratings of health over a four-year period (between the first and the third cycles of the survey). Although there were declines and improvements in these ratings over time, they were consistent for approximately half of the population. Thus, findings of this study support previous research (Lundberg and Manderbacka, 1996; O'Brien Cousins, 1997), which reported good reliability for the single-item indicator of self-rated health.

Since other generic and also more dimension-specific measures of health were included in the NPHS, it was also possible to study the construct validity of this indicator, and as presented in chapter 5, significant associations in the expected directions were found between self-ratings of health and overall functional health, level of psychological distress, number of chronic conditions, income and education. Although this study looked at the bi-variate associations between self-rated health and many other variables, the selection of the above five characteristics was based on the notion that a valid measure of overall health and well-being should be associated with both physical and psychological measures of health, reflect individuals' overall functional ability and be positively associated with their socio-economic status. Although these associations were not particularly strong, they were consistent with previous knowledge and occurred in the expected directions.

One of the main objectives of this study was also to describe the health of the Canadian population, aged 25 or older in 1994/95, using the single-item indicator of self-rated health and provide information on their socio-economic, physical, psycho-social, health behaviours and lifestyle. Examination of the distribution of self-rated health revealed that the majority of Canadians (61.5%) aged 25 or older in 1994/95, rated their overall health and well-being as either very good or excellent and only 10.8% reported either fair or poor health. This finding is consistent with the more recent reports and research papers on the health of Canadians (Statistics Canada, 1999, The Federal, Provincial and Territorial Advisory Committee on Population Health, 1999). Distribution of self-rated health by age showed deterioration in self-rated health within successive age groups. As acknowledged by many other researchers (e.g., Fylkesnes and Førd, 1992; Murray et al., 1982; Denton and Walters, 1999) less positive perceptions of health are expected at older ages, given that physical problems tend to increase with age. Examination of the distribution of self-rated health by gender also revealed that overall, a higher proportion of men than women rated their health as either very good or excellent. The finding that positive ratings of health are more prevalent among men than women is also reported in other studies (Maddox, 1964; Shanas et al., 1968; Statistics Canada, 1999). There are, however, studies, which reported no gender difference in the distribution of self-rated health (Moum, 1992; Leinonen et al., 1997).

In addition to overall health, the comprehensiveness of the NPHS data allowed this study to describe the physical, psychological, social, lifestyle and genetic endowment characteristics of the target population (Canadians, aged 25 or older in 1994/95). These descriptions, which are presented in chapter four, were in line with the observation that

the majority of Canadians were enjoying good health. These characteristics were further used to understand why some Canadians rated their health better or worse than the others. There were no surprises in comparing the profile of Canadians who rated their health as either fair or poor with the profile of those who rated their health as either very good or excellent. Canadians who rated their health as either fair or poor were more likely to report having activity limitations and being functionally dependent, suffering from moderate or severe pain, experiencing high psychological distress, living in low-income families, having low levels of education, reporting low self-esteem, being daily smokers, being abstainers and physically inactive, being underweight or overweight and reporting a higher number of chronic conditions. They were also more likely to have lost a partner due to divorce, separation, or death; more likely to report low emotional support and to have experienced the premature death of parent(s). Many previous studies also found similar associations between self-rated health and income (e.g., Minkler and Langhauser, 1988; Denton and Walters, 1999; Federal, Provincial and Territorial Advisory Committee on Population Health, 1999), physical health and functioning (e.g., Benyamini et al., 2000; Damian et al., 1999; Kempen et al., 1998), and psychological distress (e.g., Fylkesnes and Førd, 1991, 1992; Tessler and Mechanic, 1978; Ferraro and Farmer, 1997). Others reported associations with factors related to social environment (e.g., Culter, 1973; Minkler and Langhauser, 1988; Denton and Walters, 1999), sensory impairment (e.g., Dalen et al., 1994; Shanas et al., 1968), and education (e.g., Cockerham et al., 1983; Markides and Lee, 1990; Statistics Canada, 1999). While still others documented associations with health behaviours including smoking, physical activity and body weight (e.g., Smith et al., 1994; Ferraro and Yu, 1995; Manderbacka, 1998), and

psychological resources such as self-esteem (e.g., Cott et al., 1999). Finally others showed associations with chronic conditions and diseases (e.g., Tissue, 1972; Goldstein et al., 1984; Dalen et al., 1994).

Focusing on the methodology, in general, studies that focused on self-rated health as an outcome measure and aimed to explore its determinants can be divided into three groups. The first group includes studies, which aimed to explore factors associated with poor self-rated health. Studies in this group treated self-rated health, which was originally measured on a 4 or 5 point scale as a dichotomous variable and accordingly used appropriate analytical tools (e.g., Cott et al, 1999; Bobak et al., 1998; Damian et al., 1999). Studies in the second group kept self-rated health as it was originally measured on a 4 or 5 point scale and treated it as a continuous variable in multiple regression models (e.g., Benyamini et al., 2000; Denton and Walters, 1999). The third group of studies includes those, which treated self-rated health (originally measured on an ordinal scale from 1 to 4 or 5) as nominal and characterized the deviation from average health in each direction separately (e.g., Smith et al., 1994). As recognized by these and other researchers, each one of these methods has limitations. For example, studies within the first group are limited in exploring the characteristics of the different grades or states of self-rated health. Studies in the second group assume a gradient of self-rated health from poor to excellent and accordingly explore correlates that vary across the self-rated health scale, therefore not focusing on the factors, which may make the different self-rated health states qualitatively different. Having said that, it is important to note that none of these methods is better than the others, rather they serve different purposes. Given the stated objectives of this research, the analytical strategy used is consistent with the third

group of studies, which treated self-rated health as a nominal variable with three levels: less than average, which includes fair or poor ratings of health; average, which is good self-rated health; and higher than average, which includes both very good and excellent self-rated health.

The availability of the socio-economic, psycho-social, health and functioning and health behaviours information from the first and the second cycles of the NPHS for all the members of longitudinal panel allowed us to learn more about the distribution of factors known to affect health and their trends over time. For example, according to the detailed descriptive analyses presented in chapter 4, we learned that over a two-year period between the first and the second cycles of the survey, there was an increase in the proportion of Canadians who experienced moderate or severe pain, cognitive problems, and high psychological distress. On the other hand, there was a decrease in the proportion of those who reported regular physical activity and a low average frequency of social contacts. The same set of analyses revealed that the proportion of Canadians who were married, reported good functional health, and were from families with a high income level was stable over time.

The availability of longitudinal data at the national level in Canada has been successful. However, this is not essential to describe whether the health of the Canadian population is generally improving or declining or how the distribution of factors affecting its health has changed over time. As Havens (1995) pointed out these types of observations are also possible based on available cross-sectional data. According to Swain and associates (1999) the importance of the longitudinal data relates to the fact that it tells us more about the dynamic process of health and illness, which exists within the

population. As these authors stated "cross-sectional information may show an apparent stability that is not borne out when longitudinal data are investigated" (Swain et al., 1999, p.70). Consistent with previous research (Statistics Canada, 1998), longitudinal analysis of the NPHS data in this study provided several examples that support this statement. For example, while cross-sectional examination of the data showed that the proportion of non-smokers was stable over the study period (two years), longitudinal analysis revealed many transitions (stability, declines and improvements), that occurred even within the short period of two years. Although the majority of Canadians who did not smoke in 1994/95 continued to be non-smokers at the time of the next survey interview, some reported smoking occasionally and some even reported smoking daily.

In exploring factors associated with self-rated health, the descriptive findings informed us in several ways:

1. They showed that there are many conditions and characteristics such as number of chronic conditions and self-esteem, which are associated with self-assessed health;

2. These characteristics and conditions are themselves inter-related; and

3. These characteristics and conditions may change over time. For example, although almost three-quarters (72.9%) of Canadians age 25 or older experienced income stability between the first and the second cycles of the survey (1994/95 to 1996/97), even over the short period of two years, an estimated 9% experienced a decrease and another 9% experienced an increase in their household income level. Similarly, the drinking behaviour of a significant proportion of Canadians age 25 or older (72%) did not change between the two cycles of the survey. However, there was improvement (for about 15.3% of the population) and decline (for about 11.9% of the population)

in drinking behavior.

Based on these observations, this study used a comprehensive population health framework developed by Evans and Stoddart (1994) to examine the association between a wide range of socio-economic, psychosocial, lifestyle and health-related factors and self-rated health. The Evans and Stoddart (1994) population health model was used as a conceptual framework to review the literature, organize the variables of interest and guide the analysis. This approach had several advantages, including the following:

1. Unlike a biomedical model that views health as the absence of disease, the Evans and Stoddart (1994) population health model, includes functional capacity and well-being as health outcomes.

2. This model emphasizes general factors that affect many diseases or the health of large segments of the population, rather than specific factors that account for small changes in health.

3. This model uses a multidisciplinary approach, uniting biomedical sciences, public health, psychology, statistics and epidemiology, economics, sociology, education, and other disciplines. Social, environmental, economic, and genetic factors are seen as contributing to differences in health status and, therefore, as presenting opportunities to intervene.

4. The model also differentiates among disease, health and function, and well-being. It recognizes that they are affected by separate but overlapping factors. Given that the main focus of the present study was to explore factors associated with self-rated health, the differentiation among disease, health and function and well-being was very important. The adoption of this conceptual model guided the study to include

not only factors related to disease and health and function, which are well known to be associated with perceived well-being (e.g., Ferraro, 1980; Benyamini et al., 2000; Damian et al., 1999), but also psycho-social factors such as psychological distress, self-esteem and social support and those related to genetic endowment, and health behaviours. The literature review showed that the focus of previous population-based research on self-rated health has been largely limited to illness and socio-demographic factors.

Although there are several reasons for the inclusion of a single-item indicator of self-rated health in national surveys such as NPHS, one important reason is the recognition that it permits some assessment of positive health, which is likely to represent more than simply the absence of health problems (Federal, Provincial, and Territorial Advisory Committee on Population Health, 1999). Using a comprehensive conceptual framework such as the Evans and Stoddart (1994) population health model allowed us to expand the analyses to compare factors associated with both negative and positive self-rated health. The analytical strategy used pursued this comparison.

Exploring factors associated with fair or poor health is important given the accumulating evidence which clearly shows that self-assessed health which is less than good is associated with higher risk of mortality (for a comprehensive review, see Benyamni and Idler, 1999; Idler and Benyamini, 1997), new morbidity (e.g., Ferraro et al., 1997; Møller et al., 1996; Shadbolt, 1997), declines in functional ability (e.g., Idler and Kasl, 1995; Kaplan et al., 1993), health care utilization and hospitalization (e.g., Mutran and Ferraro, 1988; Wolinsky et al., 1994; Weinberger, 1986), recovery from illness (e.g., Wilcox et al., 1996), and nursing home placement (e.g., Weinberger, 1986).

The distribution and determinants of positive health, however, have been less the focus of previous studies. This could be partly due to the fact that many researchers still feel more comfortable with disease rather than good or positive health as an outcome measure. It is also true that we have not been as effective in measuring wellness and positive health as we have been in measuring illness. Another possible explanation may be the assumption that factors associated with positive and negative perceived health are the same. One of the contributions of the present study is that it addresses the distribution and determinants of not only negative, but also positive self-rated health for Canadians, aged 25 or older in 1994/95.

As the review of the literature showed there were few studies, which explored factors associated with both positive and negative self-rated health (e.g., Smith et al., 1994). However, this study compared to the previous research is unique in four primary ways:

1. It is based on the Statistics Canada's NPHS data, which is weighted to represent the population of the 10 provinces in Canada. Since the study sample is nationally representative of households within the 10 provinces, the descriptive and analytical findings can be generalized to the Canadian household population aged 25 or older at the time of the first survey (1994/95).

2. The large sample size, which included men, women, middle-aged and elderly Canadians made it possible to explore variations in the factors associated with positive and negative ratings of health among these sub-populations.

3. The comprehensiveness of the information from the NPHS on the determinants of health and also demographic and socio-economic information overcomes the limitations of many of the previous studies. It allowed using a comprehensive population health framework such as the Evans and Stoddart's population health model (1994) to examine the association between a wide range of socio-economic, psychosocial, lifestyle and health-related factors with self-ratings of health among Canadians. The comprehensiveness of the NPHS information further allowed more in-depth exploration of the variations across demographic sub-populations.

4. It was based on the NPHS longitudinal data, which allowed not only exploration of how a wide range of socioeconomic, psychological, social, physical and behavioural factors are associated with self-ratings of overall health, but also to explore how transitions in those factors over time contribute to the outcome of interest. The use of the longitudinal data further allowed moving from discussion of simple associations to prediction within a causality context. Although even with longitudinal data such as those used in the present study, cause and effect are still difficult to disentangle, as Swain and associates (1999) argued the evidence is stronger because now we have more information on the sequence of events. However, as these authors emphasized we still need to rely upon the previous research and theoretical knowledge to interpret the longitudinal findings.

   Using multivariate logistic regression modelling as the main analytical tool, this study found significant associations between not only individuals' physical health status, but also their psychological state, social aspects of their life, behaviours and

lifestyle, socio-economic status, and their perceived health status. This is consistent with the way in which we think of the determinants of health or a population health approach, today. Moreover, multivariate regression analyses revealed significant variations in the determinants of self-rated health across demographic sub-populations. There were significant variations in the factors associated with positive ratings of health between men and women and also between middle-aged and elderly adults. As well, there were significant variations in the factors associated with negative ratings of health among these demographic sub-populations. Previous studies also reported sub-population variations in the determinants of self-rated health (e.g., Krause and Jay, 1994; Borawski et al., 1996).

Observing variations in the factors predicting self-rated health (both positive and negative) is consistent with Ware's statement that health means different things to different people and physical, mental, and social dimensions of health are not valued equally by everyone (Ware, 1987). The observed variations in the factors predicting fair or poor self-rated health and those predicting very good or excellent self-rated health for the four sub-populations by the major categories within the adopted conceptual framework are summarized in Chart 6.1.

Chart 6.1. : Comparing Predictors of Fair or Poor Self-rated Health (FP98) with Predictors of Very Good or Excellent Self-rated Health (EXVG98) for each Demographic Sub-population

Women 25 or Older		Men 25 or Older		Age Group 25-54		Age Group 55+	
EXVG98	FP98	EXVG98	FP98	EXVG98	FP98	EXVG98	FP98
Age	Age	Age	Age	Age	Age	Age	Age
				Sex	Sex	Sex	Sex
Disease	Health & Function	Health & Function	Disease	Disease	Health & Function	Disease	Health & Function
Health & Function	Disease	Disease	Health & Function	Health & Function	Disease	Health & Function	Disease
Prosperity	Individual Behavior	Individual Behavior	Prosperity	Prosperity	Prosperity	Individual Behavior	Prosperity
Individual Behaviour	Social Envir.	Social Envir.	Individual Behavior	Individual Behavior	Genetic Endowment		Individual Behavior
	Genetic Endowment			Social Environment	Individual Behavior		

The first column of Chart 6.1 summarizes the main category of factors, which were found as significant predictors (either as a risk factor or a protective factor) of positive self-rated health among Canadian women age 25 or older in 1994/95. As this chart shows, this study found that after controlling for women's age, their number of chronic conditions and diseases were the most important factors in explaining why some Canadian women rated their overall health and well-being as very good or excellent and others rated their overall health as good. After controlling for respondents' age and number of chronic conditions and diseases, other characteristics related to women's health and functioning including their level of functional ability, level of pain, cognitive ability, level of psychological distress were found to be important. After controlling for the effects of age, number of chronic conditions, and all the health and functioning

related variables, women's household income level was important. After controlling for the effects of women's age, number of chronic conditions, their level of health and functioning, and their household income level, women's health behaviours and lifestyle including their level of education, level of self-esteem, smoking behaviour, drinking behaviour, their level of physical activity and body weight were found to be associated with the outcome of very good or excellent health versus good health in 1998/99. As Chart 6.1 clearly shows however, factors related to social environment and also those related to genetic endowment (other than age) did not help to explain why some Canadian women rated their overall health and well-being better than the others.

The second column of the chart lists categories of factors found to be important in explaining why some Canadian women rated their overall health worse than those who report their health as good. As this chart presents, after controlling for the effects of respondents' age, factors related to disease, health and function and health behaviours were important in predicting fair or poor self-rated health among women. However, as this chart shows the rank order of these three categories within the second column is different from their rank order within the first column. This reflects the relative importance for three categories of variables in relation to the two study outcomes. Factors related to women's social environment and genetic endowment were also important in predicting negative self-rated health.

The third column of Chart 6.1 summarizes predictors of positive ratings of health and the fourth column summarizes predictors of negative ratings of health for Canadian men age 25 or older in 1994/95. Columns five and six summarize the predictors of

positive and negative self-rated health among middle-aged Canadians and the last two columns summarizes the same type of information about the elderly population.

While not discussing all the detailed findings, in general this study found that when people are asked to rate their overall health and well-being, irrespective of their age and gender, they consider their level of health and functional ability, and also their chronic conditions or diseases (Chart 6.1). The majority of the studies reviewed also found physical health status and functioning as the strongest correlates of self-rated health (e.g., Benyamini et al., 2000; Damian et al., 1999; Kaplan et al., 1996).

The same chart shows that the factors that belonged to the two categories of health and function and disease had the highest predictive value in predicting not only negative self-rated health, but also positive health for each of the sub-populations. In other words, factors that belonged to these two categories acted as "double-risk" factors and were associated with increased odds of reporting fair or poor health and decreased odds of reporting very good or excellent health.

Individuals' behaviours were also found to be associated with both outcomes for all four sub-populations. The majority of the observed associations were in the expected directions and consistent with the findings of the more recent studies indicating physical activity, maintaining a healthy weight, and refraining from smoking positively affect perceived health (e.g., Smith et al., 1994; Krause and Jay, 1994; Ferraro and Yu, 1995). There were, however, some variations in the behaviours predicting positive and negative self-rated health for men compared to women and also for middle-aged adults compared to elderly adults. For example, occasional or infrequent physical activity was found to be associated with decreased odds of reporting very good or excellent self-rated health among

elderly adults, but not among middle-aged adults. As another example, women who reported being underweight were more likely to report very good or excellent health compared to those who had acceptable weight. This characteristic was not associated with increased odds of reporting positive self-rated health among men.

As Chart 6.1 presents individuals' prosperity, measured by household income level, was important in predicting positive ratings of health among females, but poor self-rated health among men. For the elderly sub-population, prosperity was found to be associated with more negative ratings of health, while among middle-aged Canadians prosperity related factors were found to act as double-risk factors. The observed variations are consistent with previous research (e.g., Cairney, 2000) suggesting differences in the pathways by which income affect women's overall health and well-being compared to men and younger adults compared to elderly adults.

Factors related to social environment were associated with positive ratings of health among men and middle-aged adults, but they were associated with more negative ratings of health among women. In the present study, there was no significant association between factors related to social environment and elderly adults' self-assessed health. Many of the studies reviewed also found no significant association between self-rated health and measures of social resources or network variables (e.g., Hirdes and Forbes, 1993; Markides and Lee, 1990; Chappell and Badger, 1989). There were however, other studies, which found a significant association between measures of social environment and self-rated health, especially among older adults (e.g., Shanas et al., 1968; Culter, 1973). Change in the cohorts over time may explain why older studies found a significant association between somewhat different measures of social environment and

self-rated health and more recent studies did not. Differences in the measures and scales used are another possible explanation.

The inclusion of premature death of parent(s) as a potential explanatory variable in this study was based on the suggestion that the link between self-rated health and mortality may result not only from one's own health, but also from the knowledge of familial risk factors such as premature death of parents (Idler and Kasl, 1991; Idler and Benyamini, 1997). This factor was found to be a significant predictor of fair or poor self-rated health among women and middle-aged adults. This observation is consistent with the statement that compared with men, women consider a broader set of factors when rating their overall health (Benyaminin et al., 2000). Premature death of parent(s) was not, however, associated with positive ratings of health among any of the demographic sub-populations. This observation most clearly supports Smith and associates hypothesis that determinants of positive and negative self-rated health are in fact different (Smith et al., 1994).

Results from multivariate regression analyses also provided further insights in how individuals' age and sex affect their health assessments. As mentioned earlier, descriptive analyses found a definite deterioration in self-rated health in successive age groups. This study showed that when physical health status, socio-economic status, health behaviours, and psycho-social characteristics are taken into account, there is no longer a linear association between age and self-rated health. This suggests that the association between age and self-rated health may not actually be attributable to age, but to these other factors. There were, however, exceptions. Among women, those who were between 45 and 54 or between 55 and 64 years of age in 1994/95 compared to the

youngest age group (those between 25 and 34) were significantly less likely to rate their overall health as either very good or excellent. Among men, those who were between 45 and 54 and those between 65 and 74 were significantly more likely to rate their overall health as either fair or poor compared to men aged between 25 and 34. Men who were between 55 and 64 were also significantly less likely to rate their overall health as either very good or excellent. On the other hand, men aged between 35 and 44 were significantly more likely to rate their overall health as either very good or excellent. Among the middle-aged adults, those who were between 45 and 54 were significantly more likely to rate their overall health as either fair or poor and less likely to rate it as very good or excellent compared to the youngest age group (25 to 34). Those between 35 and 44 were also associated with decreased odds of reporting very good or excellent health among the middle-aged Canadians. These findings may partly result from individuals assessing their health in relation to social roles (Liang, 1986; Fylkesnes and Førd, 1991). According to these authors, if people feel that they are not fulfilling their social roles, their health assessments may be more negative. Changes that occur between ages of 65 and 74, such as leaving the labour force for both men and women, and loss of a spouse, particularly for women may partially explain the higher odds of reporting fair or poor health in that age range. Pre-retirement stress caused by decrease in income along with all the family commitments may explain the higher odds of reporting fair or poor health among men aged 55 and 64. Poorer ratings of health among women between 45 and 54 may be attributable to menopause, while poorer ratings of health among men in that age group may be attributable to heart disease or other chronic conditions.

Results from this study showed that people in the oldest age group (75 or older) were not significantly more likely to rate their overall health as either fair or poor compared to those in the youngest age group (between 25 and 34). Previous research has also shown that older elderly persons often have more favourable health perceptions than do those aged 65 to 74 (Damian et al., 1999; Ferraro, 1980; Johnson and Wolinsky, 1993). As suggested by Cockerham and associates (1983), findings such as these may be attributed to decreased health expectations in the later years of life and the fact that simply surviving to such an age is evidence of at least good, if not very good health. Another possible explanation is a "healthy survivor" effect. By the time individuals reach their seventies, many of the sick have died or have been institutionalized, and therefore, the surviving community cohort is less sick and more healthy (Levkoff et al., 1987).

Another descriptive finding presented in chapter 4 was that overall, Canadian men aged 25 or older in 1994/95 were more likely than women in the same age range to rate their overall health and well-being as either very good or excellent (63.6% versus 59.5%). This finding was consistent with the previous research, which indicates optimism about health is greater for males (Maddox, 1964; Shanas et al., 1968). The higher prevalence of fair or poor health among women makes sense given that a higher proportion of women than men reported having activity limitations or being functionally dependent (18.1% versus 14.5%), experiencing moderate or severe pain (15.1% versus 10.3%), being highly distressed (16.1% versus 10.0%), living in low-income families (46.2% versus 38.4%) and having at least two chronic conditions (21.2% versus 14.4%) during the first cycle of the NPHS. Interestingly after controlling for the effects of all these characteristics and

conditions, men were more likely than women to rate their health as either fair or poor. Among the middle-aged adults, men compared to women were more likely and among the elderly adults, men were also more likely to rate their health as either fair or poor. This was similar to previous research, which showed that elderly males tend to report poorer health than elderly females with similar objective health conditions (Ferraro, 1980). This finding may be interpreted as reflecting more optimistic evaluations by females, perhaps based on women using more factors in their evaluations.

One of the main contributions of this study to the research on the determinants of self-rated health relates to the discussion of transitions in the characteristics and conditions, which are known to affect self-perceived health. For example, as presented in chapter five, high psychological distress in 1994/95 (during the first cycle of the survey) was associated with increased odds of reporting fair or poor self-rated health among women in 1998/99. High psychological distress in 1996/97 (during the second cycle of the survey) was also associated with increased odds of reporting fair or poor self-rated health among women in 1998/99. Examination of the transitions, however, showed that woman who had high psychological distress in 1994/95 and 1996/97 (during both cycles of the survey) were at even higher risk of reporting fair or poor health. This finding along with others suggests that when people judge their overall health, they not only consider their current level of health, but also consider changes that occurred over time in their health behaviours, socio-economic status, physical and functional ability, number of chronic conditions, and their psycho-social health. In other words, findings from this study are in agreement with Idler and Benyamini's statement that self-rated health is more likely to be a dynamic evaluation, judging trajectories as well as current levels of

health (Idler and Benyamini, 1997). This study further revealed that different patterns of transitions are associated with negative or positive self-ratings of health among men, women, middle-aged adults and elderly adults. For example, the two-year transitions in number of chronic conditions, functional health status and psychological distress were found to be associated with negative ratings of health among both men and women. However, the two-year transitions in the level of pain, drinking behaviour and marital status were only important in predicting negative self-rated health among women. Again this finding supports the notion that compared with men, women consider a broader set of factors when rating their overall health (Benyaminin et al., 2000).

Comparison of the factors predicting fair or poor health with those predicting very good or excellent self-rated health for each sub-population in this study allowed us to answer the question of whether the two ends of the self-rated health indicator are measuring the same or different dimensions. According to the information presented in Chart 6.1 models predicting fair or poor self-rated health and very good or excellent health have some factors in common (e.g., factors related to the health and function, disease, and individual behaviours). However, as discussed earlier for women, there were other factors such as those related to genetic endowment or social environment that were associated with only one end of the self-rated health indicator. Findings of this study are not completely in accord with the previous research, which proposed that the determinants were either all the same or all different (e.g., Smith et al., 1994; Mackenbach et al., 1994). These findings lead more to concluding that at least some, although not all, of the factors associated with fair or poor health are different from factors associated with very good or excellent health.

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Section II: Implications of the Study Findings

Findings discussed in this chapter along with the unique features of the study itself have some implications for future research, clinical practice, policy makers and program planners, and of course, for those who are involved in the delivery of services. The most important implication of this study for those involved in the design of longitudinal surveys, such as the NPHS, is the benefit of having longitudinal data for monitoring and assessing the health of populations and for understanding the dynamic processes of health and illness. All together, findings from this study showed that information on how Canadians' socio-economic, health and functioning, health behaviours and disease related characteristics have changed over time help us to better understand why some of them assess their health better or worse than the others. This expanded understanding was not possible without the longitudinal data.

Although the single-item indicator of self-rated health has been used since the late 1950s and has been recommended by many researchers in the field as a simple useful tool to describe, assess and monitor the health of individuals and populations, this indicator has still not been given enough attention in clinical practice, and in the development of health policies, planning and resource allocation.

Implications for Future Research

As discussed earlier, one of the unique features of the present study compared to previous research on determinants of self-rated health was its use of the Evans and

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Stoddart (1994) population health model as a conceptual framework. The use of this model itself has some implications for future research including the following.

First, by organizing the previously studied factors in relation to self-rated health within the nine components of the Evans and Stoddart (1994) population health model, important gaps in our knowledge regarding the predictors of self-rated health were found. Specifically, very little is known about the contribution of factors related to physical environment, social environment and genetic endowment. This study has built on previous research by including several variables related to social environment and also a family history of premature death of parent(s) as an indicator of genetic endowment. However, as is apparent, more work is required in these areas.

The only aspect of "physical environment" which was explored in this study was the geographic area of the residence, urban versus rural, and, in fact, the contribution of the component of physical environment in relation to self-rated health remained virtually unexplored. Investigating aspects of physical environment, which are important to how people assess their overall health, should be the focus of future research. For example, this study found that people with a low level of functional ability are more likely to report their overall health and well-being as either fair or poor compared to those who had optimum levels of functional ability. Additional information on individuals' physical environment, for example how much of the environment is barrier-free may partially explain the observed association. For example, for a person who is using wheelchair, information on ease of moving around may help to better understand why she or he is rating his/her overall health less than or above the average. Although currently this type of environmental information is lacking, it is important not only to researchers, but also

to policy makers and service providers by changing the focus from individuals and rehabilitation to the environment. There is also a need to move from individual-level information to measure more ecological and community-level characteristics, which are increasingly being shown to be associated with the health of individuals and populations.

More recently, for example, in an ecological study, Kawachi and associates (1999) found a significant contextual effect of low social capital on ratings of health status after adjusting for potential explanatory variables at the individual-level. Similarly, Ross (2002) found a significant association between a "sense of belonging to community" and self-perceived health.

The adoption of the Evans and Stoddart (1994) population health model which differentiates among disease, health and function, and well-being, allowed us to consider self-ratings of health as indicators of well-being, which were affected not only by individuals' level of health and function, and diseases, but also by many other factors related to individuals' behaviours and response, genetic endowment, social environment, and socio-economic status. Although this study examined the association between numerous factors and self-rated health, the number of non-traditional measures included was limited to social support and self-esteem. Given that the current study found differences in the factors predicting negative and positive self-rated health, the contribution of more non-traditional measures of health such as vitality and resilience requires further research.

By adopting the Evans and Stoddart (1994) population health model which differentiates among disease, health and function, and well-being conceptually, this study was able to consider self-rated health as a multi-dimensional concept and as a measure of

overall health and well-being rather than as a measure of health and functioning. This illustration highlights the utility of the Evans and Stoddart (1994) population health model for future research focusing on the determinants of self-rated health.

As discussed earlier, another unique feature of this research was the use of longitudinal data in exploring predictors of positive and negative self-rated health. As the literature review showed the use of longitudinal data on this subject has been rare. In most of the quantitative studies reviewed, the independent and dependent variables were measured simultaneously (i.e., cross-sectional studies). Moreover, among the few longitudinal studies, none of them used transitions or changes in socio-economic, health behaviours, and other health-related factors and conditions as potential predictors of self-rated health. This study has built on the previous research by examining the contribution of transitions in the characteristics related to self-rated health, which highlights the usefulness of longitudinal research.

Future studies based on longitudinal data from the NPHS should also focus on changes in key predictor variables and their relation to changes in self-assessed health. For example, how decline in functional ability between the first and the second cycles of the NPHS is associated with decline in self-perceived health between the second and the third cycles of the survey. Analyses such as these will be in a much stronger position to address hypotheses concerning the causal determinants of self-assessed health status.

Implications for Clinical Practice

This study found that poor perceived or self-rated health, in general, is not only determined by poor physical health and low functional ability, but also is associated with

low education, low income, low social support, high psychological distress, low self-esteem, unhealthy behaviours, and sensory impairments. On the other hand, this study found that, in general, positively perceived health is associated not only with good physical health and functioning, but also with high levels of education and income, having enough social support, high self-esteem, low psychological distress and healthy behaviours including physical activity. Another important finding of this study was that people who experienced unfavorable changes in their socio-economic status, physical health, their health-related behaviours and lifestyle are at higher risk of ratings their overall health and well-being as fair or poor. These are important findings, which have several implications for clinical practice. First, these findings indicate that, although subjective, self-ratings of health are important to clinicians for assessing the overall health of their patients. As this study showed even after controlling for the effects of chronic diseases and activity limitations, there are other factors, which leads to a more negative perception of overall health and well-being. As the analysis of the NPHS data in this study revealed poor physical health and diseases is only one reason among many others for people assessing their overall health and well-being as fair or poor. People who are physically healthy, but are from families with low income, and themselves have low of education, may not have equal access to social and recreational services and therefore feel lonely and rate their health as poor. Given the cumulative evidence, which clearly shows a link between poor perceived health and mortality, new morbidity and decline in functional ability, it is important for clinicians to use this simple single-item indicator to screen "at risk populations". Also it is important for them to understand why this group of people assess their health to be poor and therefore to be able to respond

more appropriately to the needs of their patients. For this to happen, a good orientation in health measurement is needed for clinicians with emphasis on the simple single-item indicator of self-rated health, which can be used to open the conversation with their patients or clients.

Implications for Policy makers and health planners

This study provides health policy makers and health planners with more evidence regarding the validity and reliability of the singe-item self-rated health indicator for monitoring the overall health of the population or of specific sub-populations. This research also extended our understanding of the meanings of excellent, very good, good, fair, and poor health and given the accumulating evidence, which clearly shows that poor self-ratings of health are associated with higher risk of mortality, new morbidity, declines in functional ability, higher rates of health care utilization, this understanding is important to those involved in the development of health policies and health planning. As this study showed there are some medical and disease-oriented reasons for why some people assess their overall health to be less than good (fair or poor). However, as this study also showed there are many other non-medical and disease related factors, which contribute to poor self-assessed health. For example, multivariate analysis of the NPHS data in this study revealed that poor perceived health among women is associated not only with low levels of functional ability and high number of chronic conditions, but also with high psychological distress, infrequent physical activity, and marital status. For men, the non-medical determinants of fair or poor health also included low levels of education and of income. Findings such as these for each of the sub-populations are important from a

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policy perspective because they call for collaboration with other sectors, outside the health care system, such as education, economics, employment, and social services to improve the overall health of Canadians. For example, increasing literacy levels and access to education, providing support for literacy upgrading programs in workplaces and communities for people of all ages, supporting families that have low and moderate incomes to access social services and recreation, thereby making the healthy choices the easy choices. These are some of the healthy public policies, which can help to enhance the health of "at risk" populations that are consistent with the results from this research.

The longitudinal nature of the NPHS data used in this study allowed us to learn more about the distribution of factors known to affect health and their trends over time. Moreover, it allowed us to study transitions in socio-economic, psycho-social, behavioural and other health and disease related characteristics and conditions among Canadians over a two-year period. For example, this study showed that over the short period of two years (between the first and the second cycles of the NPHS), the proportion of Canadians who reported negative experiences such as moderate or severe pain, cognitive problem, high psychological distress, low emotional support decreased. On the other hand, there was an increase in the proportion of those who reported low average frequency of social contacts, or having at least two chronic conditions. Also the proportion of Canadians who reported regular physical activity increased over time. Such information is relevant to policy makers and health planners because it can inform them of the effectiveness of their existing policies and programs. Moreover, this information helps policy makers and health planners to identify ways to intervene to improve the health of Canadians as a whole or specific sub-populations.

This study also showed that there is a link between some patterns of transitions in socio-economic status, psycho-social, physical, and health behaviours and positive and negative self-ratings of health. For example, this study found that a decline in level of physical activity was a protective factor for more positive ratings of health among Canadian men age 25 or older in 1994/95. As another example, stable low income level was associated with decreased odds of reporting very good or excellent health among women aged 25 or over. The significant links between unhealthy transitions and poor perceived health shown in this study suggest that health-related policies and programs need to be re-stated, reinforced or perhaps changed over time.

The observed variations in the predictors of positive and negative self-rated health among the four sub-populations studied suggest that different strategies and programs may well be needed to improve the overall health and well-being of Canadian men and women, of middle-aged adults and older adults.

Section III: Limitations of the Study

As mentioned earlier, this study, which is a secondary analysis of the NPHS longitudinal data contributed in several ways to previous research on the meanings and factors associated with self-ratings of health. However, this study also has limitations that should be recognized. These limitations are as follows:

1. This study explored factors associated with positive (very good or excellent) and negative (fair or poor) self-rated health. Further insights might have been gained by making more detailed comparisons across the five-point scale. For example, are the

factors associated with fair versus good ratings the same as those associated with poor versus good ratings? Small sample sizes prohibited analysis at this level of detail.

2. Despite efforts to maximize response, some members selected for the longitudinal panel in 1994/95 did not respond in subsequent cycles (1996/97 and/or 1998/99), and were not included in this analysis. Adjustments to survey weights were applied to people who responded in all three cycles (continuers) to compensate for those who did not respond and dropouts (Swain et al., 1999). Although this weight adjustment reduced the bias among continuers for many NPHS variables, it is possible that some bias may still exist.

3. NPHS data are self- or proxy-reported by a knowledgeable household member. As mentioned in the methods chapter, cases for which a proxy reporter provided the health component data were excluded from this analysis (N=453). Exclusion of these cases may have weakened or distorted some associations. Individuals whose health component data were provided by a proxy tended to be less healthy, since proxy responses for this component were only accepted if the selected respondent was unable to answer because of special circumstances such as a medical problem.

4. Cases where the responses to the general component of the questionnaire were provided by a proxy reporter were included in this analysis, and the degree to which they are inaccurate because of reporting error is unknown. For example, the incidence of chronic conditions may be affected by the use of proxy responses

(Shields, 2000). At the same time, self-reported data may not be accurate, since the responses were not verified by an independent source. For example, it is not possible to know if respondents who reported a chronic condition actually did have it.

5. It is possible that factors related to self-rated health that were not included in this analysis may have confounded some of the associations that were found.

6. Although a good number of factors related to individuals' health and functioning, disease, and behaviours were included in the present study, a limited number of factors related to social environment, genetic endowment and prosperity were used. Moreover, the relationship between self-rated health and the whole component of physical environment remained unexplored.

7. Respondents may give socially desirable answers to questions on issues such as smoking, alcohol consumption and weight. For instance, in exploring the relationship between alcohol consumption and self-rated health, it was not possible to consider heavy drinkers as a separate group because of the small sample size. This may, in part, have resulted from some individuals underestimating their alcohol consumption. As well, self-reported height and weight (used to calculate Body Mass Index) may underestimate the prevalence of overweight persons (Kuskowska et al., 1989; Rowland, 1990). Inaccurate self-reporting of height is particularly common among elderly persons, who frequently experience the loss of height that occurs with aging (Rowland, 1990). Such individuals often cite their height as measured in their

younger ages. As a result, BMI for the elderly respondents may be more prone to over or underestimation.

8. It was not possible to consider changes in self-esteem between 1994/95 and 1996/97 in relation to self-rated health, since self-esteem questions were not asked in 1996/97.

9. The only aspect of social support measured in the NPHS was perceived emotional support which was measured based on four "yes/no" questions in 1994/95 and 1996/97. Consequently, the range of scores was restricted (0-4), and this may have affected the relationship between emotional support and self-rated health.

10. There was two years between the first and the second cycles of the NPHS and although two years is not a long follow-up period, changes that people experienced within even shorter time frames are not reflected by the data.

11. As discussed in the methods chapter, since application of the bootstrap weights incurred some limitations for this analyses at the time it was undertaken, the decision was made to use normalized weights and to consider statistical tests with p-values less than 0.01 (instead of 0.05) to be significant to partially account for the larger variance estimates that would have been obtained if full account had been taken of the survey design. Thus, the odds ratios reported in this study should be viewed with caution as their standard errors, and therefore, confidence intervals may be underestimated.

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APPENDIX I

NPHS Content for the 1994/95, 1996/97 and 1998/99 Cycles

NPHS – Core Content

	NPHS: H* 1994/95	NPHS: H* 1996/97	NPHS: H* 1998/99
Two week disability	X	X	X
Health care utilization	X	X	X
Restriction of activities	X	X	X
Chronic conditions	X	X	X
Socio-demographic characteristics	X	X	X
Education	X	X	X
Labour force	X	X	X
Income	X	X	X
Self-perceived health	X	X	X
Self-perceived stress			
Women's health	X	X	X
Blood pressure	X	X	X
Height/weight	X	X	X
Insurance		X	X
Health status	X	X	X
Physical activities	X	X	X
UV exposure			
Repetitive strain		X	X
Injuries	X	X	X
Use of medications	X	X	X
Smoking	X	X	X
Alcohol	X	X	X
Mental health	X	X	X
Social support	X	X	X
Sense of coherence	X		X
Alcohol dependence		X	

* Household Component

NPHS – Focus Content

	NPHS: H* 1994/95	NPHS: H* 1996/97	NPHS: H* 1998/99
Stress			
Ongoing problems	X		
Recent life events	X		
Childhood and adult stressors	X		
Work stress	X		
Self-esteem	X		
Mastery	X		
Access to services			
Blood pressure		X	
Pap smear test		X	
Mammography		X	
Breast examinations		X	
Breast self-examinations		X	
Breast-feeding		X	
Physical check-up		X	
Flu shots		X	
Dental visits		X	
Eye examinations		X	
Emergency services		X	
Insurance coverage (now focus)		X	X
Self-care			X
Family medical history			
Mother			X
Father			X
Siblings			X
Chronic condition diagnosis and management			
Arthritis			
Diabetes			
Heart disease			

* Household Component

NPHS – Buy-in Content

	NPHS: H* 1994/95	NPHS: H* 1996/97	NPHS: H* 1998/99
Health promotion survey	(collected as separate component - H07)	(integrated in H05 / H06)	(integrated in H05 / H06)
Health information	X		
Diet / nutrition	X	X	
Height / weight	X	X	
Breast self-examination		X	
Breast-feeding	X	X	
Pregnancy		X	
Smoking	X	X	
Alcohol	X	X	
Injury prevention	X		
Sexual health	X	X	
HIV	X	X	
Road safety		X	
Tobacco alternatives			X
Food insecurity		X	X
Provincial content buy-ins	(integrated)	(integrated)	(none)
Coping (AB)	X	X	
Coping (MB)	X		
Health information (AB)		X	
Tanning and UV exposure (AB)		X	
Social support (AB)		X	
Attitudes towards parents (AB)		X	
Health services (AB)		X	
Sexual health (AB)		X	
Violence and personal safety (AB)		X	
Child health services (AB)		X	
Supplements	none	separate component	separate component
Asthma (Health Canada)		X	
Food insecurity (HRDC)			X

* Household Component