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RESEARCH REPORT

THE POPULATION HEALTH
APPROACH TO HOUSING:
A FRAMEWORK FOR RESEARCH

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The Population Health Approach to Housing: A Framework for Research

April 2002

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Purpose

The National Housing Research Committee, established in December 1986, is an ongoing committee made up of federal, provincial, and territorial industry, social housing and consumer representatives. Canada Mortgage and Housing Corporation (CMHC) co-chairs Full Committee meetings and most Working Groups, and provides the Secretariat. The objectives of the NHRC are to: identify priority areas for housing-related research or demonstration, encourage greater cooperation, develop partnerships and minimize overlap in research activities, encourage support for housing research, and promote dissemination, application and adoption of research results. In addition to the Full Committee, the NHRC also operates through working groups to exchange information, discuss research gaps and undertake research projects.

The NHRC became interested in population health and its links to housing in late 1999. After receiving presentations at Full Committee meetings, the Committee decided in late 2000 to set up a group to explore the research potential of this topic.

The membership of the group consisted of Canada Mortgage and Housing Corporation, the provinces of: Saskatchewan Alberta, Manitoba, Nova Scotia and Newfoundland and Labrador; Health Canada, Canadian Housing and Renewal Association, Federation of Canadian Municipalities and the Cooperative Housing Federation.

The group considered that there were large gaps in knowledge, especially in the health impacts of the social and economic aspects of housing and that there was a role that the NHRC could play. This role was to help set some directions for future research through design of a research framework. Accordingly a contract was given to Dr. James Dunn (then with University of British Columbia, now of University of Calgary) to review what research has been done to date in the area where housing and population health converge, to look for models of other population health research that could inform the housing area and to look for opportunities in the areas of data gathering, research design and methodology.

This document is Dr. Dunn's report to the NHRC group.

Acknowledgement

The five provinces represented in the NHRC group on population health and housing (Saskatchewan Alberta, Manitoba, Nova Scotia and Newfoundland and Labrador) together with CMHC provided the funding for this project. The author would like to thank the provinces and CMHC for their financial support, as well as all the members of the group for their interest and support. In particular, the work of the chairperson of the group, Mr. Tom Young (Saskatchewan and former NHRC co-chair), was pivotal in initiating and guiding the project, as was the work of Mr. Phil Deacon in providing informed input throughout the project.

Executive Summary

This report presents a framework for analyzing the relationship between housing and health from a population health perspective. The population health perspective is an influential research and policy framework that is motivated by the question "What makes some people healthy and others not?" It suggests that the strongest determinants of health are socio-economic factors in everyday life.

It is possible to identify four areas of research that have been particularly influential on the development of the population health perspective. Each of these areas—social support and health, work conditions and health, income inequalities and health and the biological embedding of social influences over the life course—can be applied to the study of relationships between housing and health either by extension or analogy. The population health perspective, in short, suggests that the large socio-economic differences in health seen in Canada and other similar societies has to do with the cumulative lifelong impact of multiple, overlapping stressors of everyday life, stretched over the life course. Housing, as a central focus of everyday life patterns, is likely to be a crucial component in the ways in which socio-economic factors shape health.

The biological mechanisms thought to underlie the relationship between socio-economic status and health are quite well understood. The human physiological stress response system is well adapted to respond to quick, short bursts of threat or challenge (like being pursued by a predator), but is ill-suited to the kind of chronic, low-level stress we experience in contemporary life. The particular type of stress that is most damaging is believed to be a lack of control, something that is experienced by us all, but more acutely and continually by people at the lower end of the socio-economic spectrum.

Despite the logic that housing can inform research on the relationship between socio-economic status and health, population health researchers have paid housing very little attention, while housing

researchers have approached health from different perspectives. The end result is that there are relatively few studies of relationships between socio-economic dimensions of housing and health in the research literature (especially in Canada). Past research on housing and health has instead focused mainly on: the health effects of physical, biological and chemical exposures in the home; health selection—the degree to which sick people end up in poorer quality social housing, especially in the United Kingdom; and the health status and health care needs and patterns of use amongst homeless persons. This latter stream of research is important, but may conceal important variations in housing that influence health amongst people who are housed.

Towards a Population Health Approach to Housing

The approach taken in developing the research area of population health and housing attempts to unpack important social and economic dimensions of housing that bear some similarity (conceptually) to already known socio-economic determinants of health. The result of this process is the housing and population health framework presented, which suggests that housing can be usefully thought to have three dimensions (materiality, meaning and spatiality) which have the potential to shape health, across the life course.

Material dimensions include the physical integrity of the home (for example, need for repair) and residents' exposure to physical, biological and chemical hazards in the home. But for many households, other material factors such as housing costs are also crucial because they represent one of the largest monthly expenditures they face. When housing costs are high relative to income, therefore, households will incur opportunity costs that may affect health. Expenditures on housing, in other words, represent money that cannot be spent on other things that shape health (for example, recreation, education, nutrition and health services not covered by insurance). In addition

to this, housing markets are also very important factors in the redistribution of wealth in our society, albeit in a regressive way (from the poor to the rich). This stems at least partly from the favourable tax treatment of owners compared to renters.

Meaningful dimensions of housing draw on environmental psychology and research on work and health and social support and health. Housing, for example, serves an important role as a place of refuge in our society, and similarly, peoples' homes are one of the few places in everyday life where they are socially and legally sanctioned to exercise complete control. A person's home is also an important source of prestige, status, pride and identity, one that is often enhanced by home ownership. Home ownership, it follows, may have important emotional, psychological, and health advantages. One's home is a crucial setting for social interaction and the centre of an individuals' social network. It is well established in the population health literature that social support is a powerful determinant of health: studies have shown that social isolation is as important a risk factor for premature death as smoking. Finally, because of the permanence of the structure and the fact that it is spatially fixed, one's home is important as a place of continuity, stability, and permanence in everyday life. In short, many of our culture's principal themes concerning our hopes, aspirations and dreams pertain to houses and homes.

Spatial dimensions of housing are potentially important to health because the home acts as a focal point for everyday activity. This means that one's home and its immediate environment is likely to be the setting for exposure to a mix of positive and negative influences on health. One example of the importance of the spatial dimensions of housing can be seen by considering the location of the home relative to services and amenities such as schools, public recreation facilities, health services and job opportunities. Another important aspect of the spatial dimensions of the home

is the social environment it places one in, particularly with respect to social norms. For adults, social norms around health behaviours may be influential upon health behaviours. For children and youth, neighbourhood social norms can be influential in socialization—growing up in a working-class neighbourhood may lead youth to underestimate the value of education, while the opposite might be true if a youth was to grow up in an environment where higher education was the norm.

A Life-Course Perspective

The population health perspective emphasizes the impact of socio-economic factors on health from a life-course perspective. The idea of chronic exposure to stress implies a period of latency before manifestation of disease. The direct and indirect effects of housing on child development and health are a particularly fruitful area of research. Some direct effects include exposure to physical, chemical and biological hazards that must be considered for all children, but those in lower socio-economic status households are more likely to be exposed to such hazards, creating a "multiple jeopardy" effect. Other direct effects on child development concern the location, design and amenities of housing. An example of indirect effects of housing on child development is through the impact of parental stress. Housing, according to such a hypothesis, can be a significant source of parental stress in low-income households, and parental stress is strongly linked to patterns of parent-child attachment. Parent-child attachment, in turn, is a very strong predictor of future emotional, social, economic and physical well-being for children.

There are many sub-populations within Canadian society who either experience unique housing difficulties that may have health consequences, or for whom housing and socio-economic disadvantages are magnified by their disempowerment on an other social axis. This report, therefore, also briefly considers the relationship between housing and

health in relevant sub-populations in Canadian society. In short, this demands that the proposed housing and population health framework be employed in a manner that is also sensitive to the question: "Are some groups in society more vulnerable to health effects of socio-economic dimensions of housing and domestic life?" Some of the population groups who experience unique housing and health issues include: Aboriginal people, people with mental illness and addictions, seniors, people with chronic illnesses and disabilities, women, and the homeless. The framework is applicable to these groups, although it may be different specific factors within each dimension of housing that makes a difference to health.

Data and Research Methods

One of the challenges to doing housing and health research is methodological. Unlike the health effects of physical, chemical and biological hazards in the home, the health effects of socio-economic dimensions of housing are less immediate and less acute. They operate over a longer time span and are less likely to manifest in measurable disease over the time period of a typical research project. This clearly points to the need for a longitudinal element to data gathering. Studies that can track individuals' housing and health circumstances over time can provide particularly powerful evidence of a relationship between housing and health. There already exist national longitudinal surveys like the National Longitudinal Survey of Children and Youth (NLSCY), the National Population Health Survey (NPHS) or the Canadian Community Health Survey (CCHS), each of which follows individuals through time and measures their health status at each point in time. Examples of appropriate health outcomes for housing and health research include mental health screening instruments and measures of children's emotional, social and cognitive development, like parent-child attachment. Health and child development variables like these are commonly collected in national surveys such

as the NLSCY and the NPHS, but the housing data that are collected in these surveys is insufficient for investigating anything more than the simplest hypotheses about housing and health. It follows that a greater number of housing variables need to be included in nationally-representative surveys. There are several standard questions on housing that have already been successfully used to quantify inequalities but other variables that conform to the framework of material, meaningful and spatial dimensions of housing have yet to be validated.

The lack of housing questions in health surveys is mirrored by the lack of health questions in housing surveys. There already exist methods and health measures capable of detecting important differences in the health status of people with different housing circumstances. For adults, there are many self-report measures available that are extremely good indicators of actual differences in health and illness. Other studies have demonstrated that such measures are strongly correlated with "harder" measures of health, like symptom reporting, diagnosable illness, and even death. Even the frequently-used question: "Compared to other people your age, how would you rate your health?" is an excellent predictor of "harder" measures of health (symptom reporting, future mortality, etc.).

The report also argues that it would also be fruitful to include already proven "intermediate variables" in studies of the relationship between housing and health. Because of the importance of housing to so many other areas of life it is likely that differences in housing circumstances are tightly linked to differences in proven determinants of health, like social support and control over everyday circumstances (similar to the importance of control, or decision latitude in the workplace). It follows that studies which show an association between housing circumstances and intermediate measures of known health determinants can be helpful in assessing and understanding the relationship between housing and health.

An alternative approach to developing longitudinal data for the study of housing and health would be to use so-called quasi-experimental methods, or "natural experiments". Each time a new assisted housing development is opened, for example, it becomes a potential natural experiment, because a number of households will change from their current housing to a new housing circumstance, and it becomes possible to assess their health status before their move and after it.

In studies based either on questionnaires or natural experiments, it is often possible to use health care utilization data from administrative databases as a proxy for health status. In many provinces (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario) there are now powerful health care utilization databases which researchers can use to detect distinct patterns of utilization in (anonymous) individuals. These patterns can then be used as evidence of illness or adverse health conditions. It is possible, with the appropriate ethical approvals in place (these demand that linkages only occur with the permission of the individuals involved and that people's privacy and anonymity is protected), to use these data to study the relationship between housing and health: such methods would provide particularly reliable and convincing evidence.

Administrative health care utilization data could also be used for research that investigated the effectiveness (and cost-effectiveness) of housing interventions for vulnerable sub-groups, especially people with chronic conditions, disabilities, and mental illnesses and addictions. In other words, it would be possible to investigate whether there were health care savings realized by providing stable, supported housing to people with mental illnesses, for example (especially if done in the context of a natural experiment). This kind of policy analysis would provide strong evidence of the impact of housing on health, and strong justification for a greater investment in housing programs for individuals with chronic illnesses and disabilities.

The report concludes that there are many opportunities to expand research on housing and health in Canada.

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I.0 Introduction

The population health perspective has become one of the most influential approaches to research and policy in Canada. Motivated by the question "What makes some people healthy and others not?" (Evans, *et al.* 1994) population health demands that policies address the reasons why differences in health status "are systematically distributed across identifiable social characteristics, and how public expenditures ought to be deployed to maximize the health status of the population" (Hayes 1994a, 1).

A population health approach to public policy implicates policy sectors that lie well outside the traditional ministries and agencies charged with the responsibility of delivering health care. Ministries of labour, education, social services, environment and housing have crucial roles to play in the development of comprehensive "healthy public policy" designed to address "upstream" factors that underlie social inequalities in health.

The population health perspective is based on a synthesis of a diverse public health and social scientific literature which suggests that the most important antecedents of human health status are not medical care inputs and health behaviours (smoking, diet, exercise, etc.), but rather social and economic characteristics of individuals and populations (Evans, *et al.* 1994; Frank 1995; Hayes and Dunn 1998). Studies repeatedly demonstrate a positive association between social status and health status, however measured. Life expectancy, for instance, increases with socio-economic status in nearly all developed countries (Hertzman and Weins 1996). The pattern is not, however, typically a simple difference between the wealthy and the poor, instead it is almost invariably "a monotonic 'gradient', wherein successive population quantiles, graded according to increasing levels of income or education, or by occupational class, enjoy increasingly long and disability-free lives" (Hertzman and Weins 1996, 1084).

Although the persistence of the social gradient in health underscores the fact that poverty severely compromises health, because the gradient also spans the entire social spectrum, it can also be inferred that income differences in health are not simply reducible to absolute deprivation *per se*. Systematic social differences in health are believed to be associated with systematic differences in the quality and stressfulness of everyday life. This focus on the "epidemiology of everyday life" (Lynch and Kaplan 1997) suggests the importance of housing as a nexus or medium through which a wide range of health determinants may operate. It follows that social policy is health policy insofar as it is directed to the improvement of everyday living conditions, with emphasis, of course, on those of lower socio-economic status.

The primary purpose of this report is to propose a conceptual framework intended to guide research on housing and health from a population health perspective. In developing an argument for such a framework, Section 2 reviews the primary underpinnings of the population health perspective, emphasizing its importance in the Canadian social policy discourse and the primary evidence base for the population health perspective. This section closes with a brief analysis of the most influential explanations of the links between everyday socio-economic environments and health status, focusing on the cumulative effect, over time, of chronic stresses.

In Section 3, a brief overview of previous research on housing and health is presented. This review strongly suggests that research on socio-economic dimensions of housing and health is underdeveloped relative to research on connections between biological, physical and chemical exposures in the home. It is also clear from the review that there are crucial intersections between the biophysical and the socio-economic dimensions of housing which only serve to heighten the urgency of further research on socio-economic dimensions of housing and health.

In Section 4 the framework for housing and population health is presented and explained. The framework emphasizes the importance of material, meaningful and spatial dimensions of housing in the production of health. Section 5 follows closely from Section 4, and in it, a number of emergent research questions that follow from the framework are identified. It is also argued that there are relatively little data currently available in Canada to address some of the more compelling questions.

Finally, despite the centrality of socio-economic lines of disadvantage and marginality in the analysis of housing and health linkages, Section 6 acknowledges that socio-economic factors may combine with other types of social disadvantage and vulnerability to powerfully undermine health and development. An individual's stage in the life-course (with particular emphasis on the beginning and end of life) is an important theme in this section. Several possible avenues for investigation of the effects of socio-economic dimensions of housing on early child development are discussed and examples presented. A focus on children's living conditions and their developmental outcomes represents a particularly underdeveloped area of research. Although the opportunities in children's housing and health research are emphasized, several key issues for housing and health relationships amongst seniors are also identified in the first portion of Section 6.

For a number of other identifiable groups that often experience marginality and disempowerment, the importance of linkages between socio-economic status, housing and health is acutely felt. For First Nations' Peoples, people with mental illnesses and

addictions, people with disabilities and chronic illnesses, and oftentimes women and visible minorities, the experience of poor housing, low socio-economic status (SES) and other aspects of social marginality are tightly linked and may severely compromise their health. While the focus of this report remains on links between the socio-economic dimensions of housing and population health, the latter portion of Section 6 identifies some of the unique questions and issues that must be addressed in the study of housing and population health among people from these groups.

The final section of the report (Section 7) emphasizes some of the methodological challenges that must be addressed by researchers studying the socio-economic dimensions of housing. An important argument advanced in this section is that housing may have the most immediate effects on factors that mediate the relationship between housing and health, such as social support, life satisfaction, self-esteem, etc. The primary recommendations made in this section are: a) that known determinants of health be used as intermediate outcomes in the analysis of relationships between housing and health; and b) that health outcomes with a shorter latency period (the time between "exposure" and health event—for example, mental health) be used more frequently in research. The section also recommends that more longitudinal and randomized quasi-experimental research be conducted on housing and health. There are hundreds of new public (and private) housing developments that are occupied each year, and each represents a possible "natural experiment" for the examination of connections between housing and health.

2.0 What is Population Health?

Population health has emerged as a major theme of health research and social policy reform in Canada, having eclipsed health promotion in this role over the last few years (Hayes and Dunn 1998; Dunn and Hayes 1999). Based on a broad synthesis of individual- and population-based research from a variety of fields (Mustard and Frank 1991), the population health approach is becoming an important tool in policy circles, at various levels of government (Health Canada 1994; Labonte 1995; Hayes and Dunn 1998).

At the federal level, there have been several research and policy thrusts employing a population health perspective, including the Federal / Provincial / Territorial Advisory Committee on Population Health (FPTACPH) *Report on the Health of Canadians* (Health Canada 1996) and *Strategies for Population Health* (Health Canada 1994); the *National Forum on Health* (1997); and the *National Population Health Survey* (Health Canada 1994-5; 1996-7). Provincial developments include four reports of the Provincial Health Officer for British Columbia (1992-1996); and British Columbia's *Health Goals for B.C.* (1997). Additionally, population health was the framework presented to B.C. residents in public consultations regarding the New Directions policy development, and population health research has become an important emphasis for funding agencies, such as the Canadian Population Health Initiative (CPHI), Health Canada's Population Health Fund, the Institute of Public and Population Health (IPPH) of the Canadian Institutes of Health Research (CIHR), the Alberta Heritage Foundation for Medical Research (AHFMR) and B.C.'s Michael Smith Foundation for Health Research (MSFHR).

Despite its popularity and influence, there remains a great deal of confusion about what population health is—a situation that is not helped by the fact that the expression is used in multiple ways. Consider the definition adopted by the Federal, Provincial, Territorial Advisory Committee on Population Health (FPTACPH):

Population health refers to the health of a population as measured by health status indicators and as influenced by social, economic and physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development, and health services.

As an approach, population health focuses on the interrelated conditions and factors that influence the health of populations over the life course, identifies systematic variations in their patterns of occurrence, and applies the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations (Health Canada 1994).

Within these descriptions, three different types of activity are implied: the generation of empirical research, the integration of this research into an understanding of the social processes that would account for the observations—a theoretical framework, and the application of this knowledge through public policy in the service of the public good (Hayes and Dunn 1998; Dunn and Hayes 1999). A somewhat different use of the term also contained in the above is the strictly literal reference to population health as "the health of a population in the aggregate", without any necessary policy connections or distinction between research and framework (for example, Saunders, *et al.* 1996; Dean 1994; Green 1994).

Some of this confusion can be overcome if a distinction is made between a population health *perspective*, population health *research*, a population health *framework*, and a population health *approach* to public policy. The term *perspective* can be used as a blanket term to cover the population health discourse in its most general sense (Dunn and Hayes 1999; Hayes and Dunn 1998).

The social gradient in health, Evans, *et al.* (1994) suggests a paradigm shift around the idea that there is *something* that underlies the persistent and consistent social gradients in health status, but the explanation of what that *something* is, and how it works—a population health *framework*—is only now emerging, for example with the publication of Wilkinson's (1996) *Unhealthy Societies*. Wilkinson's book integrates empirical and social / theoretical analyses into a coherent explanation of the social gradient in health, drawing from the body of evidence contained within population health *research*. The development of a population health *framework* from population health *research* makes the need for a coherent explanation more pressing; it forces an explicit accounting of the mechanisms by which dimensions of the socio-economic environment shape health and well-being. The development of a *framework* of understanding for relationships between housing, socio-economic status and health may contribute to the development of a population health *framework* generally, and to the development of a population health *approach* to public policy (Hayes and Dunn 1998; Dunn and Hayes 1999).

A population health framework has strong implications for public policy. It suggests that public policies that improve conditions of everyday life and reduce inequalities in those conditions, are likely to have a strong impact on the health of the population. An important implication of the population health perspective, in other words, is that governments and social institutions must move from an emphasis on health care policy to *healthy public policy*. A focus on healthy public policy transcends the stovepipes of federal and provincial health care ministries, and bestows a health responsibility on other ministries and departments, like labour, education, social services, environment, and housing. Successful healthy public policies in these sectors, however, cannot be designed without adequate conceptual frameworks and plausible mechanisms linking socio-economic factors (like housing) with health.

2.1 Evidence for the Population Health Approach

The social gradient in health, and the influence of socio-economic conditions on health more generally, are central features of the population health perspective. The strong and persistent gradient in health status observed in nearly every industrialized country of the world, is largely independent of specific disease processes (Wilkinson 1996), and cannot be reduced to differences in access to medical care (for example, Arblaster, *et al.* 1996), or differences in health behaviours (for example, Marmot, *et al.* 1978; Lantz, *et al.* 1998).

Accordingly, the primary tenets of the population health approach are as follows (Evans 1994; Frank and Mustard 1994; Frank 1995):

- the major determinants of human health are cultural, social, and economic factors—both at the population and individual levels, and not medical care inputs and utilization;
- at the population level, it is clear that societies in which there is both a high level and relatively equal distribution of wealth enjoy a higher level of health status and;
- at the individual level, one's immediate social and economic environment and the way that this environment interacts with one's psychological resources and coping skills, shapes health much more strongly than the biomedical model would suggest.

Population health has implications for healthy public policy: it implies that such policies must address the reasons differences in health status "are systematically distributed across identifiable social characteristics, and how public expenditures ought to be deployed to maximize the health status of the population" (Hayes 1994a, 1). Development of such policies requires a richer understanding of the health impact of one's place in the social hierarchy and the experiences that follow from it (Hayes 1994b).

The evidence upon which the population health perspective is based is usefully conceptualized as emerging from four related bodies of research: social inequalities in health status; social support and health; workplace / job characteristics and health; and lastly, what is called a "life-course" perspective. The latter focuses on the "biological embedding" (Hertzman 1994) of social experiences over the life course, which vary across individuals of differing socio-economic status by virtue of processes of social differentiation. Each of these streams of research is important to a population health approach to housing for at least one of two reasons: 1) they imply known determinants of health which themselves are highly influenced by variations in housing; or 2) they have the potential to inform housing and health research by extension and analogy (Dunn 2000). The remaining part of this section deals with each stream of research in turn.

2.1.1 Social Inequalities in Health Status

The population health perspective has emerged from an interest in the remarkably persistent relationship between social status and health status in industrialized countries over the 20th century. The importance of social inequalities for answering the question "why are some people healthy and others not?" (Evans, *et al.* 1994) follows from the observation of consistent social gradients in health status that have been found in virtually all human populations. Gradients are evident for various measures of social status (class, income, educational level and perceived control over life circumstances) and for various measures of health status (mortality, morbidity, sickness absence and self-reported health status).

The social gradient in health is evident across nearly all causes of mortality and morbidity, despite the fact that the major causes of mortality and morbidity changed completely during the 20th century. Moreover, the gradient has persisted even after the introduction of universal medical insurance in most industrialized countries.

The social gradient in health cannot be attributed in any large measure to any of: 1) reverse causation, where health problems cause reductions in earnings; 2) status differences in health risk behaviours (for example, poor people smoke more); and 3) lack of material means to sustain life among the poor—the relationship between social status and health status spans the entire social spectrum (Evans 1994; Kawachi and Kennedy 1997; Kawachi, *et al.* 1997; Lantz, *et al.* 1998; Wilkinson 1994; 1996).

Based on this evidence, Evans (1994) suggests that there is "something that powerfully influences health" that "...is correlated with hierarchy *per se*" (p. 6). Moreover, this "something" "operates not only on some underprivileged minority of "them" over on the margin of society" ... but on all of us ... [A]nd its effects are *large*" (*ibid*, emphasis in original). What is this something that "influences our vulnerability to a wide range of diseases and has an effect equal or greater to more conventional risk factors" (Frank and Mustard 1994, 9)? In the opinion of many researchers, it is chronic stress.

Since the groundbreaking work of Hans Selye in the 1950s, scientists have understood the way that the physiological stress response system—the famous "fight or flight syndrome"—works. But not until recently have scientists discovered that the physiological stress response is deeply and fundamentally conditioned by the experiences of powerlessness, subordination and lack of control that are inherent in societies characterized by inequality and hierarchically-ordered social relations.

The short version of the "fight-or-flight" story is that human beings, like other mammals, have evolved in a way that makes them very good at responding to quick, short bursts of stress, much like what one would experience if being chased by a predator. In his book Why Zebras Don't Get Ulcers, neuroscientist Robert Sapolsky explains that when mammals are faced with threats or stressors, a set of hormones called corticosteroids are released by the body, which stimulates

the physiological stress response.¹ The animal's pupils dilate, its blood vessels expand, its body temperature goes up, and so on, all of which serve to mobilize the body's fight or flight response, and escape or fight the predator. In the wild, this response usually only lasts a short time, seldom longer than an hour or so, and the concentrations of hormones in the bloodstream return to normal. But there is now an overwhelming body of evidence that shows that the stressors that human beings face—chronic, long-term, low-level stress—slowly kill us. This is because when the physiological stress response is engaged, a whole range of other bodily functions shut down. For example, if a zebra is chased by a lion, her body diverts all its resources to helping her get away and for a short time doesn't bother with things like repairing the stomach lining, attending to reproductive functions, and so on. For human beings, these "other" functions can be subtly compromised for as long as the individual is experiencing stress, which can be for days, weeks, months, even years.

Studies of baboons and monkeys (primates with a hierarchical social organization and a biological constitution similar to humans), both in the wild and in captivity, show that there is a strong health gradient among animals, depending on their position in the dominance \leftrightarrow subordination hierarchy (Sapolsky 1998; Kaplan, *et al.* 1994). Dominant animals are healthier than subordinate animals, even when food is plentiful. Indeed, some important studies of baboon troupes in captivity have shown that when individual members of the troupe have been fed the exact same high-fat diet, subordinate animals are many times more likely to develop atherosclerosis—the early signs of heart disease and heart attacks.

In a similar way, our body's normal hormonal stress response is also known to promote the accumulation of atherosclerotic plaque, the

material in our arteries that cause heart attacks and congestive heart failure. Heart disease is the single leading cause of death in Canada, with huge medical and social costs to our society (Health Canada 1993). Moreover, the incidence, mortality and survival of heart disease all show a very strong social gradient. The link between chronic stress and the body's response is very clear, and it is equally clear that this affects people differentially across the income spectrum, with poorer people suffering the most.

Equally alarming is the evidence that corticosteroids actually cause internal damage as well. The work of neuroscientist Max Cynader has shown that chronic exposure to the corticosteroids released into our bloodstream under the normal physiological stress response are toxic to brain cells (Cynader 1994). Although brain cells can handle short-term exposures, longer-term exposures will kill brain cells. Because it happens in a relatively non-specific way, if the brain cells that are killed happen to be ones associated with learning and memory, for example, this may mean a premature onset of dementia.

It appears that the simple experience of subordination and powerlessness can be very damaging to health. As described earlier, similar patterns exist for human beings along the spectrum of powerlessness (Sapolsky 1998; Kaplan, *et al.* 1994). This is true for a large number of other conditions, all of which show a social gradient—at each step of the income distribution, people who are poorer are more likely to suffer from a wide variety of illnesses and diseases.

2.1.2 Social Support and Health

It is now widely acknowledged that the quantity and particularly the quality of social contacts individuals have are strongly associated with a wide

variety of threats to health status (House, *et al.* 1988). The Alameda County study, one of the most widely cited examples, showed individuals' score on a combined social network index² predicted mortality with a relative risk ratio of 2.0, in an analysis that controlled for self-reports of physical health, SES, smoking, alcohol, exercise, obesity, race and life satisfaction (Berkman and Syme 1979). This study has been replicated in other locales by other investigators (House, *et al.* 1982; Orth-Gomer and Unden 1987; Schoenbach, *et al.* 1986; Welin, *et al.* 1985). The importance of the relationship between social support and health is illustrated by House, *et al.*'s claim that lack of social support is as important a risk factor for coronary heart disease mortality as smoking (1988, 242).

There are two major hypotheses by which social support is believed to influence health. The "buffering hypothesis" suggests that support may reduce the importance of the perception that a situation is stressful, and second, it may in some way tranquilize the neuroendocrine system so that people are less reactive to perceived stress. The "direct effect hypothesis", on the other hand, suggests that direct benefits of social support occur as a result of the perception that others will provide assistance in the event of stressful occurrences, and result in "increased overall positive affect and in elevated senses of self-esteem, stability, and control over the environment" (House, *et al.* 1988). These psychological states, Cohen and Syme (1985) suggest, "may in turn influence susceptibility to physical illness through their effects on neuroendocrine or immune system functioning, or through changes in health promoting behaviours" (p. 6). Another way the direct effect hypothesis of social relations is believed to operate is through "increased senses of predictability, stability and control because they [social relations] provide the opportunity for regularized social interaction and the concomitant feedback that allows for the adoption of appropriate roles and behaviors" (Cohen and Syme 1985, 6).

In other words, it is believed that the existence of reciprocally supportive relationships with friends and/or family are influential upon health, because they offer material and emotional resources that may reduce ongoing levels of anxiety, thus reducing the corrosive impacts of stress.

2.1.3 Workplace / Job Characteristics and Health

Numerous workplace studies in several industrialized countries have found that three characteristics are highly influential upon health: the psychological demand of an individual's job; the amount of control, decision latitude, or skill discretion individuals exercise in the course of their job; and the amount of social support individuals receive from co-workers (Karasek and Theorell 1990; Marmot and Theorell 1988; Wilkinson 1994). In a study of about 1,600 randomly selected Swedish men, for example, Karasek, *et al.* (1981) found that heart disease symptoms were most common (with 20 per cent of workers affected) among those workers who described their work as both psychologically demanding and low on a scale measuring the workers' discretion over use of skills on the job. Among workers who reported low psychological demand and a high level of skill discretion, no heart disease symptoms were reported. Their jobs "were associated with a much better state of health than that enjoyed by the average worker" (*ibid.*, 5). The results of this study appear in graphical form in Figure 2.1. This figure shows that for both demand and control, there is a gradient effect, with more demand and less control translating into greater heart disease prevalence, with the greatest effect seen for workers with both, low control and high demand. Similar results have been found in numerous other studies (e.g., Johnson and Hall 1988; Siegrist, *et al.* 1990; see Brunner 1996 and Marmot and Feeney 1996 for reviews).

Figure 2.1: Job Characteristics (Demand and Control) and Heart Disease Prevalence

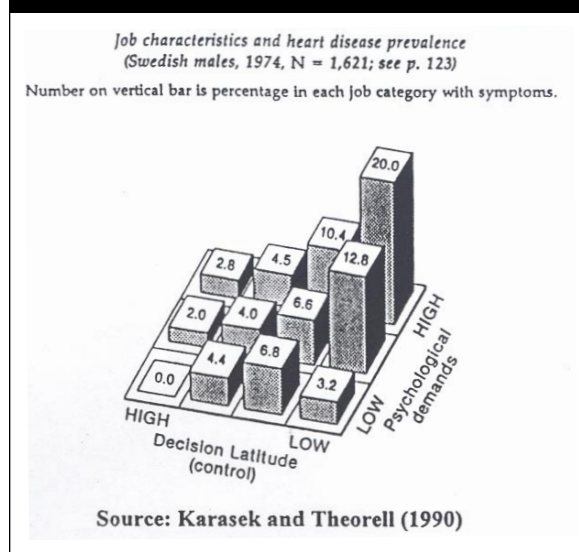
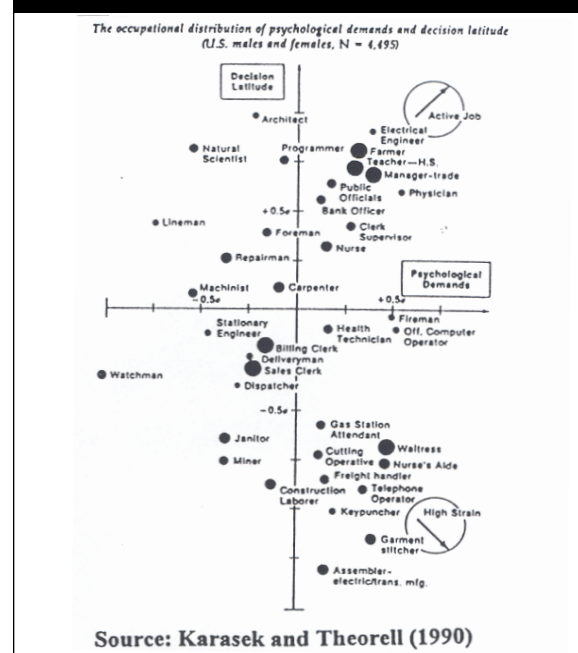


Figure 2.2 illustrates the distribution of jobs from a sample of workers in the United States according to their demand and control characteristics (Karasek and Theorell 1990). In the upper-right hand quadrant, where psychological demand and decision latitude are both high, is a concentration of high-prestige, male-dominated, high-paying jobs. These include teachers, public officials, nurses, physicians, and bank officers. The upper-left quadrant shows what Karasek and Theorell (1990) describe as "leisurely work": low demand and high decision latitude jobs. Examples of such jobs include architect, natural scientist, programmer, and foreman. These jobs are at the lowest risk on the logic of the demand-control model. In the lower-left quadrant are low-demand / low-decision-latitude, or "passive" jobs, including sales and billing clerks, transport operators, watchmen, and janitors. People working in these jobs report the lowest levels of sleep problems (1.9 per cent as opposed to 8.0 per cent in the male working population) (Karasek and Theorell 1990). The quadrant with the greatest health risks is the lower-right: high-demand/low-decision-latitude jobs. These include machine-paced workers (assembler, cutting operative, inspector, freight handler, waiter and cook). Karasek and Theorell

(1990) note the high concentration of female-dominated occupations in this quadrant (garment stitcher, waitress, telephone operator, and other office automation jobs).

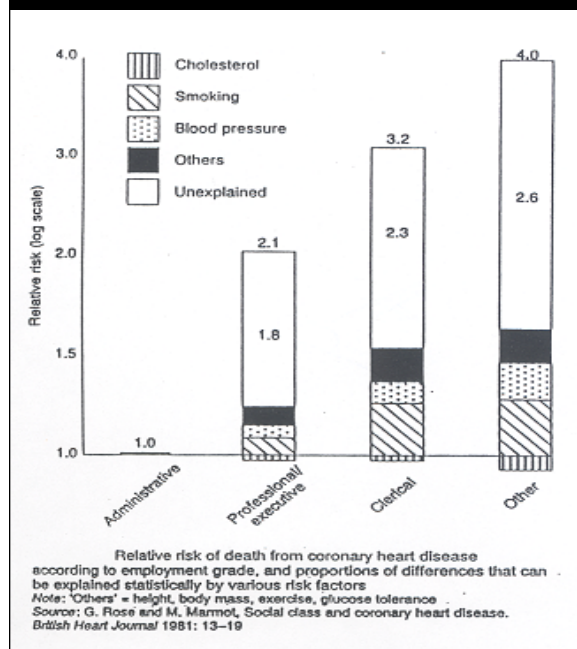
The Whitehall study of over 17,000 British civil servants (Marmot, *et al.* 1978) illustrates another dimension of the work and health relationship that reinforces the relationship between social status and health status. This study sample consisted of primarily office-workers in the rigidly hierarchical British civil service, all living in greater London, who were followed prospectively over a 10-year period, and heart disease deaths were recorded. The results showed a gradient in mortality by job class (see Figure 2.3), with workers in the lowest job class being four times more likely to die of coronary heart disease (CHD) in the 10-year study period than workers in the highest job class. Even after controlling for all of the major CHD risk factors (including blood pressure, smoking, and cholesterol), CHD mortality among the lowest status workers is still 2.6 times greater than the workers in the highest job class.

Figure 2.2: Distribution of Demand and Control in Common Job Types



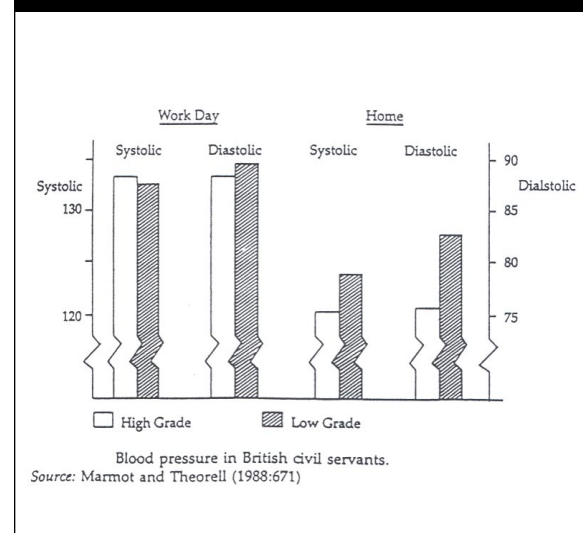
These findings have been highly influential upon the population health perspective. In particular, a great deal of emphasis has been placed on "control" as part of the explanation of the social gradient in health status (Evans 1994). Although a very good understanding of the impact of such processes in the workplace has been achieved, a full appreciation of the chronic and cumulative lifetime impact of work and non-work stressors between individuals in different social strata has yet to be achieved within population health. In reference to the issue of housing, it follows that if demand, control and social support are the three most important health-related characteristics of the workplace, that these, or very similar factors, are just as likely to apply to the other 16 hours of the day for a given individual (Dunn 2000; Wilkinson 1994; 1996). On these grounds, housing, and the domestic circumstances in which an individual lives, is a crucial locus for the investigation of socio-economic determinants of health.

Figure 2.3: Relative Risk of Death from Coronary Heart Disease, British Civil Servants



Indeed, there is some preliminary evidence that the differential distribution of health status across social strata could be influenced by domestic circumstances. As part of the Whitehall study, systolic and diastolic blood pressure measurements were taken for a sub-group of low status civil service workers and a sub-group of high status workers both at work and at home (see Figure 2.4). The results showed that high status and low status workers had similarly elevated blood pressure levels while at work, but that the low status workers' blood pressure remained moderately elevated while at home, and the high status workers' blood pressure diminished to lower levels (Marmot and Theorell 1988). The importance of such a finding for health status follows from knowledge about the detrimental health effects of chronic low-level physiological stress responses in humans and non-human primates (see Saplosky 1994; Cynader 1994). Specifically, it is the chronic nature of low-level physiological stress (24 hours a day, over an individual's lifetime) that makes it important to understand the full cumulative impact of an individual's place in the social hierarchy and the experiences that follow from it.

Figure 2.4: Blood Pressure at Home and at Work in High- and Low-Grade British Civil Servants



2.1.4 "Biological Embedding" and a Life-Course Perspective

Attention to the influence of social and economic factors on human health and development across the life-course is the final element of the population health perspective. Driven by the notion of "biological embedding"—that "the conditions of life, filtered through a perceptual screen, could affect vitality through a wide variety of pathological mechanisms" (Hertzman and Weins 1996, 1084; for an explanation of such mechanisms, see Brunner 1996), the evidence for this part of the framework comes from studies of primate behaviour and social structure and associated health outcomes (Saplosky 1994); neurological research on critical periods in brain development (Cynader 1994); and research in psycho-neuroimmunology and psycho-neuroendocrinology. A number of studies in humans have shown the "buffering" influence of high socio-economic status. They suggest that higher status not only protects healthy children from future risks and vulnerabilities but can actually reverse the latent impact of risks that already exist (for example, mild lead poisoning, perinatal stress) (Hertzman and Weins 1996).

Social influences during "sensitive" periods of human development can have lifelong consequences for health and vitality as well. A recent review, for instance, found low education levels to be associated with an increased prevalence of clinically diagnosed dementia in six different studies in different parts of the world (Katzman 1993; Hertzman and Weins 1996). Those with more education are believed to have greater brain capacity in the form of an increased density of neural interconnections (increased synaptic density) in areas of the brain associated with learning and memory. By the time they reach old age and synaptic density begins to decline naturally, individuals with a "reserve capacity" of neural connections can endure the losses

without substantial decrements in mental function (Hertzman and Weins 1996). Additional evidence shows that cognitively demanding occupations may have a protective effect against dementia (Hertzman 1994). The social policy direction such findings imply is clear: "those elements of high socio-economic status which provide the buffer should be pinpointed and ways found to provide them to children who otherwise would not benefit from them," but the elements of high socio-economic status await further definition and understanding (Hertzman and Weins 1996, 1085).

Hertzman (1994) and Hertzman and Weins (1996) propose two complementary models that exist to explain the life-course perspective on human health status. The *latency model* suggests that discrete events early in life have a strong *independent* effect later in life (for example, education and dementia; stress and heart disease). By "early in life" is often implied the years from birth to about five years of age (Hertzman 1994), but there is also evidence that the prenatal influences could also be important factors in shaping long-term outcomes (Barker 1992; 1994). This model implies a "critical periods" understanding of human development, and could lead to an inappropriate over-emphasis on targeted, "magic bullet", or "vaccination kinds" of interventions early in life (for example, social, emotional, and/or educational), and more negatively, a tendency to "give up" on people who have passed any particular critical stage of development, without developing the capacity they could have (Hertzman 1994; Hertzman and Weins 1996). The second model for articulating the life-course perspective Hertzman and Weins (1996) call the *pathways model*. This model emphasizes "the *cumulative* effect of life events along developmental trajectories and the *ongoing importance of the conditions of life* throughout the life cycle" (Hertzman and Weins 1996, emphasis added). While there is some danger

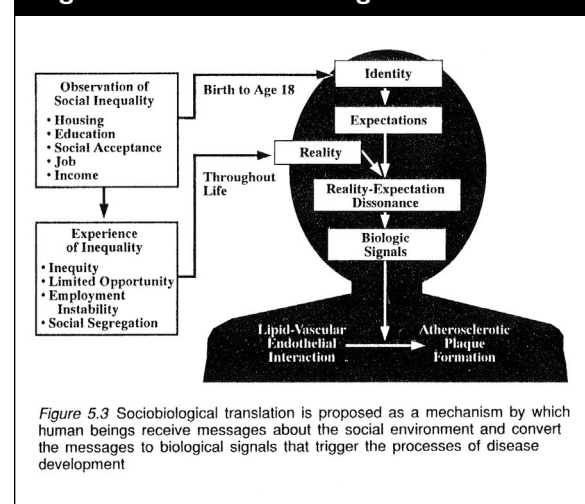
that policy-makers may be inclined to emphasize the latency model over the pathways model, by adopting a "vaccination" approach to policy, with targeted interventions for children, but little attention to influences later in life, Hertzman stresses their complementarity for social policy. He argues that it is very likely that *both* models are valid, in other words, that not only do influences during early childhood have an effect on long-term health outcomes, so do the cumulative effects of deprivation and disadvantage stretched over the life course. This strongly suggests that policy needs to be sensitive to the conditions of life across the entire human life-span.

A similar argument is advanced by Tarlov (1996), who depicts a possible set of mechanisms by which social inequality might shape health status (see Figure 2.5), and refers to his model as "the sociobiological translation." In particular, what he proposes is a specification of the "mechanisms by which the social characteristics that are responsible for creating differential vulnerability to disease across different social groups are translated into biological processes that are the forerunners to disease" (Tarlov 1996, 84). He suggests that the "observation of social inequality" between birth and age 18 is fundamental to the formation of identity, and the development of expectations. The observation of inequality soon becomes the experience of inequality, throughout life, and produces a reality that contradicts the individual's expectations, creating a reality-expectation dissonance. This dissonance, suggests Tarlov, triggers the biological signals that are antecedent to chronic disease development. In Figure 2.5, Tarlov uses the example of coronary heart disease, suggesting that the "biological signals" triggered by reality-expectation dissonance mediate the relationship between lipid-vascular endothelial interaction and the development of atherosclerotic plaque. Tarlov's model is a useful step forward, but embodies a very simple view of human consciousness, of society and of their

interaction. Nevertheless, the model is a useful starting point for appreciating the possible mechanisms by which the cumulative impact of social and economic deprivation over the life course manifests in observable decrements in health and well-being.

The life-course perspective is an important one, as it gives an appreciation of the multiple temporal spans over which different health influences operate that is absent from most contemporary health research. To grapple with the time span of such processes requires longitudinal studies, but unfortunately few such studies exist. In short, the importance of a life cycle perspective follows from the fact that when longitudinal studies are overlapped to reconstruct the life cycle, they suggest that there is an "enduring impact of socio-economic status on health, well-being, and competence from cradle to grave" (Hertzman and Weins 1996, 1086). Housing, material circumstances of everyday life and the meanings associated with them necessarily involve processes, which occur over time, and these events must be situated in the life course of individuals to be fully understood.

Figure 2.5: The Sociobiological Translation



Source: Tarlov (1996)

2.2 Explaining Social Gradients in Health and Asking the Right Questions

All the foregoing models of how socio-economic circumstances may affect health suggest, as Evans puts it, that there exists "some underlying general causal process, correlated with hierarchy, which *expresses* itself through different diseases" (Evans 1994, 7; see also Brunner 1996; Kaplan and Lynch 1997; Lynch and Kaplan 1997; Macintyre 1997; Tarlov 1996; Wilkinson 1996). Research to date suggests that this "something" resides in the social and economic environments of individuals and populations. Many authors suggest that an "individual's sense of achievement, self-esteem, and control over his or her work and life appears to affect health and well-being," echoing the conclusions of work on social support and health, (Frank and Mustard 1994, 9). Picking up on similar themes, Syme (1994) adds to the vocabulary, suggesting that "[P]erhaps it is because as one moves down the social class hierarchy, one has increasingly less control of one's destiny, less opportunity to influence the events that influence one's life" (p. 84). He adds that this may involve money, power, information, prestige, or other concepts that social scientists have studied related to the idea of "control of destiny",

including mastery, self-efficacy, locus of control, learned helplessness, ability to control, predictability, desire for control, sense of control, powerlessness, hardiness, and competence (Syme 1994, 84-85).

Syme (1994) goes on to suggest a research focus which seeks some "common denominators" in the body of work related to self-efficacy, etc., and in so doing, notes a more general characteristic of the inequalities in health research, namely, that "[I]t has been shown repeatedly that the more effectively people deal with forces that affect life and living circumstances, the better their health and well-being" (ibid, 84-85).

Syme's observations give rise to a number of useful questions, which unfortunately, have gone largely unanswered by population health research. What, for instance, are the "forces that affect life and living circumstances?" Also, what does it mean for an individual to "effectively deal with" the forces and circumstances of life? Kaplan and Lynch (1997) identify the following questions as the central ones for health inequalities research:

[H]ow does everyday life vary as one moves on different occupational trajectories? ... How does ordinary life differ among groups in which basic material needs are met, but that differ by income level? And how do these differences in the texture of everyday life translate into socio-economic inequalities in health? (1997, 1411)

Similarly, Macintyre (1997) asks:

what are the precise mechanisms or pathways by which social inequalities in health are generated and maintained in particular contexts? (p. 740).

Housing, as a crucial site in "everyday life" and individuals' life contexts, is clearly an important manifestation of socio-economic inequality and a highly relevant policy arena through which to address socio-economic inequalities in health.

Wilkinson (1994; 1996; 1997a) has built on the analysis of the social gradient in health *within societies* by investigating health inequalities *between* industrialized countries, with striking results. He claims that in these countries, population health is affected "by differences in *relative* income (differences between groups of people within the same society), not by the absolute level of average incomes for each society as a whole" (Wilkinson 1994, 68, emphasis in original). Furthermore, his analysis shows that the "countries with the longest life expectancy are not the wealthiest, but those with the smallest

spread of incomes and the smallest proportion of the population in relative poverty" (*ibid*, 68). He estimates that "between one-half and three-quarters of the differences in average life expectancy from one developed country to another may be attributed solely to differences in income distribution" (*ibid*, 69). These results and their interpretation have generated some controversy (Judge 1995; Judge, *et al.* 1998; Wilkinson 1997b), but most researchers in the field have accepted Wilkinson's (1994; 1996; 1997b) analysis and interpretation (Lynch and Kaplan 1997; Kaplan and Lynch 1997; Kawachi and Kennedy 1997; Kawachi, *et al.* 1997; Kennedy, *et al.* 1996; Marmot, *et al.* 1995).

Wilkinson (1994) argues for a "psychosocial interpretation" of relative income differentials, claiming that there are a number of different ways in which psychosocial links might be involved in the association between socio-economic status and health. For example, the stresses of economic insecurity or relative deprivation may impact directly on health, affecting both the endocrine and immune systems. Relatedly, psychosocial stress may cause people to start smoking or engage in other behaviours, which are detrimental to health (p.71; see also Saplosky 1994).

While the substance of these explanatory hypotheses is not new, Wilkinson's (1994) work does break important new ground, it would seem, in understanding the "something" that Evans (1994) suggests underlies the social gradient in health.

Particularly helpful is Wilkinson's (1994) claim that apparent influence of *relative* income:

suggests that psychosocial factors related to deprivation and disadvantage are involved. That is to say, it is less a matter of the immediate physical effects of inferior material conditions than of the *social meanings attached to those conditions and how people feel about their material circumstances and about themselves* (P. 70, emphasis added).

The italicized text illustrates a direction for inquiry required to explain the mechanisms by which social gradients in health status are produced. Specifically, Wilkinson suggests the importance of both material (income, education, etc.) and meaningful realms of social existence. His comments prompt questions of enormous scope and importance, such as: What are the social meanings attached to people's material circumstances? By what means are they produced and reproduced? How *do* people feel about their material circumstances? What are the important features of their material circumstances? How is housing implicated in the production of meaning about people's material circumstances and meanings about themselves? Why and how is housing an important aspect of people's material conditions? Housing, this report argues, is a crucial nexus for the construction of meaning, while material inequalities generated by the operation of housing and land markets significantly impact the types of experiences different people have in their everyday lives.

3.0 Housing and Health: Past Research

Given the centrality of housing to our everyday lives and its importance as a form of material wealth, it is remarkable that the population health perspective has largely ignored the role of housing in shaping health status, and the role of land markets in processes of social stratification. Research on the relationship between health and housing has tended to overlook key aspects of its function in creating financial burdens, shaping identity, distributing wealth, and providing access to goods, services, work, and recreation. In this section, the literature on housing and health is reviewed.

Interest in the public health consequences of substandard housing quality has its roots in Victorian England, where public health officials observed that slum housing conditions promoted disease and ill-health in humans (Kearns 1995). Kearns speculates that public health policy interventions targeted towards improved housing for health, and to reducing inequalities in health were not motivated primarily by altruism. Rather, he claims, "a containment of pestilence and deviance lest it penetrate the elite areas of settlements is likely to have underlain such public thinking" (1995, 5). The same slum conditions, typically associated with the urban poorer classes in England, were also the foundation for the now voluminous literature on social inequalities in health (Frank and Mustard 1994). This underscores the gap created by the lack of population health research on housing. The opposite is true too: the health consequences of many aspects of housing and housing markets have yet to be adequately conceptualized and researched.

Recent research on housing and health has been concentrated in three areas: the disadvantage of individuals who are already ill and unhealthy in the housing market and their consequent selection into substandard housing conditions, thereby accounting for any observed association between poor housing and poor health; health status and access to health care for homeless persons; and pathological aspects of dwellings

as the putative cause of both physical and mental health outcomes. These areas of research are addressed in turn in the following three sections.

3.1 Major Emphases in Housing and Health Research

3.1.1 Health Selection and Housing

The "health selection" hypothesis involves a reverse causality hypothesis with regard to the relationship between housing and health. In other words, it has investigated "whether [public] housing provision is health selective" and if this phenomenon can account for "the differential distribution of 'sick' and 'well' people across the housing stock" (Smith 1990, 753). In the United Kingdom, there are public housing programs directed at people of "medical priority" (Bickler 1988). Consequently there is an institutionalized policy that may differentially allocate relatively sicker people to public housing.

Evidence of the health improvement after medical priority re-housing is scant and equivocal. Generally those re-housed on mental health grounds improve, but the evidence for persons with physical health conditions is mixed. In a sample of 41 persons re-housed for non-psychotic mental illness under medical priority, Elton and Packer (1987) found that mean severity of mental illness declined substantially for the sample after 30-90 days, and again slightly after one year. In a prospective randomized trial of medical priority re-housing for persons with affective neurotic symptoms, Elton and Packer (1986) showed "a clear benefit to mental health as a result of rehousing up to a year after that rehousing" in a sample of 17 subjects (p. 221). Over 80 per cent (14) showed a marked decrease (50 per cent or more) in their score on a validated mental health indicator. Cole and Harries (1986) evaluated a sample of Salford residents who had been re-housed on medical priority (n=251), almost exclusively for chronic

physical ailments. In a three-year follow-up interview, 22.7 per cent of respondents reported that they were satisfied with their new housing, and that their health had improved, 23.1 per cent were satisfied with their housing but thought their medical condition had remained the same, and 13.9 per cent were dissatisfied with their housing and thought their condition had remained the same.

A research emphasis pertaining to medical priority housing that is currently more active, concerns the performance of the medical priority system in correctly identifying those in legitimate need and placing them in appropriate accommodation (Robinson 1998; Smith 1990; Smith and Mallinson 1997; Smith, *et al.* 1997). By "health selection", researchers in this field refer to the deliberately or inadvertently selective operation of the bureaucratic rules and procedures invoked to allocate housing or to dispense housing finance. The health selective effects of these rules and procedures may or may not be anticipated, and they may be directly or indirectly discriminatory (Smith 1990, 755).

Smith (1990), for instance, claims that allocations of housing on medical priority grounds "may be biased in favour of those among the medically deserving who are most skilled at mobilizing the medical priority system" (1990, 756). More generally, research indicates that people with health problems and other housing problems (for example, homelessness) are *disadvantaged* by their multiple deprivations in the medical priority system (Robinson 1998). Informal practices within the British housing bureaucracy give the highest priority to applicants who *only* have health problems, because those with both health and housing problems have access into the social housing system by virtue of their housing needs as well (Smith, *et al.* 1997; Robinson 1998).

Those who have been recommended for medical priority re-housing on the grounds of a physical ailment are often given informal priority over those recommended for a mental health problem,

Smith, *et al.* (1997) found. People with mental health problems are underrepresented in the social housing stock by 4-5 per cent, while those with walking or vision disabilities are overrepresented by 5-10 per cent (*ibid.*, 213). This is somewhat ironic given that the small amount of research on re-housing's clinical effectiveness has demonstrated a clear positive impact for the condition of people with mental illness, while evidence of the effectiveness of re-housing for those with physical conditions is equivocal.

In addition to research on the operation of medical priority re-housing, Smith (1990) suggests that "the process of health selection out of housing and onto the streets merits much more attention from the research community" (*ibid.*, 755). While this focus has received some attention (Dear and Wolch 1987), a more common concern is with health status and access to health care amongst homeless persons (Brickner, *et al.* 1992), the second major area of housing and health research.

3.1.2 Health (Care) of Homeless Persons

Clinical, disease-focused concerns dominate research concerning the health status and access to health care among homeless persons. There is a relatively large body of work reporting on health in general (Takahashi and Wolch 1994; Clarke, *et al.* 1995) and specific diseases like: AIDS (Raba, *et al.* 1992), tuberculosis (McAdam, *et al.* 1992; Gelberg, *et al.* 1997), hypertension (Piantieri, *et al.* 1992), cardiovascular risk factors (Ober, *et al.* 1997); general health status of homeless children as well as cognitive development (Rubin, *et al.* 1996), and health in general (Douglass 1996); and health services access and provision for homeless people (Somers 1992; Plumb, *et al.* 1996), for example. There is also a large body of research specifically on mental illness among homeless persons. Examples include studies that have investigated the mental health status of homeless children (Conrad 1998); mental illness among homeless in a suburban community (Haugland, *et al.* 1997); effects of homelessness

on quality of life for severe mentally ill persons (Lehman, *et al.* 1995); and the mental health of single homeless people in hostels (Holland 1996).

In general, the health status of homeless people has been found to be far worse than that of the general population. Rates of mental illness, HIV infection (Raba, *et al.* 1992), and physical violence (Burroughs, *et al.* 1992; O'Connell, *et al.* 1992) are much higher in the homeless population than in the general population.

Unfortunately, this work tends not to be concerned with root causes of homelessness, focusing instead on issues of prevalence and/or incidence of specific diseases and conditions, or issues of access to services. While these studies provide ample evidence of threats to health and barriers to health care access associated with being homeless, it seems clear that housing would go a long way to alleviate the health problems so fastidiously documented. Many of these accounts are conspicuously politically neutral; much of the research writes about homeless persons as simply another demographic sub-group, with certain agnosticism about issues as crucial as whether homelessness is preventable. Where homelessness is problematized, it tends to be done so uncritically, and relatively superficially. An example is provided by Heffron, *et al.* (1995) who look for the "causes" of homelessness in families of origin characteristics. Others (for example, Dear and Wolch 1987) provide a more balanced assessment of the causes of homelessness that considers a wider social perspective. Indeed, many of the same factors that put individuals and families at risk for homelessness also threaten to undermine their health status.

3.1.3 Physical, Biological, and Chemical Exposures and Housing

The next area of existing research consists of investigations of the "pathological" consequences of housing upon health. This area can further be divided to account for emphases on both mental

and physical health outcomes. Investigations of the former are typically concerned with links between mental health/illness and: crowding (Gabe and Williams 1993; Gove, *et al.* 1979; Fuller, *et al.* 1993), high-rise housing (Freeman 1993; Gillis 1977), housing type and location (McCarthy, *et al.* 1985), or a spectrum of housing conditions (dampness, cold, noise, crime, disrepair, crowding) (Halpern 1995; Hopton and Hunt 1996b; Spengler, *et al.* 1994; National Academy of Sciences 2000).

Some of the major emphases in research on housing conditions and physical health include links between dampness and mold on the one hand and respiratory disease on the other (Brunekreef, *et al.* 1989; Strachan 1993; Hopton and Hunt 1996a; Hunt 1993; Dales, *et al.* 1997; 1991a; 1991b; Hyndman 1990; Hyndman 1998; Evans, *et al.* 2000; Miller and Day 1997; Rylander and Etzel 1999; Dillon, *et al.* 1999); pest infestation and health (Howard 1993); fungal contamination and health (Dales, *et al.* 1998; Health Canada 1995; Miller, *et al.* 1988; Verhoeff and Burge 1997) and cold and heat related illnesses (Collins 1993). There is a significant body of research on indoor air quality and health in Canada and the U.S., where exposure to dampness and mold is relatively widespread despite a relatively temperate climate and new housing stock in North America.

The Canadian evidence on the health effects of physical, chemical, and biological exposures in the home has been thoroughly reviewed by Hwang, *et al.* (1999) and Fuller-Thompson, *et al.* (2000). Household exposure to lead, asbestos, radon, house dust mites and cockroaches all have strong or definitive evidence of an association with at least one medical outcome (see Appendix A—from Hwang, *et al.* 1999—also see National Academy of Sciences 2000). Urea formaldehyde foam insulation (UFFI), dampness and mold have a "possible" association with one or more health outcomes. Home hazards, such as stairways, heating systems, and smoke detectors are all definitively

linked to one or more health conditions, while carbon monoxide (CO) detectors have a possible link with CO poisoning and a number of design features (building type, floor level, and high-rise structure) have a "possible" association with psychological distress. Overcrowding / density has a possible association with several health conditions. The research questions that arise from these findings from a population health perspective are considered in Section 5.1.

One important finding of the Hwang, *et al.* (1999) report is that there is a dearth of studies on socio-economic dimensions of housing and health outcomes in Canada. Socio-economic factors, of course, are a strong focus of the population health approach. The literature in this area that does exist is the focus of the following section. It is worth noting, however, that socio-economic factors and physical / biological / chemical factors do not necessarily occur in isolation. A recent British study by Evans, *et al.* (2000) found that individuals' degree of worry about moisture and mold was a mediating factor in the relationship between exposure to moisture and mold and the experience of respiratory symptoms.

3.1.4 Socio-Economic Dimensions of Housing and Health

But since the publication of the Hwang, *et al.* (1999) review, a number of studies have been published investigating socio-economic dimensions of housing and health. These studies, and others not considered by Hwang, *et al.* (1999) are described briefly in this section.

In their review, Hwang, *et al.* (1999) point to a number of difficulties in attributing a causal relationship between socio-economic dimensions of housing and health. They correctly point to the need for: a) a plausible explanation of mechanisms that could account for associations between housing and health, b) adequate control

for confounders (difficult to achieve in practice), c) development of mechanisms that facilitate the development of housing interventions to improve health.

The three main areas of research addressing socio-economic dimensions of housing and health to date specifically focus on issues of housing affordability, housing tenure, and housing satisfaction / stress. As Hwang, *et al.* (1999) point out, the research to date on housing affordability and health has been inadequate to draw any conclusions. Few studies address this issue, except in some incidental manner, partly because data on housing affordability are not usually collected in health surveys. A recent exception is a study of housing, socio-economic status and health amongst 650 Vancouver households by Dunn (forthcoming). This study found that both gross monthly housing expenses and housing expenses as a percentage of monthly income were associated with better self-reported health and lower likelihood of poor mental health. The association was stronger for housing expenses as a percentage of income. A similar study by Dunn and Hayes (2000) found no association between gross monthly housing expenditures and self-reported general health, health satisfaction or mental health.

Although a good deal more research has been done on relationships between socio-economic dimensions of housing and health in the United Kingdom and New Zealand than in Canada, housing affordability has not always been addressed. Part of the reason for this inattention to housing affordability is the fact that income is not measured in the British census (or in other British studies): social class, housing tenure and car access are more common measures of socio-economic status in the UK.

Although it is difficult to study housing affordability in the UK, numerous studies have examined the relationship between housing tenure and health (for example, Filikati and Fox 1995).

This is appropriate because housing tenure has long been an important social cleavage in British society. Despite its widespread use in studies of health inequalities, relatively little research has investigated the actual influence of housing tenure upon health directly (exceptions include Macintyre, *et al.* 1998; 2001). Macintyre, *et al.* (1998) suggest that there may be various possible mechanisms linking housing tenure and health. One suggests an indirect effect: that renters may be systematically at greater risk of exposure to moisture, mold and overcrowding and suffer attendant health outcomes as a result. Another possible mechanism is also indirect: renters may be systematically exposed to a greater degree of crime, lack of opportunity, etc. Issues related to "ontological security" are more directly related to tenure, such as personalization and prestige in the home, have been linked to mental and physical health (Saunders, *et al.* 1996; Kearns, *et al.* 2000).

The relationship between stress, mental health, and housing has been explored in three related papers: Kearns and Smith (1993), Smith, *et al.* (1993), and Kearns, *et al.* (1992). In these studies marginalized populations in New Zealand were compared (people with mental illnesses, public housing applicants in severe need, and residents of deprived housing neighbourhoods). The main finding of these studies is that housing stressors are "significantly associated with psychological distress" and that "living in a substandard dwelling represents an independent and additive source of stress to the lives of low-income residents" (Smith, *et al.* 1993, 610). The experience of such stressors is an incomplete representation of the importance of housing to the stress and health impacts persons marginalized in the housing market might experience. However, claim Kearns and Smith (1993): "the despair among these populations cannot be adequately described in a series of statistical tables and conceptual diagrams" (p. 277). As such, they recommend extending this research through the use of ethnographic accounts of the experience of housing problems (*ibid*).

4.0 Towards a Framework for Housing and Population Health

4.1 Housing Inequality

Housing research has demonstrated a consistent interest in issues of affordability, adequacy and availability (Miron 1995; CMHC 1994; Wolfe 1998), and several measures of inequality have been used. In 1993, 62.4 per cent of single-parent families in British Columbia were in "core housing need" (up from 59.8 per cent in 1991), while 46.8 per cent of seniors over age 65 in the province were likewise classified.³ CMHC found that in 1996, 1.7 million Canadian households were in core housing need, and that 68 per cent of these households rented their dwellings. Fully 22 per cent of Canadian households paid more than 50 per cent of their income on housing in 1996 (up from 16 per cent in 1991), and the vast majority of those households were already vulnerable in some other way—they were families with children, Aboriginal Peoples or seniors.

Rental vacancy rates in most Canadian cities diminished substantially over the 1990s. In 1993, the national average vacancy rate was 4.8 per cent and in 1999 it was 2.6 per cent. According to CMHC data, in October 1999, 11 of 18 of Canada's major cities had vacancy rates below 3 per cent, the level considered necessary for a competitive rental market, and seven had rates below 2 per cent. Lower income households lost considerable ground on housing affordability between 1989 and 1999 as well. Amongst a selection of 15 of Canada's Census Metropolitan Areas, all had average rent increases in excess of 10 per cent (adjusted for inflation), while nine showed increases in excess of 30 per cent and two (Toronto and Hamilton) showed increases in excess of 40 per cent. Meanwhile, household incomes, especially for poor households, dropped sharply over the 1990s. Mean renter income (adjusted for inflation) declined by as much as 15 per cent in New Brunswick, and over 10 per cent in both Ontario and Saskatchewan.

Median renter income declined by 9 per cent in Quebec, while it increased modestly in Nova Scotia and BC (2 per cent and 6 per cent respectively) (Federation of Canadian Municipalities (FCM) 2000).

The gap between renters and owners also widened substantially in the late 1980s and over the 1990s. The gap between the median income of homeowners and renters grew by 16 per cent between 1984 and 1999. In 1984, homeowners had almost double the income of renters (192 per cent), but by 1999, the gap had widened to 208 per cent (Hulchanski 2001). In terms of wealth, homeowners' wealth increased from 29 times that of renters in 1984 to 70 times of that of renters in 1999. This figure is significant because owner-occupied housing is the most important asset of most households, accounting for 38 per cent of total household wealth. Home ownership is also elusive for renters, at least in some Canadian housing markets, as evidenced by CMHC's estimate that only 24.5 per cent of Vancouver households who rented housing in the second half of 1995 (July-December) could afford to buy a starter home. Vancouver ranks second-worst in the country on this statistic (after Victoria) (Baker 1996). More recently, the decline in mortgage rates witnessed in 2000 and 2001 has been offset by rapidly increasing prices in both the new home and resale markets since mid-1998 (CMHC 2000).

A number of Canadian studies have shown that inequalities in health status (Evans, *et al.* 1994) appear to parallel inequalities in adequate, affordable housing (Burr, *et al.* 1995; CMHC 1994; Liaw, *et al.* 1989). Despite these findings, there remains relatively little research examining the intersection of socio-economic inequalities in health and inequalities generated by the operation of housing markets.

Table 4.1: Dimensions of Housing Relevant to Population Health

<p><i>a) materiality of housing</i></p> <ul style="list-style-type: none"> • physical, biological and chemical exposures • redistributive properties of housing and land markets • suitability and adequacy for optimal quality of everyday life
<p><i>b) meaningful dimensions of housing</i></p> <ul style="list-style-type: none"> • refuge / control • expression of social status • surface for the inscription for self-identity
<p><i>c) spatial dimensions of housing</i></p> <ul style="list-style-type: none"> • systematic exposure to health hazards • systematic proximity to health-promoting or–diminishing opportunities

4.2 The Social and Economic Significance of Housing Inequality: A Framework

The proposed framework for housing and population health is concerned with the specific ways that dimensions of housing and home have the potential to generate social inequalities, and either directly or indirectly, health consequences. The framework addresses three fundamental aspects of housing: materiality of housing, meaningfulness of housing, and spatiality of housing (modified from Cater and Jones 1989, 38–44). The first of these dimensions, the materiality of housing, refers not only to the direct physical, biological and chemical properties of housing, and their potential health consequences, but also to the redistributive properties housing markets possess, which often work to redistribute wealth and income in a regressive fashion, to the detriment of low-income households. These three dimensions of housing appear in Table 4.1, and are hypothesized to be important factors in the structuring of inequality, the construction of identity and social status, and the distribution of control over individuals' everyday lives. Each of these dimensions is reviewed in turn.

4.2.1 Materiality of Housing

At a rudimentary level, housing clearly performs fundamental, but relatively simple material functions, that have quite a direct relationship to human health and well-being. For most people in industrialized countries, housing is designed to provide "a reasonably controlled environment with respect to light, temperature, ventilation, and sanitation," as well as a place to store possessions, sleep, prepare food, and satisfy basic bodily needs and functions (Newmark and Thompson 1977, 10). Clearly, proper biological functioning requires these sorts of protections. Paradoxically, however, at the same time that housing provides protection from such threats, it has the potential to expose its inhabitants to other threats to health arising from its structural properties. Fire, falls on stairs, etc., moisture, dusts, molds, asbestos, carbon monoxide, natural gas, etc., are all potential threats to health that arise from occupying the kinds of houses that are typical in industrialized countries. One aspect of the materiality of housing, therefore, is a functional one, that concerns preservation of proper biological functioning of human beings. It is this aspect of housing's materiality that has been the focus of most housing and health research to date.

The review of literature on housing and population conducted by Hwang, *et al.* (1999) and published by Fuller-Thompson (2000) serves as an excellent guide to this type of research. As described above, in Section 3.1.3 (Physical, Biological and Chemical Exposures and Housing), there is definitive or strong evidence of a causal relationship between a number of household hazards and one or more well-defined health outcomes for each. The research questions that arise from applying the logic of a population health approach to these studies are addressed in Section 5.1.

Housing also has important material dimensions that follow from its status as a commodity under the capitalist mode of production (Harvey 1973; Badcock 1984). Of course the issue of housing affordability figures centrally here—even in the absence of a direct connection between housing and health, the opportunity cost of money spent on additional housing expenses may compromise expenditures on other health-promoting goods (and the magnitude of that compromise is larger for lower-income households). But on top of that, there are a number of well-understood means by which housing markets redistribute wealth and income in a regressive fashion. These all follow from the fact that land (and, by extension, housing) acts as a "peculiar commodity" in several different ways⁴ (Harvey 1973). Harvey (1973) identifies several peculiarities, many of which have important implications for the role that housing plays in the generation of material inequalities in society and space. First, land, unlike other commodities, cannot be done without, as all activity must occupy a space. Land is fixed geographically—it cannot be moved around like other goods. It has permanence and indestructibility, so that it provides an enormous potential to accumulate and store wealth (Badcock 1984; Hamnett and Seavers 1996). According to Harvey (1973), land has "historically been the single most important repository of stored assets" (p. 158).

Finally, the price of land is only partly based on its production costs. Other commodities share this characteristic, but land prices are particularly sensitive to scarcity, and this, along with the basic necessity of land for all human activity, makes the property market a particularly important arena for the operation of power relations. Property-owners who control the supply of land in particular areas have considerable influence on price, and consumers of land exercise particularly little control, especially since they must purchase (rent or buy) some piece of land for their activities (Badcock 1984; Harvey 1973).

Further, crucial to understanding the ways that housing markets create social inequalities is their capacity to redistribute **real income**. Real income refers to:

all receipts which increase an individual's command over the use of a society's scarce resources—in other words his net accretion of economic power between two points of time . . . Hence income is the algebraic sum of (1) the market value of rights exercised in consumption, and (2) the change in value of the store of property rights between the beginning and end of the period in question (Titmuss 1962, 32).

There are four major ways, in fact, that urban land and housing markets operate to redistribute real income, according to Badcock (1984). In addition to distributing wealth, he contends, "the housing assignment process has an important bearing on the household's more general command over resources in the urban environment" (p. 169).

The first such mechanism is through urban development processes, which may lead to transfer payments from public to private beneficiaries. This can occur, for example, through "involuntary" transfers from those government departments that make extensive use of land—housing, education,

hospitals, parks and recreation to large land-owners by increasing local land values (Badcock 1984, 209).

The second major way that housing distributes wealth is through the economic significance of the distinction between renters and owner-occupiers of housing, which "overshadows all other redistributive mechanisms within the housing system" (*ibid*, 216). When appreciation of the value of owner-occupied housing exceeds other revenue-bearing investments, as it has for much of the last half of this century in most industrialized countries (with some exceptions of periods in certain regions), a household has the potential to realize enormous wealth gains, and to significantly alter its life chances for the better (Badcock 1984).

The third way wealth is redistributed through housing is through tax benefits and other public subsidies to homeowners. The effects of these are large and regressive, and flow from measures like capital gains exemptions, tax deductible mortgage payments, tax-sheltered home ownership savings plans, etc. (Badcock 1984). Some have estimated that over 75 per cent of federal government housing-related "expenditures" support home ownership (Harris 1998).

Finally, because there is a high degree of interdependency between activities located in close proximity to each other in the city, investment and disinvestment decisions of landowners have "the power to alter significantly the value of third party property" (*ibid*, 224). In Harvey's (1973) view, many of the activities in the land market of a city are the sorting out of, and adjustment to, (unpriced) positive and negative externalities. But in the long run, wealthier households and neighbourhoods will tend to enjoy close proximity to positive externalities, while poorer households and neighbourhoods will tend to endure proximity to negative externalities. As Badcock (1984) puts it,

[T]he land/housing market differentiates, and at worst segregates, households with respect to the acquisition of wealth and property rights, and determines where the household will be located with respect to an extensive array of community resources that are supportive of a genuinely fulfilling way of life (169).

It is in this way that inequalities entrenched in land/housing markets can be understood as systematically, and regressively redistributing income, as well as shaping individuals' control to have their wants, needs, and aspirations met, with consequent potential effects on the differential distribution of health and well-being.

4.2.2 Meaningful Aspects of Housing

The second dimension of housing illustrated in Table 4.1 concerns the social meanings commonly attached to it within Western societies. The home is one of the most important arenas for the construction of meaning in nearly every human culture. It so happens that there is a concentration of literature, primarily within environmental psychology that investigates "meaning of home" (Despres 1991; Smith 1994). This literature is quite descriptive in emphasis, and for the present purposes tends to overlap with some of the dimensions of housing labelled as "material" in the previous section and "spatial" in the following section.

Two recent reviews aptly summarize the environmental psychology literature on the meaning of home (Despres 1991; Smith 1994). In her review of the literature, Smith (1994) identifies five "essential qualities of a home", all of which resonate strongly with notions of power, identity, status and control. The idea of **centrality** refers primarily to the importance of home to many people as a "base for activity", or "a physical centre for departure and return" that allows for, and contributes to, a sense

of rootedness (*ibid*, 32). **Continuity** refers to the situation where one has "a place to return to, where one feels a sense of belonging", which, according to Smith, "engenders feelings of continuity, stability, and permanence" (Smith 1994, 32). **Privacy**, Smith argues, "can be construed as control of social interactions within that space, and this implies a state of privacy, or control of access to the self" (*ibid*). She adds that "when individuals control space and have privacy needs met, feelings of freedom and comfort are possible" (*ibid*).

Home environments have also been shown to be a medium of **self-expression and personal identity**. On this view, home is a symbol of both how people see themselves and how they want others to see them. The home can also be a medium for personalization, or a surface for the inscription of self-identity, as in the example of personal objects and home decorations, which communicate information about the owner(s) (Smith 1994, 32-3; see also Marcus 1995). Finally, Smith argues for the importance of **social relationships** to the meaning of home. Indeed, many studies suggest that this is the most important aspect of home. Lawrence (1987) argues that home is central in an individual's social network, as social networks are based upon one's relationships within the home, but then extend to include close friends, relatives, neighbours, local shopkeepers, and neighbourhood acquaintances (Lawrence 1987).

Despres' (1991) overview of the literature adds three factors influencing the meaning of home not mentioned by Smith. These are home as: **a) indicator of personal status; b) material structure; and c) a place to own**. Home as an indicator of personal status refers to social norms that suggest that it "is relatively important to people that their

home show their social status, status being mostly understood as individuals' socio-economic position" (Despres 1991, 99). Home as material structure captures an important element missing from Smith's perspective, namely

the physical characteristics of the neighbourhood and type of structure in which the dwelling is located, the size and spatial organization of the dwelling unit, the amount of space available in and around the dwelling unit, as well as the services and facilities available within the unit (Despres 1991, 99).

The notion of home as a place to own is associated with "the experience of home as freedom of action, controlled space, and permanency", as well as a source of pride, a source of solid foundations to family life, and finally, as an important economic investment (Despres 1991, 99).

Somerville (1992) provides a more linguistic examination of the meaning of home, in his comparison of the meanings of home and homelessness. He has created a table to display the seven dimensions of meaning of home he identified (Table 4.2). For each "key signifier" listed in the left column, he identifies a "general connotation", a type of security that is implied by that signifier, and the relationship of each signifier to the "self" and "others". The key point of this table is not the accuracy or completeness of its content, but the emphasis on sense of security and the meaningful relationship of the home to the self and the social environment ("others"). Note also that the material and spatial dimensions of the meaning of home are evident in the table, as seen in "physical," "physiological" (materiality), "territorial," and "spatial" (spatiality) senses of security.

Table 4.2 The Meaning of Home

Key signifier	General connotation	Sense of security	In relation to:	
			Self	Others
Shelter	Materiality	Physical	Protection	Roofing
Hearth	Warmth	Physiological	Relaxation	Homeliness
Heart	Love	Emotional	Happiness	Stability
Privacy	Control	Territorial	Possession	Exclusion
Roots	Source of identify	Ontological	Sense	Reference
Abode	Place	Spatial	Rest	Living/sleeping space
Paradise	Ideality	Spiritual	Bliss	Non-existence

Source: Somerville (1992)

In still other work on the meaning of home, Csikszentmihalyi and Rochberg-Halton (1981) interviewed members of 82 families in the greater Chicago area, and found that families investing more meaning in the domestic environment also appeared to be warmer and closer in their style of relating. Saegert (1985) speculates that the relationship between investment in the meaning of home and internal household relations

may reflect a sort of spilling over of good or bad feelings into the environment; it raises questions about the potential effects of living in a sterile, cramped, unsafe, or uncertain environment on family relations (Saegert 1985, 293).

Csikszentmihalyi and Rochberg-Halton (1981) strongly suggest that meaning is at least as important to human beings as materiality:

[D]espite a standard of living that is many times higher than any of the past or than that now enjoyed by most people in the world, persons in this culture are still confronted by the same fears and frustrations that have threatened the values of life since humans acquired self-consciousness. Meaning, not material possessions, is the ultimate goal

in their lives, and the fruits of technology that fill the contemporary American home cannot alone provide this. People still need to know that their actions matter, that their existence forms a pattern with that of others, that they are remembered and loved, and that their individual self is part of some greater design beyond the fleeting span of mortal years (Csikszentmihalyi and Rochberg-Halton 1981, 145).

Many of our culture's central themes concern hopes, aspirations and dreams pertaining to houses and homes. As Csikszentmihalyi and Rochberg-Halton (1981) put it,

home is much more than a shelter, it is a world in which a person can create a material environment that embodies what he or she considers significant. In this sense, the home becomes the most powerful symbol of the self of the inhabitant who dwells within it (p. 123).

Poorer quality social environments, characterized by, for example, crime, vandalism, threats to personal safety and property, transiency, a lack of personal investment, and so forth, undermine one's ability to construct a dignified set of social meanings around one's home. This strikes to the

heart of Wilkinson's (1996) notion of the social meanings attached to material circumstances. As he puts it,

To feel depressed, bitter, cheated, vulnerable, frightened, angry, worried about debts or job or housing insecurity; to feel devalued, useless, helpless, uncared for, hopeless, isolated, anxious, and a failure: these feelings can dominate people's whole experience of life, colouring their experience of everything else. It is the chronic stress arising from feelings like these, which does the damage. It is the social feelings that matter, not exposure to a supposedly toxic material environment. The material environment is merely an indelible mark and constant reminder of the oppressive fact of one's failure, of the atrophy of any sense of having a place in a community, and of one's social exclusion and devaluation as a human being (p. 215).

Although Wilkinson's perspective is one that leans more heavily towards the health influences of the psychosocial (or meaningful) dimensions of everyday life (as opposed to what has come to be known as the neo-material perspective in the population health literature), the argument is compelling. It lends a great deal of plausibility to the proposition that the meaningful dimensions of home may make a difference to health status.

The work and health literature suggests that demand, control and social support are a sense of stability and orderliness in the basic dimensions of human experience. Indeed, many of our cultural notions of security and control are founded on experiences within the home (Williams 1987). The quality of social environments is differentially distributed by socio-economic status (Burr, *et al.* 1995; Lynch and Kaplan 1997; Macintyre, *et al.* 1993), so that whatever increased health risk an individual might face as a consequence of his personal socio-economic status is exacerbated by (and fundamentally bound up with) the quality of the housing and social environments he lives in.

Williams (1987) sums up the meaningful aspects of housing and home succinctly when he says,

[T]he home, in a variety of ways, penetrates deeply into the core of our social being. Our notions of privacy, freedom and choice are, for example, centred in part upon conceptions of the home as a location (both physical and social) where these ideas may be exercised (156).

Williams (1987) also illustrates the interpenetration of both material and representational aspects of housing and home, demanding a consideration of both the meaningful (social) aspects and the functional (physical) elements, to which the next section is devoted.

4.2.3 Spatiality of Housing

Beginning again at a rudimentary level, housing has spatial dimensions that are relatively easy to identify because of their centrality to the spatiality of daily experience. Housing provides a quantity of space for exclusive use by the occupants; privacy (a spatial relation); a relative location which is accessible (or not) to workplaces, retail opportunities, social services, family and friends, and so on; and a relative location which is proximate to sources of pollution, areas of congestion, sources of crime and hazard (both real and perceived), people viewed with fondness or distaste, and so on (Harvey 1973). The spatial dimensions of housing are tightly bound up with the material dimensions discussed previously. Williams (1987) vividly illustrates their interrelatedness:

[T]he location of the home in the social and physical landscape influences access to public services, education, health and job opportunities. Through social networks, (which themselves are influenced by propinquity) a whole range of opportunities can be opened up through intergenerational consequences. Indeed, pursuing this a little further, the home

as a possession, a physical commodity, may itself, through sale, have wealth effects, which can substantially transform the prospects of its occupants (or through inheritance, the subsequent generation). Equally, the home consumes financial and human resources and is capable of disabling individuals and families as they seek to maintain the home in the face of its physical deterioration and the financial burdens it imposes (Williams 1987, 156).

Moving beyond the rudimentary level, is the almost trite observation that in most North American cities, at least, there is a noticeable spatial concentration of similar income and ethnic groups within particular parts of the city. Badcock (1984) puts it succinctly when he claims, "even a healthy respect for the ecological fallacy ... cannot detract from the consistently high correlations obtained between measures of workforce participation, occupational status and income, and area of residence" (182). The observation is not particularly new or unique⁵, but its enduring character within cities, its regularity across different cities, and its congruity with the health geography of the city (Liaw, *et al.* 1989; Burr, *et al.* 1995) is noteworthy. It suggests that it is important to investigate some of the implications of residential segregation, especially for mechanisms of power, status, control, and identity, and their consequent influence upon health status.

The primary ways that spatial/residential segregation would be expected to influence these mechanisms are through access to information, and through the reproduction of social status and class identities. This reproduction happens in complex and imperfect ways, and is achieved (partly inadvertently) by knowledgeable, skilled human actors, not by dupes of a social structure from which they are estranged. Nevertheless, residential differentiation "not only reflects the increasingly skill differentiated and hierarchically co-ordinated workforce, it also serves to reproduce these differences" (Pratt 1989, 92).

In the same way that Spain (1992) argues that "'gendered spaces' separate women from knowledge used by men to produce and reproduce power and privilege" (p. 3), the spatial differentiation of socio-economic groups in the city may prevent people of lower status from acquiring skills, knowledge, etc. that may increase their control over their life circumstances, improve their life chances, and increase their likelihood of enjoying good health. Indeed, it may not even be a matter of people being prevented from acquiring such a skill set, but more a matter of the situation that even "beyond direct constraints within the existing educational system, neighbourhoods are social milieux within which children learn the value (or lack of value) of skills obtained through formal education" (Pratt 1989, 92). Additionally, proximity is influential on the formation of attitudes, identities and the internalization of disempowerment. The housing assignment process, therefore, is influential in distributing access to various forms of social resources, including, but not limited to, economic resources, and in the formation of personal attributes that shape individuals' lived existence and give them relatively more or less control over their life circumstances.

None of this is intended to imply that people don't make choices within the residential assignment process. Indeed, enclaves of immigrant populations, and the housing preferences of blue- and white-collar households of similar incomes would indicate the contrary. But such choices are *constrained* choices and, moreover, the exercise of any degree of choice does not change the fact that people end up situated in homes within a geographically differentiated space, a space that represents the differential distribution of life chances, and reproduces that distribution.

5.0 Emerging Research Questions in Housing and Population Health

The framework for housing and population health described above provides three crucial dimensions of housing through which to view possible relationships between housing and population health. In this section, the framework is taken a step further, to identify questions for future research.

5.1 Material Dimensions of Housing

5.1.1 Physical, Chemical and Biological Hazards in the Home

Recall that two unique aspects of material dimensions of housing were identified in Section 3.1.3. The first of these, concerning household exposure to physical, chemical and biological hazards has a wealth of evidence demonstrating very credible causal links with health conditions.

The studies identified in the review actually underestimate the probable "true" exposures to contaminants, toxins and hazards. A second set of exposure sources, mostly attributable to building materials used in new housing construction represent a profound paradox and conundrum, given that many other indoor exposures are attributable to aging housing and/or the fact that housing was built under a more permissive regulatory environment. Some examples of exposures that may be attributable to the use of new building materials include:

- **furnishings:** off-gassing from furnishings, especially particle-board adhesives
- **carpeting and underpad:** can contain cadmium and lead
- **paints and stains:** can contain low levels of volatile organic compounds
- **floorings:** can contain adhesives with urea formaldehyde

- **interior plywood:** usually contains adhesives made with urea formaldehyde
- **kitchen countertops:** adhesives in particleboard commonly used, as well as those adhesives binding formica, etc. to counters can be stimulated by heat (for example, from dishwasher) to off-gas.

The application of a population health perspective to such potential exposures would raise three main questions:

- a) what is the overall burden of illness and exposure from a given exposure/outcome pair?
- b) what is the distribution of such exposures across social groups, especially along socio-economic lines?
- c) are there identifiable obstacles, barriers and / or constraints to ameliorative action on the part of exposed individuals, especially of a socio-economic nature?

A policy-oriented set of further research questions follows from these:

- d) do methods for rapid and economical identification of exposed individuals exist (e.g., Dales, *et al.* 1994)?
- e) do methods exist for the subsequent estimation of burden of exposure / illness?
- f) are data available to estimate the economic costs / health benefits of possible policy responses—for example, regulation vs. behavioural change?
- g) if behavioural change is attempted, how can the appropriate behaviour be promoted most effectively at the least cost and what methods should be used for the evaluation of behavioural interventions⁶ (Green and Kreuter, 1991)?

From a population health perspective, these are the most important questions related to the health effects of physical, biological and chemical exposures to be addressed, a view that is shared with the National Academy of Sciences (2000). These questions go beyond the ones currently being widely addressed in the basic scientific and epidemiological literature on household exposures. It follows that it may be necessary to attract investigators with a different "bag of tools" to the problem. That said, within several fields of this research, indoor air quality, for example, investigators are already conducting research that could inform a population health approach to the topic. Dales, *et al.* (1997), for example, have evaluated the reliability and validity of self-reported mold exposure against measurement of "true" mold levels using scientific instrumentation. In this particular instance the authors were not satisfied with the performance of the self-report measure, but further efforts to improve the sensitivity and specificity of such tools will be invaluable to the adoption of a population health approach.

A promising line of inquiry related to question f) above is illustrated by a recent study by Hammitt, *et al.* (1999). They propose a method for investigating the trade-offs of increased health and safety regulation and increased housing prices. They postulate, in fact, that the imposition of building code changes for health protection may in fact undermine health through other pathways. One is an "income effect," whereby household income is drawn away from other health-protective investments to pay for code-related costs. The other is a "stock effect" that can raise overall housing costs (due to increased regulations) and "causes some potential buyers to delay the purchase of a new home, thereby leaving more households exposed to a larger stock of older (and riskier dwellings)" (Hammitt, *et al.* 1999). This is a line of inquiry with excellent promise for informed decision-making on a number of valid housing and population health policy issues.

Of course the imposition of building code changes does little or nothing to address health risks in the existing housing stock. For the rental housing stock, regulation may be effective in improving the physical conditions of housing, but the increasingly high dependence placed on private sector rentals makes initiatives to regulate improved housing conditions difficult—it may discourage investment in private rental housing and raise the costs of such housing.

For existing owners of an aging housing stock, one of the few alternatives is to encourage upgrades, maintenance and retrofitting of houses to remove or reduce exposures. There are a number of programs run by CMHC to encourage such changes, but evaluation must be a key priority. This prompts another potential line of inquiry in housing and health. If the estimated burden of exposure to a given hazard warrants remediation, then how can policy-makers and researchers design effective behavioural interventions, and how can it be ensured that they are adequately evaluated? As Hwang, *et al.* (1999) point out, this is a daunting task. They draw attention to a comment made by Peat, *et al.* (1998) in reference to the reduction of mold and moisture in the home:

The potential benefits of reducing mold in the home have not been investigated, and the few studies that have investigated health improvements as a result of increasing ventilation or reducing moisture in order to reduce house-dust mite levels suggest that this intervention is expensive, requires a large commitment, and is unlikely to be successful in the long term. This implies that houses need to be specifically designed for primary prevention of respiratory problems associated with indoor allergen proliferation rather than using post hoc procedures to improve indoor climate and reduce allergen load as a secondary or tertiary preventive strategy (Peat, *et al.* 1998).

This pessimism notwithstanding, there is one potential approach to addressing the issue of health behavioural change that may be helpful in the design of future interventions and their evaluation. The health promotion literature is very well developed in exactly such areas. The approach is to identify predisposing, reinforcing and enabling factors for behavioural change and use this information to alter the conditions in which behaviours persist (see Green and Kreuter 1991).

5.1.2 Housing Affordability, Tenure and Regressive Transfers of Income and Wealth

The current national attention to affordable housing and homelessness, coupled with the decline of government housing programs makes this particular issue a timely one. Issues of housing affordability, tenure and regressive wealth transfers also dovetail very strongly with one of the core issues in the population health perspective: the social gradient in health. Most scholars agree that while the most common demonstration of the social gradient in health uses income as a measure of social position, that it is unlikely that the health differences associated with social position are attributable to income *per se* (Evans 1994), except amongst the poorest segments of society. It is most likely that the relationship between social position and health status is mediated through the conditions of everyday life, where housing looms large.

Pathways between housing tenure and health status are a fruitful line of inquiry. Such questions lend themselves nicely to use of the framework described above in Section 4.2, with particular reference to three types of advantages that accrue to homeowners:

a) income redistribution advantages; b) advantages in the construction of social meaning and security; and c) advantages in the formation of enduring social ties. The importance of tackling the health effects of housing tenure also stems from the central role that housing tenure plays in Canadian housing policy. It has been estimated that over 75 per cent of federal government expenditures on housing go to support or (in) directly subsidize home ownership (Harris 1998).

Information on housing tenure is routinely collected in the Census of Canada and in nationally representative surveys like the National Population Health Survey and the Canadian Community Health Survey, as well as the National Longitudinal Survey of Children and Youth. Without more information on the context of home ownership in surveys that contain both housing tenure and health status information, however, it is impossible to move much beyond a simple association between housing tenure and health status. What is required is an "unpacking" of the notion of housing tenure—this requires an approach that uses theoretical insights to identify the social, economic, psychological, etc. benefits (or burdens) that home ownership brings. Such an endeavour may also be helped by qualitative research as well. Drawing on such theoretical and qualitative research, measures of relevant properties can then be investigated for their association with health status, while controlling for relevant confounders.

Some important first steps in the "unpacking" of the financial advantages of home ownership were identified in Section 4.2.1. According to Badcock (1984), "the economic significance of access to home ownership, and hence the all-important distinction between owner-occupiers and renters, overshadows all other redistributive mechanisms within the housing system" (Badcock 1984, 216).

So long as the capital appreciation of an owner-occupier's primary residence outstrips that of competing investments (as it has done consistently in all but a small minority of housing submarkets of the industrialized countries in the past 50 years or so—Holmans 1990), a household may gain more wealth from the appreciation of its primary residence than it could in a lifetime of savings (Pahl 1975; see also: Badcock 1984; Saunders 1984). This observation underscores the need not only to deal with the affordability of current housing expenses (as in the subsequent paragraphs), but also to develop measures of cumulative housing wealth for health research (in conjunction with other measures of household wealth). The Survey of Consumer Finance (Statistics Canada) does collect information on housing assets, but no health information is collected in the same survey.

Under ideal circumstances, it would be possible to collect complete housing histories, emphasizing wealth accumulation through home ownership. While this may seem to focus on the least needy, it would go a long way to estimating the magnitude of the advantages that accrue to homeowners as opposed to renters in poor households. At the same time, it would allow for important heterogeneities within the population of homeowners to be investigated. For example, for some households, home ownership can be a considerable burden, especially when they are the victims of unanticipated financial hardships, unanticipated illness or death of an earner, or are unexpectedly exposed to some nearby hazard or noxious land use and cannot sell without suffering a loss (for example, airport, waste facility, prison, etc.). If data sources simply distinguish between owners and renters, such complexities of the relationship between housing tenure and health cannot be investigated.

Recent research has shown some preliminary promise in investigating the health consequences of housing wealth. Dunn (forthcoming) found that capital gains on current residence were associated with a measure of self-reported mental health, without controlling for income. This study, however, suffered from an incomplete reporting of capital gains (Dunn, forthcoming). Nettleton and Burrows (1998), emphasizing the potential pitfalls of home ownership, conducted a 4-year longitudinal study of mortgage debt, insecure home ownership and health. They found nearly a two-fold difference in poor self-reported mental health amongst members of the British Household Panel Survey (n=3,700) who had experienced mortgage payment problems or arrears, controlling for income, income change, change in employment status and mental health at baseline.

Another critical issue for housing and population health research is housing affordability. Again, partly because it is routinely collected in the census and in some surveys, some studies have made modest attempts to investigate housing affordability and health outcomes. Typically the 30 per cent threshold is adopted uncritically as a benchmark, with little consideration of its value as a measure. Presumably, 30 per cent of gross income towards housing is going to be a much greater financial burden for poorer households than for wealthier households. Moreover, by adopting such a threshold, information about the households spending much less or much more than 30 per cent of income on housing is lost. Studies, therefore, should be collecting information on gross and net monthly household income, housing / shelter expenditures, needed housing modifications (often a substantial unspent financial burden) and other major expenditures (for example, medical costs for people with chronic illnesses) to get a fuller picture of total household income and the burden that housing costs truly represent.

Table 5.1 Housing Finance Data Requirements in Population Health Surveys**Housing wealth**

- date of purchase
- purchase price less downpayment
- amount of mortgage at current date
- estimated market value at current date
- annual rate of inflation*

Housing expenditures

- monthly rent or mortgage payment
- condo fees
- property taxes
- basic utilities
- major repairs needed

Household revenues

- total income from all sources (including rental income)
- other significant monthly expenditures
- household size (for adjustment of income)

* not collected from respondents – used to calculate capital gains adjusted for inflation

There is already some evidence that housing affordability is associated with health. In a study amongst 650 Vancouver households, Dunn (forthcoming), found an association between percentage of gross household income individuals spent on housing costs and both self-reported general health and self-reported mental health. When gross household income was adjusted for household size, the relationship remained.

To summarize, there is a need for much more thorough research on the financial aspects of housing and health status. Because common measures in existing research only account for household revenues and not household expenditures, income gradients in health quite likely underestimate the steepness of the social gradient in health. If well done, studies with complete measures of household income and housing expenditures, as well as housing wealth effects may help to indirectly

estimate the magnitude of health benefit that could accrue to lower income households if policies were implemented to reduce the financial dimensions of housing inequities. Expenditures made on housing, in short, are expenditures not made on other health-enhancing goods, and research is needed to ascertain the health consequences of such household budgeting, especially for low-income households. For example, in recent research Cheer, *et al.* (forthcoming) demonstrate how Pacific peoples living in poverty in Auckland, New Zealand "discount" health in their household expenditure patterns. The high cost of housing, relative to income, is a large factor in the expenditure decisions these households make. In some instances, Cheer, *et al.* (forthcoming) showed, heat and electricity were forgone in favour of supporting relatives financially and participating in cultural ceremonies.

Moreover, beyond the level of the household, more complete information concerning housing expenditures and benefits (for example, capital gains exemptions) should be collected so that housing and tax policies can be audited and evaluated. With the correct information, it is possible to estimate the subsidy to home ownership. In 1983, Dowler estimated that tax deductions to home ownership represented 75 per cent of the Canadian government's expenditure on housing, while social housing, including public housing, non-profit housing and co-operative housing, accounted for less than 5 per cent of federal expenditures on housing. More research needs to be conducted on these kinds of questions.

5.2 Meaningful Dimensions of Housing

Evidence from research on the health effects of workplace organization and job structure have produced a huge volume of facts that provides strong evidence for a model of workplace organization and health. The first suggests that individuals who have more psychologically demanding jobs, who have less control (or decision latitude) in the way they carry out their work, and who work in environments with less social support and camaraderie with fellow workers are at much greater risk from a number of health conditions (mental health, hypertension, heart disease symptoms, etc.). These factors also tend to mirror the distribution of income and status, with low control, high demand jobs being those that are more poorly paid and offer little or no prestige, while high control, low demand jobs tend to be more highly paid and offer much more prestige and reward. If demand, control and social support, however, are the three most important factors for health in the workplace, it follows that similar factors would apply to the other 16 hours of the day, and the setting where most of those hours are spent—the home.

It is also the case that in most Western societies the home is the only space in an individual's everyday life where they are socially (and legally) sanctioned to have complete (or near-complete) control. It does not take a great deal of imagination to further conjecture that where this control in the home is expected but chronically absent, a good deal of emotional and even physiological stress could result. If one then imagines the cumulative impact, stretched across the life course, of the effect of this chronic stress, it becomes possible to imagine how meaningful dimensions of housing, like control, could contribute to, and even magnify socio-economic differences in health.

The bias towards home ownership in Canadian society is often expressed in terms of control as well. As a social construct, so important is control in the domestic context, that many laws related to property and housing are designed to provide residents the most control possible (while balancing against other constraints) over their domestic environments (for example, landlord and tenancy laws, housing co-ops, strata title laws, housing title and tenure laws, etc.).

But control in the domestic environment is not simply reducible to whether a household owns its home or not. Indeed, for many households the stereotypical advantages of renting really do occur as advantages—no need to be concerned with maintenance, repairs, and a good deal of flexibility and the ability to move on short notice. Despite this flexibility, many very poor households may become "prisoners of space" because of the costs associated with moving. For households on the economic margins, moreover, renting may offer very little flexibility. Moving to better housing while unconstrained by home ownership is constrained by other costs: for movers, fees for re-connection of telephone and television service, and security/damage deposits for the new apartment.

These obstacles can easily trap low-income households in inappropriate, unsatisfying, or even dangerous housing. Economically marginal households may also be systematically vulnerable to forced moves. Kohen, *et al.* (2001) have shown that child development (social, emotional, cognitive) may be undermined by more frequent household moves.

Housing tenure and particularly security of tenure, is of crucial importance to fostering a sense of control over everyday life, especially in more vulnerable households, demonstrating that control in the domestic milieu is both a meaningful and material dimension.

Some preliminary evidence of importance of control in the domestic environment is provided by Dunn (forthcoming) and Dunn and Hayes (2000). In these two studies, measures of control in the domestic environment were significantly associated with both general and mental health (from self-reports). Potential measures of control in the domestic environment include:

- home as a place of refuge
- worry about a forced move
- frequency of moves
- fear of crime / victimization

Measures of demand in the housing environment, which were not as strongly and consistently associated with health status, include:

- strain of housework
- strain of meeting housing costs

Another important meaningful dimension of housing is its role in expressing status. Some of the societal bias towards home ownership owes its existence to the prestige and status attributed to home ownership. The importance of housing as an expression of status has a crucial converse as well—housing as a source of stigma.

Living in low-quality, run-down, rental housing, in neighbourhoods reputed to be less desirable, exerts considerable influence not only on an individual's self-concept, but the way in which they are perceived by others. The stigma associated with one's housing may undermine the home's use as a site for the building of social ties, and may even lead to things like hiring discrimination. Individuals may be disinclined to invite friends as guests⁷, or may be disinclined to participate in civic activities that take place outside their own immediate area. Possible measures that may tap the social meanings of home related to prestige, stigma and so forth, include:

- degree to which an individual is proud to show home to visitors
- degree to which an individual feels like their home is a reflection of who they are
- degree to which an individual feels like they belong in their neighbourhood

Again, there is some preliminary evidence that such measures are associated with self-reported general and mental health indices (Dunn forthcoming, Dunn and Hayes 2000).

A final measure of meaning within the domestic environment is satisfaction with one's housing. It is possible to survey individuals about their satisfaction with a wide range of housing attributes, and identify which ones are most important to health and its known determinants.

5.3 Spatial Dimensions of Housing

An individual's home is a crucial locus for everyday life—the fixed point around which everyday life revolves. As such, the location of the home relative to health-enhancing amenities and health-threatening disamenities is a crucial pathway through which housing may affect health. Geographers and

epidemiologists have increasingly become interested in the extent to which the socio-economic attributes of places make an independent contribution to health status, over and above the effects of individuals' socio-economic status. A particularly strong concentration of this work has investigated the effects of contextual factors on child development.⁸

There are several suspected pathways through which attributes of places may affect health and well-being. The first concerns access and receptivity to opportunity. If a young person is socialized in a working-class neighbourhood, for example, where the value of education is considered to be low, they may not reach their full developmental and socio-economic potential. Similarly, residence in a particular neighbourhood may give an individual access to networks of influence and opportunity that exceed what might be expected from their socio-economic background alone.

This explanation is one of the ones proposed to explain an often repeated finding of studies of contextual factors and child development. Numerous studies have shown that poor children who grow up in poor neighbourhoods have health and human development outcomes that are far worse than similarly poor children who grow up in mixed-income neighbourhoods (Leventhal and Brooks-Gunn 2000; Brooks-Gunn *et al.* 1993).

It has been suggested that this effect may be attributable to exposure to positive role models and a wider spectrum of life opportunities than might otherwise be evident to children from low-income households. This implies that urban planning policies that encouraged social mix, popular in the 1970s, may have some effects on reducing inequalities in health and human development.

The location of one's residence relative to services and amenities needed for healthful everyday living may also explain part of the so-called neighbourhood effects on health and human development seen in the research literature. Access to services like health care and community supports and services can be an important pathway through which the relative location of housing can shape health. A long-term study of two pairs of socially contrasting neighbourhoods in Glasgow, Scotland, for example, has shown that residents of the two poorer neighbourhoods have less access to parks and recreational opportunities and have to travel further (using transit) to purchase a healthy basket of food (Ellaway and Macintyre 2000).

6.0 Putting the Framework in a Life-Course Perspective

Early child development has become a central pillar of the population health perspective because of the long and influential shadow that conditions of early life (particularly between birth and age 5) cast on the child's future social, economic and health outcomes. The focus of the life-course perspective, therefore, has been on children. At the same time, there has been relatively little research conducted on the influence of housing on early child development. This section reviews some of the work that does exist and begins to frame some research questions that emerge from such a perspective.

Children spend a large proportion of their time in the home, especially at younger ages, but relatively little is understood about the ways in which children's domestic environments shape their health and development. While there is a fairly large literature on physical, chemical, and biological exposures and children's health, there are several possible mechanisms through which housing attributes may affect children's health and development.

In the first instance, children may be especially vulnerable to exposure to physical, chemical and biological exposures and health consequences, simply because so much of their time is spent in the home, with a resulting long exposure to any bio-physical hazards in the home, possibly even more so than an adult or older child might. Also, very young children, while crawling or otherwise exploring their environment, may get very close exposure to hazards (for example, dust mites) in carpets, leaded paint, etc. Finally, the consequences of physical exposure may be more severe for children, possibly even having long-term effects (for example, development of allergies).

The second main mechanism through which housing may shape children's health and development is through the adequacy and suitability of the physical space for social, emotional, and cognitive development.

McLoyd's (1990) review of the effects of poverty suggests several ways in which economic stress can affect child development. According to McLoyd, there is evidence that parental stress, including stresses created by poverty, diminishes the capacity for supportive, consistent and involved parenting by undermining the emotional resources of the parent, and possibly even resulting in neglectful parenting. In addition to this, there is evidence that depressed, harassed parents, who are low on energy, are more likely to choose low-effort strategies for resolving conflicts with their children. There is also some evidence that stress can lead to a punitive parenting style and possible even a fatalistic abdication of responsibility for one's children.

Bartlett (1997) suggests that inadequate and unaffordable housing can be a main driver of household financial strain and parental stress. Beyond the financial strain housing may pose, other attributes of housing can lead to greater parental stress: poor location relative to daily needs (recreation opportunities, supportive relationships, childcare and workplaces); crowding; high noise levels; and unsafe, dilapidated, or unsuitable space. This stress is exacerbated when its source is perceived to be outside the parent's control.

There are some specific ways in which the physical layout and similar attributes of one's dwelling may undermine optimal child development. An ethnographic study of child development and housing (Hart 1979) found, for instance, that the availability of a protected outdoor play area for children where they could maintain visual and voice contact with a parent is an important factor in parent-child attachment. Ideally, according to Hart, there should be easy visual and voice contact between parent and child while the child plays. This is obviously unrealistic for many types of housing. The absence of such a space also means that the parent cannot do other tasks (cooking, washing dishes, etc.) while the child plays, which often means that low-income parents

have little choice but to practice "all-or-nothing" parenting strategies. This can be very demanding for parents, especially single parents as it may make it impossible, for example, for the parent to do dishes and the child to play outdoors simultaneously. Moreover, the availability of appropriate play spaces in or around the home can be important in developmental terms. There are a number of studies that suggest, as Bartlett (1997) puts it, that

"when young children and their caretakers are unable to experiment in a natural and easy way with increasing distance and independence from one another, this has an impact on the interaction of parent and child, and may contribute to more anxious and less flexible parenting strategies" (p. 177).

6.1 Studies of Housing and Child Health and Development

Saegert and colleagues (forthcoming; Saegert and Evans 2000) have produced recent empirical evidence supporting some of these previous findings and hypotheses. Saegert, *et al.* (forthcoming), for example, gathered data from 40 families in public housing in East Harlem to further explore the direct and indirect relationships between housing and children's health. They focused on exposure to stressful situations (violence in the home and in the community and economic strain) and social resources (social capital). They hypothesized that children's exposure to violence would directly affect their physical and mental health. They further expected that stressors experienced by parents, especially economic strain, would relate to parental depression and harsher parenting practices. Explanatory variables included economic strain (13 items measuring economic hardship), social capital (self-report items related to participation in voluntary and civic organizations and tenant participation, as well as informal social relationships), psychological distress (from a standardized scale) and harsh vs.

supportive parenting (using a composite measure of parenting behaviour). Health outcome measures included presence (in children) of post-traumatic symptomatology (from a psychometric instrument), cardiovascular activation (resting heart rate and systolic and diastolic blood pressure), neuroendocrine measures (epinephrine, norepinephrine, cortisol and creatinine from urine samples), and parents' reports of child psychological distress (from Rutter's Child Behaviour Questionnaire).

Economic strain (being unable to pay bills and meet basic family needs like food and clothing each month) proved to be the most salient negative factor in mothers' levels of depression, and was also related to the harshness of her parenting style. In addition, higher levels of social capital were related to better mental health. Both parental psychological distress and harsh parenting were associated with higher levels of psychological distress among children. Harsher parenting was also associated with higher epinephrine levels in the children. According to the authors, probably the most significant contribution of the pilot study was the identification of parental psychological distress and harsh parenting as mediators of children's poor mental health and stresses of violence and economic strain.

A very recently published study by Evans, *et al.* (2001) investigated the relationship between housing quality and children's socioemotional health in a sample of 277 grade 3, 4, and 5 children in 5 rural counties in upstate New York. The authors used an 88-item observer-based instrument to assess housing quality. The scale consists of six sub-scales that have a coherent factor structure (child resources, cleanliness / clutter, indoor climatic conditions, privacy, hazards and structural quality). Socio-emotional well-being was measured in two different ways in the study. First, the Children's Behaviour Questionnaire was completed for each child by one parent. The parent was asked to rate the child on a list of common childhood symptoms

indicative of behavioural conduct, using a 3-point scale. Second, children in the sample were given a test to determine their level of task persistence. Task persistence is considered to be a robust indicator of motivational deficits resulting from exposure to stress, and is considered to be an indicator of the likelihood that the individual will develop tendencies towards learned helplessness in adulthood.

In their results, Evans, *et al.* (2001) found that housing quality was significantly associated with the scores on the Children's Behavioural Questionnaire—better housing quality was associated with fewer behavioural problems—a result which remained even after controlling for income. Similarly, as housing quality improved, children were more likely to persist in an unsolvable puzzle (task persistence)—again, this result remained after controlling for income. A second analysis of the same data inserted a further statistical control for mother's psychological health, as measured by a standardized instrument. Both of the significant relationships between housing quality and socioemotional well-being remained after controlling for both income and maternal mental health. Despite the strength of their results, Evans *et al.* (2001) caution that the study was cross-sectional and that longitudinal data would be helpful in elucidating underlying processes that might explain how poor housing quality can lead to negative outcomes in children. They speculate that the effect may be partially explained by the myriad of hassles and high levels of chaos common in the lives of low-income parents, which may lead to stimulus overload and possibly harsher parenting practices. Moreover, they point out that some of the harmful effects of residential crowding may be buffered by having a place in the home where the child can seek refuge.

A final recent study by Ross and Roberts (1999) is important because of its use of population-based Canadian data (the National Longitudinal Survey of Children and Youth, NLSCY).

Although housing and children's health is not its primary focus, the report does implicate housing as something that can be compromised in low-income households with children. In particular, the report finds that several factors important to child development tend to be associated more or less strongly with income in families surveyed in the NLSCY. These factors include: parental depression, chronic stress, frequent school changes, living in substandard housing, living in problem neighbourhoods, neighbourhood safety and friendliness and helpfulness of neighbours.

The association between parental depression and chronic parental stress, on the one hand, and child development outcomes adds to the evidence presented above. Ross and Roberts (1999) found income gradients in both parental depression and chronic stress in the NLSCY. They also found, based on NLSCY data, that children living in lower income households were more likely to have changed schools *three or more* times before the age of 11. Past research has shown that children who frequently change schools have lower math scores, more grade failures and higher levels of behavioural problems than children who have a more consistent residential history (see also Cooper 2001 and Kohen, *et al.* 2001). Some speculate that the need to change schools frequently can be a symptom of other stressful family conditions such as family break-up, parents losing or frequently changing jobs, and pressures to move in order to find more suitable or affordable housing. The children who are most likely to change schools are often also vulnerable in other ways—they may be living in lone-parent families, may be poor, may have parents with low levels of education or poor mental health.

The importance of housing conditions in childhood for future health are underscored by two recently published longitudinal studies of childhood housing conditions and later health status in the United Kingdom. Dedman, *et al.*

(2001) examined the association between five measures of housing conditions during childhood and subsequent mortality from all causes, coronary heart disease, stroke and cancer. The analysis used data from a 1948 follow-up of children (n=4168) whose families participated in the Carnegie Survey of Family Diet and Health in pre-war Britain (1937-1939). After adjustment for childhood and adult socio-economic factors, lack of private tapped water supply was significantly associated with 1.73 times greater likelihood of mortality from heart disease and children living in poorly ventilated housing were 1.30 times more likely to die from any cause.

A more recent study (Marsh, *et al.* 1999) used the 1958 British birth cohort to examine the effects of housing deprivation at five different points in time upon self-reported health and chronic illness at age 33. The British Birth Cohort is a longitudinal study of all babies born March 3-9 in 1958 (n=17,415), which had diminished to 11,407 33-year-old adults in 1991. The study found that both cross-sectional and cumulative housing deprivation were significantly associated with the likelihood of reporting poor health and having a disability or severe ill-health. The index included both physical features of the dwelling (access to bath, toilet, presence of moisture and mold) and meaningful features (dissatisfaction with dwelling or neighbourhood, not living in a self-contained dwelling, living above three stories high). The results were also quite strong: after adjustment for socio-economic factors, 33 year-olds in the cohort who were living in a non-self-contained dwelling were 4.22 times more likely to report poor health than those who were living in self-contained housing. Those cohort members who had been "housing deprived" at two or more points in the five sweeps of data collection (1965, 1969, 1974, 1981, 1991) were 1.25 times more likely to be disabled or extremely ill at age 33 (in 1991).

These results point to the utility of longitudinal data and the necessity of using prospective studies to investigate socio-environmental influences on early child development as well as lifelong health, well-being and competence.

6.2 Housing, Neighbourhoods and Child Development

Neighbourhoods have become a hot topic in the social sciences in the last two years or so. In educational studies, population health, urban studies, geography, sociology, human development and public health there is a great deal of interest in the influence that neighbourhoods exert on human outcomes (health, child development, social cohesion, etc.). This enthusiasm for the study of neighbourhood or contextual influences on health and human development is expressed in the housing and population health conceptual framework as the "spatial" dimensions of housing. If we hypothesize that neighbourhoods are important, then this immediately implicates housing as a determinant of population health, because it is an individual's home that places them in a particular neighbourhood. In the report described above by Ross and Roberts (1999), the authors present evidence that children living in poorer families are also more likely to live in "problem neighbourhoods", unsafe neighbourhoods and environments with less friendly and helpful neighbours. Problem neighbourhoods are defined in the NLSCY as those where negative activities occur, such as drug use and drug dealing, excessive public drinking, burglaries, unrest due to ethnic or religious differences, neighbourhoods where groups of young people cause trouble, and where garbage and broken glass litter the streets. Child development experts believe that these problems can indirectly affect a child's development by being exposed to anti-social behaviour and vandalism. Although the vast majority of Canadian families

report living in non-problem neighbourhoods, more than one-quarter of children in low-income families live in neighbourhoods with at least one problem activity, compared to about one-tenth of children in high-income families (Ross and Roberts 1999).

Factors affecting neighbourhood safety, as measured in the NLSCY include parental self-reports of the level of children's safety in walking alone at night and playing outside in parks during the day. If parents consider their neighbourhoods to be unsafe, they may restrict their children's play on the street or in local parks. Ross and Roberts (1999) suggest that this may undermine children's abilities to form friendships and to develop good social skills. According to Ross and Roberts (1999), about 15 per cent of children in low-income families live in neighbourhoods which their parents consider to be somewhat unsafe, compared to only eight per cent or less of children in families with incomes of \$50,000 or more. Ross and Roberts (1999) further report income-related differences in neighbour friendliness—25 per cent of children in low-income families lived in neighbourhoods where their parents expressed reservations about the helpfulness and friendliness of their neighbours, compared to slightly less than 10 per cent of children in high-income families. They suggest that children can learn positive social skills in supportive neighbourhoods. Conversely, they can learn negative behaviours in neighbourhoods where people do not look out for or help each other.

In the United States, interest in the effects of neighbourhoods upon health and child development have produced numerous studies, some of them very large in scale. Observational studies have shown that poor children, for instance, who live in mixed income neighbourhoods have much better educational, behavioural, and career

outcomes in early adulthood (Brooks-Gunn, *et al.* 1993). But a major quasi-experimental study, currently ongoing in several cities (Baltimore, Boston, Chicago, Los Angeles and New York) in the U.S., is currently investigating the effects of a simultaneous improvement in both housing and neighbourhood.

The Moving to Opportunity (MTO) project uses a randomized quasi-experimental design to investigate the effects of residential relocation and poverty deconcentration. MTO offered families who signed up the chance to obtain a Section 8 certificate (a housing subsidy) so that they could move out of public housing and pay no more than 30 per cent of their income in rent. Eligible families who agreed to participate were randomly assigned to one of three groups. One third were randomly assigned to the MTO group: these families were given Section 8 vouchers that carried a condition which required them to move to a suburban, low poverty area but also entitled them to assistance in finding housing and overcoming other barriers to moving. Another third were randomly assigned to a different treatment. They were given a Section 8 voucher, but were free to use their vouchers wherever they wished. It was expected that on their own, these families would find housing in neighbourhoods with similar SES to the ones where public housing is located. A control group remained in public housing. There was a higher than predicted rate of up-take, which signals the strength of the desire for many public housing residents to escape their circumstances and improve their life chances. Major outcomes of interest included children's "human capital development" which are proxied by measures of child behaviour and health; adult economic self-sufficiency (welfare participation and unemployment data); and other factors affecting quality of life: safety, adult health and adult social interactions.

Preliminary results, three years into the trial, have been compiled for the Boston site (Katz, *et al.* 2001)⁹. The program was successful in moving public housing residents out of high poverty neighbourhoods—families in both treatment groups were more likely to be living in neighbourhoods with low poverty and high education levels than families in the control group, although the effect was more pronounced in the MTO group, as expected. Families in both treatment groups had moved to neighbourhoods with less drug dealing and less gunfire, and were less likely to be victims of property crimes. Interestingly, at the Boston site there were no significant impacts of MTO treatment on either the employment, earnings, or welfare receipt of household heads in the first three years of the trial (other sites have shown modest effects). In terms of health and development outcomes, households in both treatment groups experienced greater safety, improved health among household heads and fewer behaviour problems amongst boys, compared to the control group. Experimental group children were less likely to be victims of a personal crime, to be injured, or to experience an asthma attack.

6.3 Housing and Children's Health and Development—"Multiple Jeopardy"

This section has shown that variations in housing have the potential to significantly shape children's health and development. In terms of disease-based health outcomes, it is potential exposure to indoor pollutants and hazards that poses the greatest risk, although this risk is unquestionably mediated by the socio-economic status of the family in which a child lives (Olden 1996).

Lower socio-economic status poses further risks in terms of the suitability of the dwelling for developing strong parent-child attachment patterns, and has implications for the chronic stresses that it places on parents. Parental stress and depression can shape parenting strategies in crucial ways that have implications for social, emotional and cognitive development—these impacts may manifest in long term outcomes such as school performance, career achievements and undesirable social outcomes (lawlessness, substance abuse, family problems, etc.).

Relative poverty, in addition to contributing to the type of dwelling a household can afford and determining the proportion of income they pay for their housing, also severely constrains the location of housing options, potentially placing children in dangerous, or at best, neighbourhoods that offer little (or inappropriate) stimulation for social, emotional, or cognitive development. Finally, households of low socio-economic status often have very little housing choice, and once housed, may have little control over their housing and no opportunity to move to a better location (partly because of moving costs—first and last month's rents, lost work time, cost of movers, etc.). Such circumstances represent a situation of "multiple jeopardy" where children of low socio-economic status are likely to be exposed not just to a single developmental health risk due to their housing, but several interlinked risks.

7.0 Are Some Groups More Vulnerable?

Previous sections proposed a framework for understanding housing inequalities from the perspective of population health, largely without reference axes of social differentiation other than socio-economic status. There are many sub-populations within Canadian society, however, who either experience unique housing difficulties that may have health consequences, or for whom housing and socio-economic disadvantages are magnified by their disempowerment on some other social dimension. In short, this demands that the proposed framework of materiality, meaningfulness, and spatiality be employed in a manner that is also sensitive to the question: "Are some groups in society more vulnerable to health effects of socio-economic dimensions of housing and domestic life?"

There are several population sub-groups in Canadian society for whom housing is a particularly acute issue. In this section, the unique housing and health issues faced by the following groups are briefly considered within the framework of material, meaningful and spatial dimensions of housing: Aboriginal people with mental illness and addictions, seniors, people with chronic illnesses and disabilities, women, and the homeless. For several of these population sub-groups, poverty is common and a particularly important barrier to achieving stable, suitable housing.

7.1 Aboriginal People

The housing conditions experienced by many Aboriginal people in Canada are well below that of the general population. The problems of Aboriginal people housing, however, have existed for a long time and have proven difficult to ameliorate, especially on-reserve. Specifically, there are several crucial factors common to First Nations' housing that threatens health and well-being, including: housing quality, affordability, supply, sanitation issues (plumbing and sewage),

exposures to mold, moisture, etc. and housing maintenance. Responsibility for these issues lies with individual band councils and government agencies.

These problems may seem relatively straightforward, but numerous obstacles to orchestrating a co-ordinated effort seem to persist. Some of these issues concern both material and meaningful practices surrounding the home in First Nations' cultures. The home, for example, must perform very different material functions than that of non-Aboriginal housing (for example, food processing and preparation, fires for cultural rituals, accommodation of extended families, etc.). Similarly, the home also has very different symbolic representations in First Nations' cultures, which can clash with the constraints of government housing programs. A population health approach to housing and health is relatively difficult to apply to the case of on-reserve First Nations' housing, especially given the extent to which problems are on the one hand, of a technological nature (building designs and materials appropriate to northern climates and First Nations' cultural practices regarding use and function of the home), and on the other hand, of an administrative nature (how to deploy resources efficaciously, to alleviate clear problems of housing inadequacy).

Many Aboriginal people living off-reserve also face severe housing problems. Not unlike other population sub-groups, affordability is key issue that many off-reserve Aboriginal people face. But they also confront challenges related to ghettoization in the inner city (for example, Winnipeg, Regina). Poverty and housing discrimination have the potential to severely limit housing options for many Aboriginal people, and their confinement to the inner city guarantees that they will be disproportionately exposed to despair related to poverty, discrimination

and exposure to addictions, violence, and crime. It is also worth noting that the health and emotional, social, and cognitive development of Aboriginal children may be severely compromised by living in such environments (see Section 6.0).

A population health approach to research on off-reserve Aboriginal housing would seek to identify the social structures and practices that systematically disadvantage Aboriginal people in terms of housing and health, over and above (or in combination with) issues related to poverty and socio-economic status. The uniqueness and complexity of Aboriginal housing and health issues, however, demands that research initiatives be specifically targeted to this population.

7.2 People with Mental Illness and Addictions

The common inability of many people with serious mental illness and addictions to work at full capacity in the paid labour force often condemns them to a life of dependence on the social welfare system and chronic poverty. Surveys of consumers of mental health services routinely find that housing is reported as the most important issue affecting the well-being of this population sub-group. This is widely recognized, but housing for people with mental illnesses is still inadequate in most major Canadian cities.

The framework of material, meaningful, and spatial dimensions of housing can be applied to the situation of housing and health for people with mental illnesses and addictions. From a material perspective, housing must be available that is affordable, safe, easily maintained and secure.

From the material perspective, affordability is a key issue because of endemic poverty in this sub-population. The importance of this issue must be underscored. Worries about money and bureaucratic complications (due to multiple providers of benefits) are an impediment to maintaining wellness for people with mental

illnesses. Safety is also a key issue for this population, because in large cities, people with mental illnesses often live in potentially dangerous inner-city neighbourhoods, where there is affordable housing. Security of tenure is crucial because people with mental illnesses may be subject to occasional hospitalizations as their illness fluctuates and in many instances, the pressure to use public resources efficiently within assisted housing programs means that an individual's dwelling may be re-assigned if they do not return from hospital quickly. Similarly, perverse incentives exist within the system of assisted housing. Because services and subsidies are given based on a threshold of need, there may be a disincentive for individuals to get too well, because they will lose their housing.

Best practices developed by federal, provincial and territorial agencies promote the benefits of supported housing models (housing combined with custom-tailored mental health and general support services—see report by the Federal, Provincial and Territorial Advisory Network on Mental Health: Health Canada 1997). Relatively little rigorous evaluation of such programs has been conducted—there are several self-report studies of the effectiveness of such programs, all of which point to excellent results (Parkinson, *et al.* 1999). The evaluation data that are available, however, underscore the fact that stabilization of an individual's housing situation can have a cascade effect, extending into other areas of life, for example, reducing social isolation, providing opportunities for purposeful daily activity (for example, work, social activities) and providing a tolerant local environment.

Other research questions may solidify and improve the status of housing programs for people with mental illnesses and addictions. If, for example, there was evidence that the cost of providing assisted housing to people with serious mental illness was recouped in health care savings, this would make a strong policy argument for greater investment in housing.

The existence of administrative health care databases in several provinces (British Columbia, Manitoba, Saskatchewan, Alberta and Ontario) presents an enormous opportunity to objectively assess the health, health care and economic benefits of such programs. These databases contain person-specific records of health system utilization. With informed consent from subject, researchers could examine before and after differences in health status and health care utilization amongst new clients of assisted housing programs. Health care costs could then be compared.

7.3 Seniors

Seniors are another population sub-group for whom housing can be a challenging issue, particularly for seniors of lower socio-economic status. Many seniors are poor and may have chronic illnesses. They are also vulnerable to social isolation. There is a wealth of research on seniors housing, some of which investigates relationships to health, or more commonly, to functional status, cognitive function and competency. Key research issues that remain include:

- housing affordability
- research tools for rapid, inexpensive, but accurate identification of seniors at-risk for functional incompetence
- interventions to alleviate social isolation both for those who are housebound and those who are not
- identification of obstacles and barriers to making house modifications to prevent falls and reduce hazards in seniors' homes.

There has been a great deal of research on seniors' housing and conditions and their well-being, broadly defined. A complete review of the unique housing issues facing seniors (and their potential health consequences) is outside the scope of this report.

The framework developed in this report can nevertheless be applied to seniors' housing issues in future research.

7.4 People with Disabilities/ Chronic Illnesses

Disabilities and debilitating chronic illnesses can be another important factor in shaping individuals' housing choices, preferences and experiences. The relative suitability and affordability of one's housing can be instrumental in creating a sense of control over life, a meaningful daily environment and a place for the maintenance of important social relationships. Research has demonstrated, however, that the onset of disabilities and debilitating chronic illness must be negotiated within the context of an individual's current housing circumstances. The home, in other words, is fundamentally important in mediating the experience of chronic, physically disabling illness. Dyck (1995; 1998), for instance, found in her research with women with multiple sclerosis, that

[H]ousing was an area over which most felt they could exert control as they managed their illness. Restructuring of space, however, was not confined to a simple equation between physical experience and environment. It was also a reconstitution of the home according to a woman's reading of her new self as couched in the language of biomedical knowledge describing the disease process. This reading included mapping future possibilities as well as current experiences in material space (Dyck 1998, 113).

Other concerns common to people with disabilities and debilitating chronic illnesses include:

- social isolation if individual is housebound
- intrusion of home-care workers into meaningful personal space (the home) (Newman 1995)

- appropriateness of housing under the added demands of increased home-based care instead of institutional care
- stress on live-in family caregivers
- costs of needed modifications to accommodate people with disabilities.

Somewhat like seniors' housing, there is already a great deal of research activity pertaining to the housing and health needs of people with disabilities. That said, the framework presented in this report is a potentially valuable tool for future research questions and hypotheses in this growing area.

7.5 Women

Given the high degree to which traditional gender roles are driven by men's and women's relationship to the home, it is surprising that there is so little research on housing and health from a gendered perspective. The importance of gaining a better understanding of the ways in which housing may contribute to women's health is all the more important given women's increasing participation in the labour force. Key issues include:

- women in poverty, especially single mothers: control, demand, social isolation are possible threats to health for this group (Doyle, *et al.* 1996)
- importance of safety and security of housing for all women, with a particular need for adequate transitional housing for women leaving abusive relationships

- double-duty-working women also retain traditional gendered domestic roles—health impacts of such stress (see Johnson and Hall 1988)
- more qualitative research needed on demand, control and meaningful dimensions of domestic life for women as gender roles change (Wasylyshyn and Johnson 1998).

The importance of gender in the relationship between housing and health is a particularly fruitful area for future research. Relatively little is known about how gender may mediate the relationship between different aspects of housing and health status.

7.6 Homeless Persons

The negative health consequences of homelessness and the challenges in providing health care to homeless people are well-documented and profound. This report has devoted relatively little attention to the issue of homelessness, not because its effects are not important, but because many of the same factors that make individuals and households vulnerable to homelessness also threatens their health. It follows that the population health perspective, if effectively applied to design policies that interrupt and ameliorate those factors that lead to homelessness, will also likely improve the health of those vulnerable to homelessness.

8.0 Standards of Evidence in the Study of Housing and Population Health

8.1 Study Designs

One of the problems with the existing body of research on housing and population health is that the study designs that have been used are incapable of producing strong evidence of a causal association. That said, multiple studies that use weaker study designs can provide very compelling evidence of causal links.

Observational studies are the most common in housing and health research, and there is a hierarchy of evidentiary strength within three types of such studies. An ecological study, the weakest study design, would, in the case of housing and health research, investigate the association between the incidence of a housing characteristic amongst population groups (usually in place) and the incidence of a health condition in the same groups. For example, a study might examine the association between home ownership rates and mortality rates in neighbourhoods within a given city. The principal weakness of this study design is that it is impossible to know if the same individuals who possess the housing characteristic are the same individuals who experience the health outcome.

Case-control studies, the next strongest type of study, would, in the case of a housing and health study, choose a sample of individuals who had a health condition of interest (cases) and another sample who did not have the condition (controls) and then reconstruct their housing conditions retrospectively. Such a study suffers from inaccuracies that result from having to reconstruct individuals' exposure to the housing characteristic.

Cohort studies, the strongest observational study design, sample on the basis of "exposure" as opposed to outcome. In this case, it might mean that the researcher would select a sample of homeowners and a sample of renters and follow them through time to determine if either group has a greater likelihood of dying. This study design can be substantially strengthened if it is conducted

longitudinally, so that any relationship between changes in the housing characteristic can be investigated for their health effects (the other observational study types can be strengthened with longitudinal data too). Longitudinal data is expensive to collect, and longitudinal studies can suffer from biases attributable to sample attrition.

Experimental studies can provide very strong evidence of causal relationships. There have been several studies of experimental or quasi-experimental housing interventions. A recent review (Thomson, *et al.* 2001) discovered 18 completed primary intervention studies. Eleven of these were prospective, but only six used control groups. Housing interventions included re-housing, refurbishment, and improved energy efficiency measures. Most studies found at least a modest health effect as an apparent result of the housing intervention, but the small sample sizes and the lack of control for confounders limit the generalizability of this body of work.

The results of the review and the need for more conclusive evidence of relationships between housing and health suggest the need for a more concerted effort to conduct experimental or quasi-experimental studies. A first step in this regard would be to attempt to develop an exhaustive list of expected or ongoing "natural experiments" in the form of housing interventions. These probably occur relatively frequently, but go unnoticed and uninvestigated.¹⁰ A concerted effort to identify instances of rehousing and seek funding to evaluate their health impacts would take the field of housing and population health in Canada several steps forward from where it sits. It should be cautioned, however, that what makes a good experiment may not make a good policy.

8.2 Health Outcome Measurement

Having addressed the study design issues in the study of housing and population health, it is important to consider the measurement of health outcomes. Certainly housing and population health

research could make a huge impact if conclusive evidence of housing causing clinically diagnosed illness could be brought to bear. But the health consequences one might expect to occur as a result of the socio-economic dimensions of housing will have long latency periods and therefore may not have any illness to diagnose for many years, even decades. It follows that other measures of health may be more appropriate to the study of housing and population health. This does not mean that housing does not and cannot shape health.

This does not mean that links between housing and population health cannot be investigated. Self-reported general health measures can be very robust in predicting future incidence of a wide variety of conditions, including mortality. The simple question "Compared to other people your age, how would you rate your health?", for example, with response options: excellent, very good, good, fair, poor, is a robust indicator of overall health. It correlates highly with symptom reporting scales, as well as future mortality and morbidity.

Non-psychotic mental health conditions like depression and anxiety may also be appropriate outcome measures for the study of relationships between housing and population health. There are numerous mental health screening questionnaires in the published literature that are effective at identifying a large proportion of cases with acceptable levels of misclassification error. Some of these instruments are as short as five questionnaire items. Mental health is not a secondary-level outcome either—it currently represents the 2nd highest burden of illness in developed societies (World Health Organization (WHO) 2001). The Business and Economic Roundtable on Mental Health (July 2000) estimates that \$16B is lost in annual economic output in Canada due to sickness absence and lost productivity due to mental illness. Moreover, there is recent evidence of links between depression and onset of heart disease and heart attacks (Hippisley-Cox, *et al.* 1998).

The measurement of the effect of housing on health services outcomes is especially relevant to people with chronic illnesses and severe and persistent mental illness. It is now possible to develop rigorous estimates of the health, health care utilization, and health cost savings of interventions outside the health sector, like in housing. The costs of marginal housing and homelessness have been estimated using less direct measures, but are thought to be very large (Eberle, *et al.* 2000). At least three provinces now have linked administrative health databases that provide person-specific records of individuals' complete health services usage. This allows researchers to conduct surveys on a health determinant of interest and anonymously link respondents' survey data with their health records (with permission granted in the survey). It has long been asserted that supportive housing is beneficial to the health and health care utilization of people with mental illnesses, but few studies have reached the level of rigour possible with linked administrative outcome data.

Given that some of the ways in which housing would be expected to shape health have long latency periods, it is sensible and useful to measure the impact of housing upon intermediate outcomes—known determinants of health. Improved housing, for example, may enhance social support and self-efficacy, and may reduce the experience of stress, and lack of control. Increased housing satisfaction and quality of life are likely to have effects on health even if those effects cannot be easily measured. Housing improvement may also have effects on intermediate outcomes such as income and employment outcomes, educational achievement and child development outcomes, including social, emotional and cognitive development, educational outcomes and over-all health.

9.0 Selection of Research Priorities

Criteria for selection of research priorities are available from a number of organizations around the world that have conducted consultations on such matters. In 1996, the Alberta Science and Research Authority (ASRA 1996¹¹) conducted a public consultation to set priorities for scientific research in Alberta. Table 9.1 shows the initial evaluation criteria that were proposed for the stakeholder consultation. It is evident from this table that only a few of the criteria used to assess priorities for scientific research in general are appropriate to the task of evaluating priorities for housing and population health research.

Table 9.1 ASRA's Criteria for Evaluation of Research Priorities

Indicators	Number of "Hits"
Export potential	111
Projected market growth	87
Size of market	83
Contribution to productivity	81
Social enhancement	59
Health and safety improvement	52
Import replacement potential	16
Avoided damage	15

Evaluating research priorities is an inherently subjective undertaking. The process can be made more objective by employing agreed upon, or widely held values as evaluation criteria, but the process by which evaluation criteria are selected and proposed is itself a subjective act. That said, there are some fundamental underpinnings to the population health perspective that can be translated into evaluation criteria for an exercise such as this. Some of these are expressed by the generic criteria suggested by the Canadian Institutes of Health Research (CIHR) for evaluating strategic initiatives within and between CIHR Institutes (see Table 9.2). While only partially

applicable, it does offer some guidance for some first steps towards criteria for priority-setting. It is reasonable to suggest, based on this guidance and the principles of the population health perspective, that housing and population health research be prioritized according to the following criteria:

- 1) potential to improve the health of Canadians—related both to attributable "burden of suffering" and the likelihood of its substantial future reduction as a result of the research;
- 2) potential to reduce current inequalities and inequities in health status—socio-economic, regional, disability, ethnic, gender, etc.;
- 3) potential to produce new knowledge about how health and health inequalities are produced and reproduced;
- 4) capacity for better evidence to strengthen the justification of existing policies and programs;
- 5) anticipated cost-benefit of research: strength of expected evidence and anticipated user uptake balanced against cost of research;
- 6) capacity for research to uncover policy-relevant dimensions of housing with potential to influence health or its known determinants;
- 7) potential to provide new knowledge about how health and health inequalities are produced and reproduced;
- 8) potential to illuminate broader processes and principles (generalizability);
- 9) anticipated long-term value of research.

Table 9.2 Generic Criteria for Selection of Strategic Initiatives by CIHR Institutes*

Nine Prioritization Criteria in Three Clusters (Unranked)

Science

1. Potential to illuminate broader processes/principles (generalizability)
2. Potential for significant scientific advance

Pertinence/Strategic Importance

- 3 a) Potential to improve the health of Canadians—related both to attributable "burden of suffering" and the likelihood of its substantial future reduction as a result of the research
- b) Potential to reduce current inequalities in health status—regional/ethnic/gender-related, etc.
4. Potential to improve the effectiveness, efficiency and equity of the Canadian health care system
5. National competitive advantage/niche
6. Contribution to capacity building in Canada
7. Tackles emergent or increasing public health or health care system problem

Organizational Arrangements

8. Bridges across institutes and themes
9. Unlikely to be funded through CIHR investigator-initiated competitions, given current Canadian research capacity.

* from http://www.cihr.ca/institutes/ipph/funding_opportunities/rfa_needs_e.shtml#app2

10.0 Conclusions and Recommendations

This report has presented a framework for analyzing the relationship between housing and health from a population health perspective. The population health perspective is an influential research and policy framework that is motivated by the question "What makes some people healthy and others not?" (Evans, *et al.* 1994). It suggests that the strongest determinants of health are socio-economic factors in everyday life. Housing, as the central focus of everyday life patterns, is likely to be a crucial component in the ways in which socio-economic factors shape health.

The approach taken in developing the framework for a population health approach to housing and health attempts to unpack important social and economic dimensions of housing that bear some similarity (conceptually) to already known socio-economic determinants of health. The framework developed herein suggests that there are material, meaningful and spatial dimensions of housing which have the potential to shape health, across the life course.

Relevant material dimensions include the physical integrity of the home (for example, need for repair) and residents' exposure to physical, biological and chemical hazards in the home. But for most households, material factors such as housing costs are important because they represent one of the largest monthly expenditures they face. When housing costs are high relative to income, therefore, households will incur opportunity costs that may affect health. Expenditures on housing, in other words, represent money that cannot be spent on other things that shape health (for example, recreation, education, nutrition and health services not covered by insurance). In addition to this, housing markets are also very important factors in the redistribution of wealth in our society, albeit in a regressive way (from

the poor to the rich). This stems at least partly from the favourable tax treatment of owners compared to renters (for example, tax deductions and capital gains exemptions) and the financial benefits of home ownership (forced storage of wealth).

Meaningful dimensions of housing are also underscored in the population health framework for housing and health. Housing, for example, serves an important role as a place of refuge in our society, and similarly, a person's home is one of the few places in everyday life where they are socially and legally sanctioned to exercise complete control. An individual's home is also an important source of prestige, status, pride and identity, one that is often enhanced by home ownership. Home ownership, it follows, may have important emotional, psychological and health advantages. Finally, because of the permanence of the structure and the fact that it is spatially fixed, one's home is important as a place of continuity, stability and permanence in everyday life. In short, many of our culture's principal themes concerning our hopes, aspirations and dreams pertain to houses and homes.

Spatial dimensions of housing are potentially important to health because the home acts as a focal point for everyday activity. This means that one's home and its immediate environment is likely to be the setting for exposure to a mix of positive and negative influences on health. One example of the importance of the spatial dimensions of housing can be seen by considering the location of the home relative to services and amenities such as schools, public recreation facilities, health services and job opportunities. Another important aspect of the spatial dimensions of home is the social environment it places one in, particularly with respect to social norms.

The population health perspective emphasizes the impact of socio-economic factors on health from a life-course perspective. This report has demonstrated that the effect of housing on child development and health is a particularly fruitful area of research. There are direct effects of exposure to physical, chemical and biological hazards that must be considered, but children in lower socio-economic status households are often more likely to be exposed to such hazards, creating a "multiple jeopardy" effect. Other direct effects on child development concern the location, design and amenities of housing. An example of indirect effects of housing on child development is through the impact of parental stress. Housing, according to such an hypothesis, can be a significant source of parental stress in low-income households, and parental stress is strongly linked to patterns of parent-child attachment. Parent-child attachment, in turn, is a very strong predictor of future emotional, social, economic and physical well-being for children.

There are many sub-populations within Canadian society who either experience unique housing difficulties that may have health consequences, or for whom housing and socio-economic disadvantages are magnified by their disempowerment on some other social axis. This report, therefore, also briefly considered the relationship between housing and health in relevant sub-populations in Canadian society. In short, this demands that the proposed housing and population health framework be employed in a manner that is also sensitive to the question: "Are some groups in society more vulnerable to health effects of socio-economic dimensions of housing and domestic life?" Some of the population groups who may experience unique housing and health issues include: Aboriginal people, people with mental illness and addictions, seniors, people with chronic illnesses and disabilities,

women and the homeless. For several of these population sub-groups, poverty is common and a particularly important barrier to achieving stable, suitable housing. The framework is applicable to these groups, although it may be different specific factors within each dimension of housing that make a difference to health.

One of the challenges to doing housing and health research is methodological. Unlike the health effects of physical, chemical and biological hazards in the home, the health effects of socio-economic dimensions of housing are less immediate and less acute. They operate over a longer time span and are less likely to manifest in measurable disease over the time period of a typical research project. Nevertheless, there are methods and health measures capable of detecting important differences in the health status of people with different housing circumstances. This is especially the case with measures of children's early development. There are many adult self-reported health measures available, especially for adult mental health, that are extremely good indicators of actual differences in health and illness. Even the frequently-used question: "Compared to other people your age, how would you rate your health?" is an excellent predictor of "harder" measures of health (symptom reporting, future mortality, etc.).

Examples of appropriate health outcomes for housing and health research therefore include: self-reported health status, mental health screening instruments, and measures of children's emotional, social and cognitive development, like parent-child attachment. Many of these health measures are strongly correlated with "harder" measures of health, like symptom reporting, diagnosable illness and even death. Health and child development variables like these are commonly collected in national surveys such as the National

Longitudinal Survey of Children and Youth (NLSCY) and the National Population Health Survey (NPHS), but the housing data that are collected in these surveys is insufficient for investigating anything more than the simplest hypotheses about housing and health. It follows that a greater number of housing variables need to be included in nationally-representative health surveys, especially housing variables that conform to the framework of material, meaningful and spatial dimensions of housing. In addition to this, surveys of household social, economic and housing issues (for example, Survey of Consumer Finance, General Social Survey) need to include at least a modest number of health measures, for example self-reported health or a mental health screening measure.

It would also be fruitful to include "intermediate variables" in studies of the relationship between housing and health. Because of the importance of housing to so many other areas of life it is likely that differences in housing circumstances are tightly linked to differences in proven determinants of health, like social support and control over everyday circumstances (similar to the importance of control, or decision latitude in the workplace). It follows that studies which show an association between housing circumstances and intermediate measures of known health determinants can be helpful in assessing and understanding the relationship between housing and health.

Another important research need concerns longitudinal data. Studies that show a change in health following a change in housing circumstances can provide particularly powerful evidence of a relationship between housing and health. One approach to correcting this lack of longitudinal data would be to collect data on more attributes of housing in national longitudinal surveys like the National Longitudinal Survey of Children and Youth (NLSCY), the National Population Health Survey (NPHS) or the Canadian Community

Health Survey (CCHS), each of which follows individuals through time and measures their health status at each point in time.

Another approach to developing longitudinal data for the study of housing and health would be to use so-called quasi-experimental methods, or "natural experiments." Some of the most powerful studies in health sciences like epidemiology come from investigating the health consequences of changes in individuals' circumstances that occur "naturally." Each time a new assisted housing development is opened, for example, it becomes a potential natural experiment, because a number of households will change from their current housing to a new housing circumstance, and it becomes possible to assess their health status before their move and after it. This too could provide compelling evidence of the health effects of housing. There are hundreds of such natural experiments that occur across the country each year and if more pre- and post-occupancy research could be done on relevant dimensions of housing and health with some of these households, it would be possible to improve our understanding of links between housing and health very rapidly.

In studies that are based on either questionnaires or natural experiments, it is possible to use health care utilization data from administrative databases as a proxy for health status. In many provinces (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario) there are now powerful health utilization databases which researchers can use to detect distinct patterns of utilization in (anonymous) individuals. These patterns can then be used to infer the incidence of illness or adverse health conditions. It is possible, with the appropriate ethical approvals in place (these demand that linkages only occur with the permission of the individuals involved and that protect people's privacy and anonymity). This would provide particularly reliable and convincing evidence for housing and health studies.

Administrative health care utilization data could also be used for research that investigated the effectiveness (and cost-effectiveness) of housing interventions for vulnerable sub-groups, especially people with chronic conditions, disabilities and mental illnesses and addictions. In other words, it would be possible to investigate whether there were health care savings realized by providing stable, supported housing to people with mental illnesses (especially if done in the context of a natural experiment). This kind of policy analysis would provide strong evidence of the impact of housing on health and strong justification for a greater investment in housing programs for individuals with chronic conditions and disabilities.

This report underscores the need and opportunity to expand research on housing and health in Canada. It is recommended that a national dialogue be conducted to develop priorities for research in this area and that funding be sought to conduct initial studies using the best possible methods and evidence. All such evidence should be policy-relevant: this may entail the evaluation of existing programs, but may also involve research to inform the development of new policies and programs that use housing as a vehicle to improve the health of Canadians.

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Endnotes

¹ An interview with Robert Sapolsky was featured in a recent issue of the Atlantic Monthly Review. <http://www.theatlantic.com/cgi-bin/o/unbound/interviews/int2001-04-25.htm>

² constructed from self-report data from 4, 775 survey respondents on four types of social contacts / activities (marriage, contacts with family and friends, church membership, and formal and informal group affiliation).

³ Core housing need is defined as follows: the household cannot find suitable (uncrowded) and adequate (in good repair) housing in their community without paying more than 30 per cent of their income (affordable) (CMHC 1993).

⁴ In economists' terms, land markets have several characteristic "imperfections".

⁵ Interest in this aspect of cities is traceable back to the Chicago School of sociologists, for example Park, *et al.* (1925), who explained the social geography of the city with their theory of "human ecology," (a "cultural" approach). This included the concentric zone model of the city. Engels (1844), however, also noted concentric zoning in cities and sought to interpret it in economic class terms, receiving the approval of Harvey (1973). The approach taken here attempts to marry material practices (favoured by Harvey and Engels) and meaningful or cultural practices (favoured by the Chicago School).

⁶ The National Academy of Sciences (2000) points out that although there is somewhat less than complete certainty about the effectiveness of actions like mold and moisture reduction, relatively little intervention research has been conducted.

⁷ To invite someone into your home as a guest is an act that is replete with social and interpersonal significance. The sanctity of the home sanctioned by society makes the guest-host relationship all the more meaningful and significant.

⁸ Child development has been widely recognized as an early indicator of future trajectories of lifelong, health, well-being and competence (Keating and Hertzman 1999).

⁹ See also: www.wws.princeton.edu/~kling/mto/boston.htm

¹⁰ Examples of quasi-natural experiments include a recently condemned social housing complex in Toronto, which will require the relocation of several hundred households.

¹¹ See the following Web site: <http://www.gov.ab.ca/sra/publicdocs/priority/prior/titlepg.html>

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