UNDEREMPLOYMENT AND HEALTH-RELATED QUALITY OF LIFE
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Milosh M. Raykov
Department of Sociology and Equity Studies in Education
University of Toronto

Abstract

Considering the increasing levels of unemployment and underemployment, and the limited evidence concerning the impact of underemployment on health, my study examines the relations between subjective, objective, and time-related underemployment and employees’ health-related quality of life, as manifested through self-rated health, activity limitations and work-related stress.

The study compares an expanded model of work-health relations that, along with the factors addressed by control-demand, and social capital theories, includes characteristics of the physical work environment, and employees’ economic class. In addition to the commonly examined factors related to employment and health (control-demand and social capital), my study explores the impact of the work environment (hazards, discomfort and physical demands) and economic class to determine the specific effects of underemployment on an employee’s health-related quality of life. My main argument is that underemployment, in conjunction with lower economic class, higher exposure to a harmful work environment, lack of control over work, and lower social capital, contributes to increased work-related stress and diminishes health-related quality of life.
The study applies a mixed methodological approach based on data from the Canadian Work and Lifelong Learning Survey and the US General Social Survey, and qualitative analysis of interviews from the Ontario Survey on Education-Job Requirements Matching. Evidence based on cross-sectional and qualitative data analysis provides consistent findings and confirms the main assumption that high levels of underemployment have a significant effect on employees’ health-related quality of life. The study shows that employees’ economic class, characteristics of work environment and control over work carry the highest associations with health-related quality of life, while underemployment has a significant additive association with health-related quality of life, most importantly with work-related stress.
Acknowledgement

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I feel fortunate to have been in the Centre for the Study of Education and Work (CSEW) in the Ontario Institute for Studies in Education of the University of Toronto that provided vibrant environments for research on work, learning and health related issues. I am also indebted to my colleagues and all Doctoral Thesis Workshop members who provided helpful comments, valuable suggestions and support during initial presentations of the thesis-related results.

Immeasurable appreciation I owe to my parents from whom I inherited the understanding of and attitudes toward work, society and environment.

Utmost appreciation I owe to my family, wife Vesna, sons Luka and Matija for their love, understanding and support.

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<th>Definition</th>
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<tr>
<td>AO</td>
<td>Adjusted Odds</td>
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<td>CI</td>
<td>Confidence interval</td>
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<td>CVD</td>
<td>Cardiovascular disease</td>
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<td>HRQoL</td>
<td>Health-related quality of life</td>
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<td>MI</td>
<td>Myocardial infarction</td>
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<td>OR</td>
<td>Odds ratio</td>
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<td>Sig.</td>
<td>Statistical significance (2-tailed)</td>
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<td>(P)=</td>
<td>Statistical significance (2-tailed)</td>
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<td>CDS</td>
<td>Control-demand-support</td>
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<td>ERI</td>
<td>Effort-reward imbalance</td>
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<td>SCT</td>
<td>Social capital theory</td>
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Chapter 1
Introduction and Main Argument

During the last 30 years, medical sociology and social epidemiology have provided a large body of evidence documenting the impact of socioeconomic conditions on health.\(^1\) Numerous studies on diverse indicators of health have reported that socioeconomic status has a significant impact on self-perceived health,\(^2\) morbidity,\(^3\) mortality,\(^4\) and life expectancy.\(^5\) The strong negative impact that unemployment has on health has also been examined and documented over the last 70 years.\(^6\)

Despite remarkable achievements in studying the social determinants of health, there is a consensus among researchers that the impact of underemployment has been insufficiently examined (Feldman, Leana & Bolino, 2002; Friedland & Price, 2003; Dooley & Prause, 2004). An illustration of this is that, while MEDLINE (frequently used bibliographic medical studies databases) contains 1,870 studies that include the terms unemployment and health, only 21 include them as their main research topics. A search of the Sociological Abstracts provided 932 unemployment studies and 35 on underemployment and health. The greatest number of studies on underemployment and

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health (53) is found in PsycINFO, but again this is much smaller than the number of studies on unemployment and health (1,420). There is evidence that the majority of the research on underemployment and health is conducted in the field of psychology (Borgen, Amundson, & Harder, 1988; de Almeida-Filho, 1981; de Brito, 2000; Friedland & Price, 2003; Dooley, 2003; Sanderson & Gavin, 2006; Cassidy & Wright, 2008.) However, some of this research clearly has a narrow perspective, arguing that individual responsibility determines underemployment status (see e.g. Wohl, Pritchard, & Kelly, 2002).

A growing number of studies show that unemployment and underemployment are widespread global phenomena (Livingstone, 1998; Green & McIntosh, 2002; Sloane, 2003; Livingstone & Sawchuk, 2004; Livingstone, 2004; Livingstone & Scholtz, 2006). According to the 1998 ILO report, 25–30% (750–900 million) of the world’s labour force has experienced some kind of underemployment, while 150 million workers are unemployed (ILO, 1998). A later report indicates that the situation is getting worse: 850 million people are either underemployed, working fewer hours than they want, or earning less than they need for a decent living (ILO, 2000). More recent estimates on unemployment and underemployment show that almost 186 million individuals are unemployed, which is the highest level of unemployment ever recorded (ILO, 2004, p. 1). According to the same report (ILO, 2004, p. 3), “underemployment remains a critical issue of concern in a number of countries” and youth and women are the most affected by it. This situation highlights the need to create more and better jobs, as recognized by various studies and policy documents (Berger & Harasty, 2002; OECD, 2003).

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7 Search of the MEDLINE database (Scholars Portal) updated on October 19, 2008.
Issues related to mass underemployment and its consequences have recently attracted greater attention, as manifested through increased publishing on underemployment and health (Thematic issue of *American Journal of Community Psychology* on underemployment and health, 2003), and through labour unions’ activities related to employment conditions and underemployment and health (ILO, 2002; Hoel, Sparks & Cooper, 2002; CUPE, 2003). As well, there is a greater interest in underemployment-related issues among human capital theorists and mainstream sociologists, as shown through an increased number of publications and conferences on “overeducation” (Sloane, 2002).

The majority of research on underemployment and health only partially addresses the complex and multidimensional determinants of health, and considers only a small number of factors that are associated with or determine relations between health and underemployment. These studies are often based on survey data collected for other purposes and rarely simultaneously contain data on underemployment (specific employment-related information and educational attainment) and health. Numerous surveys contain large sets of indicators concerning health,°education and training° or employment and work conditions,° but rarely examine specific variables related to education, work and health. There is also an obvious lack of empirical data on the work environment and underemployment in exploration of underemployment-health relationships.

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° Canadian Community Health Survey (CCHS), National Population Health Survey (NPHS), and Joint Canada -United States Survey of Health (JCUSH).
° International Adult Literacy and Skills Survey (IALSS), Registered Apprenticeship Information System (RAIS), Adult Education and Training Survey (AETS), Survey of Literacy Skills Used in Daily Activities.
° Labour Force Survey (LFS), Workplace and Employee Survey (WES), and Participation and Activity Limitation Survey (PALS).
Studies on underemployment and health are usually based on surveys examining school-to-work transition (Youth in Transition Survey) and on some waves of general social surveys (General Social Survey) that include a limited number of indicators on underemployment and health. In addition, large-scale surveys on employment trends\(^{11}\) do not contain complete information (variables) on health and do not provide enough data to make reliable estimates of underemployment.

1.1. Overview of Contemporary Approaches to Work-related Health

The most influential contemporary approaches to employment-related stress and health relationships—the demands-control-support model,\(^{12}\) the effort-rewards imbalance model,\(^{13}\) and the rapidly growing social capital theory\(^{14}\)—consider a limited number of specific psychosocial factors. These theories are oriented towards currently employed workers and their experiences with job demands and control over work (DCS), or with employees’ perceptions of the balance between efforts and rewards at work (ERI); they provide a useful initial framework for exploring different forms of underemployment, as well as underemployment-health relationships. A large number of empirical studies are based on these models. While the majority of studies on underemployment and health investigate specific diseases or specific health-related behaviour (depression, alcohol use, interpersonal relations), my study explores a more inclusive idea of health that is operationalized as health-related quality of Life (HRQoL). This concept is particularly

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\(^{11}\) Labour Force Survey (LFS), Survey of Labour and Income Dynamics (SLID) or Workplace and Employee Survey (WES).

\(^{12}\) Karasek, 1979; Karasek & Theorell, 1990.


significant because it investigates aspects of health and daily functions that are caused by or affect work. The concept, which includes self-perceived health and activity limitations, has been validated through several cross-sectional and public health studies (CDC, 2000).

According to the demand-control model, high demands and low control over work create job strain, which causes work-related stress and contributes to the development of diseases. The same theory indicates that positive social support mitigates job strain, while lack of social support additionally contributes to the deterioration of employees’ health.15

Another major theory of work-related stress and health, the effort-rewards imbalance (ERI) model, argues that the major factor contributing to the deterioration of health is the imbalance between efforts (responsibilities) at work and the rewards received (financial, self-esteem, security, and promotion). The lack of reciprocity often causes overcommitment from employees, which puts their health at additional risk.16

Social capital is a new but rapidly growing theory in social epidemiology and the sociology of health. Regardless of the inconsistent definitions of major concepts, there is a consensus among scholars who promote this approach that social involvement, social networks, social attitudes and social trust have a beneficial impact on the health of individuals in a community. According to proponents of this theory, a person’s social capital determines his or her social position and access to goods and services relevant to his or her health and well-being. This theory states that social conditions determine individual health, and documents this through numerous studies on social inequalities in neighbourhoods (Berkman & Kawachi, 2000).

15 Karasek, 1979; Karasek & Thoerell, 1990; also, see section of this study for review of studies based on the DC/S model.
16 Siegrist et al., 1992; Siegrist, 1996; also, see section of this study for review of studies based on the ERI model.
In summary, this review of the major contemporary theories on work and health shows that they consider only a limited number of work characteristics that are related to workers’ health. They mainly explore psychosocial relations at work, demand-control, effort-rewards, and broad dimensions of social capital.

These approaches to work-related stress and health provide some evidence of the significant association of cardiovascular diseases (CVD) with job strain and lack of support at work. Similarly, numerous large-scale international studies suggest a statistically significant association between effort-reward imbalance at work and CVD. A substantial number of international longitudinal studies also show that both the control-demand and effort-rewards imbalance models prove the correlation between stress at work and depression. In addition, a rapidly growing number of studies based on the social capital theory also demonstrate the considerable association of social cohesion, social networking and social trust with self-perceived health, mortality and morbidity. This theory finds that the aggregated social and economic characteristics of communities (local, national, and international) and the level of archived equality in a community have a significant impact on its residents’ health.

The effort-reward imbalance model measures employees’ self-perceived efforts and rewards to determine the level of imbalance and overcommitment and their relationship to different diseases. In order to determine the level of demands,

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21 Kawachi, 2005; Kawachi & Berkman, 2000; Kawachi, Kennedy, & Glass, 1999; Putnam, 2000; Subramanian, Daniels, & Kawachi, 2002.
discretionary control and social support experienced at work, the control-demand theory uses indicators based on employees’ self-reported data on their psychosocial relations.

There are also evident differences between the DCS and ERI models in the range of outcomes they discuss. The DCS considers both the negative impact of work on health and its more positive outcomes (active behaviour and active learning), while the ERI considers only the negative health outcomes of effort-reward imbalance (Karasek, Siegrist, & Theorell, 1998). In spite of their manifest differences, empirical studies based on large-scale surveys (see Siegrist and Dragano, 2008; Karasek, 2008), as well as some studies based on qualitative data (Polany & Tompa, 2004) demonstrate a high level of overlapping between these two models.

The majority of studies based on the DCS model show the significant relationship of job strain with CVD and depression, while a smaller number of more recent studies provide evidence of a more robust association among ERI constructs, CVD and depression. There is a trend toward integration of the leading work-health models, as demonstrated by numerous empirical studies (e.g. Peter et al., 2002; Ostry et al., 2003) and systematic literature reviews (Tsutsumi & Kawakami, 2004). Proponents of the DCS and ERI theories also suggest this (Siegrist & Dragano, 2008; Karasek, Karasek, Siegrist & Theorell, 1998). A Swedish study on associations among job strain, effort-reward imbalance and coronary risk factors (Peter et al., 2002) found that combining ERI and DCS scores could improve the prediction of coronary risk. A Canadian study of sawmill workers (Bosma et al., 1998; Ostry et al., 2003) concluded that a combined ERI and DCS model was a better predictor of self-reported health status and chronic conditions than was either model separately. Based on the results, Ostry suggested the need to combine
constructs from both models to improve predictions and more accurately explain work-health relations.

A review of major studies based on the ERI and the DCS models done by Tsutsumi and Kawakami (2004) found that both show the significant independent association of work-related stress with adverse health effects. They concluded that these models complement each other, since they measure different types of psychosocial conditions at work. Similarly, when considering a summary of the results from empirical studies of occupational stress based on ERI and DCS models, Siegrist and Dragano (2008) demonstrated the validity of both. Comparisons of the DCS and ERI models revealed that the ERI model had a slightly higher power to predict CVD and depression.

In general, there is a 50% to 250% probability that persons who experience job strain, effort-rewards imbalance or lack of social capital are at greater risk of suffering stress-related diseases, CVD, depression, MSD and lower self-rated health. However, other studies exploring social determinants of health strongly suggest that, in addition to demands-control, effort-rewards, and social capital (DCS, ERI and SCT), educational attainment, occupational class and exposure to harmful environmental conditions at work significantly affect employees’ health.

The literature contains an overwhelming amount of research that demonstrates the link between educational attainment and better health (Muennig, 2007; Schnitker, 2004). According to the majority of studies in this field, higher educational attainment is significantly associated with better self-perceived health, lower morbidity and greater life expectancy.22 There is also a strong interaction between education and income on

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22 Leigh & Fries, 1994; Manton, et al., 1997; Szwarcwald & Souza-Junior et al., 2005.
Research on the relations between educational attainment and health provides results that contradict the findings on underemployment and health. Evidence that underemployment (which usually indicates a higher level of education and/or knowledge) has a negative impact on health go against the well-documented conclusion that higher levels of educational attainment promote better health outcomes. These seemingly contradictory findings require further investigation; my study aims to explore work-related conditions that might explain this discrepancy.

1.2 Methodological Issues in the Exploration of Work-related Health

Despite findings that link job strain, effort-reward imbalance and social capital with different indicators of health, a large number of studies recognize the deficiency of models that are based on self-reported data about workplace-related issues. These studies provide valuable insights towards further research in this domain. The majority of criticism is directed at the DCS, developed much earlier than the ERI, but since both models are based on self-reported data, such criticism is also applicable to the ERI.

A review of research on job strain and health (Kristensen, 1995) found that out of 16 epidemiological studies, 14 provided evidence supporting the DCS model, while only 2 provided negative evidence. Regardless of the wide support that the DCS model receives from empirical studies, Kristensen found several methodological issues related to this model and its use of self-reported indicators of stress and psychosocial relations at work. To overcome these flaws, he recommended an evaluation of the DCS model.

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through prospective studies that would test it in some selective, non-representative or highly distinctive employment groups. As well, Kristensen proposed using multi-method strategies for measuring stress and stress outcomes (self-reports, imputation or expert assessment and qualitative methods) in the same studies in order to improve the quality of research findings.

In a critical article on the measurement of job stressors and the impact of the work environment on stress, Kasl (1998) underlines the differences between the environmental and psychological research traditions in exploring the relationships between stress and health. Kasl proposes a broader taxonomy of the dimensions of the work environment and multiple alternative medical and psychological approaches to the measurement of job strain and to subjective and objective measures of work characteristics.

A more recent critical evaluation of the DCS model also finds some issues related to its validity (de Jonge & Kompier, 2004). Most notably, it finds a lack of intervention studies based on the DCS model. Nonetheless, the general opinion of this model from a psychological perspective is that, regardless of its problems, its core structure provides a solid base for the further exploration of issues surrounding work-related stress and health.

The control-demand and effort-reward imbalance models are constantly undergoing modifications and improvements in terms of measurement and conceptualization. Using the criticisms and findings obtained through ongoing evaluation, the authors of the DCS (Karasek, 2005, 2008) and ERI (Siegrist, 2004, 2005, 2008) have introduced a number of changes, and have made a combination of their models to minimize measurement issues, improve the prediction of diseases, and develop their conceptual frameworks.
In order to overcome the methodological difficulties and the scarcity of data on underemployment and health, I have undertaken a multi-method study consisting of three sources of information: self-reported data on underemployment and work conditions, experts’ assessments of work environments (location, hazards, discomforts), and qualitative data on health and underemployment obtained through interviews with employees from different occupational groups.

1.3 The Main Argument and Research Questions

The major argument of my study is that underemployment, in conjunction with lower economic class, higher exposure to a harmful work environment, lack of control over work, and a lower social capital, contributes to increased work-related stress and diminishes an employee’s health-related quality of life. The proposed model offers an explanatory framework for underemployment-health relations through increased stress and exposure to unfavourable environmental and economic conditions.

More specifically, I argue that underemployment and health-related quality of life are directly associated because of the increased stress caused by the overall working conditions that underemployed workers experience. In addition, I argue that underemployment and HRQoL are associated through the unfavourable work environment and economic hardship inherent to underemployment.

It is to be expected that different forms of underemployment contribute to increased work-related stress due to overall working conditions, including the constant re-adjustment to lower level tasks than a person is able or expects to do, and the adverse working and living conditions that result from being underemployed.
Further I assume that underemployment contributes to health deterioration through a higher exposure to a more hazardous and uncomfortable work environment than is experienced by those who are not underemployed, yet who possess the same skill levels, knowledge, and educational attainment. Also, underemployment affects employees’ occupational class and thus determines access to health-related goods and services.

In light of its major argument and its assumptions about the relationships between underemployment and health-related quality of life, my study addresses the following research questions:

1) Are there differences in health-related quality of life (self-rated health and activity limitations) between the underemployed and other groups of employees in the active labour force?

2) To what extent are socio-demographic characteristics associated with underemployment and health, and how do these associations affect underemployment-health relationships?

3) To what degree are structural, environmental, and psychosocial health determinants associated with underemployment and health, and how do these associations affect underemployment-health relationships?

To help answer these questions, I conducted a comprehensive review of the literature on underemployment and health to identify the main empirical evidence and conceptual approaches to this subject.

Because of the scarcity of research on underemployment-health relations, the literature review includes a wide array of studies, even if some only marginally examine
the impact of underemployment on employees’ health and well-being. The review is organized according to the different forms of underemployment and to the topics most frequently explored in the research on underemployment-health relationships.

The first part of the literature review summarizes findings concerning the forms of underemployment most frequently examined in relation to health. This section mainly includes studies on subjective and time-related underemployment. The second part focuses on the dominant topics in contemporary literature on underemployment and health and includes underemployment in relation to school-to-work transition and underemployment-health relationships among professionals. The studies are often based on large-scale longitudinal surveys and the selection of the available rather than representative indicators on underemployment-health relationships. In addition, this section presents research findings on immigrant status and race/ethnicity and their relation to underemployment, as well as the effect of precarious employment on health.

The third part of the review summarizes the impact of underemployment on work-related stress, social relations and mental health.

The initial literature review revealed other topics that must be examined for an adequate explanation of underemployment and health. Since the major forms of underemployment or overqualification are defined in respect to educational attainment, a section of the review considers employees’ education and its impact on their health. In addition, the review contains findings on different employment statuses (including unemployment), as well as the impact that environmental working conditions have on the health of employees.
The next section provides an overview of the major contemporary approaches to work and health, as well as a critical analysis of these approaches. It includes reviews of the control-demand-support model, the social capital theory, and the effort-reward imbalance models of work-related stress and illness.

Based on the entire literature review, a summary of the research findings on underemployment and health is provided. The literature review is concluded by a critical analysis, and a presentation of research gaps and inconsistent findings that require greater attention.

The intent of my study was to provide an overview of the research on underemployment and health, to propose a framework for future study in this field, and to perform an empirical assessment of underemployment-health relations and their conceptual frameworks. Based on a critical assessment of the empirical findings and theoretical approaches to underemployment and health, as well as a consideration of additional and often unobserved concepts (employment class and work environment), I propose the conceptual model that forms the basis for my empirical assessment of underemployment-health relations. This approach includes an expanded concept of underemployment and an inclusive concept of health, operationalized as health-related quality of life (HRQoL). The design of my study and my selection of variables for analysis takes into account potential confounding effects and explores the usually unobserved confounding factors of work characteristics and the work environment that are collinear with both dependent and independent variables. A complete description of the proposed model is presented in Section 3.5 (pp. 119–125). A simplified model that contains the main groups of variables included in my study is presented in Figure 1.1.
In order to provide evidence appropriate for the assessment of its main argument, my study uses a variety of relevant sources on underemployment and health, and applies an integrative, mixed methodological approach. By using a methodological approach that combines quantitative data from two large-scale surveys (i.e. “objective”, observer-based information on the work environment and required physical demand), with subjective, qualitative data from interviews with employees from different occupational groups, my study avoids the major limitations of research that uses only subjective data.

The main data sources employed in my study are the 2004 Canadian Work and Lifelong Learning (WALL) Survey, the 2002 US General Social Survey, and qualitative interviews from the Education-Job Requirements Matching (EJRM) case studies. The study pays special attention to the analysis of confounding factors and the specific impact that different forms of underemployment have on health-related quality of life.
The objectives and motivations for my study on underemployment and health-related quality of life are set out in Chapter 1, which also contains a summary of the main argument. The literature review is presented in Chapter 2. A detailed explanation of my conceptualization of underemployment and health is presented in Chapter 3, followed by a description of my methodological approach in Chapter 4.

Chapter 5 details the empirical assessment, descriptive and bivariate data analysis, of health-related quality of life among the underemployed and other groups in the active labour force. It includes an analysis of the impact that demographic characteristics have on underemployment-health relationships, and describes the objective and subjective forms of underemployment and their association with HRQoL and job insecurity. The next part of my study (Chapter 6) deals with the most severe form of underemployment, unemployment, and compares unemployed, underemployed, adequately matched and underqualified workers in regard to health-related quality of life and working conditions.

Because of the limitations encountered in the majority of studies on underemployment and health, and because there is a scarcity of data on these research topics, Chapter 7 includes analysis of the US GSS survey. This survey contains well-conceptualized indicators of subjective underemployment, an abundance of information on quality of work, and an inclusive set of data on health-related quality of life.

To examine the extent of the impact that structural, environmental, and psychosocial determinants of health have on underemployment, and how these associations affect underemployment-health relationships, Chapter 8 includes a class analysis. This explores factors specific to employees of different economic classes that determine underemployment-health relationships.
In addition to investigating factors that affect underemployment-health relationships, my study, in Chapter 9, deals with the effect of exposure to a harsh work environment on health, and the associations between different forms of underemployment and environmental risks and discomforts.

Chapter 10 provides an integration of quantitative and qualitative findings on underemployment and health that includes a variety of data (“objective” and subjective data on the work environment and the personal experiences of people who are underemployed).

A discussion of my findings and conclusions on underemployment and HRQoL are presented in Chapter 11, which also discusses the limitations, significance, and policy implications of my study, and suggests directions for future research.
Chapter 2

Literature Review

The intent of my study is to provide an inclusive overview of the research on underemployment and health and to propose a framework for future research in this field. Keeping in mind the lack of research on underemployment and health, I review a wide array of studies, even if they only marginally examine the impact that some form of underemployment has on employees’ health and well-being. In addition, this review includes a number of studies on the socioeconomic determinants of health that are perceived as pertinent to the research on underemployment and health. A section of the literature review and the data analysis also includes related problems associated with unemployment and its impact on the health of the unemployed.

The studies on underemployment and health that I present in this review are classified in a number of more or less consistent groups. This allows a more complete evaluation of the research findings obtained in this field of research to date.

2.1. Subjective Underemployment and Health

In their research on job satisfaction, Khan and Morrow (1991) found a relatively strong association between subjective underemployment and low job satisfaction. In relation to self-perceived health, and according to this study, objective underemployment was not associated with negative long-term health outcomes. Similarly, a study performed among clerical government workers (Jones-Johnson & Johnson, 1992) also found significant relationships between subjective underemployment and psychosocial...
stress. Multiple regression analysis applied in this research showed that underemployed workers are more likely to feel more depressed, frustrated, and manifest higher levels of hostility than their adequately employed counterparts. Social relations at work are also related to psychosocial stress that is mostly due to relations with supervisors. In contrast to other studies, the performed analysis did not show a significant relationship between social support and underemployment.

Through a survey of 288 unionized American postal workers, Johnson and Johnson (1996) have found that subjective underemployment (perceived mismatch and “no grow”) were significantly associated with depression and stress. According to this study, highly overqualified or underemployed postal workers experience depression and/or stress more frequently.

In a recent comprehensive evaluation study based on performed confirmatory factor analysis, Johnson, Morrow & Johnson (2002) found two moderately associated dimensions of underemployment: job mismatch and no-growth. Johnson, Morrow & Johnson (2002) define perceived overqualification or underemployment as:

“… the extent to which an employed individual perceives that he or she (a) possesses surplus job qualifications or (b) has limited opportunities to acquire and use new job-related skills. Perceived overqualification is said to exist when individuals perceive that they possess education, experience, or skills that exceed normal job requirements.” (Johnson, Morrow & Johnson, 2002, p. 425).

In order to evaluate a perceived overqualification scale across different work settings, Johnson, Morrow & Johnson examined three groups of employees (nurses,
railroad workers, and service employees) and obtained relatively consistent patterns of subjective underemployment. They found significant correlations between both dimensions of underemployment, job mismatch and no-growth with somatization, job satisfaction, and organizational commitment. This study confirms findings from a number of other studies that identified associations between underemployment and depression because the somatization scale used in this research measured self-perceived depression (headaches, lack of energy, and anxiousness). The components of job satisfaction that were negatively associated with underemployment were work satisfaction, possibilities for promotion, pay, and supervision. This study, based on person-job fit theory, provided interesting results but considered underemployment and health mainly at the individual, micro level and did not take into account wider (meso- and macro-) social relations or their impact on the nature and quality of work and industrial relations.

2.2. Time-related Underemployment and Health

Part-time employment is more frequently a focus of research that examines the impact of employment status on workers’ health. Regardless of the differences in conceptualization and applied research methodology, arbitrary definitions of part-time work, and the lack of precise distinctions among the different forms or causes of part-time work, numerous studies demonstrated the negative impact that such employment has on an employee’s health and well-being.

Rodriguez’s (2002) research on marginal, temporary, and part-time employment based on the 1991-1993 Household Panel data found that permanent part-time employment has no significant impact on health. However, temporary part-time
employees in Germany report poor health much more frequently than permanent part-time employees (42%).

Mortimer, Harley & Staff (2002) demonstrated that unwanted part-time work arrangements have negative consequences on the mental state of the employee. This is true even for young people who, in general, have better health status than other age groups.

In their review of the global expansion of precarious employment, work disorganization, and the consequences for occupational health, Quinlan, Mayhew & Bohle (2001) showed that precarious employment is strongly associated with a deterioration in occupational health and safety. They reported that injuries, risk of disease, and exposures to hazards are much higher among people in precarious working conditions. A particularly strong negative impact on health is evident in outsourcing, organizational restructuring, and downsizing. According to their review, research on part-time and temporary work indicates substantive but less persuasive evidence of the negative impact on health.

Based on the Current Population Survey (Kalleberg, Reskin & Hudson, 2000), research on standard and nonstandard employment relations and job quality in the United States estimates showed that 31% of employees in the US work in some type of nonstandard employment. According to this study, nonstandard employment increases workers’ exposure to working conditions that have a negative impact on health.

In addition to other negative consequences that part-time work has on employees’ health, Pitts (1998) demonstrated an uneven distribution of part-time employment across different industries. Pitts’ research revealed that industries that offer employees lower
salaries and health care coverage also employ more part-time workers. This research indicates that part-time employees, besides being subject to less favourable working conditions, are also less likely to have health insurance provided by their employer.

In his research on mental health and employment status, Furnham (1983) has found elevated levels of illness? for unemployed individuals and part-time workers. Houseman (1995) analyzed part-time employment in Europe and Japan and found a specific demographic profile for part-time employees (female, younger or older, and receiving lower wages) and reported a need for adequate social protection measures.

A study of the employment quality of ten young psychologists (de Witte & Lagrou, 1990) showed that poor job quality, employment under the Bachelor’s degree level, and job insecurity were inversely associated with job and life satisfaction. This study also showed that part-time work had no impact on satisfaction. Soumerai and Avorn (1983) also showed that when part-time work was the preferred employment option, it had a positive impact on employees’ health and well-being.

The majority of research on involuntary part-time work shows that this form of underemployment has a negative impact on workers’ health. The fact that a large number of young people combine work and education before finishing their studies requires special attention, as this group in general has better health than the rest of the working population. To avoid biased results, special attention should also be paid to research design and sample selection in research conducted on the impact of part-time work on employees’ health.
2.3. Underemployment, Health and School-to-Work Transition

The majority of studies on underemployment and health have been conducted in the United States. The most comprehensive studies in this domain are two large-scale longitudinal surveys, the US National Longitudinal Survey of Youth (NLSY) and Americans’ Changing Lives Study (ACL). Findings from longitudinal studies on school-to-work transition and a new conceptualization of underemployment (Friedland & Price, 2003; Dooley, & Prause, 2004), require attention because this type of study can provide valuable results on causal relations between underemployment and health.

The emerging field of research on underemployment and health is greatly benefited by a group of studies based on the US National Longitudinal Survey of Youth, which provided data on underemployment-health relations for a younger segment of the population. The studies mainly provide data on underemployment, minor psychiatric problems, and some aspects of employees’ mental health.

A comparison of the 1980 and 1987 data from the National Longitudinal Survey of Youth (Dooley & Prause, 1995) shows that students from the 1980 cycle, who did not go to college, experienced much longer spans of unemployment. Unemployed and inadequately employed respondents from the 1987 NLSY demonstrated much lower self-esteem than their adequately-employed colleagues. In their 1997 study, Dooley and Prause (1997a) presented additional data indicating lower self-esteem due to employment status among 14 to 21 year-olds who left school.

The next study by this research team that examined relations between health, unemployment, and inadequate employment (Dooley, Fielding & Levi, 1996) indicated that inadequate employment status contributes to increased psychiatric problems,
depression, and substance abuse. The study also suggested that employment promotes both physical and mental health. One conclusion of this study was that more studies on the impact of underemployment on health are needed.

The US National Longitudinal Survey of Youth provided an opportunity to research the impact of adverse change in employment on alcohol consumption. In this study, as in the majority of their studies, Dooley and Prause used involuntary part-time employment and poverty-level wages as measures of underemployment. Dooley and Prause (1998) demonstrated that adverse employment changes—transitions from adequate employment to underemployment—were associated with increased alcohol consumption, elevated alcohol symptoms, and heavy drinking.

In a similar study, which included more than five thousand adequately employed respondents, Dooley, Prause, and Ham-Rowbottom (2000) found that employment changes from adequate to inadequate employment (low-income and involuntary part-time) had a significant impact on depression. Controls for a range of mediating variables showed that unemployment and underemployment have the same effect on depression as an indicator of mental health, with only marital status having a significant modifying effect. In this study, Dooley, Prause, and Ham-Rowbottom operationalized employment as a continuum that includes adequate employment, inadequate employment, and unemployment. This is an asymmetric definition of employment and does not contain an opposite category. According to Canadian studies on underemployment (Livingstone, 1998, Livingstone & Schultz, 2006, Livingstone et al., forthcoming) underqualified workers represent a distinctive category.

The concept of employment status as a continuum is explained in some very
recent studies (Dooley, 2003a & Grzywacz & Dooley, 2003b). A comprehensive study based on the California Work and Health Survey (CWHS) and the National Survey of Midlife Development (MIDUS), Dooley and Grzywacz (2003b) found a significant association between employment status, self-reported physical health, and depression in both analyzed surveys. Employees in better jobs reported less depression and better physical health. Dooley and Grzywacz applied a new definition for employment status based on Clogg’s (1979) labour utilization framework, but a lack of indicators prevented them from including all categories proposed by this framework. Dooley and Grzywacz’s (2003b p. 1753) conception of employment status as a continuum includes five categories:

- unemployment,
- inadequate employment (employment in poverty wage job based on household earnings for CWHS and personal earnings for MIDUS),
- barely adequate job (based on the same household and personal earnings below poverty line),
- economically good job (provides stability, is economically and to some extent a psychologically good job),
- psychologically good job (less economically good and more psychologically good by the Karasek classification; provides high decision latitude, low demands, and high social support) and
- optimal job (provides more than two economic and psychological resources).

In contrast to previous studies, Dooley’s research omits involuntary part-time...
employment. This classification is based on a compilation of different aspects of personal satisfaction with employment (economic, psychological) and uses an artificial dichotomization that is a combination of nominal characteristics rather than a continuum. The combinations of unemployment, earnings, job demands, decision latitude, and social support that contain six employment categories seem complex and inconsistent. The contraction of barely adequate job and artificially, partially economically and psychologically good categories of employment would an a single category of partially adequate jobs can minimize inconsistently apply classification criteria.

My study uses a continual definition of employment that contains a five point classification of the currently employed segment of the active labour force that consists of a large group of adequately employed workers, relatively small groups of slightly underemployed workers and slightly underqualified workers, and two small groups at the opposite sides of the scale that include highly underemployed and highly underqualified workers as defined through studies on education job gaps (Livingstone, 1998). In addition, a section of my study includes an additional category of unemployment: people who could be understood as an extreme form of underemployment. Lack of data limits this type of analysis on more general issues since specific information on employment experiences were not available for this subsample.

In a recently published study on the long-term impact of inadequate employment on health that was based on the 1994 wave of the US National Longitudinal Survey of Youth, Dooley and Prause (2004) documented the significant relationship between unemployment and underemployment and mental health, depression, self-esteem, and alcohol abuse. This study includes unemployed respondents and those working in
economically inadequate jobs (involuntarily part-time, less than 35 hours per week, or working for poverty-level pay). In contrast to other studies on underemployment and health conducted by this group of scholars, this study also included discouraged workers. Dooley and Prause (2004) explain the adverse impact that underemployment has on health as the effects of global economic and social changes on employment relations:

We are witnessing not the end of work but the end of traditional jobs and careers seen as marriage-like bonds between employees and employers. As more of us become contingent workers in one fashion or another, the few who can exploit this new environment will reap high rewards. But workers who are not well equipped to compete are likely to experience continued wage stagnation, insecurity, and the “social breakage” of the lost career identities (Dooley & Prause, 2004, p. 8).

As in previous studies, Dooley and Prause point out that standard unemployment statistics include poor measures and propose a more inclusive set of indicators that would show workers’ real working and living conditions. As with the majority of the studies in this field, their study does not pay sufficient attention to the social aspects of the underemployment problem and advocates psychologically individualistic rather than integrative humanistic approaches for achieving both individual and social objectives.

In addition to the conceptualization of underemployment, the recently developed concept of continual employment status (Dooley, 2003) represents a significant advance since provides a base for a more specific understanding of the dimensions of underemployment. This recently introduced concept of underemployment represents a
significant advance beyond dichotomized employment status (employed vs. unemployed) but requires further theoretical development and empirical validation. It seems that categories included in this classification can contradict each other (‘‘economically good’’ vs. ‘‘psychologically good’’) and represent a one-dimensional continuum rather than a multidimensional, bipolar phenomenon that characterizes quality or the type of employment discussed.

There are studies that integrate job-demand and effort-reward approaches (e.g. De Jonge, Bosma, Peter, & Siegrist, 2000; Ostry, Kelly, Demers, Mustard & Hertzman, 2003; Calnan, Wadsworth, May, Smith & Wainwright, 2004) and demonstrate advantages that provide a more inclusive model for explaining relations between employment, underemployment, and health. Detailed analysis of the mentioned models of workplace stress and health as well as a model that aims to overcome the disadvantages of these middle-level theories is presented in the concluding section of my literature review. These studies may benefit from a wider model that includes the overall impact of economic class and not only specific aspects of economic class, such as the rewards for labour in Siegrist’s (1996) effort-reward model.

2.4. Underemployment, Health, and Professional Work

A considerable number of studies on underemployment are related to management and their work in regard to the use of knowledge and skills.

A study of underemployment among managers on overseas assignments demonstrated that the majority of managers are overqualified, with just a small number of
them being underqualified for their assignments (Bolino & Feldman, 2000). According to this study, underemployment is negatively related to job attitudes, general mental health, and self-reported job performance. This study, conducted from a managerial point of view, demonstrated that underemployment is encountered in different occupational and social groups, including management.

A group of studies on the nature and consequences of underemployment among business graduates, laid-off executives, and re-employed executives (Feldman & Turnlry, 1995; Feldman & Leana, 2000 and Feldman, Leana & Bolino, 2002), based on samples that included 300 to 500 graduates and executives, showed a significant association between underemployment and lower feelings of life satisfaction. These studies did not identify any associations between underemployment, mood, and job satisfaction. They showed that re-employed executives experience poorer psychological well-being, and indicated a need for a wider approach to underemployment that would include indicators on the quality of employment. This group of studies is based on the relative deprivation theory and searches for ways to decrease the feeling of deprivation among laid-off and re-employed executives.

A number of studies have indicated higher levels of unemployment and underemployment among professionals with specific or narrow specializations. David, Mogilner, & Ozick (1998) reported on a large number of unemployed or underemployed medical specialists (gastroenterologists). They defined underemployment as the condition of working less than half the time than in a full-time practice. Similarly, Humphrys and O'Brien (1986) found strong relations between the possibility of using their skills at work and job satisfaction among pharmacists. In this study, the possibility of using their skills
at work explained almost a third of the variance for job satisfaction.

A study that included three groups of clerical workers with different educational levels (college education, some postsecondary education, and high school diploma), Burris (1983a) found high levels of subjective overqualification and lower satisfaction with work control. Among clerical workers with an education greater than required for their jobs, Burris found lower job involvement, lower job satisfaction, and higher turnover. Among underemployed clerical workers, Burris also found more impaired interpersonal relations, an increased likelihood of turnover, and more ambition.

Results from Sweden’s Labor Market Survey on working conditions and health revealed that more than a quarter of permanent employees (28%) do not work in their desired occupation (Aronsson & Goransson, 1999). This group of employees more frequently experiences headaches, greater fatigue, and mild depressive symptoms than adequately placed employees.

A comparative study based on the 1979, 1988, and 1992 US Current Population Surveys (Crown & Leavitt, 1996) showed that underemployment steadily increases over time. This study distinguishes two types of underemployment: Type I is classified as involuntary part-time work and Type II is classified as employment below education and skill levels. This study has also found that almost halfamillion workers between the ages of 50 and 64 experienced involuntary part-time employment, while more than seven million individuals work at jobs below their education and skill levels. Crown & Leavitt documented that underemployed older workers are frequently not covered by pension and health insurance plans.
2.5. Immigrant Status, Race, Ethnicity and Underemployment

A considerable segment of the research on underemployment is related to immigrants and the impact that employment status has on their mental health (see for example Cheung, & Dobkin de Rios, 1982; Canadian Task Force, 1988, Kinnon, 1999). Several studies document higher underemployment among immigrants and minority group members, (Aycan & Berry, 1996, Livingstone, 1999; Livingstone & Scholtz, 2006) and some of these studies indicate that risk of underemployment has a significant negative impact on immigrants’ mental health and on their social adjustment (Abbott, Wong, Williams, Au & Young, 1999 & 2000).

A study of recently-arrived Canadian immigrants (Aycan & Berry, 1996) shows that more than two-thirds of them were unemployed or underemployed during their first six months in Canada. Results show that downward mobility, unemployment, and underemployment have a harmful impact on the psychological well-being of immigrants.

Regardless of the unfavourable situation that many refugees encounter, few studies are dedicated to the employment and health problems that refugees experience after immigration. Danso (2002), who examined the initial settlement experiences of Ethiopian and Somalian refugees in Toronto, documented the social exclusion and multiple disadvantages that refugees encounter. Refugees also encounter high levels of unemployment and underemployment, which sometimes cause suicidal behaviour when combined with other cultural factors. The 1975 Detroit study of suicide (Stack, 1982) obtained results that indicate similar associations between underemployment, immigrant status, and suicidal behaviour.

Beiser, Johnson & Turner (1993) compared the influence of unemployment and
underemployment on depression in refugees and permanent Vancouver residents and found significant differences between the two groups. Differences were noticeable in regard to the impact that job loss had on permanent residents, who were mainly troubled by low self-esteem and few social contacts, and refugees, who were mainly concerned with income loss. The main conclusion of this research is that underemployment (working at a job below the respondent’s educational level) increases the risk of situational depression, often without long-term consequences for mental health.

A study of underemployment and stress in employed African Americans, based on data from the National Survey of Black Americans (Jones-Johnson, 1989), found tendencies towards, but not significant relations between, subjective underemployment and stress. A study that was based on the same data (Johnson, 1990) examined associations between underemployment, underpayment, attributions, and self-esteem in working African Americans. This study did not find significant associations between underemployment and self-esteem.

Using data from the 1990 Census of employees between 25-64 years old and not in school, de Jong and Madamba (2001) documented a high level of underemployment among native-born minority and ethnic immigrants in the United States. To examine the phenomenon of the “double disadvantage”, de Jong and Madamba used multinomial logistic regression to examine the impact of minority group membership and immigrant status on unemployment, part-time employment, working poverty, and job mismatch in relation to adequate employment. They found that minorities encounter a “double disadvantage” — a tendency for members of a minority group to work more frequently in secondary sector jobs coupled with the initial disadvantages immigrant workers
encounter in the labour market. Results from this study documented greater underemployment among females, minority group members, and immigrants as well as differences between racial groups. According to this study, employees of African American and Hispanic origin were more frequently unemployed and living at the poverty line, while employees who are Asian in origin encountered the highest job mismatch.

A recent Canadian ethnographic study of illness experience and help-seeking among Chinese immigrants, based on Kleinman’s explanatory model of illness and stigma, has shown that immigration, interpersonal conflicts, and underemployment have a significant impact on chronic fatigue and weakness (Lee, Rodin, Devins & Weiss, 2001). The study considered the implications of the obtained results for therapeutic practice and underlined the need for a more comprehensive understanding of the adjustment issues encountered by recent Chinese immigrants.

The majority of the presented studies on underemployment and health do not exclusively examine the relationship between underemployment and health, and apply varying, often non-comparable approaches to underemployment. Despite conceptual and methodological inconsistency, the evidence provided indicates a high level of underemployment among minority group members, recent immigrants, and refugees. Appropriate immigration and social policies as well as settlement interventions would improve this situation. From a research perspective, the presence of racial and ethnic issues requires that more attention be given to research design to make possible multivariate, longitudinal, and better-controlled research on the complex relations between underemployment, health, and race and/or ethnicity and immigrants’ status.
2.6. Precarious Employment and Health

A growing number of studies related to underemployment and health showed an increasing interest in precarious employment. These studies, performed in various industries and different countries, provide significant insights and contributions to the research domain on underemployment and health.

Recent publications based on the Second 1995 and the Third 2000 European Survey on Working Conditions (Benavides, Benach, Diez-Roux, & Roman, 2000; Benach, Gimeno, & Benavides, 2002) demonstrate the strong negative impact of precarious employment on health. This large-scale study, which included combinations of permanent, temporary, full-time, part-time and self-employment, as well as small employers from 15 EU member states, showed similar results in all participating countries. Precarious employment was strongly associated with lower mental and physical health (attitudes, lower job satisfaction, fatigue, back pains, and muscular pains). It should be noted that in all 15 countries between 1995 and 2000, poor health related to absenteeism and increased reports of muscular pain were evident. This study (Benach, Gimeno, & Benavides, 2002, p. 18) revealed that mentally demanding work has a stronger association with all health-related variables than physical working conditions (vibrations, noise, extreme temperatures, vapors, short repetitive tasks, and repetitive movements).

Similar but weaker associations with health outcomes are evident for control over working conditions which, in this research, have a lower association with stress. The Benach, Gimeno, & Benavides (2002) study demonstrated the strong impact that working
conditions have on health and showed that self-employment has a negative effect on health. The majority of self-employed people work long hours, especially families with their own small businesses, and have the lowest absenteeism rate compared to other social groups. This study attempts to explain the negative health consequences that globalization has caused: “flexibility” in the job market, precarious employment, increased demands for productivity, and increased deregulation of the job market. Unfortunately, it does not offer longitudinal data, which is the type of data needed for this kind of generalization. Furthermore, this study’s provided evidence on the social determinants of health would be much stronger if more complete demographic and socioeconomic indicators (not just age and gender) were available. The study’s authors also noted the lack of such data and recommended the inclusion of more socioeconomic indicators in future surveys on employment and health.

Unlike some other large-scale European surveys (Benach, Gimeno, & Benavides, 2002), Buchel’s study on overeducation and productivity in Germany (Buchel, 2002) has found that overeducated workers have better health than their adequately placed colleagues. Overqualified employees included in this study were working in low-skill industries and classified as overeducated if their education was higher than required for their work based on their own subjective estimate. Buchel found a similar level of job satisfaction in both groups, and slightly better self-perceived health (P< 0.10) among overeducated workers. He also found that blue-collar workers have more health problems than white-collar workers. His explanations were centred on the educational level of overeducated workers and he presented a new hypothesis stating that the differences may be caused by the varying attitudes that people with different educational backgrounds
have towards life.

A longitudinal study (Graetz, 1993) that used the General Health Questionnaire showed that besides unemployment, working conditions and interpersonal relations strongly determine an employee’s health. According to this study, the impact of the quality of work and job satisfaction determines employees’ health regardless of the variations in socio-demographic characteristics.

2.7 Underemployment, Work-related Stress and Mental Health

Numerous studies demonstrate that stress has a highly negative impact on the health of employees. Stress is often related to hazardous and high-intensity work conditions. In a paper that summarized the trends of stress-related literature and reviewed the changes in workers' compensation legislation, Warshaw (1988) recognized that stress has become one of the strongest and most frequent health hazards in the work environment.

Shankar and Famuyiwa (1991) examined stress among factory workers in developing countries and found that 35% of factory workers experienced measurable health problems in the form of anxiety, sleep disturbance, depression, somatic complaints and other clinical indicators of stress. Job stress and social support levels experienced by “sick” workers were significantly different from the control group. The authors found that job stress has a major impact on mental health. The main job stress variables include job pressure, namely security and job tension, and interpersonal rewards. A study found that perceived social support seems to increase at higher levels of occupational status and appeared to exert a positive influence on health at the workplace.
Fiedler (1990) explored the effect of stress on hazardous waste workers. The author argues that because of the nature of their work, these workers are more susceptible to the risk of stress-related illnesses and advocates frequent surveillance of employees’ mental and physical health in order to address any possible problem in its early phase.

Kouvonen et al. (2006) looked at effort-reward imbalance at work. The goal of this study was to investigate the extent to which dimensions of the Effort-Reward Imbalance (ERI) model are associated with the co-occurrence of lifestyle risk factors. The data from the Finnish Public Sector Study was analyzed for this study. The authors conclude that a high ratio of occupational efforts relative to rewards may be associated with an elevated risk of having multiple lifestyle risk factors. The study also shows a significant association between low effort and a higher likelihood of risk factor co-occurrence. Similarly to many other studies in this domain, the study underlines the absence of data on overcommitment and the need for further exploration of the validity of the ERI model.

D'Souza et al. (2005) investigated the association of job strain and insecurity within health differences grouped by work status. Using the data from an Australian survey conducted in 2000, the authors found that high job strain was associated with depression, anxiety, lower mean physical health scores, and increased visits to the general practitioner. Also, high job insecurity showed associations with depression, anxiety, and general practitioner visits. The authors concluded that high-status workers were just as likely as low-status workers to be exposed to adverse work conditions and that both status groups showed similar health effects.

Jamison et al. (2004) investigated working environment stressors and their effects
on health. Using the data from the Indiana Survey of Work in a Polarized Economy, and multiple regression analysis, the authors concluded that occupational status is negatively associated with ill health. Conversely, organizational disruption, layoffs, and educational discordance are associated with poor health outcomes. Looking at each gender separately, the study found that organizational disruption is more strongly related to ill health for males.

Bardasi and Francesconi (2004) looked at the impact of atypical employment on individual well-being in Britain. Using the data on mental health, general health status, and life and job satisfaction reported in the 1991-2000 British Household Panel Survey, the authors found evidence that job satisfaction is reduced for seasonal/casual workers and is higher for part-timers. On the other hand, it was found that the chances of poor mental and physical health and low life satisfaction are unaffected by atypical employment. Also, very few employment transitions appear to be the cause of worsening health. Overall, the authors suggest that the pattern of results indicates that atypical forms of employment do not have durable adverse health consequences on workers.

A number of studies on underemployment have identified its negative impact not only on individual health but also on social and family relations (Briar & Knighton, 1988). Zvonkovic (1988) found that husbands who were underemployed, discontinuously employed, or with earnings 20% below the average felt lower satisfaction with their financial situation as well as with their marital relations. In another qualitative study, Zvonkovic, Guss & Ladd (1988) found that a family’s adjustment to a husband’s underemployment and income loss depended on the quality of marital relations before the
change of job status. A more recent comprehensive interdisciplinary study of the impact of structural social change and economic hardship on family relations (Voydanoff & Majka, 1988) vividly demonstrated how underemployment is frequently associated with lower income, frustration, insecurity, and unfavourable family relations.

In an early study of workers’ mental health in industrial settings, Kornhauser (1965) found that the opportunity to use one’s own abilities at work is a significant predictor for the mental health of workers in Detroit. Another pioneering study of underemployment and health (Santhanam, 1973), based on psychomotor and psychological measures of 165 employed, underemployed, and unemployed younger workers (23 to 35 years old), has shown that underemployed workers experienced the highest levels of anxiety. In this study, underemployed workers experienced prolonged and consistently high levels of anxiety. In contrast, unemployed workers showed anxiety that tended to decrease over time. Similarly, a recent extensive meta-analytical study of the consequences of job insecurity (Sverke, Hellgren, & Naswall, 2002) showed that job insecurity has a harmful impact on employees’ attitudes, as well as on their physical and mental health. This study also demonstrated the high probability that a large number of consequences remain underestimated due to methodological pitfalls and to inadequate or single measures of job insecurity.

Similarly, a recent Canadian study also found an increased risk of suicidal behaviour among people without full-time employment (Kraut & Walld, 2003). In comparison to respondents employed full-time, unemployed workers were 3.7 times more likely to attempt suicide, 2 times for part-time workers, and 2.1 times for people not in the labor force. This study proves Kraut and Walld’s main assumption that there is an
association between part-time work and suicide, and it concludes that this type of suicidal behaviour is preventable through appropriate policies on underemployment and unemployment.

Discussing the psychiatric treatment of depression, Kupers (1996) considers unemployment and underemployment as hazardous to mental health. According to Kupers, job loss or fear of job loss often leads to depression and in some cases to suicide. Kupers proposed a kind of therapy that involves a de-construction of the tendency towards the generalized feeling of failure that has been noticed among unemployed and underemployed workers. This therapy also includes a de-contextualization of the employment problem through the placement of the patient’s problems in a wider social context. From a therapeutic point of view, this proposed procedure is justifiable as a form of help for workers in an acute situation. However, it does not consider the core causes of underemployment and the social relations social conditions that cause inadequate work relations and lack of work.

In her qualitative study of the meaning of work and the impact of work on mental health, based on interviews with 36 employed and unemployed mental health consumers, Kirsh (2000) provided evidence that work plays a highly meaningful role for both employed and unemployed respondents. She also found that both groups in this study perceived employment as positive for their health and self-esteem. Besides unemployment, respondents in this study recognized underemployment and its strong impact on their health. A respondent from Kirsh’s study vibrantly described the feeling of underemployment and its impact on mental health:
... being underemployed is very frustrating, it caused me to feel anger: I would work quite hard and not be paid very much money and not have enough to make ends meet and I found it very frustrating...I went back to school.... at one point I offered to work for nothing for one or two months to get experience and I was turned down, so I felt really, really badly... I just felt like giving up and it was actually after that I started to get depressed about being unemployed because it was dragging on longer and longer ...I became totally withdrawn... you know, things when you're depressed, sometimes they feel hopeless. (Kirsh, 2000, p. 26)

‘Mental health consumers’ in Kirsh’s research, similar to the respondents from representative, large-scale international surveys, the International Social Survey Program (ISSP), and the World Value Survey (WVS), indicated that work satisfies various human needs: desires to contribute to society, achievement, and self-esteem. In contrast to other studies in this field, Kirsh stressed the importance of the dynamic aspect of relations in the workplace for professional rehabilitation and the roles of employers, co-workers, and the work environment. Despite the fact that Kirsh’s study only marginally elaborated on underemployment issues, the ethnographic material obtained through this study is a valuable source for future research on underemployment and health. This research indicates that the often-neglected variables of respondents’ values and needs may contribute significantly to understanding and explaining the relations between underemployment and health.

Similar to Kirsh, Livingstone and Sawchuk (2004), in their recent ethnographic study of work and learning, demonstrated that unionized employees experience feelings
of loss of control over their work and have deep emotional reactions associated with job insecurity and underemployment: “People are feeling uncomfortable and insecure ... [workers] are not interested in doing things, they're interested in sustaining things, through systems and stuff. But they're dying. Everything around them is dying” (Excerpt from an interview: Livingstone & Sawchuk, 2004: 136).

Ethnographic materials from both studies indicated much deeper causes and consequences of underemployment than were considered in most studies on underemployment and health. These studies illustrate alienation from work and social relations that cause strong emotional reactions that are harmful to employees’ health.

2.8 Type of Employment Status and Health

Underemployment, underutilization of skills and/or knowledge attained through different forms of learning, represent the quality and quantity of work that is manifested through occupational status. Large number of studies show that occupational status affects health in different ways, through stress caused by type of employment or through exposure to stress at the workplace and harmful working environment.

In a study that explores the relationships between employment and health, Ross and Mirowsky (1995) found consistent relations between full-time employment and slower declines of perceived health and physical functioning among people of different gender, race/ethnicity and marital status. Their study provides evidence that indicates stronger support for social causation (employment improves health) than for social selection (healthy people get and keep jobs more easily than unhealthy people do).
Borrell et al. (2004) analyzed the relationship between economic class and self-reported health status and looked at the role of work organization, material standards and household labor. The authors used the Barcelona Health Interview Survey consisting of 10,000 employed city residents. They conclude that a part of the association between economic class and poor health for men could be accounted for by the psychosocial and physical working conditions at work and by job insecurity. The conclusion for women is that the association between working class positions and health is largely explained by working conditions, material well being at home and the amount of household labor.

Schrijvers et al. (1998) analyzed the data collected through a postal survey conducted in 1991 in the Netherlands and examined the socioeconomic inequalities in health among the working population. Logistic regression analysis showed a higher ratio of less than good perceived general health in lower economic classes among men and women. It also showed a higher odds ratio among people reporting more hazardous physical working conditions, lower job control, lower social support at work and those in the highest category of job demands. Similar results were found for both men and women. Both sexes in the lower economic classes reported more hazardous physical working conditions and lower job control. In contrast, this study shows that high job demands were more often reported in the higher economic classes.

In a study related to paid work, unpaid work and social support and their association with health problems for registered nurses in Ontario, Walters et al. (1996) concluded that the demands of paid and unpaid work (time pressures, caring for a dependent adult) and overall stress in life are linked with greater health problems. It was also found that there is a link between social support and health. A poor relationship with
a supervisor is associated with a health problem and alternatively, a close social relationship with a friend and having children reduces the likelihood of experiencing health problems. The authors conclude that the most important issues for both men and women were hazard exposure, work satisfaction, children and overall stress level.

In contrast to economically developed nations, more direct relations between underemployment and health are more noticeable in developing countries and countries shifting away from communist regimes.

Based on a representative sample of 1549 adults, a large survey on unemployment, underemployment, and mental health in a low-income neighborhood in Brazil (de Almeida, 1981) showed the detrimental impact of unfavourable employment status on mental health. Controlling for possible confounding effects of the respondents’ socioeconomic status, this study demonstrated the negative effect of unemployment and underemployment on mental health.

The impact that new forms of economic and political domination have on human health and well-being has not been sufficiently documented. “Transitional” societies with devastated economies, decreased economic production, and high unemployment and underemployment demonstrate the strong negative impact of deteriorated social conditions on human health and well-being. Numerous studies (Bobak & Marmot, 1996; Carlson, 1998; Illner, 1998; Piko & Fitzpatrick, 2001) illustrate the human and social costs of rapid change in social and employment relations.

Similarly to authors from North America and Europe, Australian scholars (Winefield, Montgomery, Gault, Muller, O'Gorman, Reser et al., 2002) perceive underemployment to be harmful to health. Recent changes in workplace and work
requirements, work intensification, new skill requirements, job insecurity, and increased social inequalities are perceived as the main reasons for negative psychological and health outcomes. This study builds on a large-scale longitudinal Australian survey of unemployment, unsatisfactory employment, and health. In another study, Winefield, Winefield, Tiggemann & Goldney (1991) found that unemployed and inadequately employed respondents, compared with students and adequately employed individuals from the same initially similar sample, showed lower self-esteem, higher depressive effects, and more negative moods. In the same study, Winefield, Winefield, Tiggemann & Goldney found that students and the adequately employed are less alienated, less distressed, and more satisfied with their way of life than unemployed and inadequately employed respondents.

According to Winefield (2002), research on unemployment, underemployment and stress caused by the organizational changes that became significant social issues in industrialized countries attract great research interest throughout the world. Winefield sees the impact of this growing interest in underemployment in the changing conditions caused by globalization and changing working relations through restructuring and downsizing, leading to higher unemployment, underemployment and work-related stress.

It is important to note that at all levels of the occupational hierarchy, employees and employers experience conditions that contribute to the deterioration of health or health-related quality of life.

Lundberg (1999) examined the relationship of stress responses to health for low-status jobs. The author concludes that cigarette smoking and drug abuse are contributors to degradation in health, along with negative emotional states associated with low-status
jobs, which, combined with a lack of economic resources, are likely to reduce the individual's motivation to seek proper medical treatment, thus increasing the risk of transient symptoms that develop into chronic illness.

Using the Occupational Stress Indicator scale, Michailidis and Elwkai (2003) examined the factors contributing to the experience of occupational stress in the fast-food industry. They found significant statistical differences between individuals in managerial and non-managerial positions, as well as differences in responding to stressors between men and women.

Cassitto and Gilioli (2003) looked at the aspects of occupational stress, particularly the effects of work stress caused by excessive demands, requiring cognitive and behavioral solutions. The authors determined that at the point when workers become unable to comply, non-physiological reactions might follow, including emotional, neuro-vegetative and behavioral changes. If exposure to such conditions persists, the effects may be in the form of depression, phobic syndromes, anxiety syndromes, hypertension, heart disease, eating disorders or drug addiction.

Michailidis and Asimenos (2002) examined occupational stress among faculty, administrators and program coordinators. Their findings indicated that occupational stress has a negative impact on the degree of workers’ satisfaction with their achievement. High dissatisfaction with organizational design, structure and processes was found among faculty. Overall occupational stress has affected their state of health.

In a longitudinal study among office workers, Leitner and Resch (2005) investigated whether the effects of job stressors on health persist over time. The authors infer that stressors have a strong and persistent impact on employees’ health.
Numerous studies show the adverse effects of the type of employment on health. Particularly negative effects are attributed to flexible work arrangements, precarious working conditions (e.g. Vosko, 2005) and different aspects of health.

Benavides et al. (2000) investigated the associations of various types of employment with some of the self-reported health indicators. The study covered 15 countries of the European Union, including 15,146 employees. The authors found that precarious employment was consistently and positively associated with job dissatisfaction as well as being negatively associated with absenteeism and stress. Fatigue, backache and muscular pains seemed to be positively associated with precarious employment. Small employers had high percentages of stress and fatigue, but low absenteeism. Sole traders reported high percentages of all outcomes except for absenteeism. The authors noted a consistent pattern of findings across all examined countries.

Kim et al. (2005) analyzed the effects of non-standard work on health. Since non-standard work is related to job insecurity, it is reported to have a detrimental impact on health. Based on the Korea National Health and Nutrition Examination Survey and the self-reported health indicator, the authors found that non-standard employment was significantly associated with poor health among female manual workers. The study also shows that among female manual workers, non-standard employees reported poorer health than did standard workers.

Virtanen et al. (2002) examined health, job satisfaction, and behavioral risks when going from fixed to permanent employment in two Finnish hospitals over a period of five years. The authors found that a permanent job contract was significantly associated with
good self-rated health, lower psychological distress, high job satisfaction, and a non-sedentary lifestyle. The authors concluded that fixed term employees yield new information about selective mechanisms in employment mobility, and that overall good health seems to promote the chances for a fixed term employee to reach a better labor market status.

Saloniemi et al. (2004) examined the relationship between employment type and the physical work environment for blue-collar workers. They concluded that working on a fixed-term basis increased the risk of physical strain at work for fixed-term construction workers.

2.9 Educational Attainment and Health

As the literature review shows, there is an overwhelming number of studies that demonstrate the strong impact of educational attainment on better health (Schnittker, 2004). Higher educational attainment is significantly associated with better self-perceived health as well as with lower morbidity and greater life expectancy (Szwarcwald & Souza-Junior et al., 2005; Leigh & Fries, 1994; Manton et al., 1997). Also evident is a strong interaction between education and income on health (Lynch, 2006; Schnittker, 2004; Zimmer & House, 2003; von dem Knesebeck et al., 2003; Moore et al., 2002; Lantz et al., 2001; Ross & Wu, 1996; Cohn & Geske, 1992).

Lynch, S. M. (2006) presents an investigation of the role income plays in the relationship between education and health. Based on the 1972-2001 National Health Interview Survey data, Lynch found that a direct relationship between education and health is weakening across cohorts, while the indirect effect of education through income
is strengthening across cohorts. The results suggest that future research should continue to employ a life course framework.

Cutler and Lleras-Muney (2006) investigated the association between education and health. Initially, the relationship between education and health was documented. They found education to be ‘gradient’ for both health behaviors and health status, and suggested that increased levels of education lead to different thinking and decision-making patterns. They also documented the monetary value of the return to education in terms of health to be half of the return to education on earnings.

Szwarcwald and Souza-Junior et al. (2005) presented a study that investigated self-rated health, which has been used extensively in epidemiology studies because of the association with clinical conditions and the greater risk of subsequent morbidity and mortality. Based on the World Health Survey carried out in Brazil (2003), they concluded that factors that contributed most to the deterioration of health perception were incomplete education and material hardship for women. It was found for males that the deterioration of health perception was due mainly to material hardship and work-related indicators (manual work, unemployment, work retirement or the inability to work). Finally, they found that among individuals with long-term illness or disability, the socioeconomic gradient persisted, but to a smaller magnitude.

Mensah, Mokdad et al. (2005) assessed the current magnitude of disparities in cardiovascular disease (CVD) and its risk factors in the United States from the national survey data. They found that ischemic heart disease and stroke were inversely related to education, income, and poverty status.

Based on an analysis of compulsory education laws from 1915 to 1939, Leras-
Muney (2005) found that an additional year of education lowers the probability of dying in the next 10 years by at least 3.6 per cent.

Almeida et al. (2005) studied the effect of stressors on socioeconomic disparities in health. Based on the National Study of Daily Experiences and the Midlife in the United States Survey, they concluded that respondents without a high school degree had more severe stressors because of their financial situations when compared to respondents with a high school or college degree. They also found that differences in the severity of stressors were related to differences in education as well as psychological distress and physical health symptoms.

Schnittker (2004) investigated social determinants of health and their relative importance on different features of socioeconomic status. Based on two large national data sets, Schnittker concluded that education improves health, and its effects are larger on people with lower levels of income. Furthermore, the educated population has better health for all levels of income and there are fewer income-based disparities among the well educated than the less well educated.

Jamison et al. (2004) looked at the relationship between work and poor health caused by stressors originating in the work environment. The study showed that lower occupational status is negatively associated with ill health and organizational disruption, layoff experience, and educational discordance are positively associated with it.

Zimmer and House (2003) examined how education and income relate differently to the onset versus the progression of functional health problems. Multinomial regressions determine transition probabilities related to onset and progression of health issues. They concluded that education determined early in life influences psychosocial
mechanisms throughout life, and may have a greater impact on the prevention of activity
and functional disorders. Also, the role of income serves as both a prevention factor and a
mechanism for the management of health problems.

Von dem Knesebeck et al. (2003) conducted a study on socioeconomic status and
health among the aged in the United States and Germany. They found that income is the
best predictor of health measures among the aged in Germany, whereas education,
occupational prestige, assets, and home ownership are not consistently related to health.

Oh and Shin (2003) examined the inequalities of nonfatal work injuries. The
authors concluded that human capital, represented by education and work experience, is
the crucial determinant of nonfatal injury at work. This means that workers with more
years of schooling and work experience encounter fewer nonfatal work injuries. The
study also highlights the significance of occupational conditions (occupational positions
and work activity) for nonfatal injuries at work.

Silventoinen and Lahelma (2002) examined health inequalities by education and
age. Their study compared health differences by age in different educational categories
and found that health in the oldest age group was poorer for men with basic or secondary
school education than for men with higher education in Finland in 198687. However,
they also noted that the study could not conclude similar results within the populations of
Denmark, Norway, and Sweden. The final result of this study was that current social
policies and past economic circumstances affect overall health status and health
inequalities.

Murrell and Meeks (2002) examined mediators in the relationship of education to
health to further define education as a health resource. In assessing income, life
satisfaction, services and social support as mediators of the health-education relationship, they found that education was related to all health measures and to all mediators. The main conclusion of their paper was that educational attainment is a good investment for successful aging.

Moore et al. (2002) found that higher education was associated with higher income, which is associated with better physical health and psychological outcomes. Sleep quantity was related to both measures of health and income and seemed to mediate the effect of education on sleep and, in turn, on health.

Miech and Hauser (2001) compared education with occupational measures, including economic class, in relation to health. Their study explored a mechanism linking education and health, and controlled for the overall relationship between socioeconomic status and health. They suggested that it is not necessary to measure occupational standing when educational attainment is measured well. Their study was based on a relatively small sample that included non-Hispanic high school graduates from Wisconsin.

Using data from the Americans’ Changing Lives Study and the Socioeconomic Disparities in Health Change, Lantz et al. (2001) found that both income and education were strong predictors of poor health. Bailis et al. (2001) studied perceived psychological control over life events in relation to socioeconomic and behavioral resources for health. Using data from the National Population Health Survey of Canada, they reported that self-rated health status was composed of physical and mental health. Their findings suggest that the psychological processes of perceived control over life events underlie social inequality in health. Health-related behaviors appeared not to serve as the primary
mechanism through which perceived control over life events influences health.

White et al. (1999), noted that levels of material deprivation or affluence were strongly and independently correlated with all causes of (?) mortality. They also noted that educational attainment, after controlling for deprivation-affluence, remains strongly associated with coronary and infant mortality. Their analysis of the cross sectional associations of self-reported longstanding illness and "not good" or "fairly good" self-assessed health illustrated that associations of self-reported health with deprivation-affluence were stronger than with educational attainment. However, educational attainment was associated with self-assessed health in adulthood, independent of deprivation-affluence. They provided different explanations for this association, suggesting that differences may result from occupational characteristics, or education may influence the propensity to follow health education advice.

Using the Survey of Income and Program Participation, Freedman and Martin (1999), examined the importance of education for the decline in functional limitations among older Americans. From eight demographic and socioeconomic variables considered, education was found to be the most important in accounting for recent trends. The authors suggested that future changes in education would continue to contribute to improvements in functioning, although at a reduced rate.

Kubzansky et al. (1998), investigated the association of educational attainment with the risk factors for poor health among the elderly through a cross-sectional analysis of psychosocial, behavioral, and biological factors with educational attainment. The authors found that low levels of education were associated with poorer psychological function, less optimal health behaviors, poorer biological conditions, and larger social
networks.

Hraba et al. (1998), applied a model between education and health that had been found in the United States to a Czech Republic population. The cross-sectional results on the Czech Republic population showed results similar to those found in the United States. Their study also found that market position fully mediated the relationship between education and health in the Czech Republic.

Gilleskie and Harrison (1998) looked at the effect of endogenous health inputs on the relationship between health and education. They found that a better-educated person was more likely to select more efficient inputs to produce better health.

Cirera et al. (1998), analyzed the associations between educational attainment and major cardiovascular disease risk factors in Southern Spain. Based on control of the impact and adjusting for environmental factors in the adult general population, they concluded that educational attainment is inversely associated with arterial hypertension and leisure-time physical activity in both genders and with overweight in women, and is directly associated with cigarette smoking in women.

Sundquist and Johansson (1997) studied the relative risk (RR) of mortality for people who reported poor health or had low educational levels in Sweden. Men and women in both age groups who reported poor health status at the interview had a strongly increased risk of dying during the follow-up period. The study concluded that poor self-reported health was a strong predictor for total mortality. Further study noted that in Sweden, there are inequalities in health with higher total mortality risks for people with a low educational level and those who are not owner-occupiers.

Manton et al. (1997) investigated the education-specific estimates of life
expectancy and age-specific disability in the United States. They found that males and females with high education maintained better functioning at later ages than those with low education. Mortality was higher for the group (both men and women) with lower education. They also found that the level of education affected disability and mortality was very significant.

Ross and Wu (1996) investigated the education-based gap in health variability with age. The authors found that the gap in self-reported health, physical functioning, and physical well-being among people with high and low educational attainment increased with age. It was also shown that the health advantage of the well educated is larger in older age groups and household income does not fully explain the positive effect of education.

Leigh and Fries (1994) state that according to the Compression of Morbidity (CM) hypothesis, people who exercise, eat nutritiously, do not smoke, and maintain a healthy weight, will be more likely to live free of disabling diseases and injuries up until the last few months or years of life. They showed that lifetime (over age 50) cumulative disability was 21 to 60 per cent less for the more educated than the less educated.

Cohn and Geske (1992) showed a positive correlation between higher education and good health. They also showed that parental schooling levels (after controlling for differences in earnings) are positively correlated with the health status of their children and increased schooling (and higher relative income) correlate with lower mortality rates for given age brackets.

Ross and Mirowsky (1999) examined three aspects of a person's education (quantity, credential, and selectivity) in relation to health. They concluded that the total
years of schooling have the largest effect on health because of the correlation with work and economic conditions, social psychological resources, and a healthy lifestyle.

2.10 Working Conditions and Health

There is also a large number of studies that show the deteriorative effects of an inadequate, hazardous work environment and the exposure to physical and chemical substances on health and on disability (Fidan et al., 2005; Chalupka, 2005; Coggon, 2006; Evertz, 2003; Burdett & Bard, 2007; Crimmins & Hayward, 2004).

Evertz (2003), who studied exposure assessment through electrical discharge machining, found that in 2001 more than fifty per cent of all occupational diseases in Germany were due to hazardous dusts, mists, vapors or gases.

Burdett & Bard (2007) examined the exposure of UK industrial plumbers to asbestos. The data suggests that asbestos-containing materials (ACM) have been and may continue to be a significant risk to maintenance workers. Particularly problematic is the fact that these workers may not know that they are working with ACM. The calculated risk from airborne amphibole fibers was approximately 6 times greater than from chrysotile fibbers. Overall, the estimated lifetime risk of death from asbestos-related cancer (considering exposure beginning from age 20 and continuing for 40 years) would be 68 per 100,000, which equates to an annual risk of death of the order of 10 per million.

Hay (2006) presents a guide on controlling the exposure to chemicals in the workplace. This guide is based on a 1996 survey of 1500 safety managers and trade union safety representatives that revealed that the majority had little understanding of the
occupational safety limits of exposure to chemicals. As a result, the guide published by the UK Health and Safety Executive (HSE) has been made available on the HSE website. The study shows the helpfulness of the Control of Substances Hazardous to Health Regulations *Essentials guide*, a five-step procedure devised to foster appropriate monitoring strategies and reduce exposure to chemical substances under variety of working conditions.

Evertz et, al. (2006) presents a new assessment of the hazards of electrical discharge machining in industrial environments. They demonstrate the optimization of a manufacturing process (electrical discharge machining, EDM), with regard to risk reduction assessment, based on emission analyses, and find that metal analysis should be introduced in future risk assessments because some metals have a highly hazardous potential. This process has shown to lead to a better understanding of the production process, which can be used to extract recommendations regarding aspects of monitoring and protection measures.

Coggon (2006) presents a study on epidemiology in risk management for chemicals. The author defines risk management as the process by which choices are made between alternative actions or policies according to the likelihood of beneficial or adverse outcomes. For chemicals, a distinction is made between hazard and risk. The most relevant measures of risk management are the individual attributable risk and the population risk. The author notes that the assessment of risk entails the identification and characterization of hazards, and the estimation of the risks associated with the circumstances of exposure from different policy options.

Waters et al. (2005) review the epidemiological studies related to forklift
operators and musculoskeletal disorders (MSD) and conclude that forklift operators are at increased risk of lower back pain. They point out that there is a need for epidemiological studies to determine the magnitude of risk for MSD, which should also include additional indicators of MSD such as neck pain.

Lahiri et al. (2005) examined the cost effectiveness of occupational health interventions and conclude that economic efficiency is essential in any evaluation of interventions to reduce hazardous working conditions. In order to evaluate cost effectiveness, the authors employed simulation models based on the generalized cost effectiveness analysis which was developed by the World Health Organization. Based on the obtained results, they conclude that engineering control programs would be cost effective in the prevention of silicosis in both developed and developing countries.

Using the adapted respiratory illness questionnaire from the American Thoracic Society, Fidan et al. (2005) examined the effects of welding on pulmonary function and serum oxidant-antioxidant status. The authors conclude that the pulmonary function tests and oxidant-antioxidant status are negatively affected by chronic exposure to welding fumes and gases and they propose preventive measures in order to improve welders’ health.

Chalupka (2005) examined health promotion and disease prevention in regard to improvement of human environment. The author notes that differences in susceptibility to environmental hazards can be attributable to age, gender, previous or concomitant exposure, economic status, race, or genetic endowment. Also, the analysis of pollution sources and water pollutants is significant for environmental health. It is noted that air pollution from all sources has an estimated cost of $40 to $50 billion and is responsible
for some 100,000 fatalities per year in the United States alone. Finally, the author states that through the identification of people and groups at greater risk, occupational and environmental health professionals can take preventative actions.

Buchanan et al. (2005) presented the results of a small study on the occupational health of Chicago day laborers. The respondents, recruited on a street-corner day-labor hiring site in Chicago, were all male and 90% were Latino. The study shows that roofing and demolition were the most hazardous jobs. Also, 52% of respondents had been injured in the previous year and these workers were frequently exposed to hazardous working conditions without safety training or equipment.

Szymanska (2004) presents a study on the risk of exposure to Legionella in dental practice. The author presented information about Legionella, as well as its prevalence and the immunological reactions of dentists. The study mainly looked at the aerosols generated in dental operations as a source of exposure to the microorganisms proliferating within dental unit waterlines’ biofilm.

Stetkiewicz (2004) looked at good laboratory practice in occupational hygiene. Good laboratory practice is defined as a system that ensures quality assessment, defines the organization’s rules, and sets the conditions of planning, performing and monitoring for which the outcome is recorded, stored and reported. Occupational hygiene concentrates on the anticipation, assessment and surveillance of health hazards in the work environment and is aimed at protecting the health of workers and the population at large. The author suggests carrying out all procedures according to the EN/ISO 17025 developed standard and cooperation between researchers to avoid the repetition of analyses and studies, which would thus effectively contribute to the better care of human
health and environment.

Pikula et al. (2004) looked at the influence of working conditions on employees and their exposure to detrimental agents in the workplace. The study estimated working conditions through microclimate measurements, dust density, noise volume, light intensity and exposure to carbon monoxide. The authors underline a need for the permanent monitoring of risks in order to minimize exposures and their negative effects on health.

Kittusamy & Buchholz (2004) examined whole-body vibration and postural stress among operators of construction equipment. This study focused on these risk factors because of their association with the development of musculoskeletal disorders. The literature review shows that there is a lack of studies of risk factors among construction equipment operators and indicates a need for further studies in this domain.

Jhun et al. (2004) looked at the unfavourable working conditions for nurses after the adoption of a computerized communication system. Their study suggests that the new system has likely provoked job stress, musculoskeletal symptoms, and complaints of unfavourable working conditions. Overall some changes were favourable, but complaints of hazardous conditions and back pain symptoms have increased.

Dutkiewicz (2004) looked at occupational biohazards issues and the new viruses emerging in different parts of the world, which may pose particular threats to the health and life of healthcare workers, agriculture workers and veterinarians.

Donoghue (2004) examined the occupational health hazards in mining and highlights the importance of studies on traumatic injury hazards, ergonomic hazards and noise in the mining industry. Particularly important are the hazards associated with the
metallurgical processes, that include physical, chemical, biological, ergonomic and psychosocial occupational health risks.

Using data from the Health and Retirement Survey, Crimmins & Hayward (2004) investigated the relationship between job characteristics and work disability among men and women in older working age groups. The authors conclude that the onset of disability and health problems seem to be less related to job characteristics in women than in men. In men, work disability is associated with stressful jobs, lack of job control, and environmentally hazardous conditions.

Wang & Christiani (2003) examined occupational lung disease in China. They state that because of the recently transformed industrial structure and the expansion of the industrial labor force, occupational health policy and research encounter numerous challenges; they underline that occupational health research should try to minimize industrial hazards and protect workers' health in China.

Vecchio et al. (2003) examined the occupational risk in health care and science. The authors found that the risk of infection is primarily associated with clinical personnel and that exposure to anesthetics creates behavioral effects and the possible risk of reproductive problems. Moreover, reproductive problems have also been found in people exposed to antineoplastic drugs and ethylene oxide. Exposure to formaldehyde appears to be associated with nasopharyngeal tumors and increases the risk of cancer (particularly of the brain and lymphohematopoietic system) for research and health care personnel. The authors conclude that continued environmental and biological monitoring should provide a better assessment of exposures and the realization of protection measures.

Meo & Al-Khlaiwi (2003) present a literature summary review for the health
hazards of welding fumes. They reported evidence that all welding processes involve potential hazards. Particularly hazardous are welding fumes that cause lung function impairment, obstructive and restrictive lung disease, cough, dyspnea, rhinitis, asthma, pneumonitis, pneumoconiosis, and carcinoma of the lungs. An association has also been found which suggests that welders are more likely to suffer from eye irritation, photokeratitis, cataract, skin irritation, erythema, pterygium, non-melanocytic skin cancer, malignant melanoma, reduced sperm count, motility and infertility.

Roberts (2002) has examined hazardous occupations in Great Britain and concludes that seafaring merchants and trawler fishing are the two most risky occupations. Compared with other occupations in Britain, fishermen were 52.4 and seafarers 26.2 times more likely to have a fatal accident at work.

Focusing on the labor process, heavy exploitation, hazardous working conditions, and precarious living conditions, Dias et al. (2002) reported results from a study completed on occupational health and labour processes in charcoal production in Brazil, indicating a need for social policies and social stakeholders’ decisive actions to change documented working and living conditions.

2.11. Contemporary Approaches to Work-related Health and stress

Three main contemporary approaches to work and health relations require particular attention because of their important contributions to empirical studies and their influence on explorations of work and health, stress, and stress-related illnesses.
2.11.1 Control-demand-support Model of Work-related Stress

Most researchers explain their findings about the negative impacts on health by using the control-demand-support (Figure 2.1) model of work-related stress and illnesses (Karasek 1979; Karasek & Theorell, 1990). This model asserts that high demands and low control over work cause stress and have a damaging impact on health. Later developments of this theory include social support as an important modifier of the strain that high-demand work and low control have on workers’ health, stress and related diseases.

Opposed to specific environmental working conditions, the interpretive model of the CDS theory provides a useful framework for explaining work-stress-health relations. One of the major problems is the relatively small number of theories on health and work and their limited and mono-disciplinary scope. These theories are often based on a medical approach (Warr, 1987, 1994), they examine relations from a narrow mid-level without a sociological base (Siegrist, 1996) or they use econometric approaches that are concerned with the outcomes of learning introduced through research on returns from education.

Figure 2.1 Control-demand Model of Work-related Stress and Active Learning Hypothesis

Source: Karasek, 2005.
Regardless of the limitations of mid-level theories and abstract constructs, as Karasek’s CDS theory considers a wider number of factors that determine worker health, as well as a wider number of the outcomes that inadequate working conditions have on health. A particularly interesting concept is that active jobs characterized by high demands and high control over work in addition to positive outcomes on health, also improve peoples’ readiness for learning.

The active learning hypothesis, regardless of the limited number of studies, demonstrates interrelations between work and all spheres of human activity, including learning in formal and informal settings (see e.g. Livingstone & Raykov, 2008).

Using a relatively small sample (N=286) of production employees in order to examine Karasek’s DC model, Parker and Sprigg (1999) found the highest strain only among the more proactive employees. This study also provided evidence that high demands and low control can influence learning, which was anticipated by Karasek’s model. It also showed that personal proactive orientation has an additional moderating effect on development.

Holman & Wall (2002) provide a significant contribution to the debate on the active learning hypothesis by demonstrating that skill utilization modifies the negative effect of high job demands among call center employees. This study also shows a reciprocal effect between learning and strain. According to Holman & Wall (2002), learning reduces strain that inhibits learning, whereas job control has a significant association with both.
Studies of Karasek and Thoerell’s (1990) model usually examine job strain as a negative outcome of inadequate psychosocial working conditions. On the contrary, De Witte, Verhofstadt & Omey (2005) examine aspects of the impact of both job demand and control. They confirm the negative impact of strain on job satisfaction and the considerable positive impact of an “active job” on learning, illustrated by notably increased skills among young workers at their first job.

Using Swedish data from 1978, Karasek (2004) confirms the active learning hypothesis that active jobs and high demands determine the levels (rates) of participation in “socially active leisure activities.” The study (Karasek, 2004: 291) shows that “variety in leisure, total active leisure, and total political activity are clearly associated with higher skill discretion on the job and higher levels of psychological job demands.”

Chambel and Curral (2005) show that satisfaction with academic life and anxiety and depression levels are all strongly dependent on workers’ perceptions of work and work control, and have a significant impact on students’ academic performance.

In a series of studies among Dutch secondary teachers, Kwakman (1998, 2001) found some evidence that supports the active learning hypothesis and concluded that in addition to job characteristics (job control), some other characteristics have a significant impact on learning. Conducting a wide exploration of teacher learning that applied an inclusive research model of professional learning activity based on personal, task and work environment factors, Kwakman (2003) showed that there is a frequent lack of opportunities for professional learning, and also demonstrated discrepancies between norms and practice related to workplace learning.
In the scarce literature on the active learning hypothesis, which examines the impact of job demands and control on learning, there is a general consensus that the active learning component of the Karasek (1979) and Karasek-Thoerell’s (1990) control-demand model is insufficiently examined (de Jonge & Kompier; Taris et al., 2003, 1997; Taris & Kompier, 2005).

De Jonge and Kompier (1997) explain the lack of research on control over work as a result of the scientific domain, epidemiology, in which the DCS model was developed, since learning does not represent a central field of study in this domain. Taris and Kompier (2005) additionally explain the underutilization of the active learning hypothesis because of its complexity and the difficulties inherent in its operationalization. In addition, part of the problem is the ambiguity of the DCS model and its changing and developing concepts and definitions.

The most recent version of the DCS theory is extended to include physical working conditions, job insecurity and competition. This new stage of the DCS theory indicates the ability of this theory to adjust to new developments related to changing work and global employment trends. The most recent development of the DCS model is the change to The Stress – Disequilibrium Theory, which explains not only how work-related but overall low social control could cause chronic disease through constant deregulation of human physiological systems. This theory is consistent with the Demand-Control Model and includes new biochemical and physics principles in its explorations of human abilities and limits in coping with stress (Karasek, 2005).
2.11.2 Social Capital Theory and Public Health

Social capital is a new but rapidly expanding theory in social epidemiology and the sociology of health and illnesses. Regardless of inconsistent definitions of the major concepts in this theory, the social capital approach explains health benefits as a result of social capital and includes the individual “assets” of social capital involvement, social networks, social attitudes, and social trust. Social capital is defined in terms of the social networks in which a person is involved, and represents an individual asset or community asset.

In his studies of social capital, Putnam (2000) states that members of communities with higher social capital have better mental health and that these communities also have lower crime rates. Similarly, Kawachi et al. (1997) report lower mortality in communities with higher social capital. Berkman (Berkman et al., 2000) provides evidence that higher social cohesion and social support are beneficial for the health of the members in a community, just as Durkheim (1997/1897) found in his study.

Regardless of its recent development, there are different approaches to the conceptualization of social capital. According to Kawachi (2006), there are two major approaches to the social capital theory. One approach is the ‘social cohesion’ school of social capital, which is sometimes labeled as a ‘communitarian’ approach (Moore et al., 2004), that defines social capital through a number of proxy indicators including voting participation, volunteering, crime rates and community perceptions. This school considers social capital as a group attribute and examines the characteristics of communities or neighborhoods and their contextual impact on the health of community
members. This school takes into account trust and reciprocity in a community through aggregation of individual responses up to group levels.

The other approach, the ‘network’ theory of social capital (Lin, 1999) defines social capital as a network of people manifested through mutual social support, information channels and exchange and social credentials. This approach uses some forms of socio-metric analysis in order to perform network analysis, including the nomination of network members who provide access to valued information or resources.

This theory basically states that inadequate social conditions determine individual health, and documents this through numerous studies on social inequalities in neighbourhoods. According to proponents of social capital theory and their explanation of social determinants of health, a person’s social position and access to goods and services determines his or her health and well being.

The major advocates of this theory are Ichiro Kawachi (Kawachi et al., 1999) and members of the Harvard School of Public Health (Berkman & Kawachi, 2000; Melchior, Krieger, Kawachi, Berkman, Niedhammer & Goldberg, 2005), who base their work on a neo-Durkheimian approach to health and health inequalities (Turner, 2003). This approach is more directly connected to work on social engagement and is widely explored and propagated by David Putnam (Putnam, 1995; Putnam, 2001).

Concerning social control over work, Kawachi (2005) indicates issues related to collinearity, which is in turn related to socioeconomic gradients in mortality and low control over work that are themselves related to lower socioeconomic status (Davey-Smith & Harding 1997, Carroll, Davey-Smith, & Bennett, 1996). Kawachi (2005) argues that the empirical findings contradicting expected health outcomes demonstrate that
causal relations could hardly be established. He indicates the need for further explorations of unobserved determinants of health (Figure 2.2) and proposes the application of more specific, multi-level methodological approaches to this domain. In fact, he demonstrates that regardless of social class position, job stress is significantly associated with health.

Figure 2.2 Concurrent models of causal relations between social class, health and coronary diseases

![Concurrent models of causal relations](source: Kawachi, 2005.)

Kawachi argues with Marmot (Marmot et al, 1997), who interprets social class as a mediator in relation to job stress and their joint impact on the incidence of cardiovascular disease. He states that social gradient determines the psychosocial work environment and in this way contributes to health deterioration, specifically to cardiovascular disease. Kawachi also argues with Davey-Smith (Davey-Smith & Harding, 1997), who considers the impact of social class on the confounding factors for job-related stress and cardiovascular disease.
Similarly to Landsbergis et al. (2003), Kawachi (2005) appraises the role of job control as a mediator of socioeconomic inequalities in health, and proposes a new hypothetical framework that reinforces the impact of class position on increased work-related stress. The basic point in this consideration is that job control is strongly related to social class, and since social class is “upstream” of job control and work conditions, it affects the relations between social class and other possibly confounding variables, including control over work. The confounding effects deserves carefully elaboration and my study address this issue through multivariate research design and analysis of variety of complementary data sources.

The problem with this theory in regard to work-related health is that it mainly explores the general social determinants of health and peoples activities during free time while devoting little attention to industrial relations and environmental working conditions.

Regardless of the conceptual (Kushner & Sterk, 2005) and methodological issues, this method represents a more advanced approach than the neo-liberalism and modern individualistic approaches to health related issues (Turner, 2003).

Also, social capital theory provides limited empirical findings on work-related factors as determinants of health but, similarity to theories that underline the important mediating role of social relations for employees’ health (e.g. Karasek, 1979; Karasek & Theorell, 1990), indicates the possibility for its integration in an advanced explanatory model of work-related health. The particular contribution of social capital theory is an approach that examines health of populations at an aggregated level and in this way goes beyond modern individualism.
As previously mentioned, the review of studies based on social capital theory shows significant differences in the conceptualization and measurement of the main indicators of social capital (Kawachi, 2005). My study uses indicators that represent both streams of social capital theory, social cohesion (participation in volunteer work in local communities), and an approach that emphasizes the important role of social networking and nonformal information exchange for human health. This approach is represented through informal learning at work and employees’ requests for advice at work (worker search for advice about job-related skills at work).

2.11.3 Effort-reward Imbalance Model of Work-related Stress

The second major theory that explores work and health relations and the adverse effects of work stress is the effort-reward imbalance (ERI) model, which explains risks for the onset of stress-related diseases as a result of an imbalance that exists between efforts a person makes at work and his or her received rewards. According to this model, the imbalance, low efforts, and rewards ratio create strong and often prolonged negative emotions that cause stress and stress-related illnesses. This model, as Figure 3 shows differentiates efforts into two groups related to situational (including demands) and personal factors (motivation and commitment). Rewards are perceived not only as the financial results of work but non-financial rewards, including work status, prospects for promotion and job security. An additional intrinsic factor that contributes to stress, according to the ERI model, is overcommitment, which is pertinent to prestigious occupations or scarce labor market perspectives. According to the ERI model, work stress
increases the likelihood of developing illnesses (e.g. cardiovascular disease) through biological reactions to stress as well as through the impact on the onset of health adverse behaviours.

Siegrist (2005) recognizes that the ERI model is not an exclusive determinant of health and he recognizes the impact of environment, physical and chemical hazards, shift work, and level of physical activity and their impacts on employees’ health. This model recognizes a wider array of human needs, including those for personal growth, status and access to a social network beyond primary groups, whereas explanation of the effects of work on health mainly includes basic financial needs, salary and promotion, self-esteem, and job security. Other human needs, such as needs for self-actualization and social affiliation, as well as the impact of work environment, are not included in the ERI and other similar theories such as relative income (e.g. Wilkinson, 1997) that examine specific psychosocial characteristics of work environment and its impacts on health.

The Effort-reward imbalance model of work stress considers employment relations related to salary and status and is rooted in the theory of reciprocity or social
exchange. The Effort-reward imbalance (Figure 2.3) represents the disproportion between efforts based on external demands and intrinsic motivation, and received rewards in the forms of income, social- and self-respect and the likelihood for career mobility.

There is a large body of studies that prove the validity of this model in different areas of work (see reviews in Tsutsumi & Kawakami, 2004; van Vegchel et al., 2005). In a study that integrates findings from two models of job stress, the effort-reward imbalance and the job strain model, conducted among respondents who suffered from an acute myocardial infarction, Peter, Siegrist, Hallqvist, Reuterwall, & Theorell (2002) found that combined information from both of the investigated models of stress increases risk estimation of acute myocardial infarction in comparison to both theories alone. Another study (Bosma, Peter, Siegrist, & Marmot, 1998) found that, in comparison to high control jobs, employees working at intermediate and low control jobs are 2 and 2.5 times more likely to suffer from coronary heart disease.

Overall, the ERI model provides a logical framework that takes into account factors that, in addition to work, determine human health, including genetic predispositions, early life events, material conditions and environment- and health-related behaviours. The ERI model recognizes but does not include these factors in its core explanatory model and future studies are warranted to closely examine these interrelations.

2.12 Summary of Literature Review on Underemployment and Health

The majority of studies on the impact of underemployment on health examine specific and non-representative segments of the population. Most of these studies
included mainly young employees that are between the ages of 20 to 40 years old
(Dooley & Prause, 1998 and 2004; Dooley Prause, & Ham-Rowbottom, 2000; Dooley,
2003), college graduates and executives (Feldman, & Turnley, 1995; Feldman, & Leana,
2000; Feldman, Leana, & Bolino, 2002). There are also various studies that include only
immigrants (Beiser, Johnson, & Turner, 1993; Aycan, & Berry, 1996; Lee, Rodin,
Devins, & Weiss, 2001; Abbott, Wong, Williams, Au, & Young, 1999), relatively small
and non-representative samples of racial minority groups, and clerical workers (Jones-
Johnson, 2002).

In general, these studies are not concerned with the impact of structural social
factors and specific environmental conditions on health. The major dependent variables
examined in these studies are based on psychological theory and focus on individual
mental health and depression, stress and well-being, self-esteem, or alcohol consumption.

Also, these studies define underemployment and health in a way that makes
reliable generalizations and comparisons to previous studies difficult. Underemployment
is usually defined as subjective underemployment (Jones-Johnson, 1989; Johnson, 1990;
Johnson, Morrow & Johnson, 2002; Bolino & Feldman, 2000), economic
underemployment, involuntary part-time employment, employment at poverty level
wages (Dooley & Prause, 1995; Dooley, Fielding & Levi, 1996; Dooley & Prause, 1997a,
1997b, and 1998a; Dooley, Prause, & Ham-Rowbottom, 2000), or as chronic
underemployment (Prause, 1991). Recently introduced concepts of continuing
employment status (Dooley, D. 2003a; Grzywacz & Dooley, 2003b) provide valuable
findings and contribute to the development of this research domain, but require further validation based on a more complete sociological framework. Unfortunately, studies on underemployment and health suffer from lack of data and researchers often conduct studies that include available rather than required variables for the adequate definition of underemployment. This fact diminishes the conceptual validity of these studies and necessitates further studies specially designed to grasp the complex phenomenon of underemployment.

Many studies of underemployment and health have problems obtaining data that contains appropriate variables on underemployment. In an effort to construct variables related to underemployment, researchers were, with greater or lesser success, adjusting the indicators contained in the existing national data sets. Prause (1991), for example, used the concept of “chronically underemployed” for any of the four indicators of economic underemployment that respondents in the 1979 National Longitudinal Survey of Youth experienced during the previous two to three years: unemployment, involuntary part-time work, intermittent unemployment, and low income.

Because of limited data sources, studies on underemployment and health usually addresses specific issues related and assessing these issues in some specific population groups or by examining mainly psychosocial determinants of underemployment and health relationships.

In a study based on the Americans’ Changing Lives (ACL) survey, Friedland and Price (2003) report the significant effects that different forms of underemployment have on health. Using Clogg’s labour utilization framework, this study distinguishes four forms of underemployment: involuntary reduced hours of work (workers that want to
work more than 35 hours per week), income under the poverty line, skill-based underemployment (the difference between the average for an occupation and the worker’s attained education), and status-based underemployment (based on discrepancies between real and expected status). In this study Friedland and Price used indicators for self-perceived health, activity limitation, and psychological well-being. Job decision latitude from Karasek’s Job Control Questionnaire and variables on financial stress as mediating factors were also included. Longitudinal data used in this study allowed for the control of the selection hypothesis. This research indicated the significant impact that diverse forms of underemployment have on the different aspects of health. The main conclusion from this study was that the causal effect of underemployment on health is stronger than the selection effect. Using stress processes and personality frameworks, this study explains the impact of underemployment on health as a result of financial stress and job decision latitude. This study, in its examination of longitudinal data and a wider spectrum of underemployment measurements, provides significant insights into underemployment-health relations and the operationalization of underemployment measures.

This longitudinal study provides valuable indications of the effects of causality and selection on underemployment and health, but available measures of underemployment are significant limitations of this study. The arbitrary criteria of classification (35-hour work week and average educational attainment for a specific occupation) applied in this study require cautious generalizations based on results from the study. Further studies based on a consistent conceptualization of underemployment that avoid arbitrary definitions of time-related underemployment and approximations of
skill-based underemployment, as well as a reexamination of “status-based underemployment” can provide the results required for understanding and explaining the complex underemployment phenomenon.

My study is based on an inclusive and consistent conceptualization of underemployment (Livingstone, 1998, Livingstone and Schultz, 2006) that defines underemployment based on both subjective and objective criteria. Subjective underemployment includes self-perceived relevance of education to work and self-reported utilization of skills and knowledge at work as well as time-related underemployment. Objective or formal underemployment is based on the real differences between the level of attained education and the level of education required for obtaining and performing a specific job. My study uses a specific time-related definition of underemployment based on the workers’ preference regarding hours of work, rather than artificially imputed criteria for part-time work.

In the research area of underemployment and health, a large body of literature (Link, & Phelan, 1995; Marmot et al., 1998; Marchand, Wikler & Landesman, 1998; Adler, 2003; Williams, 2003; Ferrer & Palmer, 2004; Siegrist, 2004) demonstrates the strong association of socioeconomic status and economic class with health. In many of these studies, which were conducted mainly by government health institutions, particular attention is paid to individual lifestyles and their impact on health (Lyons, R. & Langille, 2000; Health Canada, 2000). For instance, in a comprehensive assessment of mortality and/or disability due to disease, injury, and conditions usually considered as a major risk factor, Murray and Lopez (1996) attribute around 40% of mortality and morbidity to traditional risk factors (malnutrition 11.7%, tobacco use 6.0%, hypertension 5.8%, water
and sanitation 5.3%) and more than 60% of mortality and morbidity to undefined risk factors. It should be noted that even traditional risk factors are strongly related to socioeconomic status. Similarly, Adler’s (2003) estimation, based on her extensive studies, is that 70% of all premature mortality can be explained by socioeconomic status, which demonstrates a widening social disparity in health.

A longitudinal study of health inequalities (Zins, Gueguen, Nakache & Goldberg, 2003) shows a significant association between health and socioeconomic class. This study also shows that all lifestyle factors are strongly associated with socioeconomic status. It concludes that lifestyle factors only partially explain social inequalities in health and mortality and that other factors have a strong impact on health inequalities between different socioeconomic groups. Similarly, a recent study of the health status of young Canadians and the impact of unemployment and underemployment shows that risky health behaviour explains only a part of the variations in health (Sadava, O'Connor, & McCreary, 2000). This study finds that household income, rather than individual income, has a greater impact on health; it also finds that both unemployment and underemployment represent risks to the health of young Canadians.

2.13 Research Gaps in Domain of Underemployment and Health Relationships

In contrast to studies that document the negative impact of underemployment caused by involuntarily reduced hours of work, a considerable number of studies find no difference in health status among employees with temporary and fixed work agreements. Benach et al. (2004) looked at the changes in employment and health in the European Union. Using the data from the Third European Survey on Working Conditions
related to job satisfaction, stress, fatigue and backache as health indicators, the authors found that non-permanent employment is associated with higher job dissatisfaction but with lower levels of stress. Also, small employers had more fatigue and stress but less job dissatisfaction, whereas the self-employed were more likely to report fatigue and backaches. The study also found that full-time employees reported lower levels of health indicators than part-time workers.

Rodriguez (2002) examined marginal employment and health in Britain and Germany. The study found that the health status of part-time workers with permanent contracts is not significantly different from those who are employed full-time. In Germany, about 42% of full time employees with fixed-term contracts were more likely to report poor health than those who had permanent work contracts. Also, in Britain, only part-time work with no contract is associated with poor health, but the difference is not that statistically significant. Based on the obtained results, Rodriguez concludes that monitoring the possible health effects of the increasing number of marginal employment arrangements requires additional research and higher priority.

Costa et al. (2006) examined the flexibility and variability of work hours on health. Variability was defined as being subjected to company control and decision, and flexibility as individual discretion and autonomy. Using the Third European Survey on working conditions data, the authors conclude that flexibility and variability of working hours seem to be inversely related to health and psychosocial well-being. A flexible work schedule was the most important factor influencing work satisfaction and the second most important in affecting family and social commitment. On the other hand, variability was the third most important factor influencing family and social commitments. The study
provided evidence that suitable arrangements of flexible work hours appear to have a beneficial effect on health and well-being, as well as on social relations at work.

Bardasi and Francesconi (2004) found that atypical employment (temporary and part-time employment) does not have a significant detrimental impact on employees’ health. The results from a panel study of approximately 7000 workers obtained from the British Household Panel Survey show that atypical (seasonal/casual) employment has a negative impact only on job satisfaction.

Hibbard and Pope (1987) studied the characteristics of jobs held by women as compared to men during the 1970s and assessed the differences between job characteristics and family status with health status by sex. They suggest that there are differences in the job characteristics held by men and women and in the relative importance of these job characteristics in relation to health. It was also concluded that men held jobs with higher quality intrinsic work characteristics and perceived their jobs to be less stressful and less physically and mentally tiring than did women.

Huang et al. (2003) examined the role of workplace safety. The study particularly evaluates the role of employment status and its effects on job satisfaction. Particular attention was focused on perceived injury risk and injury incidence. They found that for full-time workers the level of job satisfaction was about the same regardless of the level of injury risk. However, the satisfaction of part-time workers was significantly higher when they perceived low injury risk rather than high injury risk.

It seems that in studies that examine the impact of employment on health, and particularly in studies about underemployment and health, more attention is devoted to psychosocial working conditions than to the physical working environment. It is likely
that inconsistent results in this domain, in addition to incomplete control for confounding factors, could be attributed to usually neglected variables related to environmental work conditions, health hazards and discomfort experienced at work.

Lowe and colleagues (2003 and 2007) examined the correlation of workers' perceptions of the extent to which their work environment is healthy. Based on the results of a representative Canadian survey, it was found that perceptions of a healthy work environment were positively associated with job satisfaction, commitment to work, work morale, and lower self-reported absenteeism. The strongest correlations with a healthy workplace environment were found between good communication, social support, and job demands. Overall, the authors concluded that a higher rating of working environments is significantly associated with job satisfaction, higher commitment to work and higher work efficiency. The obtained results from this study demonstrate the important role that organizational characteristics have for employees’ job-satisfaction and individual well-being.

Recent reviews of literature on theory and practice related to the impact that work environment has on health provide a basis for the definition of an appropriate conceptual framework that should include the relevant structural and situational variables necessary for the explanation of underemployment-health relations. My study intends to provide relevant empirical evidence in order to define a reasonable model of underemployment-health relationships.
Chapter 3

Conceptual Model for the Study of Underemployment and Health-Related Quality of Life

My general approach to the study of underemployment and health is based on an understanding that the progress made in population health, increased longevity, and reduced morbidity stems from better general living conditions, themselves the results of social, economic, and educational development during the last century. This perspective also recognizes that the main risks to human health today are products of newly constructed environments (Mechanic, 1975; Brown, 2002; Neumann, 2005; Gunton, 2005). Further progress requires the consideration of social determinants of health and the development of mechanisms to protect the well-being of people from all social groups, at work, in the household, and in the community (Lynch et al., 2000).

My conceptual approach is based on a humanistic sociological theory that understands people as having universal abilities and needs, exceeding those of basic physiology and survival. According to this perspective, humans also have a need to realize their individual potential through creative involvement in work and social activities (Fromm, 1955, 1968, 1984; Maslow, 1969, 1983).

Understandings of the relations between structural variables and health are extensively informed by critical realist theory (Scambler, 2001, 2002), and by the neo-materialistic approach to social determinants of health proposed by Lynch (Lynch et al., 2000).

The conceptual model applied in my study builds on four main sources:
1. Critical analysis of the mainstream contemporary theories on work-related health, such as the demand-control model (Karasek, 1979), social capital theory (Kawachi & Berkman, 2000), and effort-reward imbalance (Siegrist, 1986), as well as other psychosocial theories such as the relative income hypothesis (Wilkinson, 1997);

2. The neo-material approach to health and income inequality (Lynch, 2006; Lantz & Lynch et al., 2001; Lynch, Davey Smith, Kaplan et al., 2000) and the critical realist perspective on health (Scambler, 2001);

3. Environmental theories of stress (Tompa et al., 2007; Wisher, 2007; Frankenhaeuser, 1991); and


The model applied in my study recognizes findings obtained through research based on the control-demand and social capital theories, which document the negative impact of job strain and poor social relations on workers’ health. While acknowledging the well-established link between demand and control over work and employees’ health, my model goes beyond these approaches by considering employment class. In this model, social class is seen as determining core employment relations, including authority and control at work. Basically, in other models, specific job features like control and demand are confounded with social class, which in fact determines or significantly impacts relations at work and in society in general.
Furthermore, my conceptual framework recognizes the importance of the physical work environment. It is informed by a large body of empirical evidence demonstrating that the work environment and exposure to risks and discomforts play a crucial role in various fatal and nonfatal occupational diseases and injuries. However, despite this evidence, the main theoretical approaches to work-related health (DCS, SCT, ERI) do not devote sufficient attention to this factor. It is expected that my proposed expanded model, incorporating social conditions and characteristics of the work environment as mediating factors in determining employees’ health, will provide a more comprehensive explanation of underemployment-health relationships and a new direction for work- and education-related policies.

3.1 Critical Analysis of Contemporary Theories on Work-Related Health

The literature review shows that major research approaches to work-related health often consider only a limited number of health determinants, without controlling for the possible impact of the physical work environment. Also, studies on work and health, along with those on underemployment-related health, do not include employment status, nor do they connect the main constructs (demand-control, effort-reward or social capital) with the structural health determinants that, according to many researchers, profoundly affect the population’s health. Since these models mainly use subjective data on perceptions of health-related psychosocial conditions at work, and rarely include rigorous controls for collinearity, there are high risks for methodological fallacies.
Also, psychosocial approaches conflate the structural determinants of work with their subjective consequences. For example, the demand-control model (Figure 3.1) conflates demand and control at work with social class, since class position, or the ownership of the means of production and control over work processes (Livingstone, 2004), determines employment relations. According to this approach, the demands at and control over work are decided by occupational class, and represent only one aspect of class relations.

Figure 3.1 Demand- Control Model, Karasek, 2008.

Source: Karasek, 2008.

In a similar way, the effort-rewards imbalance model (Siegrist, 2005, Figure 3.2) conflates the structural determinants of income distribution with the subjective perception of this distribution. This is due to the fact that rewards basically represent the perceived adequacy of income, or workers’ feelings of exploitation or division of the surplus value derived from the production or service they provide.
Health Canada (2002) proposes a comprehensive and consistent evidence-based model of the factors that determine population health. It includes a variety of factors classified as home (housing quality, indoor air quality, water supply, noise, sanitation, chemicals), neighbourhood (water, food, drugs, crime, road safety), and ambient environment (ambient air quality, insect-borne diseases, water, hazardous chemicals, radiation).

According to the Health Canada model (Figure 6), the environment refers to the physical, social, cultural, and economic attributes of human surroundings. The physical environment is identified as one of the determinants of health. According to this model (p. 3):

Our health—in fact, our very survival—depends on the environment, from the air we breathe, to the water we drink and the food we eat. When any of these is threatened, human health is compromised.
Regardless of the strong evidence that the work environment is a vastly important health determinant, Health Canada’s model (Figure 3.3), like the majority of contemporary models on health, does not consider it as a specific and highly influential source of hazards, discomforts, and unfavourable locations for employees. In contrast to the major reports on Canadians’ health, which have primarily focused on healthcare, more recent studies recognize social, environmental and working conditions as significant health determinants (e.g. Romanov, 2002; Jackson, 2002; Raphael, 2004; The Senate Subcommittee on Population Health, 2008; World Health Organization, 2008). However, there is as yet a relatively small number of empirical studies that evaluate the specific relations between different forms of employment and environmental working conditions. Although working conditions have generally improved in comparison to those of previous decades, there are still considerable risks for human health; indeed, a number of studies have actually revealed new risks for employees (Brun et al., 2007).
In addition to the methodological issues surrounding psychosocial theories of work-related health, studies in this domain suffer from conceptual fallacies that indicate a need for a comprehensive, theory-based sociological conceptualization of the main constructs used in the DCS and other psychosocial models (Muntaner & O'Campo, 1993). Instead of relying on self-reported indicators of demand and control, and an individualistic approach to the measurement of social processes, Muntaner and O'Campo suggest the use of social class as a basic unit of analysis and the development of objective measures of work characteristics that can provide a more reliable explanation of work-health relationships.

A more recent study (Borrell, Muntaner, Benach & Artazcoz, 2004), which applied the model proposed by Muntaner and O'Campo, provided evidence that social class, defined as the relations of ownership and control over productive assets, reveals an inequality in health that conventional measures of social stratification, education, and income do not detect. Also, a study exploring different concepts and measures of socioeconomic inequalities in health (Wolfforth, 1997) indicates that socioeconomic status (SES) and a neo-Marxist conceptualization of social class are empirically distinct and serve to explain different aspects of social inequalities in mental health. According to Wolfforth, social class has a greater explanatory potential for mental health than socioeconomic status, as measured through education and income. Similarly, Muntaner and Lynch (1999) demonstrate that measures of social stratification, when operationalized as a continuum of income, occupational prestige or education, do not adequately explain how this stratification determines health (Muntaner & Lynch, 1999).
Evidence from numerous epidemiological and sociological studies shows the critical impact that economic class has on health (Krieger & Fee, 1994; Drever, Whitehead & Roden, 1996; Adler et al., 1999; Scambler, 2001; Raykov et al., 2005). This explains the differences that exist in mortality in regard to the British Registrar General Occupational Classification (Figure 3.4), as well as the health disparities that exist among people who belong to different economic classes (Figure 3.5).

Figure 3.4  
Economic Class & Health*  

Figure 3.5  
Class Position & Health**

Regardless of the evidence of the effect of the physical work environment on employees’ health, the mainstream theories on work-related health and stress do not include this variable in the core of their explanatory models. It is for this reason that my study simultaneously includes employment class and characteristics of the physical work environment in its analysis.

* defined per UK Registrar General classification

Source: Raykov et al., 2005. ** Class was defined on the basis of the ownership of the means of production and the role of employees in production
3.2 Neo-material and Critical Realist Approaches to Social Determinants of Health

Various theoretical approaches to social inequalities in health—neo-material, critical realist, and psychosocial—examine social inequalities in health, but provide different explanations for this phenomenon (Lynch, Dave Smith, Kaplan et al., 2000; Ross & Lynch, 2004).

Neo-material and critical approaches argue that income inequality and health depend not only on perceptions of unequal income (imbalance), but on the structural causes of income inequality. These psychosocial theories explain the link between income (rewards) and health inequalities. The major criticism of these theories is that they conflate the structural determinants of health (e.g. class position) with the subjective consequences of inequality (e.g. demand and control at work). The neo-material approach recognizes that structural, political, and economic determinants generate income and health inequalities before they transform into a personal experience of inequality. This approach also concedes that psychosocial theories consider only horizontal social relations without reference to vertical social relations, which, by their very nature, can significantly determine horizontal or informal social ties. Psychosocial interpretations are also criticized for giving the impression that psychosocial processes take place in a type of vacuum, thus perpetuating the status quo of regressive social relations.

Based on a synthesis of an extensive body of empirical evidence and a critical review of the existing theories on health inequalities, scholars who propose the neo-material approach (Lynch, Dave Smith, Kaplan et al., 2000) explain health inequalities as the result of people’s exposure to the material world. According to this approach, income
inequality impacts health through the negative exposure and lack of resources that underprivileged social groups experience. Health inequalities arise from a “neo-material” matrix, or the public infrastructure that is available to individuals, such as education, health services, transportation, environmental quality, food and housing. In short, income inequality is a manifestation of neo-material conditions and disadvantages that affect population health. According to this approach, income and health inequalities are the products of historical, cultural, political, and economic processes and power relations that determine investments in health-related public infrastructure and the distribution of income.

Unlike psychosocial and individual interpretations, which consider personal psychological functioning as a cause of health inequalities, the neo-material approach recognizes political and economic processes as generating inequalities through available resources and determining access to education, health services, and employment. Like Mechanic (1975), Lynch (Lynch et al., 2000) advocates strategic investment in the improvement of neo-material conditions through a more equitable distribution of resources as a means of reducing health-related inequalities and improving access to public resources for people at all levels of the social hierarchy. In addition, according to the neo-material approach (Ross & Lynch, 2004), the major factors linking income inequality and health are labour market experience and income transfers to disadvantaged social groups. The neo-material approach provides a coherent explanation of social determinants of health and indicates a need for the analysis of structural factors in the exploration of work-health relationships. By including employment class, my model
acknowledges structural social relations, ownership, and the role of employees in the production of goods and services.

Critical realism provides a practical model for this study and a conceptual model of employment relations and an explanation of social determinants of health, (Scambler & Higgs, 1999; Scambler, 2001, 2002). This model shows the interactions between social class and the constructs used to explain work-related health and stress: demand-control, effort-reward imbalance, and relative income hypothesis (Wilkinson, 1996, 1997). Like Adler (Adler et al., 1999), Scambler (2002) argues that class relations as a generative mechanism provide the most important single measure for understanding health inequalities. Class is seen as a categorical mechanism that generates social and health inequalities through employment and everyday interactions. Regardless of equivocal early and neo-positivist studies that employ different forms of Registrar General Occupational Classification (RGOC) and forms of socioeconomic status (SES), this approach reveals significant social and racial differences in health.

Scambler and other critical realists accept the neo-Marxist theory of class relations employed by Clement and Myles (1994) as a useful starting point for further discussion of health inequalities. According to Clement and Myles, who use an approach developed by E.O. Wright (1996, 2006), classes are formed through production and are reproduced through social life. The main criteria for class definition are the real ownership of the means of production and the appropriation of surplus value through control of labour. Hence, the capitalist class is determined by the real economic ownership that gives it the right to make strategic decisions. The new middle class exercises ”tactical decision-making” related to administrative procedures and control over others. The working class
has no command over the means of production or control over others involved in it; this class sells only labour power. Many studies on social stratification and health focus on narrow socioeconomic status, as defined by education and occupation, and avoid conflict-oriented theories that examine the ownership of the means of production and authority in the workplace (Robinson & Kelley, 1979). The critical realists’ approach considers class relations as crucial to the understanding of health inequalities and provides justification for the inclusion of class in further studies on employment and health.

Since core concepts used by the control-demands approach to work-related health depend on class relations, ownership and decision-making, my study concurrently analyzes social class and perceived control over work to explore their explanatory power and collinearity. Class also directly affects attitudes toward earnings and fringe benefits, which, at the personal level, are perceived as efforts and rewards; in fact, they represent another name for the appropriation of surplus value. For this reason, my study includes income in its analysis of the association between underemployment and health-related quality of life.

### 3.3 Environmental Theories of Stress

There are a considerable number of studies documenting the differences that exist in the physical work environment of those who experience precarious employment. The revival of studies on work conditions and precarious employment (Lundberg, 1991; Quinlan, 2001; Evans & Kantrowitz, 2002; Tompa et al., 2007) demonstrates a higher
level of risk exposure and injuries among temporary and part-time workers and, in general, among people in precarious working conditions.

One study of health risks on the job (Lundberg, 1991) showed that poorer people often experience disadvantageous working conditions (heavy lifting, repetitive strain, frequent contact with toxins, fumes, dust, explosives, and vibration) compared to more affluent people. Based on regression analysis, this study demonstrated that working conditions have a strong association with health than socioeconomic status.

Another study summarizing the potential role of environmental risk exposure to health disparities in relation to socioeconomic status (Evans & Kantrowitz, 2002) demonstrated that lower socioeconomic groups in the United States experience greater exposure to multiple environmental risks with adverse health consequences than do more affluent groups. These include hazardous materials and toxins, air pollutants, water quality, ambient noise, residential crowding, and inadequate housing. Evans and Kantrowitz also found that lower socioeconomic groups experience more harmful environments in their educational facilities and workplaces, as well as in their households and neighbourhoods.

Tompa and his colleagues (2007) offer a more inclusive model of occupational health than do other theorists. Their study considers a wider array of the dimensions that represent precarious work experience, and is based on a synthesis of the demand-control-support (DCS) and effort-reward imbalance (ERI) models. In addition to exposure to physical hazards, this theory emphasizes the positive role of legal and institutional protection. According to this model (Figure 3.6), precarious work experiences cause
adverse health effects through employees’ increased exposure to a harsh physical environment, work-related stress (DCS), and material deprivation (ERI).

Figure 3.6 Framework of the Health Consequences of Precarious Work-related Experiences

This model, developed on a framework of precarious work in Western Europe (Rodgers, 1989), is a valuable contribution towards understanding the impact of precarious work-related experiences on employees’ health. Particularly important is the recognition of environmental work conditions as significant risk factors for employees.

The proposed model considers various aspects of precarious work and provides a useful mechanism for explaining the “downstream” adverse health outcomes that this type of employment engenders. However, it does not recognize “upstream” or structural factors, including economic class, as determinants of specific dimensions of work relations (authority and control) and of the distribution of earnings (wages and profits) that operate within the capitalist mode of production. My conceptual framework overcomes this missing link and, alongside the characteristics of the work environment,
includes economic class as a core determinant of employees’ health-related quality of life.

Other studies on the impact of the work environment on health show that psychosocial theories have a narrow understanding of stress (Vischer, 2007). These theories mainly consider psychological or mental stress due to increased demands, tight deadlines, or intensification of work. They neglect the physical stress from a harmful work environment (e.g. temperature, noise, vibrations or chemical substances) and high physical exertion (heavy loading or awkward working positions). According to Vischer, both types of stress produce similar reactions. Known as the *fight-or-flight response*, these reactions mobilize an organism for survival. If such responses chronically accrue, deleterious effects on physical and mental health can result (Farag & Mills, 2004). There is strong evidence that chronic stress significantly increases the risk of many diseases through its effects on different biological systems. The most frequent consequences occur to the cardiovascular system, metabolism, and the immune and gastrointestinal systems (Schneiderman, McCabe & Baum, 1992).

A study among blue-collar workers, conducted almost 30 years ago, demonstrated that, in addition to the work environment, chronic stress was associated with cardiovascular, gastrointestinal, and psychical symptoms. Stress was also linked with respiratory and dermatological symptoms, but only among workers who reported exposure to harmful physical and chemical agents (House et al., 1979).

According to the standard definition, stress is the result of a perceived imbalance between work demands and a person’s potential to cope with them (OSHA, 2005). This understanding emphasizes the need for an appropriate match or fit between a person’s
abilities, skills, and degree of control and the demands of work. A mismatch in any direction, from extreme demands to a lack of demands or lack of discretionary control over work, represents a possible source of stress (French et al., 1982; Kaplan, 1983; Czikszentmihalyi, 1990). A wider understanding of the ”person-environment match” theory of stress, documenting adverse neuroendocrine and cardiovascular reactions caused by ”overload” or ”underload” (Frankenhaeuser, 1991), provide a valuable framework for understanding underemployment experiences and their consequences on health. In sum, it seems that any type of imbalance at work, either significantly increased demands or considerably decreased demands, provokes employees’ adaptation mechanisms and in this way causes stress. Since chronic stress produces altered and adverse psychosocial and physiological reactions that often lead to the development of chronic diseases, this study considers chronic stress as a negative outcome of work that can lower employees’ health-related quality of life.

Considering the large body of literature on the environmental psychology of the workspace that shows its significant impact on satisfaction, productivity, and employees’ health, Vischer proposes a new theoretical model of the worker-workspace relationship in which physical stress and comfort play a critical part. According to Vischer (2007), the physical environment should be healthy, safe, comfortable, and supportive for work activities. If employees perceive the work environment as uncomfortable, it causes stress that affects performance, satisfaction, and health (Klitzman & Stellman, 1989; Milton, Glencross & Walters, 2000).

Vischer’s research framework (Figure 3.7) builds on the demand-control model of stress, though he replaces discretionary control over work with control over decisions
about the physical workspace (Vischer, 2007: 181). This model also translates psychological demands into work “demandingness,” which signifies the energy required to perform tasks in a specific workspace.

The proposed model reveals the complexity of the work-health relationship and introduces frequently overlooked features of the workplace (e.g. risk, discomfort and location) that significantly affect employees’ health. However, this approach is mainly concerned with the way in which the architectural design of the workplace can increase office workers’ productivity. Like many others on work-related health, Vischer’s study (e.g. Whitehall Study of male British public servants, Marmot, Kogevinas & Elston, 1987) focuses on white-collar workers and neglects a large number of industrial workers who, more than other occupational groups, are exposed to harmful work environments (Cooper & Smith, 1985; Kvarnstrom, 1997).

Figure 3.7 ”Demand-Control Model” of Workspace Stress

![Image of Demand-Control Model diagram]

Source: Vischer, 2005.
The value of Vischer’s model is undisputable for office and service workers, but the industrial work environment requires the same or greater attention, because of the specific nature of its hazards and discomforts. The approach proposed in my study considers a whole array of workplace hazards, locations, and discomforts while remaining open to additional information. As well, my framework recommends the constant development and re-examination of the criteria for maximal exposure to harmful chemical, biological, and physical stressors at work.

3.4 Empirical Evidence on Risks for Occupational Health

According to the most recent global data, reported at the XVIII World Congress on Safety and Health at Work, organized by the International Labour Office, 358,000 fatal work-related accidents and 1.95 million fatal work-related diseases were registered in 2003. In the same year, 337 million accidents causing four or more days’ absence from work (Al-Tuwaijri et al., 2008) were documented.

In addition, several large-scale surveys on working conditions in the European Union show that musculoskeletal diseases are the most frequently reported work-related ailments (Paoli, 1992, 1997; Karlheinz & Marlier, 1996; Paoli, Pascal; Parent-Thirion, Agnès, 2003; Paoli & Merllié, 2001; Parent-Thirion, Fernández Macías, Hurley & Vermeylen, 2007).

Likewise, the US Survey of Occupational Injuries and Illnesses (BLS, 2007) and Census of Fatal Occupational Injuries (BLS, 2008), recognized by OSHA-monitored injuries and illnesses, show that 4 million American workers suffered occupational
injuries and 216,000 nonfatal work-related illnesses in 2007. As well, the World Health Organization reported that millions of workers are at risk of developing lung cancer, mesothelioma or leukemia from exposure at their workplace (WHO, 2007; Driscoll et al., 2005). According to the same source, at least 200,000 people die every year from preventable cancer related to their workplace.

The previously presented data indicates that it is not likely that psychosocial factors, job strain, effort-reward imbalance, social capital or perceived relative income disparity cause such a large number of the reported work-related illnesses and injuries, such as repeated trauma, skin diseases, falls, slips or trips. The most likely causes for these nonfatal occupational injuries and work-related illnesses are high exposure to risks of injury, the physical requirements of the job, and contact with harmful environmental conditions at work.

In addition to the existing evidence on occupational health, studies show that, as well as currently recognized risks, there are many new or emerging biological (Brun et al., 2007), physical (Flaspöler, Reinert & Brun, 2007), and psychosocial (Brun, E., & Milczarek, 2007) health hazards.

According to these studies, the most significant physical risks that threaten employees at modern workplaces are a lack of physical activity, prolonged standing, and combined exposure to musculoskeletal diseases (MSD) and psychosocial risk factors (Flaspöler, Reinert & Brun, 2007). Particularly risky is multi-factorial exposure, that is, exposure to prolonged sitting, noise, poor acoustics and room atmosphere, inadequate lighting, and poor ergonomic design of the work equipment, and organizational factors, such as low job control, time pressure, and high mental and emotional demands.
Emerging biological risks include occupational hazards related to global epidemics (SARS, avian influenza, risk of drug-resistant organisms) that threaten healthcare workers and employees in the veterinary services, livestock and food-manufacturing industries (Brun et al., 2007). In addition, biological threats can result from poor maintenance of water and air systems, and combined exposure to biological agents and chemicals that exist in many workplaces.

According to the Delphi method-based forecasts, the most significant emerging psychosocial health risks are changing forms of employment contracts and increased job insecurity, work intensification, high emotional demands, and poor work-life balance (Brun & Milczarek, 2007).

Because of their profound impact on employees’ health, these existing and emerging risks are at the top of research and policy agendas in many industrialized countries (Rial-González et al., 2005; CDC, 2002). Risks related to the physical work environment indisputably influence employees’ well-being, and my study considers exposure to a harmful work environment (locations, hazards, and discomforts) as one of the major determinants of employees’ health-related quality of life.

The European Heart Network (Kristensen et al., 1998) published an account reflecting state-of-the-art information on cardiovascular diseases (CVD), the most prevalent illness in industrialized countries, in the European Union and elsewhere. It found that CVD has become a disease of the lower social classes, but that conventional risk factors (smoking, diet, and physical activity) explain a relatively small proportion of CVD disparities. According to this study, psychosocial and occupational factors are the major contributors. Occupational risk factors—monotonous work, shift work, noise,
chemical exposure, and passive smoking—account for 16% of premature cardiovascular disease in men and 22% in women. A sedentary lifestyle increases the risk for men to 35% and 33% for women, making overall work-related risks of CVD 51% and 55%, respectively. As a result of these risk factors, employees in high-risk occupations (the industrial and transportation sectors, metal process workers, traffic supervisors and controllers) experience a CVD risk nine times greater than those in low-risk professional occupations.

In addition, the many other studies examining the association between socioeconomic status and CVD show high health disparities between different social groups. A small number of studies explicitly use social class as a criterion for comparison (Antonovsky, 1968; Lehman, 1967; Marmot & Theorell, 1988; Møller, Kristensen & Hollnagel, 1991; Syme & Berkman, 1976) and provide results and explanations that seem more realistic than the superficially functional definitions of socioeconomic status based on employees’ educational and occupational position.

The evidence demonstrates a strong association between social class and health, and indicates the need to study this variable in employment-health relationships. Thus, my research framework includes social class as one of the major determinants of health.

### 3.5 Conceptual Model for the Study of Underemployment and HRQoL

This study considers the issues identified through my literature review and the evidence on work and health, and proposes a model that considers structural social relations and environmental conditions as a core set of determinants for work-related health. My proposed model includes workers’ economic class and environmental
working conditions, because of their proven impact on work-related health. It recognizes
the important role of power relations at work as well as that of social support and income
(rewards), but considers these concepts as manifestations of employees’ economic status.
These concepts are included in my critical environmental approach to underemployment-
health relations, since they in fact represent the specific manifestation of class relations at
work.

The conceptual model that I apply includes employment class as a core category
because class position determines a person’s overall social position and the
characteristics of his/her work environment. In this way, it also determines levels of
exposure to work hazards and discomfort. As well, employment class determines
discretionary control over work, which is known to have a particularly important impact
on employees’ health. Since class determines the possibility for workers to choose how
and when to perform specific work tasks, it consequently determines their levels of
environmental exposure and physical exertion. The study also explores concepts related
to social participation and social networking, as well as the possibilities for personal
development through learning at work.

To a large extent, my proposed model corresponds to Scambler’s (2002) scheme
of class relations and the mechanisms of their impact (Table 3.1). In addition to this
scheme, which relates to global social issues, the effects of class on individuals are also
included. Furthermore, the proposed scheme contains detailed operationalized categories
which, besides core class relations, include the indirect effects of economic class on
psychosocial relations.
Table 3.1 Critical Realist Model Applied to Illustrating the Impact of Underemployment on Health-Related Quality of Life

<table>
<thead>
<tr>
<th>CLASS RELATIONS</th>
<th>Effects of class relations on society (MACRO LEVEL)</th>
<th>Effects of class relations on individuals (MICRO LEVEL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Mechanisms of impact]</td>
<td>Causal relations of class relations in respect to health</td>
<td>Employment class and morbidity, mortality, life expectancy, self-rated health status, HRQoL</td>
</tr>
<tr>
<td>CATEGORICAL</td>
<td>Employment conditions</td>
<td>Underemployment, lack of work &amp; opportunities to use knowledge and skills as forms of employment that modify economic class</td>
</tr>
<tr>
<td>[Mechanisms that have strong causal effects for the outcome]</td>
<td>Command relations as derived from class relations in respect to healthcare</td>
<td>Demand-control-support (DCS), work-related stress and adverse health effects</td>
</tr>
<tr>
<td>DERIVATIVE</td>
<td>Social relations, employment, education and housing policies</td>
<td>Effort-Reward imbalance (ERI) at work and adverse health effects</td>
</tr>
<tr>
<td>[Mechanisms that have apparent causal relevance that is part of the categorical mechanism]</td>
<td>Confrontation over pay and fringe benefits in a particular organization</td>
<td>Social participation, social networks and access to information, goods, services</td>
</tr>
<tr>
<td>CIRCUMSTANTIAL</td>
<td>Confrontation over work conditions, health and safety policies</td>
<td>Exposure to harmful physical environment at work, hazards, discomfort and physical exertion</td>
</tr>
<tr>
<td>[Mechanisms that have an apparent causal role including fortuitous events]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Scambler, 2002. Scheme adapted to include individual effects of class relations.
Considering the complexity of employment-health relationships, my study examines different forms of underemployment, a set of representative indicators for health-related quality of life, several well-documented determinants of health and a number of demographic variables to avoid colinearity and spurious empirical results.

The operationalization of the variables included in my study is presented in Figure 3.8. This includes dependent variables (health-related quality of life), independent variables (objective, subjective, and time-related underemployment) and control variables (demographic characteristics, occupational class, work environment, and psychosocial relations).

In summary, my model is informed by the critical realist theory (Scambler & Higgs, 1999; Scambler, 2001, 2002) and the neo-material approach to work and health-related issues (Lynch et al, 2000; Lynch & Kaplan, 2000; Lynch, 2006; Muntaner & O'Campo, 1993). It is based on evidence from multiple studies that employment class has a greater explanatory power for work-health relationships than socioeconomic status, calculated as an index of income and educational attainment (Borrell, Muntaner, Benach & Artazcoz, 2004).

The model seeks to examine the explanatory power of this theory-based sociological conceptualization of employees’ economic position, and to compare it with the control-demand and effort-rewards models. In addition, the inclusion of employment class provides a basis for specific policies and targeted actions for the improvement of working conditions. Including employment class is also justified through preliminary analysis of the WALL data, which demonstrates a strong association between
employment class and health, as well as a significant association with personal income; careful analysis of the specific effects of these work characteristics is required.

Figure 3.8 Model for Study of Underemployment-health Relations

Taking into account environmental theories and the impact of stress on workplace health and safety (Tompa et al, 2007; Vischer, 2007), the proposed model considers characteristics of the work environment and their specific impact on different forms of underemployment. Psychosocial studies on work and health relations rarely consider or
simultaneously explore the impact of psychosocial and physical working conditions. The proposed model includes two sets of variables related to the physical work environment that address these issues: first, subjective estimates of different aspects of working conditions that are relevant to health (US GSS, 2002); second, experts’ estimates based on the National Occupational Classification (HRDC, 2004).

Figure 3.9 Variables Included in the Model

Because of the complex relationships between underemployment and health, and to minimize methodological challenges and measurement errors (Kristensen, 1995), the study examines different types of data: self-reported estimates of working conditions (WALL and US GSS), objective data based on experts’ estimates of work environments
(NOC), and qualitative data related to education-job matching in Ontario (EJRM, 2004).

The complete model, as presented in Figure 3.9, includes the following variables:

- Employees’ socio-demographic characteristics (age, sex, race);
- Variables related to employment class and the work environment;
- Variables related to social capital (social participation and networking); and
- Variables related to the control-demand model (control over work, participation in decision-making and active learning).

The variable selection was determined by the central aim of my study—to examine the association between underemployment and health-related quality of life and to compare the explanatory power of mainstream theories of work-related health, control-demand and social capital with critical environmental approach proposed by my study. Based on a review of the existing literature as applied through studies and empirical evidence, in addition to the selected determinants of health identified through previous studies, the proposed model includes employment class and characteristics of environmental conditions at work.
Chapter 4
Methodology for the Study of Underemployment and (HRQoL)

4.1 Methodological Approach to Study of Underemployment and Health

In order to examine the impact that different forms of underemployment have on health, my study applies a unique combination of qualitative and quantitative methodology that includes secondary data analysis of the 2004 Work and Lifelong Learning Survey, the EJRM survey, and the recent American and Canadian general social surveys (GSS). It utilizes a combination of quantitative data analysis and respondents’ narratives obtained through the EJRM survey and interviews from the case studies from this project. In order to go beyond the dominant (neo) positivistic approach in this research domain, my study applies class analysis (Scambler, 2001; Wright, 2001) to provide an explanatory context for the obtained results and the ways in which underemployment contributes to the deterioration of health.

Analysis of the data from the 2002 US General Social Survey allows exploration of a larger number of work-related characteristics and their association with health-related quality of life. This study is based mainly on workers’ perceptions of psychosocial and physical conditions at their workplace. In addition to analysis of the WALL data and self-reported measures, despite of the weaknesses of experts’ estimates (See Livingstone, 2009, forthcoming), my study includes “objective”, observer-based indicators of the work environment. Considering the methodological issues in research on employment-health
relations, my study uses a multi-method approach and both quantitative and qualitative data in order to minimize the methodological challenges (Kristensen, 1995).

4.2 Definition of the Dependent, Independent and Control Variables

In order to examine established hypotheses, the study focuses on the association between objective and subjective forms of underemployment with health-related quality of life and controls for the confounding effects of a number of well-known demographic and structural factors including age, sex, race and economic class, as well as educational attainment and personal income.

Graph 4.1 Underemployment and Health-Related Quality of Life: General Research Design

The study uses indicators related mainly to respondents’ self-perceived health and short term limitations verified through various Canadian (Activity Limitation Survey) and US (CDC studies and the 2002 GSS Survey) surveys (Graph 4.1). For different types of
quantitative data, the study applies appropriate descriptive and multivariate statistical techniques.

4.2.1 Dependent Variables

The concept of health in my study is based on an approach that explores different aspects of mental and physical health in relation to the worker’s day-to-day life. The concept of health-related quality of life (HRQoL) is based on the Centers for Disease Control definition (CDC, 2002) and includes the original CDC measures as well as the measures of health indicators from the national survey on Work and Lifelong Learning in Canada (WALL).

Substantial research on the validation of the major health measures used in my study on health-related quality of life (HRQoL) demonstrates a high level of validity and reliability associated with different types of objective health measures and with the morbidity of the general population. According to the Centers for Disease Control, “in public health and in medicine, the concept of health-related quality of life refers to a person or group's perceived physical and mental health over time. Physicians have often used health-related quality of life (HRQoL) to measure the effects of chronic illness in their patients to better understand how an illness interferes with a person's day-to-day life.” HRQoL represents a valid set of measurements proven through numerous studies (See e.g. Moriarty, Zack & Kobau, 2003; CDC, 1998; CDC, 2000; CDC, 2003; Hagerty et al., 2001; Hennessy et al., 1994; Ounpuu et al., 2000).

A set of health-related quality of life indicators includes self-rated health status, variables related to activity limitations and self-reported work-related stress. Different
sections of my study are based on the WALL and the US General Social Survey.

Dependent, health-related variables from the WALL Survey analyzed in this study include:

1. **Self-rated health status**
   
   **QUESTION:** Would you say that in general your health is excellent, very good, good, fair, or poor? (WALL, 2004)

2. **Activity limitation due to health difficulties**
   
   **QUESTION:** To what extent does a long-term physical condition, mental condition, learning or health problem reduce the amount or the kind of activity you can do? (WALL, 2004)

3. **Self-perceived work-related stress**
   
   **QUESTION:** How often do you find your job stressful: would you say all of the time, most of the time, about half the time, seldom or never? (WALL, 2004)

4. **Job insecurity**
   
   **QUESTION:** How likely is it that you will lose your main job [business] in the next year? Would you say very likely, somewhat likely, somewhat unlikely, or very unlikely? (WALL, 2004)

Dependent, health related variables from the US General Social Survey analyzed in this study include the following variables:

1. **Self-rated health status**
   
   **QUESTION:** Would you say that in general your health is excellent, very good, good, fair, or poor? (US GSS 2002)
2. Days of poor physical health past 30 days

**QUESTION:** Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good? (US GSS 2002)

3. Days of poor mental health past 30 days

**QUESTION:** Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good? (US GSS 2002)

4. Days of activity limitation past 30 days

**QUESTION:** During the past 30 days, for about how many days did your poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation? (US GSS 2002)

In addition, section of this study that presents results from descriptive analysis which explores general characteristics of working and living conditions of underemployed people includes subjective measures, indicators on Quality of Working Life indicators related to a wide array of working and living conditions as well as perceived social relations at work.

**4.2.2 Independent Variables**

**Set of indicators that represent independent variables**

Measures of underemployment are based on the several Canadian studies (Livingstone, 1998, Livingstone and Schultz, 2006; Livingstone et al., 2009, forthcoming) and include measures skill and time related underemployments based on
subjective and objective indicators.

**Measures of underemployment**

**Relevance gap** (closeness of field of studies to the job)

**QUESTION:** How closely is your job related to your formal education? Is it closely related, somewhat related, or not at all related?

**Subjective gap** (perceived competencies in regard to the job requirements)

**QUESTION:** In terms of your schooling, do you feel you are very overqualified somewhat overqualified, adequately qualified, somewhat underqualified or very underqualified for your current job?

**Credential gap** (formal qualifications exceed declared entry requirements)

**DERIVED VARIABLE:** Credential underemployment: Credential required minus attained education

**Performance gap** (actual skill and knowledge exceeds that needed to do job)

**DERIVED VARIABLE:** Performance underemployment: Education used on job minus attained education

**Preferred hours of actual work** (preferred hours of work)

**QUESTION:** Would you like to work more, less or same … hours

4.2.3 Mediating Variables

The study includes a number of mediating variables including age, sex, race, educational attainment, and income, as measured in the 2004 Canadian WALL Survey (Livingstone & Scholtz, 2006) and the 2002 US GSS survey (Davis, Smith, & Marsden, 2003). The
study also includes variables related to work environment in Canada based on job
description from the Canadian national economic classification (NOC, 2004) as well as
on subjective reports on job characteristics reported by the participants in the 2002 US
GSS survey.

Age
Gender
Race
Education
Total household income

Economic class

Constructed variable coded according to the 1980 Standard Occupational
Classification (SOC, 1980) and self-reported ownership status and size of
organization. The classification consists of six distinctive social groups
established based on ownership status and respondents’ occupation and number of
employees in organization. Procedure used for construction of this variable is
described in the WALL survey report (Livingstone & Scholtz, 2006). The
economic classes in Canada included in the study are:

Employers
Self-employed
Managers/Supervisors
Professional employees
Service Workers
Industrial Workers
Environmental Conditions at Work: Locations, Hazards and Discomfort

Study includes variables related to different characteristic of work environment based on the 4-digit description of occupations from Canadian the 2006 National Occupational Classification (NOC). The study includes analysis of all single indicators as well as summarized scores, indexes for major groups of the major aspects of work environment. Work environment variables included in this study consist from work location, exposure to hazards at work and discomfort experienced at work.

Environmental Work Conditions based on the NOC description of occupations included in my study contain the following indicators:

**Work Location**

- L1 Regulated inside climate
- L2 Unregulated inside climate
- L3 Outside
- L4 In a vehicle or cab

**Hazards at Work**

- H1 Dangerous chemical substances
- H2 Biological agents
- H3 Equipment, machinery, tools
- H4 Electricity
- H5 Radiation
- H6 Flying particles, falling objects
- H7 Fire, steam, hot surfaces
- H8 Dangerous location

**Discomfort at Work**

- D1 Noise
- D2 Vibration
- D3 Odours
- D4 Non-toxic dusts
- D5 Wetness

Physical Activities Required at Work (Strength and Body position)
Variables related to Social Capital Theory: Social Participation and Networking

Social participation

QUESTION: In the past year did you do any unpaid volunteer work in any organization or group?

Social networking and information exchange

QUESTION: In the past four weeks did you seek advice from someone knowledgeable with the intention of developing your job skills?

Variables related to Control-demand theory: Control over Work and Active Learning

Control over work

QUESTION: How much choice do you have over the way in which you do your job: a great deal, a moderate amount, a little, or none at all?

Active Work-related Learning

QUESTION: Please tell me if you strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, or strongly disagree with the following: Your job often requires you to learn new skills?

4.3 Study Participants

Empirical assessment of the basic assumption applies an integrative methodology that uses quantitative data analysis of the 2004 Canadian Work and Lifelong Learning Survey (WALL), the 2002 US General Social Survey (GSS), as well as analysis of qualitative data from the Education-Job Requirements Matching (EJRM) survey. The
study uses a representative set of underemployment measures and health-related quality of life and controls for the impact of demographic characteristics, economic class and unobserved variables related to work environment, hazards and discomfort.

This study uses responses from 5760 participants in the WALL survey, 104 interviews from the EJRM study and secondary analysis of data from the 2002 US General Social Survey (US GSS) that includes a sub-sample of 1775 respondents who are active in the labour force.

The data reported here was gathered as part of the research network on The Changing Nature of Work and Lifelong Learning (WALL) funded by the Social Sciences and Humanities Research Council (SSHRC) from 2002 through 2006 as a Collaborative Research Initiative on the New Economy, Project No. 512-2002-1011. (www.wallnetwork.ca). This study also includes qualitative data from the Education-Job Requirements Matching (EJRM) survey funded through a standard research grant by the Social Sciences and Humanities Research Council (SSHRC) from 2002 through 2007.

4.4 Statistical Data Analysis

To verify the established hypotheses, my study utilizes several standard, descriptive and inferential, mono and multivariate statistical techniques. The basic descriptive statistical measures, percent, averages, bivariate cross-tabulations and inferential statistics, and graphical representations of the data are applied in order to describe the different forms of underemployment and their distribution of the different
forms of underemployment among employees from different social groups. Multivariate analysis follows descriptive and bivariate analysis that includes raw and adjusted logistic regression analyses. Control for the

First model of adjusted logistic regression analyses controls for impact that basic demographic characteristics have on underemployment-health relations, while second model simultaneously, through separate analyses includes different forms of underemployment, demographic characteristics, employment class, physical and social work environments.

The findings related to the descriptive section of my study are presented in the form of the percentages of respondents who report different levels of health-related quality of life, listed by level of underemployment and socio-demographic characteristics. This section also includes the percentages of participants who report different forms of control over work and social participation, grouped by economic class. Percents based on two-dimensional cross-tabulations are accompanied with Chi-Square values for variables included in this study, combined with the corresponding levels of statistical significance, \( (a) = P < 0.001 \), \( (b) = P < 0.01 \), \( (c) = P < 0.05 \), \( (ns) = \) not significant. Acronyms used for results obtained through logistic regression are: RO=Raw Odds ratios, AO=Adjusted Odds, and Confidence Interval for Odds (C.I.) Lower 95% C.I.; Upper 95% C.I.
Chapter 5

Results of the Empirical Study on Underemployment and HRQoL

This chapter analyzes the association between different forms of underemployment and health. The WALL survey contains a core set of variables dealing with quality of life, including self-rated health, activity limitation and work-related stress. The US General Social Survey supplies an extended set of health-related variables that include days of poor health due to physical illness, mental health, or activity limitation.

This section answers the question of whether or not there are differences in health-related quality of life (self-rated health and activity limitations) between the underemployed and other groups in the active labour force.

5.1 Education-Job Mismatch and HRQoL

Among employed Canadians (Graph 5.1), more than one-third (37.3%) are working at jobs not at all related to their field of study, while an additional quarter (25.9%) are working at jobs only somewhat related to their field of study. Slightly more than one-third are employed in a position closely related to their education. These troubling statistics strongly indicate that the situation requires appropriate social actions and policy measures to mitigate the negative consequences of underemployment.
Graph 5.1 Relevance Gap: Closeness of Education to Job, Canada, 2004 (%)

Bivariate analysis (Table 5.1) shows that a job which is unrelated to a worker’s educational background has a small but statistically negative impact on all measures of self-rated HRQoL. Graph 5.1.2 demonstrates that those who experience a relevance gap perceive higher levels of work-related stress and slightly lower self perceived health and activity limitations than other groups of employees.

Table 5.1 Relevance Gap and Health-related Quality of Life

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Less than Good Self-Rated Health</th>
<th>Self-Reported Activity Limitation</th>
<th>Constant Work-related Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>10.985</td>
<td>7.610</td>
<td>19.146</td>
</tr>
<tr>
<td>Sig</td>
<td>.004</td>
<td>.022</td>
<td>.000</td>
</tr>
</tbody>
</table>

Similar results reflect bivariate logistic regression, as well as regression adjusted for basic demographic characteristics. A more inclusive regression model (Table 5.2) that examines the impact of mediating variables (economic class and characteristics of work environment, control-demand and social capital indicators) shows that there is no direct or significant association between relevance gap and self-perceived health. In fact, there
is only a slightly greater likelihood for education-job mismatch and activity limitation (RO = 1.186). When the odds are adjusted for mediating variables, only work-related stress remains substantially significant (AO = 1.408, P< .002).

Table 5.2 Relevance Gap and Health-Related Quality of Life [(AO)] **

<table>
<thead>
<tr>
<th></th>
<th>Self-rated Health (AO)</th>
<th>Activity Limitation (AO)</th>
<th>Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closely related</td>
<td>.427</td>
<td>.110</td>
<td>.000</td>
</tr>
<tr>
<td>Somewhat related</td>
<td>.724</td>
<td>1.046</td>
<td>.280</td>
</tr>
<tr>
<td>Not at all related</td>
<td>.206</td>
<td>1.162</td>
<td>.036</td>
</tr>
</tbody>
</table>

Source: WALL, 2004. **Odds Adjusted for age, sex, race, economic class, work environment, social participation and social networking, control over work and participation in decision-making.

Again, there is a strong association between all demographic indicators and education-job mismatch (Graph 5.3). The greatest differences exist in regard to
educational attainment, where 62% of those without a diploma, and almost half of those with a high school diploma (48.7%) work at jobs that are not at all related to their education, in comparison to a quarter of those with postsecondary certificates (25.2%) and one-fifth of those with university degrees (21.7%). Strong differences concerning the relevance gap exist between members of different social groups; half of industrial workers hold jobs that are not related to their education, compared to only 14% of professionals.

Graph 5.3 Relevance Gap and Social Determinants of Health

<table>
<thead>
<tr>
<th>AGE</th>
<th>18-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65+</th>
<th>SEX</th>
<th>Male</th>
<th>Female</th>
<th>EDUCATIONAL ATTAINMENT</th>
<th>No diploma</th>
<th>HS diploma</th>
<th>Post-sec. Cert.</th>
<th>University degree</th>
<th>PERSONAL INCOME</th>
<th>$29K</th>
<th>$30K-$59K</th>
<th>$60K+</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERSONAL INCOME</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- $29K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.2 Subjective Underemployment and HRQoL

As shown in Graph 5.4, subjective underemployment is quite common among the working population. According to the 2004 WALL survey, more than a quarter (27.9%) of all employees report subjective underemployment, while approximately 10% consider themselves highly overqualified.

Graph 5.4 Incidence of Subjective Underemployment, Canada 2004


Bi-variant analysis shows (Graph 5.5 and Table 5.3) considerable associations between subjective underemployment and self-perceived health (Chi. sq. =19.445, P<0.001), activity limitations (Chi. sq. =19.802, P<0.001), and work-related stress (Chi. sq. =59.899, P<0.001). In addition to marked bivariate associations between subjective underemployment and the aforementioned core indicators of HRQoL, there is a strong, statistically significant association between subjective underemployment and increased feelings of job insecurity and lower levels of job satisfaction (Raykov, 2008). This study revealed the significant impact of underemployment on employees' experience of greater job-related stress, job insecurity and lower job satisfaction. The study also identified
strong associations between underemployment and other measures of socio-economic status, as well as with increased discomforts and exposures to risk from the work environment (subjective underemployment, \( F = 5.317 \); relevance of education to job, \( F = 41.134 \); credential underemployment, \( F = 2.703 \); performance underemployment, \( F = 2.973 \), involuntary and involuntary reduced hours of work, \( F = 30.044 \)).

Graph 5.5 Subjective Underemployment and Health-Related Quality of Life


Analysis of the results obtained (Graph 5.5) shows that though there are some differences between adequately qualified and highly overqualified individuals, the worst HRQoL is reported by highly underqualified workers.

Table 5.3 Subjective Underemployment and Health-Related Quality of Life

<table>
<thead>
<tr>
<th></th>
<th>Less than Good Self-Rated Health</th>
<th>Self-Reported Activity Limitation</th>
<th>Constant Work-related Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>19.445 (^{(a)})</td>
<td>19.802 (^{(a)})</td>
<td>59.899 (^{(a)})</td>
</tr>
</tbody>
</table>

These findings on underqualification and health are probably the most surprising of this study. This justifies the approach utilized to examine underemployment as a continuous characteristic and to apply consistent (“symmetric”) criteria to define the various forms of employment. Employment status in this study includes underemployment (high or slightly higher educational attainment, greater skills than required or insufficient hours), adequate employment, underqualification (lower educational attainment, lack of skills or overwork), and unemployment as an extreme form of underemployment (Livingstone, 1998).

The fact that underqualified employees experience the worst health-related quality of life is most likely due to their overall working conditions. This group has a lower educational attainment, experiences more hazards and higher discomfort at work, possesses fewer possibilities for participation in decision-making, and are involved to a lesser extent in community participation than any other group of employees. All of these factors represent significant health risks and likely contribute to their lower health-related quality of life.

Table 5.4 Subjective Underemployment and Self-Rated Health [Adjusted Odds] **

<table>
<thead>
<tr>
<th></th>
<th>Sig. Self-rated Health (AO)</th>
<th>Sig. Activity Limitation (AO)</th>
<th>Sig. Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequately qualified</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>.114</td>
<td>1.283</td>
<td>.363</td>
</tr>
<tr>
<td>Smwht. overqualified</td>
<td>.558</td>
<td>1.081</td>
<td>.143</td>
</tr>
<tr>
<td>Smwht. underqualified</td>
<td>.598</td>
<td>1.123</td>
<td>.515</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.100</td>
<td>1.820</td>
<td>.015</td>
</tr>
</tbody>
</table>

Source: WALL, 2004. **Odds Adjusted for age, sex, race, economic class, work environment, social participation and social networking, control over work and participation in decision-making.
Graph 5.6 Subjective Underemployment and Socio-demographic Determinants of Health

<table>
<thead>
<tr>
<th>AGE</th>
<th>18-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>University degree</td>
<td>42.1</td>
<td>29.7</td>
<td>27</td>
<td>22.6</td>
<td>23.6</td>
<td>15.1</td>
</tr>
<tr>
<td>P post-sec. Cert.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS diploma</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ppost-sec. Cert.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INCOME</td>
<td>- $29K</td>
<td>$30K-$59K</td>
<td>- $60K+</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As Graph 5.6 shows, younger, non-white, more educated and less well-paid employees experience subjective underemployment more frequently than other groups. Raw odds and odds adjusted for basic demographic characteristics show that there is a significantly higher likelihood for underemployed and underqualified individuals to report lower HRQoL, as demonstrated through temporary activity limitations and work-related stress. However, when the odds are adjusted (Table 5.4) for economic class, work
environment and indicators related to social capital and control demand, significant results remain for only two variables (AO = 1.467). Results demonstrate that only underqualified respondents are more likely to report activity limitation (AO = 2.127) and work-related stress (AO = 3.450) than adequately employed.

5.3 Credential Gap and HRQoL

The study provides evidence of slightly high levels of credential underemployment among employed Canadians (Graph 5.7). It also shows that slightly less than half (47.7%) of all Canadians are well matched in terms of credential underemployment, while 35% are underemployed and 18% are underqualified.
Graph 5.8 Credential Underemployment and Health-Related Quality of Life

As Graph 5.8 and Table 5.5 show, there is no significant direct association between credential underemployment and indicators of HRQoL. Logistic regression, raw odds and odds adjusted for demographic characteristics provide the same results.

Table 5.5 Credential Underemployment and Health-Related Quality of Life

<table>
<thead>
<tr>
<th></th>
<th>Less than Good Self-Rated Health</th>
<th>Self-Reported Activity Limitation</th>
<th>Constant Work-related Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>5.702</td>
<td>8.838</td>
<td>5.660</td>
</tr>
<tr>
<td>Sig</td>
<td>.222</td>
<td>.065</td>
<td>.226</td>
</tr>
</tbody>
</table>

As Table 5.6 indicates, completely adjusted logistic regression (for demographic characteristics, social and environmental conditions) shows a smaller likelihood for those with credential underqualification to report activity limitation (AO = 0.716, P<.036) or work-related stress (AO = 0.648, <.018). The most probable reason for this is that credential underemployment is more often experienced by younger employees and it is well known that to a great extent age determines health-related quality of life. 

5.3.3 shows that younger employees and those with higher educational attainment and lower income more often experience credential underemployment than do other groups.

Table 5.6 Credential Underemployment and Self-Rated Health [Adjusted Odds] *

<table>
<thead>
<tr>
<th></th>
<th>Self-rated Health (AO)</th>
<th>Sig.</th>
<th>Activity Limitation (AO)</th>
<th>Sig.</th>
<th>Work-related Stress (AO)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match</td>
<td>.257</td>
<td>.129</td>
<td>.047</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.129</td>
<td>.758</td>
<td>.140</td>
<td>.842</td>
<td>.018</td>
<td>.648</td>
</tr>
<tr>
<td>Underemployed</td>
<td>.982</td>
<td>1.003</td>
<td>.902</td>
<td>.989</td>
<td>.038</td>
<td>.791</td>
</tr>
<tr>
<td>Underqualified</td>
<td>.157</td>
<td>1.236</td>
<td>.597</td>
<td>1.061</td>
<td>.897</td>
<td>.980</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.944</td>
<td>1.016</td>
<td><strong>.036</strong></td>
<td><strong>.716</strong></td>
<td>.564</td>
<td>1.130</td>
</tr>
</tbody>
</table>


Graph 5.9 Credential Underemployment* and Workers’ Demographic Characteristics (%)

5.4 Performance Underemployment and HRQoL

As Graph 5.10 shows, similarly to credential underemployment, there is evidence of high levels of performance underemployment among Canadians. More than 30% of Canadians are underemployed and close to 20% are underqualified, while only approximately one-half are well matched.

Graph 5.10 Incidence of Performance Underemployment


Graph 5.11 Performance Underemployment and Health-Related Quality of Life

As Graph 5.11 and Table 5.7 show, there is significant bivariate association only between performance underqualification and work-related stress (Chi-Sq. = 23.400, P<0.001). The analysis suggests that credentially underqualified employees experience the greatest work-related stress.

Table 5.7 Performance Underemployment and Health-Related Quality of Life [% and Chi-Square]

<table>
<thead>
<tr>
<th></th>
<th>Less than Good Self-Rated Health</th>
<th>Self-Reported Activity Limitation</th>
<th>Constant Work-related Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>1.411</td>
<td>4.061</td>
<td>23.400</td>
</tr>
<tr>
<td>Sig.</td>
<td>.842</td>
<td>.398</td>
<td>.000</td>
</tr>
</tbody>
</table>


Raw odds and odds adjusted for the complete set of control variables (Table 5.8) show similar results. There is evidently a higher probability for underqualified employees to report greater work-related stress (AO = 2.031, P<.001).

Table 5.8 Performance Underemployment and Self-Rated Health [Adjusted Odds] *

<table>
<thead>
<tr>
<th></th>
<th>Sig. Self-rated Health (AO)</th>
<th>Sig. Activity Limitation (AO)</th>
<th>Sig. Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match</td>
<td>.817</td>
<td>.701</td>
<td>.000</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.785</td>
<td>.952</td>
<td>.794</td>
</tr>
<tr>
<td>Underemployed</td>
<td>.745</td>
<td>1.042</td>
<td>.435</td>
</tr>
<tr>
<td>Underqualified</td>
<td>.687</td>
<td>.940</td>
<td>.210</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.316</td>
<td>1.251</td>
<td>.963</td>
</tr>
</tbody>
</table>

Graph 5.12 Performance Underemployment*: Socio-demographic Profile

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGE</strong></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>38.7</td>
</tr>
<tr>
<td>25-34</td>
<td>36.6</td>
</tr>
<tr>
<td>35-44</td>
<td>30.2</td>
</tr>
<tr>
<td>45-54</td>
<td>26.1</td>
</tr>
<tr>
<td>55-64</td>
<td>28.8</td>
</tr>
<tr>
<td>65+</td>
<td>21.3</td>
</tr>
<tr>
<td><strong>SEX</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>32.3</td>
</tr>
<tr>
<td>Female</td>
<td>30.5</td>
</tr>
<tr>
<td><strong>RACE</strong></td>
<td></td>
</tr>
<tr>
<td>Non-white</td>
<td>37.5</td>
</tr>
<tr>
<td>White</td>
<td>30.7</td>
</tr>
<tr>
<td><strong>EDUCATIONAL ATTAINMENT</strong></td>
<td></td>
</tr>
<tr>
<td>No diploma</td>
<td>25.5</td>
</tr>
<tr>
<td>HS diploma</td>
<td></td>
</tr>
<tr>
<td>Post-sec. Cert.</td>
<td>44.7</td>
</tr>
<tr>
<td>University degree</td>
<td>43.4</td>
</tr>
<tr>
<td><strong>PERSONAL INCOME</strong></td>
<td></td>
</tr>
<tr>
<td>- $29K</td>
<td>36.1</td>
</tr>
<tr>
<td>$30K-$59K</td>
<td>30.4</td>
</tr>
<tr>
<td>- $60K+</td>
<td>25.9</td>
</tr>
</tbody>
</table>


As Graph 5.12 shows, similarly to the incidence of credential underemployment, younger employees and those with higher educational attainment and lower income more often experience performance underemployment than do other groups.
5.5 Involuntarily Reduced Hours of Work and HRQoL

Among employed Canadians, there are a large number who work unwanted hours. One-third of Canadians are overworked, or work more hours than preferred (32.8%), while 14.5% of Canadians are underemployed, and want to work more hours (Graph 5.13).

Graph 5.13 Incidence of Involuntary Reduced Hours of Employment


Graph 5.14 Involuntary Reduced Hours of Employment and Health-Related Quality of Life

As Graph 5.14 and Table 5.9 show, there is a significant bipolar distribution in terms of HRQoL; there are significant associations among activity limitation, work-related stress, and involuntarily reduced or increased hours.

Table 5.9 Involuntary Reduced Hours of Employment and Health-Related Quality of Life [% and Chi-Square]

<table>
<thead>
<tr>
<th></th>
<th>Less than Good Self-Rated Health</th>
<th>Self-Reported Activity Limitation</th>
<th>Constant Work-related Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>2.773</td>
<td>7.643</td>
<td>23.854</td>
</tr>
<tr>
<td>Sig</td>
<td>.250</td>
<td>.022</td>
<td>.001</td>
</tr>
</tbody>
</table>


Logistic regression for completely adjusted models shows the same results (Table 5.10) upon bivariate analysis. Overworked employees are more likely to report activity limitation (AO = 1.212) and work-related stress (AO = 1.567) than are other employees.

Table 5.10 Involuntary Reduced Hours of Employment and Self-Rated Health [Adjusted Odds] *

<table>
<thead>
<tr>
<th></th>
<th>Self-Rated Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Work-Related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same hours (Match)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>More (Underemployed)</td>
<td>1.330&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>1.217&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>1.090</td>
</tr>
<tr>
<td>Fewer hours (Overworked)</td>
<td>1.229&lt;sup&gt;(e)&lt;/sup&gt;</td>
<td>1.212&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>1.567&lt;sup&gt;(a)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Source: WALL, 2004. *Odds adjusted for age, sex, race, economic class, work environment, social participation and social networking, control over work and participation in decision-making.
Graph 5.15 Involuntary Reduced Hours of Employment and Demographic Characteristics

<table>
<thead>
<tr>
<th>AGE</th>
<th>Wants less hours</th>
<th>Wants more hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>15.9</td>
<td>31.3</td>
</tr>
<tr>
<td>25-34</td>
<td>13.3</td>
<td>33.7</td>
</tr>
<tr>
<td>35-44</td>
<td>17.6</td>
<td>35.6</td>
</tr>
<tr>
<td>45-54</td>
<td>22.2</td>
<td>35.5</td>
</tr>
<tr>
<td>55-64</td>
<td>10.6</td>
<td>34.9</td>
</tr>
<tr>
<td>65+</td>
<td>3.4</td>
<td>29.5</td>
</tr>
<tr>
<td>SEX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12.3</td>
<td>35.2</td>
</tr>
<tr>
<td>Female</td>
<td>15.9</td>
<td>30</td>
</tr>
<tr>
<td>RACE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-white</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>13</td>
<td>33.6</td>
</tr>
<tr>
<td>ED. ATTAINMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No diploma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS diploma</td>
<td>22.6</td>
<td>25.2</td>
</tr>
<tr>
<td>Post-sec. Cert.</td>
<td>4.5</td>
<td>31.5</td>
</tr>
<tr>
<td>University degree</td>
<td>13.4</td>
<td>33.6</td>
</tr>
<tr>
<td>FERS INCOME</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$29K-50K</td>
<td>17.8</td>
<td>27.9</td>
</tr>
<tr>
<td>$50K-65K</td>
<td>8</td>
<td>37.9</td>
</tr>
<tr>
<td>$65K+</td>
<td>4.5</td>
<td>48.8</td>
</tr>
</tbody>
</table>


Underemployed workers are slightly more likely to report activity limitations (AO = 1.217) than those who are satisfied with their number of work hours.

<table>
<thead>
<tr>
<th>Wants more hours</th>
<th>Wants fewer hours</th>
</tr>
</thead>
</table>

Wants more hours | Wants fewer hours |
5.6 Underemployment and Job Insecurity

Numerous studies found a significant association between employment status and job insecurity and its negative impact on employees’ self-perceived health and minor psychiatric morbidity.

Thomas et al. (2005) examined the impact of changes in employment status (transition from employment to unemployment) and long-term sick leave on psychological well-being. Independent multivariate analyses for men and women showed that changes from paid employment to either unemployment or a long-term leave of absence were associated with periods of increased psychological distress. For women, maternity leave or staying home for household duties often had a negative impact. Overall, it is suggested that the effects were most noticeable during the first six months of the transition. The authors also found that returning to formal employment improved mental health.

Ferrie et al. (2005) investigated the factors affecting the relationship between self-reported job security and health. They found associations between self-reported job insecurity and both poor self-rated health and minor psychiatric morbidity. Specifically, they concluded that 68% of the association between job insecurity and self-rated health in women, and 36% in men, could be explained by insecure employment, pessimism, heightened vigilance, primary deprivation, financial security, social support and job satisfaction.

Vaananen et al. (2004) examined employees' psychosocial health in the context of organizational mergers. The study found that a decline in job position strongly increased
the risk of poor subjective health after the merger and that weak organizational support was linked with impaired subjective health. The results were found to be especially significant among blue-collar workers. Also, the study demonstrated that among white-collar workers, weak supervisor support significantly impaired functional capacity.

Kim et al. (2005) researched the effects of non-standard work on health. Since non-standard work often implies job insecurity, it is reported to have a detrimental impact. Based on the Korea National Health and Nutrition Examination Survey and self-reported health indicators, the authors found that nonstandard employment was significantly associated with poor health among female manual workers; among this group, nonstandard employees reported poorer health compared with standard workers.

**Empirical Findings on Underemployment and Job Security**

Analysis of the WALL data shows that job security (Table 5.11) is most significantly associated with involuntary reduced hours (odds = 1.643) and education-job mismatch (odds = 1.414). Job security is also highly associated (Table 10.2) with lack of control over work (odds = 2.051) and with social class. Self-employed, service and industrial workers are approximately 50% more likely to experience job insecurity than other groups of employees.

<table>
<thead>
<tr>
<th>Table 5.11 Job Security and Underemployment</th>
<th>Bivariate analysis: Job Security and Underemployment (Chi-Square Test)</th>
<th>Multivariate analysis: Job Security and Underemployment (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Education-Job Match</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closely related</td>
<td>12.9%</td>
<td>Closely related 1</td>
</tr>
<tr>
<td>Somewhat related</td>
<td>12.5%</td>
<td>Somewhat related .923</td>
</tr>
<tr>
<td>Not at all related</td>
<td>18.1%</td>
<td>Not at all related 1.414(a)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14.7%</td>
<td></td>
</tr>
<tr>
<td><strong>Chi-Square</strong></td>
<td>28.058&lt;sup&gt;(a)&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

### 2. Subjective Underemployment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly overqualified</td>
<td>17.6</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>15.6</td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>13.7</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>17.0</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>10.4</td>
</tr>
<tr>
<td>Total</td>
<td>14.6</td>
</tr>
<tr>
<td><strong>Chi-Square</strong></td>
<td>8.947&lt;sup&gt;(ns)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### 3. Credential Underemployment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly underemployed</td>
<td>14.5%</td>
</tr>
<tr>
<td>Underemployed</td>
<td>14.5%</td>
</tr>
<tr>
<td>Match</td>
<td>15.6%</td>
</tr>
<tr>
<td>Underqualified</td>
<td>10.9%</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>13.7%</td>
</tr>
<tr>
<td>Total</td>
<td>14.6%</td>
</tr>
<tr>
<td><strong>Chi-Square</strong></td>
<td>8.487&lt;sup&gt;(ns)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### 4. Performance Underemployment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly overqualified</td>
<td>15.4%</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>14.7%</td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>15.3%</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>11.6%</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>15.4%</td>
</tr>
<tr>
<td>Total</td>
<td>14.7%</td>
</tr>
<tr>
<td><strong>Chi-Square</strong></td>
<td>6.439&lt;sup&gt;(ns)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### 5. Involuntary Reduced Hours

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Want more (Underemployed)</td>
<td>22.6%</td>
</tr>
<tr>
<td>Want same hours (Match)</td>
<td>12.7%</td>
</tr>
<tr>
<td>Want fewer hours (Overworked)</td>
<td>14.2%</td>
</tr>
<tr>
<td>Total</td>
<td>14.6%</td>
</tr>
<tr>
<td><strong>Chi-Square</strong></td>
<td>47.233&lt;sup&gt;(a)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Chapter 6

Unemployment, Underemployment and Health-related Quality of Life

My study shows that significant associations exist between underemployment and health only among workers who are highly underemployed or highly underqualified. The following graphs demonstrate that the slightly higher levels of subjective (Graph 6.1), credential (Graph 6.2) and performance (Graph 6.3) underemployment are not significantly related to health-related quality of life.

Graph 6.1 Subjective Underemployment and Self-Rated Health Status


Graph 6.2 Credential Underemployment and Self-Rated Health Status

Further analysis includes a category of the active labour force that represents the most severe form of underemployment, unemployment, and compares the available data for unemployed, underemployed, adequately matched and underqualified workers. This range of employment conditions makes it possible to analyze employment status as a continuum in regard to health-related quality of life.

Table 6.1 Associations between Underemployment, Economic Class, Work Environment and Psychosocial Conditions (Chi-Square test)

<table>
<thead>
<tr>
<th></th>
<th>Relevance Gap</th>
<th>Subjective Gap</th>
<th>Credential Gap</th>
<th>Performance Gap</th>
<th>Reduced Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Class</td>
<td>348.53 (\textsuperscript{(a)})</td>
<td>97.66 (\textsuperscript{(a)})</td>
<td>187.59 (\textsuperscript{(a)})</td>
<td>191.63 (\textsuperscript{(a)})</td>
<td>225.11 (\textsuperscript{(a)})</td>
</tr>
<tr>
<td>Wok environment</td>
<td>37.66 (\textsuperscript{(a)})</td>
<td>21.77 (\textsuperscript{(a)})</td>
<td>15.46 (\textsuperscript{(b)})</td>
<td>8.39 (\textsuperscript{(ns)})</td>
<td>7.23 (\textsuperscript{(c)})</td>
</tr>
<tr>
<td>Do volunteer work</td>
<td>22.50 (\textsuperscript{(a)})</td>
<td>14.88 (\textsuperscript{(b)})</td>
<td>2.21 (\textsuperscript{(ns)})</td>
<td>15.64 (\textsuperscript{(b)})</td>
<td>15.17 (\textsuperscript{(a)})</td>
</tr>
<tr>
<td>Seek advice</td>
<td>89.36 (\textsuperscript{(a)})</td>
<td>10.22 (\textsuperscript{(c)})</td>
<td>2.02 (\textsuperscript{(ns)})</td>
<td>4.86 (\textsuperscript{(ns)})</td>
<td>1.95 (\textsuperscript{(ns)})</td>
</tr>
<tr>
<td>Lack of Control</td>
<td>67.070 (\textsuperscript{(a)})</td>
<td>64.99 (\textsuperscript{(a)})</td>
<td>73.38 (\textsuperscript{(a)})</td>
<td>81.34 (\textsuperscript{(a)})</td>
<td>62.22 (\textsuperscript{(a)})</td>
</tr>
<tr>
<td>Lack of Learning</td>
<td>244.52 (\textsuperscript{(a)})</td>
<td>49.46 (\textsuperscript{(a)})</td>
<td>46.51 (\textsuperscript{(a)})</td>
<td>31.10 (\textsuperscript{(a)})</td>
<td>34.59 (\textsuperscript{(a)})</td>
</tr>
</tbody>
</table>


As Table 6.1 shows, there is a highly significant association between different forms of underemployment and economic class. Also, major differences exist between
underemployment and control over work, opportunities for learning and the work environment. Further analysis concentrates on these as possible mediating factors of underemployment- and unemployment-health relationships.

The strong negative impact of unemployment on health has been examined and documented by numerous studies over several decades (Fryer & Fagan, 2003; Taris, 2002; Hammarstroem & Janlert, 2002; Beland, Birch, & Stoddart, 2002; Pohjola, 2001; Rodriguez et al., 1999; Rantakeisu, Starrin, & Hagquist, 1999; Mastekaasa, 1996).

Various theories were developed in different disciplines to explore specific aspects of unemployment. Classic and Keynesian economic theories explain unemployment as a disequilibrium between the demand and supply of labour in an ideal labour market conditions. In relation to health, dominant theories focus on the impact of employment status on job loss or related economic conditions. According to an explanation proposed by Jahoda (1981, 1982), the loss of latent job functions (status and identity) is the main cause of the negative psychological consequences of job loss. By contrast, Fryer (1986) considers the loss of agency leading to financial frustration and ensuing economic deprivation as the main cause of the negative impact of unemployment on health. Similarly, other psychological theories (e.g. Warr, 1987) also underline the important role of unemployment and loss of economic benefits in health deterioration.

There are numerous studies on the impact of unemployment on health, the majority of which find significant associations between involuntary job loss and poor health. There are also evident differences in the explanation of this effect and the interpretation of confounding factors on the health of the unemployed. Many researchers agree that unemployment negatively affects health, but underline the need for better
control and explanation of the impact of the confounding factors. Burgard, Brand, and House (2007) estimate the effect of job loss on health through a study that controls for the confounding effects of job-related selection, reasons for job loss and time of job loss, since these additional factors determine the health of people who lose their jobs. This study shows the significant effect of job loss on the onset of depressive symptoms, but also demonstrates a lower effect among persons with initially better self-reported health.

Regardless of methodological difficulties, the insufficient amount of data, and limitations pertinent to cross-sectional study design, there is an overwhelming amount of evidence documenting lower self-perceived health, higher morbidity and increased mortality among the unemployed. As well, there is evidence showing that unemployment negatively affects the family relations and household members of unemployed workers (Zvonkovic, 1988).

In addition, according to many authors (Fryer, 1986; Hartley & Fryer, 1984), the most significant problem in the field of unemployment and health is the domination of an empiricist, positivist approach that mainly includes data-driven theories, and often uses non-representative samples of study participants. The critics point out that they more often include white male workers than those from other racial groups.

Analysis of the 2004 WALL Survey data is consistent with other similar studies (Fryer & Fagan, 2003; Taris, 2002; Hammarstroem & Janlert, 2002; Beland, Birch, & Stoddart, 2002; Pohjola, 2001; Rodriguez et al., 1999; Rantakeisu, Starrin, & Hagquist, 1999; Mastekaasa, 1996), and shows a significant association between unemployment and health (Table 6.2, Chi-Square = 37.953, P<0.001). Further analysis shows that unemployed respondents experience less than good health approximately twice as often
as their employed counterparts. The WALL Survey data also shows (Table 6.2) that unemployed respondents report disabilities (Chi-Square =58.320, P<.000) more frequently than those who are employed. Also, unemployed respondents report a higher level of daily activity limitation due to their health (64.1% vs. 51.5%; Chi-Square = 17.524, P<0.001).

Table 6.2 Employment Status, Health, Disability and Activity Limitations

<table>
<thead>
<tr>
<th></th>
<th>Less than Good Self-Rated Health</th>
<th>Self-reported disability</th>
<th>Self-reported Activity Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed</td>
<td>10.3%</td>
<td>5.1%</td>
<td>51.5%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>20.7%</td>
<td>14.7%</td>
<td>64.1%</td>
</tr>
<tr>
<td>Total</td>
<td>10.9%</td>
<td>5.7%</td>
<td>52.3%</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>37.402&lt;sup&gt;(a)&lt;/sup&gt;</td>
<td>58.320&lt;sup&gt;(a)&lt;/sup&gt;</td>
<td>17.428&lt;sup&gt;(a)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>


To provide an inclusive assessment of the association between underemployment and health, a separate section of this study is devoted to formulating a comprehensive measure of employment that, in addition to different forms of underemployment, includes unemployment. This classification encompasses all those active in the labour market, regardless of their current employment status, since employment status is a changing process rather than something that is stable throughout an extended period.

Unemployment is understood as an extreme form of underemployment. This section of the study includes variables that were available and that were suitable to currently unemployed respondents. Regardless of its reduced set of variables, this auxiliary analysis provides a valuable addition to the developing field of underemployment-health relationships.

In contrast to criteria of employment as a continuum that contains mixed
categories based on levels of economic and psychological qualities of employment (Dooley, 2003; Grzywacz & Dooley, 2003), my study uses a consistent criterion for distinguishing different employment types. My conceptualization is based on a continuum that includes different forms of underemployment (subjective, objective and time-related) and unemployment as an extreme case of underemployment, since this represents a complete lack of opportunities to use knowledge and skills, to be involved in paid work and to obtain economic benefits. A comprehensive measurement of employment status can only be consistent if it considers all or most of the relevant aspects or qualities of employment and underemployment. The measures in my study include a set of underemployment and unemployment variables.

Bivariate analysis (Table 6.3) of self-perceived health and an array of employment statuses (including quality of employment based on underemployment criteria along with unemployment) shows substantial differences in health only in regards to unemployment, with an exception related to self-perceived health and subjective underqualification. While some 11% (10.7%) of all participants reported less than good (fair or poor) health, almost twice as many unemployed respondents reported the same (20.7%). The majority of the other respondents—those who are underemployed according to objective criteria (credential and performance underemployment),
Table 6.3: Employment Status and Self-Perceived Health

<table>
<thead>
<tr>
<th>Subjective Underemployment and Unemployment</th>
<th>Less than good Self-Rated Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very overqualified</td>
<td>11.5%</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>9.3%</td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>9.6%</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>10.0%</td>
</tr>
<tr>
<td>Very underqualified</td>
<td>23.8%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>20.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10.6%</td>
</tr>
</tbody>
</table>

Chi-Square Tests: 58.770 (a)

<table>
<thead>
<tr>
<th>Relevance gap and Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closely related</td>
</tr>
<tr>
<td>Somewhat related</td>
</tr>
<tr>
<td>Not at all related</td>
</tr>
<tr>
<td>Unemployed</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Chi-Square Tests: 50.338 (a)

<table>
<thead>
<tr>
<th>Credential Underemployment and Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Underemployed</td>
</tr>
<tr>
<td>Underemployed</td>
</tr>
<tr>
<td>Match</td>
</tr>
<tr>
<td>Underqualified</td>
</tr>
<tr>
<td>Highly Underqualified</td>
</tr>
<tr>
<td>Unemployed</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Chi-Square Tests: 45.250 (a)

<table>
<thead>
<tr>
<th>Performance Underemployment &amp; Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Underemployed</td>
</tr>
<tr>
<td>Underemployed</td>
</tr>
<tr>
<td>Match</td>
</tr>
<tr>
<td>Underqualified</td>
</tr>
<tr>
<td>Highly Underqualified</td>
</tr>
<tr>
<td>Unemployed</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Chi-Square Tests: 41.808 (a)

<table>
<thead>
<tr>
<th>Time-Related Underemployment &amp; Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underemployed (Want More Hours)</td>
</tr>
<tr>
<td>Match (Want Same Hours)</td>
</tr>
<tr>
<td>Overworked (Want Fewer Hours)</td>
</tr>
<tr>
<td>Unemployed</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Chi-Square Tests: 42.274 (a)

who report subjective underemployment, or who are underemployed according to subjective criteria (subjective underemployment, reported mismatch between education and job or involuntarily reduced hours of work) —experience less than good health that is close to the overall average (11%). The only exception is a high level of underqualification. Among underqualified respondents, almost a quarter (23.7%) experience less than good health.

To explore the possible confounding effects of adequate employment, underemployment and unemployment, this study applies multiple logistic regression, allowing it to control for the impact that the colinearity between employment status and demographic characteristics have on self-perceived health.

Moreover, it shows (Table 6.4) that, when adjusted for relevant demographic characteristics that are often related to health, lower levels of self-rated health exist among underemployed people. The analysis indicates that respondents who experience subjective underemployment are 61% more likely to report lower perceptions of health, as are 42% of those who experience credential underemployment and 49% of those who experience performance underemployment. The strongest association exists between underqualification and subjective underemployment; underqualified workers are 132% (adjusted odds=2.324) more likely to report less than good health than are adequately qualified employees. There is also a 34% higher probability among overworked employees to report lower self-perceived health. This study also reveals a positive association between performance underemployment and self-reported health (adjusted odds=.662), which most likely reflects the fact that younger employees (18-24 years) experience this type of underemployment more frequently (39%) than the oldest (65 and
over) group (21%). This requires further research, since this unique figure could be caused by the relatively small number of sample respondents in this oldest group.

As Table 6.4 shows, regardless of the associations that age, sex, race, educational attainment and personal income have with HRQoL, unemployment is significantly related to less favourable health. Results of the logistic regression adjusted for demographic variables show that unemployed individuals are more likely to report only poor or fair self-perceived health (adjusted odds are in range of 1.690 to 1.813).

| Table 6.4 Self-Rated Health, Underemployment, Underqualification and Unemployment* |
|---------------------------------------------------------------|-------------------|-------------------|
| Subjective Underemployment and Unemployment                  | Highly Overq.     | Underqualified    | Unemployed       |
|                                                               | (AO=1.605)        | (AO=2.324)        | (AO=1.813)       |
| Relevance Gap and Unemployment                                |                   |                   |
| Credential Underemployment and Unemployment                   | Overqualified     | Underqualified    | Unemployed       |
|                                                               | (AO=1.421)        | (AO=.662)         | (AO=1.773)       |
| Performance Underemployment and Unemployment                  | Overqualified     | Underqualified    | Unemployed       |
|                                                               | (AO=1.486)        | (AO=1.690)        | (AO=1.692)       |
| Involuntary Hours of Work and Unemployment                    | Overworked        | Unemployed        |
|                                                               | (AO=1.336)        | (AO=1.692)        |

Source: WALL, 2004. * Odds adjusted for age, sex, race, educational attainment and personal income.

Research Findings on Unemployment and Self-Perceived Health

Bivariate analysis (Table 6.5) of activity limitations caused by health and the set of employment status indicators explored throughout this study, shows a similar pattern to the analysis of self-perceived health. According to the results obtained through cross tabulations and Chi-square tests, there are significant and substantial associations between unemployment and all the measures expressed in the employment continuum.
Table 6.5 Employment Status and Activity Limitations

<table>
<thead>
<tr>
<th>Any Activity Limitations</th>
<th>Subjective Underemployment and Unemployment</th>
<th>Chi-Square Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very overqualified</td>
<td>53.0%</td>
</tr>
<tr>
<td></td>
<td>Somewhat overqualified</td>
<td>52.8%</td>
</tr>
<tr>
<td></td>
<td>Adequately qualified</td>
<td>50.0%</td>
</tr>
<tr>
<td></td>
<td>Somewhat underqualified</td>
<td>54.9%</td>
</tr>
<tr>
<td></td>
<td>Very underqualified</td>
<td>75.0%</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>64.1%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>52.3%</td>
</tr>
</tbody>
</table>

| Relevance Gap and Unemployment                              | Closely related                             | 49.2%            | 24.195 (a) |
|                                                             | Somewhat related                            | 51.9%            |           |
|                                                             | Not at all related                          | 54.1%            |           |
|                                                             | Unemployed                                  | 64.1%            |           |
|                                                             | Total                                       | 52.5%            |           |

| Credential Underemployment and Unemployment                 | Highly Underemployed                        | 47.7%            | 26.977 (a) |
|                                                             | Underemployed                               | 52.0%            |           |
|                                                             | Match                                       | 51.7%            |           |
|                                                             | Underqualified                              | 54.9%            |           |
|                                                             | Highly Underqualified                       | 44.3%            |           |
|                                                             | Unemployed                                  | 64.1%            |           |
|                                                             | Total                                       | 52.2%            |           |

| Performance Underemployment & Unemployment                  | Highly Underemployed                        | 50.4%            | 22.025 (a) |
|                                                             | Underemployed                               | 51.5%            |           |
|                                                             | Match                                       | 50.1%            |           |
|                                                             | Underqualified                              | 54.3%            |           |
|                                                             | Highly Underqualified                       | 54.2%            |           |
|                                                             | Unemployed                                  | 64.1%            |           |
|                                                             | Total                                       | 52.1%            |           |

| Credential Underemployment and Unemployment                 | Underemployed (Want More Hours)             | 51.6%            |           |
|                                                             | Match (Want Same Hours)                     | 49.2%            |           |
|                                                             | Overworked (Want Fewer Hours)               | 54.3%            |           |
|                                                             | Unemployed                                  | 64.1%            |           |
|                                                             | Total                                       | 52.0%            |           |

Overall, slightly more than one-half of respondents reported some form of activity limitations caused by health status, but almost two-thirds of the unemployed reported activity limitations. An extraordinarily high number of underqualified respondents (75%) reported activity limitations. This study found no significant association between any form of underemployment and activity limitations.

Multivariate analysis controlling for the impact of confounding factors on the association between underemployment and activity limitations (Table 6.6) reveals that control variables (age, sex, educational attainment and income) more strongly affect activity limitations than unemployment. It is probable that age has a crucial impact on activity limitations, exceeding that of the bivariate associations between unemployment and health. This segment of the analysis, which uses multivariate logistic regression, shows a significant relationship between high levels of underqualification (adjusted odds=2.011) and overwork (adjusted odds=1.271). It also reveals an unexpected link between credential underemployment and activity limitations. This inconsistent association with objective measures of underqualification relies on a relatively small sample, and must be validated by additional studies with a more inclusive sample and a more comprehensive set of measures.

Table 6.6 Underemployment, Underqualification, and Activity Limitations *

<table>
<thead>
<tr>
<th>Activity Limitation</th>
<th>Subjective Underemployment</th>
<th>Relevance Gap</th>
<th>Credential Underemployment</th>
<th>Performance Underemployment</th>
<th>Involuntary Hours of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Underqualified, (AO=2.011)</td>
<td></td>
<td></td>
<td>Highly Underqualified, (AO=.615)</td>
<td></td>
<td>Overworked, (AO=1.271)</td>
</tr>
<tr>
<td>(n.s.)</td>
<td></td>
<td></td>
<td>(n.s.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: WALL, 2004. * Odds adjusted for age, sex, race, educational attainment and income.

Based on my analysis, it could be concluded that the most significant association
related to employment status exists between unemployment and self-perceived health. There is also an evident link between unemployment and activity limitations, but according to this study, self-perceived health is more closely tied to respondents’ age. In addition, it shows that subjective underqualification and overwork are significantly associated with both self-rated health and activity limitations.

My results, like those of other previous studies, demonstrate a strong association between unemployment and health; however, they do not prove causal relations, since the cross-sectional design and the possibly confounding impact of some other unobserved variables could change the pattern of the findings. In addition to the general methodological difficulties and a lack of comprehensive control, research studies on unemployment-health relations rarely consider the impact of physical work conditions as a possible confounding factor.

This analysis (Table 6.7) shows that the unemployed are more likely to have been previously employed in less than favourable conditions, including an environment that exposed them to work hazards (Chi-Sq.= 4.015, p<.05), discomfort (Chi-Sq.=26.519, p<.001), and unfavorable work locations (Chi-Sq.=15.082, p<.001) than are currently employed respondents. Such conditions include exposure to unregulated inside climate and generally unfavorable locations. The greatest difference between the currently employed and the unemployed is that the latter more often experienced noise, vibration, and exposure to non-toxic dusts at their previous jobs.

The results provide a strong indication that the postponed effects of work in unfavourable locations and exposure to higher levels of risk have a significant impact on the health of the unemployed. Such findings deserve greater attention from studies on the
sociology of health. A critical sociological approach might be able to elucidate the
sometimes incoherent results regarding unemployment-health associations.

Table 6.7 Job Characteristics (Work Environment) and Employment Status

<table>
<thead>
<tr>
<th>Location</th>
<th>Employed</th>
<th>Unemployed</th>
<th>Chi-Sq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1 Regulated inside climate</td>
<td>10.6%</td>
<td>15.1%</td>
<td>4.605(c)</td>
</tr>
<tr>
<td>L2 Unregulated inside climate</td>
<td>7.0%</td>
<td>14.3%</td>
<td>16.827(a)</td>
</tr>
<tr>
<td>L3 Outside</td>
<td>19.3%</td>
<td>23.3%</td>
<td>1.983</td>
</tr>
<tr>
<td>L4 In a vehicle or cab</td>
<td>8.1%</td>
<td>10.3%</td>
<td>1.408</td>
</tr>
<tr>
<td>LLBIN Total Locations 2C</td>
<td>29.5%</td>
<td>35.6%</td>
<td>4.015(c)</td>
</tr>
<tr>
<td>Hazards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1 Dangerous chemical substances</td>
<td>9.3%</td>
<td>13.7%</td>
<td>5.265(c)</td>
</tr>
<tr>
<td>H2 Biological agents</td>
<td>5.6%</td>
<td>5.6%</td>
<td>.000</td>
</tr>
<tr>
<td>H3 Equipment, machinery, tools</td>
<td>22.5%</td>
<td>33.5%</td>
<td>15.157</td>
</tr>
<tr>
<td>H4 Electricity</td>
<td>2.0%</td>
<td>1.8%</td>
<td>.050</td>
</tr>
<tr>
<td>H5 Radiation</td>
<td>1.7%</td>
<td>1.7%</td>
<td>.000</td>
</tr>
<tr>
<td>H6 Flying particles, falling objects</td>
<td>4.2%</td>
<td>11.2%</td>
<td>26.025(a)</td>
</tr>
<tr>
<td>H7 Fire, steam, hot surfaces</td>
<td>2.8%</td>
<td>5.6%</td>
<td>6.465</td>
</tr>
<tr>
<td>H8 Dangerous locations</td>
<td>6.8%</td>
<td>14.7%</td>
<td>20.551(a)</td>
</tr>
<tr>
<td>HHBIN Total Hazards 2C</td>
<td>30.1%</td>
<td>42.1%</td>
<td>15.082(a)</td>
</tr>
<tr>
<td>Discomfort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1 Noise</td>
<td>17.6%</td>
<td>25.7%</td>
<td>9.421(b)</td>
</tr>
<tr>
<td>D2 Vibration</td>
<td>4.8%</td>
<td>9.9%</td>
<td>11.278(a)</td>
</tr>
<tr>
<td>D3 Odours</td>
<td>18.1%</td>
<td>20.2%</td>
<td>.675</td>
</tr>
<tr>
<td>D4 Non-toxic dusts</td>
<td>9.6%</td>
<td>15.9%</td>
<td>9.809(b)</td>
</tr>
<tr>
<td>D5 Wetness</td>
<td>5.6%</td>
<td>6.0%</td>
<td>.056</td>
</tr>
<tr>
<td>DD Strength at Work</td>
<td>27.6%</td>
<td>32.1%</td>
<td>1.839</td>
</tr>
<tr>
<td>DDBIN Total Discomfort 2C</td>
<td>47.2%</td>
<td>64.4%</td>
<td>26.519(b)</td>
</tr>
</tbody>
</table>


Since my study was not designed to examine different aspects of the relationships
between unemployment, underqualification and health, it can only identify salient issues
and propose topics for future research. Further studies specifically designed for these
topics, including variables appropriate for strongly controlled cross-sectional or
longitudinal analysis, are warranted to determine the real nature of the associations
discussed in this chapter.
Chapter 7
Quality of Employment, Underemployment and HRQoL

The literature review most often shows a significant association between underemployment and a variety of indicators of health. Most frequent are studies that investigate subjective underemployment and its facilitation of depression and minor psychological stress that can develop into a disease. Analysis of the data from the 2002 US General Social Survey provides an opportunity to explore subjective underemployment and a larger number of work-related characteristics in terms of health-related quality of life.

In light of the methodological issues in research on employment-health relations, my study employs a multi-method approach and both quantitative and qualitative data to minimize the methodological challenges (Kristensen, 1995). This section mainly uses employees’ subjective perceptions of psychosocial and physical conditions at their workplace. This complements analysis of the WALL data, which provides quantitative, survey-based information on underemployment and health, as well as of objective measures of underemployment, and observer-based indicators of work environment, as described in the four-digit codes of the National Occupational Classification (NOC, 2006). Since all types of data, subjective and “objective,” have some advantages and weaknesses, my study is based on the assumption that using different types of complementary data to explore the same or similar research topics provides more reliable results than does a single data source (Kristensen, 1995).

Analysis of the data from the US GSS 2002 shows that one in three employees experiences one or more forms of underemployment, while 14.5% experience two or
more forms of overqualification (Graph 7.1). At the same time, more than 20% of employees work part time, and a great number of them do so involuntarily. Aside from actual underemployment, 40% of employees consider it difficult to find a similar job, implying a high level of systemic underemployment. When the official unemployment rate, alternative unemployment, and underemployment measures are combined with employees’ stated preferred hours, results indicate that almost four out of five employees perceive their employment status as inadequate.

Graph 7.1 Forms of Subjective Underemployment

![Graph 7.1](image)


This secondary data analysis from the US GSS 2002 shows a relatively large difference between overqualification and health (Chi-Square =58.618, P=0.001). Graph 7.2 reveals that approximately one in three (31%) of those adequately qualified for their jobs estimate their health as excellent. Conversely, almost twice as many of those underemployed with appropriate qualifications, or those who report subjective underemployment or overqualification for their current job (10.8% vs. 20.0%) report fair or poor health.
Logistic regression based on grouped underemployment measures, and three- and four-level scale (Table 7.1 and 7.2) indicate that overqualified workers are 1.9 to 2.4 times more likely (C.I. 1.50–2.46 and 1.58–2.87) to report poor health in comparison to those with appropriate qualifications.

Table 7.1 Subjective Underemployment and Health (Three-level indexes)

<table>
<thead>
<tr>
<th>Over qualification Level</th>
<th>Sig.</th>
<th>Odds</th>
<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over qualification Level</td>
<td>.001</td>
<td>1.92</td>
<td>1.50</td>
<td>2.46</td>
</tr>
<tr>
<td>Over qualification Level (1)</td>
<td>.001</td>
<td>2.18</td>
<td>1.65</td>
<td>2.87</td>
</tr>
</tbody>
</table>

Table 7.2 Subjective Underemployment and Health (Four-level index)

<table>
<thead>
<tr>
<th>Over qualification Scale</th>
<th>Sig.</th>
<th>Odds</th>
<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over qualification Scale</td>
<td>.001</td>
<td>1.92</td>
<td>1.50</td>
<td>2.46</td>
</tr>
<tr>
<td>Over qualification Scale (1)</td>
<td>.001</td>
<td>2.05</td>
<td>1.47</td>
<td>2.85</td>
</tr>
<tr>
<td>Over qualification Scale (3)</td>
<td>.001</td>
<td>2.43</td>
<td>1.58</td>
<td>3.75</td>
</tr>
</tbody>
</table>


The long-term trends in the US (Graph 7.3a) show a constant worsening of health-related quality of life. Graph 7.3b demonstrates that adequately qualified employees have the best health status, the barely overqualified or underemployed report health status close to the average population, and the highly underemployed most often perceive their
health as worse than that of other employment groups. The association between poor self-rated health and subjective underemployment indicates a need for further studies, which can provide evidence to explain the decline of health-related quality of life in the US.

Graph 7.3 Poor Self-Rated Health Status: Trend in the US and its Association with Subjective Underemployment

Further comparisons, based on analysis of variance, show notable differences in the average self-perceived level of health and the number of days of limited activity or poor physical and mental health during the past 30 days (Graph 7.3c). Generally, overqualified workers report between 1.1 and 2.8 days of poor health or activity limitation, which is 250% more than adequately qualified workers. It is important to note that there are no significant age differences among the compared groups. Data from the same table indicates that socioeconomic factors (expressed as occupational prestige) play a highly significant role in the frequency of illnesses.
The following three charts illustrate that in addition to deteriorating self-reported health in the US, other indicators of HRQoL—physical health, mental health and activity limitations—demonstrate negative trends. Comparison of HRQoL indicators shows that underemployed people most frequently experience lower self-perceived health and activity limitations. This explains the main outcome measures selected for this study.

Graph 7.4 Days of Poor Physical Health: Trend in the US and its Association with Subjective Underemployment

Graph 7.4a Average Number of Days of Poor Physical Health per Month, United states, 1993–2007

Graph 7.4b Underemployment and HRQoL: Days of Poor Physical Health

Source: CDC, 2008.
Graph 7.5 Days of Poor Mental Health: Trend in the US and its Association with Subjective Underemployment

Graph 7.5a Average Number of Days of Poor Mental Health per Month, United states, 1993–2007

Graph 7.5b Underemployment and HRQoL: Days of Poor Mental Health

Source: CDC, 2008.


Graph 7.6 Days of Activity Limitation: Trend in the US and its Association with Subjective Underemployment

Graph 7.6a Average Number of Days of Activity Limitation per Month, United states, 1993–2007

Graph 7.6b Underemployment and HRQoL: Days of Activity Limitation

Source: CDC, 2008.


More detailed analysis of adequately qualified and overqualified workers shows that there are no significant differences between people from different age groups or between males and females (Table 7.3). Strong distinctions exist among people with different
education levels, personal income and self-estimated economic class. A raw per cent comparison shows that there is a 2.7 to 8.6 times higher rate of overqualification among people with less than a high-school education and those with a graduate degree. Slightly lower, but still notable, differences exist among people with different personal incomes (3.5 to 5.7%) and people who belong to different economic classes (2.2 to 4.9%). These results imply that underemployment is strongly related to a lower socioeconomic class. Additionally, these results indicate that the relations between underemployment and health have strong social roots.

Graph 7.7 Underemployment and HRQoL

![Graph showing underemployment and HRQoL](image)


Table 7.3 Socio-demographic Profile for Overqualified Persons

<table>
<thead>
<tr>
<th>AGE</th>
<th>Adequately Qualified (%)</th>
<th>Barely Overqualified (%)</th>
<th>Overqualified (%)</th>
<th>Do not use skills (%)</th>
<th>Do not learn (%)</th>
<th>Stereotypic work (%)</th>
<th>Skill stagnation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>61.0</td>
<td>18.6</td>
<td>20.3</td>
<td>18.1</td>
<td>18.1</td>
<td>11.9</td>
<td>22.0</td>
</tr>
<tr>
<td>25-34</td>
<td>66.6</td>
<td>17.3</td>
<td>16.1</td>
<td>13.2</td>
<td>11.6</td>
<td>11.2</td>
<td>22.4</td>
</tr>
<tr>
<td>35-44</td>
<td>67.2</td>
<td>22.2</td>
<td>10.6</td>
<td>9.2</td>
<td>12.4</td>
<td>7.8</td>
<td>18.1</td>
</tr>
<tr>
<td>45-54</td>
<td>70.8</td>
<td>14.3</td>
<td>15.0</td>
<td>8.3</td>
<td>12.3</td>
<td>10.5</td>
<td>18.7</td>
</tr>
<tr>
<td>55-64</td>
<td>71.5</td>
<td>18.6</td>
<td>10.0</td>
<td>5.0</td>
<td>12.7</td>
<td>9.5</td>
<td>14.0</td>
</tr>
<tr>
<td>665+</td>
<td>46.1</td>
<td>34.2</td>
<td>19.7</td>
<td>6.5</td>
<td>35.9</td>
<td>21.8</td>
<td>18.4</td>
</tr>
</tbody>
</table>
Further analysis (Graph 7.8) demonstrates that overqualified employees more frequently experience chronic stress (13.0 vs. 7.9%), feel exploited or used up (10.2 vs. 5.4%) and suffer from job layoffs (10.6 vs. 6.5%). Overqualified workers seem to more often experience back pain (38.8 vs. 25.9%), pain in their arms (34.5 vs. 26.0%) and injuries on the job (15.4 vs. 9.7%). It is important to note that a significant number of job-related injuries remain unreported (CCOHS, 1995; Shannon & Lowe, 2002), and thus actual figures should be higher than those presented. Aside from proposed policy initiatives and administrative measures, it is vital to increase public awareness of workplace safety and health issues and establish stronger labour standards.
Graph 7.8 Subjective Underemployment and Stress, Pain and Injuries on the Job during Last 12 Months


The facts indicate how a basic social phenomenon, such as work overqualification, can cause psychological and biological changes that directly affect health-related quality of life, operationalized as self-perceived health and physical and mental well-being.

Graph 7.9 Discrimination and Harassment on the Job during Last 12 Months [%]

This analysis also found (Graph 7.9) that overqualified respondents experience age-, race- and gender-based discrimination or harassment more frequently than their adequately qualified counterparts.

As Graph 7.10 shows, a large number of overqualified employees (38.0%) do not perceive conditions as appropriate for productive work. They report a lack of support and limited access to information on how to get the job done much more frequently than do adequately qualified employees (26.9% and 11.8%, respectively). Furthermore, the overqualified feel that their work environment does not run smoothly (13.0% vs. 1.7%), while a similar number of overqualified and adequately qualified employees consider their workplace to be understaffed.

Graph 7.10 Subjective Underemployment and Attitudes toward Work and Workplace Experiences


Considering the experiences described above, the individual and social consequences of underemployment, and its human side as described by Livingstone (1998), it is not surprising that almost one-half (46.9%) of overqualified people do not consider work as a source of personal satisfaction.
Analysis of job demands (Graph 7.11), a central concept of the demand-control theory, demonstrates differences between observed groups, but overall, in comparison to other indicators of employment quality, this factor is not highly prevalent.

Graph 7.11 Subjective Underemployment and Psychological Demands


As Graph 7.12 shows, the unemployed experience physical exertion much more than do adequately matched employees. Approximately 50% of them report heavy physical work demands, like repeated lifting and forceful hand movements. In addition, significant differences exist between employees with appropriate job qualifications and those who consider themselves overqualified. More than 60% of the latter encounter physical demands, whereas only 40.2% of those with adequate qualifications experience repeated lifting and 47.0% forceful hand movements.
Workplace safety is another key condition that overqualified employees perceive as an issue more frequently than do the adequately qualified (Graph 7.13).

Few overqualified employees perceive safety and health conditions at work as good (20.0% vs. 42.2%) and a similar number report a lack of joint management and employee activities related to workplace safety. One-quarter of overqualified employees recognize workplace safety as a priority compared with almost half of adequately qualified employees (27.3% vs. 49.4%).

The overqualified report very low levels of discretionary control (Graph 7.14). Only 10.2% claim that they have “a lot of say in their job” (compared with 38.5% of those adequately qualified), and 18.8% (vs. 51.5%) participate in decision-making.

Graph 7.14 Subjective Underemployment and Control over Work

![Graph showing subjective underemployment and control over work](image)


Less than one-quarter of the overqualified, compared to over half of the adequately qualified (23.8% vs. 54.1%), “lead the way” on how tasks are completed, and less than a third (31.6% vs. 65.4%) feel that they have “a lot of freedom to decide how to do their job.” According to Job Strain, Demand-Control, and Effort-Reward theories, such factors, combined with high job demands, can cause increased work-related stress,
which weakens employees’ health in the long run. Several studies prove the strong negative effect of such conditions on human health.

Analysis of respondents’ incomes shows that a very high number of employees struggle with their earnings. More than half of all respondents (68%) do not see their income as sufficient to meet their basic living needs (Graph 7.15). This is much more prevalent among underemployed workers, only one-third of which perceive their earnings as sufficient. In addition, approximately 22.3% of workers who are underemployed believe their fringe benefits are good, while only 11.4% think it possible to receive a bonus or pay increase. Similar results were obtained in regard to overall income equality; just 14.4% of all employees see their income as unequal compared to 25.2% of overqualified workers.

Graph 7.15 Subjective Underemployment and Earning


This study found that almost two-thirds of all respondents (63.7%) believe that they have opportunities for training, and slightly more than half (53.9%) feel assured of job security (Graph 7.16). Overall, as this study shows, very few employees expect
chances for promotion (20.8%), while only 3.9% of overqualified workers, or 1 in 25, expect job advancement.

Additional analyses were performed to examine the expectations and hopes of underemployed workers. They were conducted through a series of multidimensional tabulations and the application of several models of regression analysis. Employees’ expectations seem to significantly reduce the negative effects of underemployment. Such results indicate the high relevance of humanistic theory, which considers the hierarchy of human needs, including those for safety, self-esteem and self-realization, to be taken into account in assessing living and work conditions (Maslow, 1969, 1993).
In the field of interpersonal relations, underemployed or overqualified workers experience more serious difficulties than their adequately qualified counterparts (Graph 7.17). For instance, overqualified employees feel that they receive less respectful treatment than adequately placed workers (22.7% vs. 46.1%), their trust in management is considerably less (16.3% vs. 35.7%), they perceive good management and employee relations less frequently (24.4% vs. 40.5%), and fewer of them expect to be praised by a supervisor (30.6% vs. 63.2%).

Graph 7.17 Subjective Underemployment and Perceived Interpersonal Relations [%]


Also, the overqualified consider supervisors and coworkers as helpful and reliable much less than adequately qualified employees (Graph 7.18). They do not think supervisors are concerned with employees’ welfare, nor do they see them as helpful in getting the job done (34.9% vs. 56.2%). Moreover, they are less likely to perceive coworkers as people who can be relied on when help is needed (44.7% vs. 58.6%) or as taking a personal interest in the problems of others (29.9% vs. 50.5%).
This study, through measuring self-perceived health status, reported days of poor physical and mental health, and the number of days of limited activity during the past 30-day period, shows that subjective underemployment or overqualification is often associated with unfavourable working and living conditions, which contribute to a lower perception of HRQoL.
Chapter 8

Class Analysis: Economic Class, Underemployment and HRQoL

Numerous studies in social epidemiology, sociology and social psychology show the essential impact of economic class on health (Krieger & Fee, 1994; Drever, Whitehead & Roden, 1996; Adler et al., 1999; Scambler, 2001; Raykov et al., 2005). Previous research on morbidity, mortality, life expectancy and self-rated health that uses the official UK economic classification system also shows that this factor has a profound effect on health (Wilkinson & Marmot, 2003).

Graph 8.1 Working Conditions by Economic Class (percent of employees exposed to risks and discomforts)

From the results of my study (Graph 8.1), there is strong evidence to suggest that industrial workers are the most exposed to harmful working environment. Compared to other occupational groups, they are more likely to work under less favourable conditions (51% vs. 19%), and are more often exposed to workplace hazards (81% vs. 31%). Furthermore, 86% of them are exposed to discomforts at work, compared to a 47% average for all occupational groups.

Further analysis demonstrates (Graph 8.2) that industrial workers are several times more likely to be exposed to hazards than are managers or service workers. In addition, they experience a much larger number of combined exposure than other employment groups. It should be noted that self-employed are also exposed to similarly high risk levels. Also, though the majority of managers are not exposed to great environmental risk, some managers and supervisors, probably in smaller organizations not affected by highly specialized work, experience extremely high exposure to detrimental work conditions.

My results, based on Canadian (WALL, 2004) and US (GSS, 2002) surveys, indicate the probable causes of lower self-perceived health among industrial workers and the self-employed. My study explores the level of underemployment and its impact on health among members of different economic classes.
To examine these relations, this section of my study applies logistic regression, which controls for confounding impact of demographic factors. This study controls for respondents’ age, sex, race and income and explores the interrelations between health and six forms of underemployment. Results are based on the WALL Survey, 2004 (N= 5760); statistically significant results are coded according to three standard levels: (a) $P < 0.001$, (b) $P < 0.01$, and (c) $P < 0.05$, (ns) = not significant. Tables contain odds ratios adjusted for age, sex, educational attainment and income.
Employees, Underemployment, and Health-Related Quality of Life

Results of the class analysis (Table 8.1), which includes control for relevant demographic factors, shows that a significant association exists between self-reported health, subjective underemployment (Odds = 6.159) and involuntary reduced hours of work (Odds = 6.938). There is no major association between activity limitations and underemployment. A strong association is evident between inadequate employment and perceived stress. Those working at jobs unrelated to their education perceive almost 3 times as much stress as do adequately matched (Odds = 2.846) workers. Also, those who report a performance gap are almost 4 times more likely to experience stress (Odds = 3.793), and people working reduced hours are almost 7 times more likely (Odds = 6.931).

It should be noted that those who are overworked are also much more likely to experience stress than employees working hours that they prefer (Odds = 4.615).

Table 8.1 Employees, Underemployment, and Health-Related Quality of Life

<table>
<thead>
<tr>
<th></th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUBJECTIVE UNDEREMP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequately qualified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>6.159&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>.596</td>
<td>.994</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>.550</td>
<td>2.105</td>
<td>.852</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>.384</td>
<td>2.853</td>
<td>.681</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000</td>
<td>.183</td>
<td>.000</td>
</tr>
<tr>
<td><strong>RELEVANCE GAP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closely related</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat related</td>
<td>.507</td>
<td>1.548</td>
<td>1.192</td>
</tr>
<tr>
<td>Not at all related</td>
<td>.959</td>
<td>1.246</td>
<td>2.846&lt;sup&gt;(c)&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>CREDENTIAL GAP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Self-Employment, Underemployment, and Health-Related Quality of Life

Overworked self-employed (Table 8.2) individuals who experience a performance gap (Odds = 9.664) and who are not in a business related to their education (Odds = 2.151) are more likely to report a lower level of self-perceived health. Such individuals (Odds = 3.027) are also likely to feel work-related stress (Odds = 1.829). Those who are self-employed and who prefer fewer hours are also more likely to report activity limitations than are underqualified (Odds = 0.271) and involuntary part-timers (odds = 0.174).

Table 8.2 Self-Employment, Underemployment, and Health-Related Quality of Life

<table>
<thead>
<tr>
<th></th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECTIVE UNDEREMP</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>SE04</td>
<td>SE04</td>
<td>SE04</td>
</tr>
<tr>
<td>Highly overqualified</td>
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<td>.720</td>
<td>1.495</td>
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<tr>
<td>Somewhat overqualified</td>
<td>.733</td>
<td>.951</td>
<td>1.355</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>.260</td>
<td>1.041</td>
<td>.000</td>
</tr>
</tbody>
</table>

Managers, Underemployment, and Health-Related Quality of Life

Inadequate employment and underqualification have a significant impact on managers, as shown by the large number associations between underemployment measures and HRQoL indicators. Significant associations with poor perceived health exist between high levels of underqualification, overwork (Odds = 1.651) and the credential gap (Odds = 1.648). Stress is reported by highly underqualified workers experiencing a performance gap (Odds = 5.697), and by employees with reduced hours of work or involuntary part-timers (Odds = 1.864). Managers who reported subjective overqualification also felt higher work-related stress (Odds = 2.076).
As Table 8.3 shows, activity limitations are more often reported by managers and supervisors who work fewer hours than preferred (Odds = 1.777) or involuntarily part time (Odds = 1.947), who experience credential (Odds = 1.514) or subjective underemployment (Odds = 1.622), and who report subjective underqualification (Odds = 1.719).

Table 8.3 Managers, Underemployment, and Health-Related Quality of Life

<table>
<thead>
<tr>
<th>Subjective Underemployment</th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-Related Stress (AO)</th>
</tr>
</thead>
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<tr>
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<td>MS05</td>
<td>MS05</td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>1.404</td>
<td>1.622&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>1.539</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>1.043</td>
<td>1.137</td>
<td>2.076&lt;sup&gt;(a)&lt;/sup&gt;</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>1.065</td>
<td>1.719&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>1.744</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>3.067&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>2.120</td>
<td>5.697&lt;sup&gt;(a)&lt;/sup&gt;</td>
</tr>
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</table>

Relevance Gap

<table>
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<th>Somewhat related</th>
<th>Not at all related</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.888</td>
<td>1.254</td>
</tr>
<tr>
<td></td>
<td>1.251</td>
<td>1.245</td>
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</table>

Credential Gap

<table>
<thead>
<tr>
<th>Match</th>
<th>Highly underemployed</th>
<th>Underemployed</th>
<th>Underqualified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.433</td>
<td>1.648&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>.552&lt;sup&gt;(e)&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>.909</td>
<td>1.514&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>.859</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.481</td>
<td>.907</td>
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</table>

Performance Gap

<table>
<thead>
<tr>
<th>Match</th>
<th>Highly underemployed</th>
<th>Underemployed</th>
<th>Underqualified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.328</td>
<td>1.388</td>
<td>1.010</td>
</tr>
<tr>
<td></td>
<td>1.379</td>
<td>1.247</td>
<td>.956</td>
</tr>
<tr>
<td></td>
<td>1.287</td>
<td>1.541</td>
<td>2.961&lt;sup&gt;(a)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Inadequate Hours

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.738</td>
<td>1.777&lt;sup&gt;(b)&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.063</td>
</tr>
</tbody>
</table>

Professional Employees, Underemployment, and Health-Related Quality of Life

The descriptive part of this analysis shows that professionals are less likely to be underemployed than are all other occupational groups (Table 8.4). There are a relatively small number of significant associations between underemployment and measures of health-related quality of life among this group. Despite some bipolar tendencies towards associations between health and underemployment, the only significant association is with the credential gap (Odds = 2.574). Involuntary part-time professionals are less likely to report activity limitation (Odds = 0.366), probably because younger professional employees often involuntarily work part-time hours.

Table 8.4 Professional Employees, Underemployment, and Health-Related Quality of Life

<table>
<thead>
<tr>
<th>Subjective Underemp</th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequately qualified</td>
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<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>3.280</td>
<td>1.116</td>
<td>1.899</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>1.728</td>
<td>.981</td>
<td>1.741</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>2.654</td>
<td>1.176</td>
<td>.224</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Relevance Gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closely related</td>
<td>1.872</td>
<td>1.338</td>
<td>.675</td>
</tr>
<tr>
<td>Not at all related</td>
<td>1.458</td>
<td>2.668(^{(c)})</td>
<td>1.788</td>
</tr>
<tr>
<td>Credential Gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.949</td>
<td>1.058</td>
<td>.462</td>
</tr>
<tr>
<td>Underemployed</td>
<td>2.574(^{(c)})</td>
<td>.835</td>
<td>.935</td>
</tr>
<tr>
<td>Underqualified</td>
<td>.828</td>
<td>1.162</td>
<td>.852</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000</td>
<td>1.009</td>
<td>.057</td>
</tr>
<tr>
<td>Performance Gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.549</td>
<td>1.023</td>
<td>.526</td>
</tr>
</tbody>
</table>
Underemployed 1.672 1.145 .938  
Underqualified .605 .792 .121(b)  
Highly underqualified .300 1.479 .126  

INADEQUATE HOURS  
Same [Match]  
More [Underemployed] 2.710 1.467 .096  
Less [Overworked] 1.831 1.989(c) 1.335  


Service Workers, Underemployment, and Health-Related Quality of Life

Higher levels of job stress are experienced by service workers who report credential (Odds = 2.346) and performance (odds = 2.910) underqualification, or who are overworked (odds = 1.883). Service workers who experience a credential gap more often report a lower level of self-perceived health (Odds = 2.196) and are more likely to suffer activity limitation (Odds = 1.855). Those who experience performance underqualification are more than 3.5 times (Odds = 3.486) as likely to report activity limitation.

Table 8.5 Service Workers, Underemployment, and Health-Related Quality of Life

<table>
<thead>
<tr>
<th>Subjective Underemp</th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-Related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequately qualified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>1.294</td>
<td>1.007</td>
<td>1.337</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>1.113</td>
<td>1.216</td>
<td>.831</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>1.719</td>
<td>.637</td>
<td>1.359</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>2.652</td>
<td>-</td>
<td>1.214</td>
</tr>
<tr>
<td>Relevance Gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closely related</td>
<td>1.902</td>
<td>.927</td>
<td>.620</td>
</tr>
<tr>
<td>Not at all related</td>
<td>1.225</td>
<td>.756</td>
<td>.777</td>
</tr>
<tr>
<td>Credential Gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.687</td>
<td>.831</td>
<td>.849</td>
</tr>
<tr>
<td>Underemployed</td>
<td>.967</td>
<td>.823</td>
<td>1.125</td>
</tr>
<tr>
<td>Underqualified</td>
<td>2.196(c)</td>
<td>1.855</td>
<td>2.346</td>
</tr>
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</table>
Industrial Workers, Underemployment, and Health-Related Quality of Life

Industrial workers who work more hours than they prefer (overworked) experience higher levels of job-related stress (Odds = 2.643) and activity limitation (Odds = 1.682) more frequently than other occupational groups (Table 8.6). Those who work fewer hours are less likely to report lower self-perceived health (Odds = 0.355) and education-job mismatch (Odds = 0.471). Employees experiencing a high performance gap are almost 4 times more likely to report poorer health (Odds = 3.957). Stress is more likely to be felt by industrial workers who perceive subjective underqualification (odds = 2.663), or who work involuntary part-time hours (Odds = 2.059). A significantly lower level of stress is perceived by those who experience high credential underemployment (Odds = 0.103) and high credential underqualification (Odds = 0.047). Industrial workers whose jobs are not matched with their education and involuntary part-timers are more likely to have activity limitations (Odds = 1.998). Less likely to report activity limitations are those who experience a credential gap (Odds = 0.331 and 0.412). The following tables illustrate the impact of different forms of underemployment and working conditions on workers’ health.
Table 8.6 Industrial Workers, Underemployment, and Health-Related Quality of Life

<table>
<thead>
<tr>
<th></th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUBJECTIVE UNDEREMP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>1.859</td>
<td>1.730</td>
<td>2.663^{(b)}</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>1.656</td>
<td>1.281</td>
<td>1.059</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>.370</td>
<td>.386</td>
<td>.510</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000</td>
<td>5.086</td>
<td>.216</td>
</tr>
<tr>
<td><strong>RELEVANCE GAP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closely related</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Somewhat related</td>
<td>.471^{(c)}</td>
<td>1.486</td>
<td>1.279</td>
</tr>
<tr>
<td>Not at all related</td>
<td>.576</td>
<td>1.998^{(b)}</td>
<td>1.872</td>
</tr>
<tr>
<td><strong>CREDENTIAL GAP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>2.716</td>
<td>2.290</td>
<td>.103^{(c)}</td>
</tr>
<tr>
<td>Underemployed</td>
<td>1.758</td>
<td>.878</td>
<td>.689</td>
</tr>
<tr>
<td>Underqualified</td>
<td>.968</td>
<td>.412^{(b)}</td>
<td>.702</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.363</td>
<td>.331^{(b)}</td>
<td>.047^{(c)}</td>
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<td><strong>PERFORMANCE GAP</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>3.957^{(c)}</td>
<td>2.033</td>
<td>.203</td>
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<td>Underemployed</td>
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<td>.965</td>
<td>.785</td>
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<td>Underqualified</td>
<td>.249^{(b)}</td>
<td>.787</td>
<td>.987</td>
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<td>.398</td>
<td>.974</td>
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<td><strong>INADEQUATE HOURS</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Same [Match]</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>More [Underemployed]</td>
<td>.355^{(b)}</td>
<td>1.113</td>
<td>1.043</td>
</tr>
<tr>
<td>Less [Overworked]</td>
<td>1.014</td>
<td>1.682^{(b)}</td>
<td>2.643^{(a)}</td>
</tr>
</tbody>
</table>


As shown in Graphs 8.2 and 9.11, significant differences in the quality of the work environment (locations, hazards and discomfort) exist among members of different occupational groups. The greatest harm is experienced by industrial workers, who report the highest exposure to workplace risks and discomforts. This is likely the most significant reason why industrial workers report lower levels of health-related quality of life.
Chapter 9

Underemployment and Exposure to a Harmful Work Environment

One of the research questions of my study is to explore the extent of the association between structural, environmental and psychosocial determinants of health and different forms of underemployment. This chapter also examines how these associations affect underemployment-health relations. My analysis uses data on the work environment, hazards, discomfort and locations based on the description of jobs that is available in the Canadian National Occupational Classification (NOC, 2004).

A large number of studies provides evidence of a significant association or direct causal relationship between health conditions and exposure to an inadequate physical work environment (Lundberg, 1991; Evans & Kantrowitz, 2002; Tompa et al., 2007).

Because of the colinearity between underemployment and environmental conditions and their joined or collinear impact on health-related quality of life, my study controls for the possible impact of confounding factors on these associations. This chapter first examines bivariate relations between underemployment and work environment; subsequent analyses using multivariate logistic regression explore interrelations between all relevant variables and their associations with underemployment.
The results presented in Table 9.1 show a large number of significant relations between underemployment and an unfavourable working environment. The most frequent exposure to risks and discomforts is reported by those who experience education-job mismatch (16 significant associations), who work involuntary reduced hours (13) and who report subjective underemployment (10). Those who experience credential underemployment (9) and performance gap (9) are subjected to a slightly lower, but still considerable, exposure to risks, discomforts and less favourable locations.
These results explain the associations between underemployment and health, and provide information on other forms of inadequate employment, underemployment and overwork that are useful for academic discussion and policy making.

**Combined Exposure to Hazards, Discomfort and Inadequate Workplace Locations**

Graph 9.1 shows that respondents who perceive higher levels of underemployment more often work under less favourable environmental conditions (average number of hazards 2.16 vs. 1.90; $F = 5.317^{(a)}$ than other employees. Analysis of the continual measure of employment based on respondents’ perceptions of the match between their current job and their knowledge and skills, reveals that underqualified respondents experience the least favourable working conditions. This is likely the reason why underemployed respondents report the worst self-perceived health.

**Graph 9.1 Subjective Gap and Combined Exposure to Harmful Work Environment**

![Graph 9.1 Subjective Gap and Combined Exposure to Harmful Work Environment](image)

Based on an analysis of the relevance of an individual’s education to his/her job (Graph 9.2), the most substantial difference in exposure to harmful work environment exists between those who report a good education-job match and those who work at a job that is unrelated to their education (F = 41.134). Such findings demonstrate the need for a careful exploration of the physical environment and overall working conditions that underemployed workers encounter. In addition, they indicate a high colinearity between working conditions and employees’ health, and demonstrate the need for comprehensive approaches to examining the work environment and its impact on HRQoL. Controlling for confounding effects could significantly improve the existing studies on underemployment-health relationships. The analysis presented in the next chapter applies multivariate logistic regression to examine these complex relations.

Graph 9.2 Relevance of Education to Job and Combined Exposure to Harmful Work Environment*


In addition to the significant association between subjective underemployment and a less favourable working environment, my study also found small differences in the
working conditions of those who experience objective underemployment (Graph 9.3).

Respondents who experience credential underemployment more often \((F = 2.703^{(c)})\) suffer combined hazards and discomforts at work.

**Graph 9.3 Credential Underemployment and Combined Exposure to a Harmful Work Environment** *

![Graph 9.3 Credential Underemployment and Combined Exposure to a Harmful Work Environment](image)

Source: WALL, 2004. * Combined N = 5052, \(F = 2.703^{(c)}\).

**Graph 9.4 Performance Underemployment, Work at Unfavourable Locations, and Exposure to Hazards and Discomforts** *

![Graph 9.4 Performance Underemployment, Work at Unfavourable Locations, and Exposure to Hazards and Discomforts](image)

Source: WALL, 2004. * Combined exposure, N = 5257, \(F = 2.973^{(c)}\).

As Graph 9.4 shows, small differences in exposure to harmful work environments exist among those who experience performance underemployment \((F = 2.973^{(c)})\).

Employees who involuntarily work fewer hours than they prefer (Graph 9.5) are more likely to experience hazards or discomforts at work than are other groups \((F = \ldots\))
There is a need for comprehensive studies on the conditions experienced by employees who work fewer hours than they wish.

Graph 9.5 Involuntarily Reduced Hours and Combined Exposure to Harmful Work Environments *

Work Environment and Health-Related Quality of Life

As Table 9.2 shows, there are significant statistical associations among Self-reported Health, Activity Limitations, Work-related Stress and workplace hazards and discomforts. High risk and discomfort at work are most often linked to activity limitations (12), lower self-perceived health (10), and, to a lesser extent, perceived stress (6).

Table 9.2 Self-Reported Health, Activity Limitations, Work-Related Stress and Characteristic of Work Environment*

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1: Regulated inside climate</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2: Unregulated inside climate</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>L3: Outside</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>L4: In a vehicle or cab</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Any Unfavourable Location</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HAZARDS</th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Dangerous chem. substances</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>H2: Biological agents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H3: Equipment, machinery, tools</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>H4: Electricity</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H5: Radiation</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H6: Flying particles or objects</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>H7: Fire, steam, hot surfaces</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>H8: Dangerous locations</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Exposure to Any Hazard</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DISCOMFORT</th>
<th>Self-Reported Health (AO)</th>
<th>Self-Reported Activity Limitation (AO)</th>
<th>Constant Work-related Stress (AO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1: Noise</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>D2: Vibration</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>D3: Odors</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>D4: Non-toxic dusts</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>D5: Wetness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D6: Required Strength at Work</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Exposure to Any Discomfort</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

Number of Significant Associations 11 12 6

This study provides evidence consistent with previously accumulated data that an inadequate work environment, higher exposure to risks and discomfort, and work in less favourable locations are associated with lower HRQoL, and likely contribute to deterioration of the physical health of employees and cause permanent damage.

**Combined Exposure to Hazards and Discomfort at Work and HRQoL**

The study also provides evidence (Graph 9.6) of significantly greater exposure to hazards and discomfort at work among employees who have lower self-reported health (1.87 vs. 2.28), who report some form of activity limitation (1.69 vs. 2.18), and who experience higher levels of exposure to stress at work (1.91 vs. 201).

Graph 9.6 Self-Reported Health, Activity Limitations, Stress and the Combined Exposure to a Harmful Work Environment

Source: WALL, 2004. * Combined Exposure to hazards, discomfort and unfavourable locations at work.
An analysis of variance (Table 9.3) shows that the combined scores for unfavourable locations, hazards and discomfort are significantly higher for all health indicators examined in this study. The average number of risks and discomforts is higher among workers who report less than good health \((F = 13.256, P < .00)\), activity limitations \((F = 36.060; P < .000)\), and higher work-related stress \((F = 1.047; P < .306)\).

Table 9.3 Analysis of Variance for Self-Reported Health, Activity Limitations, Stress and the Combined Exposure to a Harmful Work Environment*

<table>
<thead>
<tr>
<th>ANOVA</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-rated Health Status</td>
<td>13.256 (a)</td>
</tr>
<tr>
<td>Activity Limitation</td>
<td>36.060 (a)</td>
</tr>
<tr>
<td>Work-related Stress</td>
<td>1.047 (ns)</td>
</tr>
</tbody>
</table>


The results demonstrate that harmful working conditions significantly affect the core indicators of HRQoL and are very likely to contribute to health deterioration among employees exposed to them. Such evidence supports my main assumption that the physical environment, hazards and discomfort at work have a significant impact on workers’ health that and have additive effect on HRQoL of underemployed workers.

These results suggest that, along with the usually advocated improvements to psychosocial and organizational conditions, further research and practical efforts are required to eliminate or minimize workers’ exposure to harmful environmental conditions. In addition to extensive academic research and inclusive safety measures,
decision-makers of employment and workplace-related safety policies should examine and remodel current standards to improve, rather than simply protect, workers’ health.

This study notes a tendency among employees exposed to greater risks and discomfort to use more specific indicators to describe the issues they encounter, rather than abstract concepts for self-perceived stress. Future research should explore the terminology that different social groups use to report stress and health-related issues, as well as their perceptions of standards for health evaluation.

In sum, my study finds that there is an evident need for the expansion of theoretical frameworks and explanatory models regarding the impact of work and environmental conditions on health. Future studies and policy measures should go beyond superficial changes in human relations toward a comprehensive model that considers both the work environment and more profound reforms to production relations.

Work Environment, Economic Class and Employees’ Demographic Characteristics

There is a well-established socio-demographic profile for underemployed people in Canada (Livingstone, 1998; Livingstone, 2001; Livingstone and Schultz, 2006) and abroad (Green, 1996; Dooley, 1998, 2004; Handle, 2005, 2006) that shows distinctive characteristics. My study (Chapter 5) also shows significant variations in the extent of underemployment among people of different age, sex, race, educational attainment, income, and probably most notably, economic class.

Since the existing literature shows a strong association between socio-
demographic characteristics and health status, in order to control for colinearity, my study applies multivariate analysis that controls the impact that demographic characteristics have on health as well as environmental work conditions that people with different socio-economic characteristics experience at work.

The results (Table 9.4) prove that different occupational groups in Canada and abroad (USGSS, 2002; EU Surveys, 1996, 2001, 2006) are exposed to harmful environmental conditions and risks to varying extents. The greatest differences in exposure to environmental risks and discomfort at work are evident among members of different economic classes.

The largest number of statistically significant differences concerning harmful work environments appear to exist among employees of different economic classes. All of the 18 indicators of hazards, discomfort and locations are presented by economic class in Table 9.4. According to the results, industrial and self-employed workers experience the highest environmental risks while professionals and employers experience the lowest levels of exposure to risks and discomfort at work.
Table 9.4 Economic Class, Socio-Demographic Characteristics and Characteristics of the Work Environment*

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Empl Class</th>
<th>Age</th>
<th>Sex</th>
<th>Race</th>
<th>Low Ed. Attainm.</th>
<th>Low Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1: Regulated inside climate</td>
<td>+</td>
<td>.</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>L2: Unregulated inside climate</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>L3: Outside</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>L4: In a vehicle or cab</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Any Unfavourable Location</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

HAZARDS

<table>
<thead>
<tr>
<th>HAZARDS</th>
<th>Empl Class</th>
<th>Age</th>
<th>Sex</th>
<th>Race</th>
<th>Low Ed. Attainm.</th>
<th>Low Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Dangerous chem. substances</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>H2: Biological agents</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>H3: Equipment, machinery, tools</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>H4: Electricity</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>H5: Radiation</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>H6: Flying particles or objects</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>H7: Fire, steam, hot surfaces</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>H8: Dangerous locations</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Exposure to Any Hazard</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

DISCOMFORT

<table>
<thead>
<tr>
<th>DISCOMFORT</th>
<th>Empl Class</th>
<th>Age</th>
<th>Sex</th>
<th>Race</th>
<th>Low Ed. Attainm.</th>
<th>Low Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1: Noise</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>D2: Vibration</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>D3: Odors</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>D4: Non-toxic dusts</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>D5: Wetness</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>D6: Required Strength at Work</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Exposure to Any Discomfort</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

Number of Signif. Associations 18 10 15 5 17 12


The same table shows that employees with lower educational attainment are also very often exposed to workplace risks and discomfort (17 significant measures). The gender difference is also highly significant and shows that males are more exposed to 15 out of the 18 examined work environment-related risks and discomforts. Lower levels of exposure to unfavourable impacts in the work environment are evident among people of different race, different age and different income.
Socio-Demographic Indicators and Combined Exposure to Harmful Work Environments

In addition to the Chi-Square results based on comparisons of single measures of exposure to the harmful work environment, the summary measure, combined exposure or total number of risks and discomfort that individuals experience at work provides additional evidence and the possibility of determining the levels of exposure to harmful work environments among different socio-demographic groups.

As the following graphs demonstrate, it is also evident that the largest variations in exposure to harmful environments exist between people of different economic classes, educational attainments and genders. The graphs include the average number of risks and discomforts that members of specific groups encounter at work, as well as the results from an analysis of variance (ANOVA) comparing the combined average number of exposures to risks and discomforts at work. Also included are F-test values and their level of significance.

The most substantial difference in the total number of unfavourable working conditions (Graph 9.7) exists between males and females (2.59 vs. 1.24; F = 465.781\textsuperscript{a}). The main reasons for this are the traditional gendered division of labour and the characteristics of those occupations traditionally associated with gender.
Graph 9.7 Gender and the Combined Exposure to Harmful Work Environment*


Significant differences in the work environment are also related to employees’ age (Graph 9.8). It should be noted that less favourable environmental working conditions are more frequently experienced by the youngest and oldest employees (F = 3.680, P < .003).

Graph 9.8 Respondents’ Age and the Combined Exposure to Harmful Work Environment*

Very strong differences in the level of exposure to risks and hazards at work exist among employees with different educational attainments (Graph 9.9). Simple comparisons of the average number of exposures to combined hazards and discomforts at work indicate that employees without a high school diploma have four times the average number of exposures to harmful work environments ($F = 197.260(a)$. 

Graph 9.9 Educational Attainment and the Combined Exposure to Harmful Work Environment*

![Graph showing educational attainment and combined exposure](image)


As Graph 9.10 shows, statistically significant differences in exposure are also evident among people with different levels of income ($F = 11.067^a$). An increased level of exposure is evident for people from the lowest income group.
Graph 9.10 Personal Income and the Combined Exposure to a Harmful Work Environment


One of the most significant differences in the quality of the work environment (locations, hazards and discomfort) is evident among members of different occupational groups (Graph 9.11). The highest exposure to a harmful work environment is experienced by industrial workers, who report approximately 7 times as much as that experienced by professional employees, and more than twice that of all other employees (F = 237.293a). This is likely the most significant reason why industrial workers report lower levels of health-related quality of life. It should be noted that a separate annex of this study shows that people working at high-risk and high-discomfort jobs are, on average, younger, and gain greater financial rewards.
Graph 9.11 Economic Class and the Combined Exposure to a Harmful Work Environment*


Graph 9.12 demonstrates that there are also significant differences in the characteristics of the work environment among people who, according to their opinions, belong to different economic classes (F = 66.081). This can help to explain the large differences in social inequalities in health and among occupational and social groups in regard to morbidity, mortality and health-related quality of life. The results support the argument that employment class and characteristics of the work environment have a stronger association with HRQoL then the psychosocial work relations. Industrial workers and the self-employed are exposed to the greatest risk and discomfort at work. Employers and service workers experience similar exposure patterns, probably because a large number of small employers, like many of the self-employed, are directly involved in production or service work.
In summary, my study provides unique empirical evidence that underemployment is strongly associated with less favourable working conditions. Exposure to specific hazards and discomforts at work, as well as the combined scores of exposure to a harmful working environment, are significantly higher among underemployed respondents than among those who are adequately employed.

An analysis of variance shows significant statistical differences in combined exposure to harmful work environments for all underemployment measures used in this study: subjective, objective and time-related underemployment.

Evidently, there is a marked similarity between the results of my study and the existing literature on health disparities. Results from my study show significant differences in exposure to a harmful work environment are similar to the variations

Graph 9.12 Subjective Class Position and the Combined Exposure to Harmful Work Environments*

reported in the previously mentioned literature among different economic classes (e.g. Wilkinson & Marmot, 2003; Raykov, 2006; WHO/EU, 2005).

Such consistent results indicate the need for a wider exploration of health inequalities that should take into account work-related hazards, discomfort and inappropriate locations, along with other characteristics of the work and household environments likely to affect health. It is probable that a more inclusive conceptual approach based on the proposed critical environmental perspective can provide evidence for an explanation of health disparities and for the mechanisms that contribute to the deterioration of health among disadvantaged social groups.

In addition to examining issues related to underemployment and health, my results contribute to the discussion on social disparities in health and mortality (Mechanic, 1975; Wilkinson, 1997; Lynch, 2000; Scambler, 2002). For the majority of the commonly used criteria of social disparities in health and mortality, (economic class, sex, race, educational attainment and income) my study documents significant differences in exposure to inadequate, risky or distressful work environments among underprivileged social groups.
Chapter 10

Qualitative Analysis of Underemployment and HRQoL

10.1 Self-Rated Health and Underemployment

The results of bivariate analysis demonstrate significant relations between self-rated health and subjective underemployment. However, when controlled for confounding effects (demographic characteristics, work environment and social relations at work), this association vanishes because of the stronger association among self-rated health, characteristics of work environment and workplace social relations (Table 10.1). Significant links between underemployment and self-rated health only exist between involuntary reduced hours of work and subjective underemployment. Indeed, there is an approximately 33% (odds=1.330) greater likelihood that those involuntarily working reduced hours will report lower self-rated health. Analysis of the underemployment profile shows that this category includes older, insufficiently employed respondents with lower incomes. The strongest relations to subjective underemployment and health exist among work environment (Odds = 1.82) and economic class, and, lower but statistically significant, opportunity for learning (odds = 1.32), social environment (odds = 1.79) and control over work (odds = 1.38).
Table 10.1 Self-Rated Health and Underemployment

<table>
<thead>
<tr>
<th>Bivariate Analysis of Self-Rated Health and Underemployment</th>
<th>Multivariate Logistic Regression Analysis</th>
<th>Sig.</th>
<th>Adj. Odds*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Subjective Underemployment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>Adequately qualified</td>
<td>.292</td>
<td>1</td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>Highly overqualified</td>
<td>.114</td>
<td>1.283</td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>Somewhat overqualified</td>
<td>.558</td>
<td>1.081</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>Adequately qualified</td>
<td>1.283</td>
<td></td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>Somewhat underqualified</td>
<td>.598</td>
<td>1.123</td>
</tr>
<tr>
<td>Total</td>
<td>Highly underqualified</td>
<td>.100</td>
<td>1.820</td>
</tr>
<tr>
<td>Chi-Square</td>
<td></td>
<td>19.445</td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td><strong>2. Relevance gap</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closely related</td>
<td>Adequately qualified</td>
<td>.427</td>
<td>1</td>
</tr>
<tr>
<td>Somewhat related</td>
<td>Somewhat related</td>
<td>.724</td>
<td>1.046</td>
</tr>
<tr>
<td>Not at all related</td>
<td>Not at all related</td>
<td>.206</td>
<td>1.162</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10.985</td>
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</tr>
<tr>
<td>Chi-Square</td>
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</tr>
<tr>
<td><strong>3. Credential Underemployment</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Highly underemployed</td>
<td>Match</td>
<td>.257</td>
<td>1</td>
</tr>
<tr>
<td>Underemployed</td>
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<td>.129</td>
<td>.758</td>
</tr>
<tr>
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<td>.982</td>
<td>1.003</td>
</tr>
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<td>Underqualified</td>
<td>.157</td>
<td>1.236</td>
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<td>Highly underqualified</td>
<td>.944</td>
<td>1.016</td>
</tr>
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<td>Total</td>
<td></td>
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<td></td>
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<tr>
<td>Chi-Square</td>
<td></td>
<td>.222</td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4. Performance Underemployment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Adequately qualified</td>
<td>.817</td>
<td></td>
</tr>
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<td>Highly overemployed</td>
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<td>.952</td>
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<tr>
<td>Adequately qualified</td>
<td>Underemployed</td>
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<td>.940</td>
</tr>
<tr>
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<td>Highly underemployed</td>
<td>.316</td>
<td>1.251</td>
</tr>
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<td>Total</td>
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<td>1.411</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
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<td>.842</td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>5. Involuntary Reduced Hours</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Want more (Underemployed)</td>
<td>Same hours (Match)</td>
<td>.055</td>
<td>1</td>
</tr>
<tr>
<td>Want same hours (Match)</td>
<td>More (Underemployed)</td>
<td>.048</td>
<td>1.330</td>
</tr>
<tr>
<td>Want fewer hours (Overworked)</td>
<td>Less hours (Overworked)</td>
<td>.056</td>
<td>1.229</td>
</tr>
<tr>
<td>Total</td>
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</tr>
<tr>
<td>Chi-Square</td>
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<td>.250</td>
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As Tables 10.1 and 10.2 show, self-rated health is most significantly linked with workers’ age (AO = 1.79-3.38), employment class (AO = 1.81-193), and characteristics of the work environment (AO = 1.89. Similar associations exist for relevance gap, credential,
performance and time-related underemployment. There are also significant but less
strong associations among self-rated health, social participation (1.49), opportunities for
learning (1.42), and control over work (1.51).

It should be noted that the crude odds (bivariate association and associations adjusted for
age, gender and race) between subjective underemployment and relevance gap are
statistically significant (crude odds AO = 3.03 and 1.41 and Model 1 AO= 3.94 and 1.45,
respectively). However, when these associations were tested with control variables
related to employment class, work environment, social capital and control-demand, they
were found not to be significant. This suggests that a large part of the relationship
between underemployment and self-reported health can be attributed to other factors,
such as employment class and characteristics of work environment, that have stronger
effects on the perception of health.

Despite the fact that much of the association between underemployment and core
health-related variables can be attributed to employment class, work environment and
specific workplace psychosocial relations, there are still links between some forms of
underemployment, like involuntary reduced hours of work and subjective
underemployment, and self-rated health. There are significant independent associations
between different forms of underemployment and other indicators of HRQoL, as
presented in the following sections of this study. As well, there is a more robust
association between underemployment and stress, job insecurity and job satisfaction, all
of which are important aspects of quality of work and which represent risks for
employees’ health.
The results show that underemployment has an independent, direct impact on HRQoL, while employees’ class and work conditions have stronger associations with core HRQoL indicators, self-perceived health and activity limitation.

Table 10.2 Relations between Self-Rated Health: Raw Odds, Partially (Model 1) and Completely (Model 2) Adjusted Odds

<table>
<thead>
<tr>
<th>Self-rated Health</th>
<th>Subjective Gap</th>
<th>Relevance Gap</th>
<th>Credential Gap</th>
<th>Performance Gap</th>
<th>Time-related Underemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAW ODDS</td>
<td>Sig.</td>
<td>AO</td>
<td>Sig.</td>
<td>AO</td>
<td>Sig.</td>
</tr>
<tr>
<td>Match</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>1.23</td>
<td>1.18</td>
<td>.81</td>
<td>.98</td>
<td>.82</td>
</tr>
<tr>
<td>Underemployed</td>
<td>98</td>
<td>.001</td>
<td>1.41</td>
<td>.98</td>
<td>1.01</td>
</tr>
<tr>
<td>Underqualified</td>
<td>98</td>
<td>1.27</td>
<td>.94</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000</td>
<td>3.03</td>
<td>1.09</td>
<td>1.24</td>
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<table>
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<th>ADJUSTED ODDS (Model 1)</th>
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<th>1</th>
<th>1</th>
<th>1</th>
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<tr>
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<td>.033</td>
<td>1.37</td>
<td>1.12</td>
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<td>.98</td>
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<td>Underemployed</td>
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<td>.000</td>
<td>1.45</td>
<td>1.00</td>
<td>1.04</td>
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<td>1.16</td>
<td>.88</td>
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<td>1</td>
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<td>.000</td>
<td>3.94</td>
<td>1.03</td>
<td>1.20</td>
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</table>

<table>
<thead>
<tr>
<th>ADJUSTED ODDS (Model 2)</th>
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<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly underemployed</td>
<td>1.28</td>
<td>1.04</td>
<td>.75</td>
<td>.95</td>
<td>.048</td>
</tr>
<tr>
<td>Underemployed</td>
<td>1.08</td>
<td>1.16</td>
<td>1.00</td>
<td>1.04</td>
<td>1</td>
</tr>
<tr>
<td>Underqualified</td>
<td>1.12</td>
<td>1.23</td>
<td>.94</td>
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</tr>
<tr>
<td>Highly underqualified</td>
<td>1.82</td>
<td>1.01</td>
<td>1.25</td>
<td>1</td>
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<table>
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<tr>
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<th>18-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>Gender (Male)</th>
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<th>.78</th>
<th>.040</th>
<th>.80</th>
<th>.031</th>
<th>.79</th>
<th>.003</th>
<th>.73</th>
<th>.014</th>
<th>.77</th>
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<td>1.79</td>
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<td>1.68</td>
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<tr>
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<td></td>
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<td>1.79</td>
<td>.011</td>
<td>1.76</td>
<td>.008</td>
<td>1.83</td>
<td>.015</td>
<td>1.74</td>
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<td>1.79</td>
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<td>.001</td>
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<td>.001</td>
<td>3.83</td>
<td>.000</td>
<td>4.41</td>
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<td>4.57</td>
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<td>4.19</td>
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<td>.040</td>
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<td>.003</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>.77</td>
<td>.78</td>
<td>.87</td>
<td>.74</td>
<td>.77</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Employment Class and Environment | Employers | 1 | 1 | 1 | 1 | 1 | Self-employed | .011 | 1.93 | .017 | 1.81 | 1.55 | .016 | 1.86 | .017 | 1.82 |
|-----------------------------------|-----------|---|---|---|---|---|---------------|-----|-----|------|-----|------|-----|------|-----|------|-----|
| Managers/supervisors              | .013 | 1.83 | .019 | 1.74 | .051 | 1.61 | .047 | 1.62 | .017 | 1.76 |
| Professionals                     | 1.35 | 1.22 | 1.25 | 1.20 | 1.333 | 1    | 1    | 1    | 1    | 1    |
| Service workers                   | 1.24 | 1.18 | 1.06 | 1.08 | 1.06  | 1    | 1    | 1    | 1    | 1    |
| Industrial workers                | .027 | 1.81 | .024 | 1.79 | .036 | 1.76 | .030 | 1.79 | .019 | 1.85 |
| Inadequate work environment       | .000 | 1.89 | .000 | 1.94 | .000 | 1.87 | .000 | 1.88 | .000 | 1.87 |
| Social Capital                    | Social Participation | .000 | 1.49 | .000 | 1.53 | .000 | 1.47 | .000 | 1.59 | .000 | 1.59 |
|                                  | Social Networking   | .97  | 1.01 | .99  | .95  | 1.02  |     |       |     |     |     |
| Control-Demand                   | Control over work   | .002 | 1.51 | .007 | 1.43 | .002 | 1.53 | .010 | 1.42 | .006 | 1.45 |
|                                  | Opportunity for learning | .002 | 1.42 | .003 | 1.39 | .000 | 1.58 | .003 | 1.40 | .000 | 1.47 |

Source: WALL, 2004. [Legend for Specific Underemployment measures: * Closely Related vs. Somewhat Related and Not Related at All; ** Match vs. Underemployed and Overworked].
Perceptions of Self-Rated Health and Factors that Determine Health

Similar to findings from quantitative analysis based on the survey data, interviews with industrial workers conducted through study *Education-job Requirements Matching* (Livingstone, 2009, in press) contain topics related to some of the most serious health-related problems more often than interviews with other occupational groups. This is illustrated dramatically by some of the answers about self-perceived health:

... I had an operation last year and just about died. I’m doing a lot better.  
[Participant in Auto Work Case Study who reported time-related underemployment]

Another set of interviews from the same study (Livingstone, 2009, in press) on industrial and other workers further indicates the severity of health-related issues encountered by this group. Types of illnesses and chronic conditions are indicative of a direct or likely relationship between workers’ health status and the work environment.

... I have carpal tunnel, tendonitis, I had a back injury. I find like I said to you I blow my nose and stuffiness in my nose from work. My general health right now outside of my work area, you are talking about outside of my work life I am down to 97.5 pounds and I do not know why. And I am going through a series of tests right now. ... I know there are some concerns, I do not want loosing this weight. I do not know if it’s stress-related maybe I’m taking on too much, maybe it is because of all this pain in my shoulder you know for the last few months. We do not know but we are checking everything to be sure that it is not something that it is serious. So overall my health has been fair.  
[Participant in Auto Work Case Study who reported overwork]

As seen in the literature (e.g. Lowe, 1998, 2007), there are numerous methodological difficulties in exploring the impact of employment on health. One important factor in this domain is the large number of health difficulties and injuries that
are not reported to researchers and/or medical institutions. An interview with an industrial worker who participated in one of these case studies reveals such flaws:

...If you are hurt you go to medical, ...“do not say you are hurt…, okay.”
[Participant in Auto Work Case Study who reported knowledge and skills mismatch]

In many cases, employees are well aware of factors that influence their health:

… ... I developed severe pain in the bottom of my feet and had terrible pain walking. I was told it was because I stand on my feet all day on a concrete floor at work. At the time my work shifts were 10 hours long when I did overtime. I ended up on worker’s compensation for three months because the pain got really bad. I had to go on medication and got physio treatments for two months. I was under the care of a specialist for treatment. I ended up getting custom orthotics to wear for work.
[Participant in Disability and Work Case Study who reported relevance gap]

Similarly, survey results demonstrate a significant association between the work environment and health. Interviewed workers also perceive workplace conditions as having a particularly significant impact:

The part [of my job] that I don't like is because I'm working with lapping oil and it's pretty toxic. I've looked at the WHIMIS thing and it's not good for you. And I get covered in it. Like my coveralls are covered... and it drips onto your shoes and soaks into your feet. You can get new safety shoes all the time, mind you, you can get them replaced. It'll soak through the safety shoes. Now I think they have new ones, with rubber going around, really ugly, but those actually have protectant on it where the oil doesn't go through...
[Participant in Auto Work Case Study who reported relevance gap]

Such low levels of self-perceived health among industrial workers and the self-employed are probably the result of general social conditions within their work environment. This
indicates that many underemployed people working in an unfavourable environment or working a physically demanding job likely suffer deteriorating health over an extended period. Case study participants not only demonstrate an awareness of the hazards of such work, but indicate feelings of anxiety over the negative impact their occupations have on their health:

… I have been to doctors for the last two months. I thought I had a heart attack in December but it was not. It was a severe muscle pull here and it went across my chest down my arm, I went for test immediately, you know went over for all testing and then went for ultrasound of the heart last month and cholesterol everything, blood pressure every single day at work, I mean you know I have been having problems with my left arm and lower back when and actually going for therapy and I will be going for my EMG next month. There is good neurology at the hospital and I am having problems with my arm. Probably I have to get an operation. My chiropractor and I am going for acupuncture next week. I am going for massage therapy. I am going to Farm Hill five times in the next two weeks for a treatment of my arm and ultrasound... I got this for a quite a while, arm problem since ‘92, back problems probably from ’88-’89 ... I do not remember.

[Participant in Auto Work Case Study who reported knowledge and skills mismatch]

In addition to the hazards and discomfort related to industrial work settings, employees are also aware of new types of risks common to typical office and non-industry-related occupations:

… Well I always want to find ways of improving my lifestyle. Because unfortunately, part of our job involves a lot of sitting down, which really does not help much.

[Participant in Disability and Work Case Study who reported knowledge mismatch]

As this participant confirms, employees are often aware of the degree to which their occupations can interfere with their efforts to maintain a healthy lifestyle:
… ... I am a little overweight. I eat a lot of veggies and fruits but I eat too much and I exercise too little and the more overtime I work, the less time and energy is there for exercise. So, overtime is not bad for your health, because of the overtime per se.

[Participant in IT Case Study who reported knowledge and skills mismatch]

Among professional information technology employees participating in this study, the most frequently occurring topics involved health-related lifestyle and health improvement. Many case study participants, for example, spontaneously mentioned nutrition:

I lost a lot of weight and that was intentional because I thought I was getting a little up there and I was having some issues with blood pressure and so forth. So I have really modified my eating and exercise habits.

[Participant in IT Case Study who reported subjective underemployment]

Participants from non-industry-related case studies also consider exercise to be a significant factor in health and health improvement:

… I have started exercising so there is some health improvement. There was a period of the time where that was neglected.

[Participant in IT Case Study who reported overwork]

Furthermore, there are indications that professional workers perceive nutrition as a greater determinant of health than exercise:

… ... my health might have improved a little bit with more exercise but my nutrition might not be that great.

[Participant in IT Case Study who reported relevance gap and overwork]
As indicated by findings from the WALL and EJRM surveys, knowledge of health and work safety is often obtained through informal learning. Case studies have revealed that individuals often learn about health-related issues through the Internet:

... I learn through the Internet. If I am curious about some nutritional content or something. I am pretty conscious about eating relatively healthy

[Participant in IT Case Study who reported overwork]

There is an obvious association between learning about health and practising a healthy lifestyle. But some participants do not pay much attention to literature-based health education. Instead, they stress the importance of actions and habits to maintaining a healthy lifestyle:

… I do not do any learning about health and safety but I do visit the gym everyday. So I prefer to do health rather than read about health.

[Participant in IT Case Study who reported overwork]

The workers who most often commented on their efforts in health improvement were those who reported activity limitation or disability. They often identified specific exercises or aids they used to correct their health-related deficiencies:

... exercises to do with stretching, to do with maintaining the muscles and tendons. Within the last year, I have started going to a nutritionist, so working on, on everything from that perspective.

[Participant in Disability and Work Case Study who reported relevance gap]

Several participants who reported activity limitation or disability indicated a need to invest in health-related activities and provide examples of exercise equipment being of use in coping with such conditions:

… I want to get more on a regular schedule with the weight training and resistance machine. I have an elliptical trainer at home that is one of the good things that I invested in for my own health.
Though the Education-Job Requiring Matching project was not focused on health-related issues, some of the spontaneous claims regarding underemployment and health provide valuable insights into underemployment-health relations. When workers comment on underemployment, they state that reduced hours and work intensification can create stress and dissatisfaction with work:

... as we lost work and now everything is pretty well leveled up, leveled out, but they are still looking for more, they are always looking like more money, and how do you make more money, maintain production, and cut workers.

10.2 Activity Limitation and Underemployment

Activity limitation is more often associated with underemployment than is self-rated health (Table 10.3). It is important to note that it has stronger links with self-reported underqualification than with subjective overqualification, defined as subjective gap (Livingstone, 2009, in press). Underqualified employees are 2.1 times more likely to report activity limitation than adequately qualified employees. Those working unwanted hours are also approximately 20% (odds=1.212) more likely to report activity limitation. Those who report credential underqualification are some 30% (odds=.716) less likely to report activity limitation. This is probably due to the fact that younger people are more often credentially underemployed and usually report better health.
Table 10.3 Activity Limitation and Underemployment

<table>
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<th>Adj. Odds*</th>
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<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
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<tr>
<td>Somewhat overqualified</td>
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<tr>
<td>Adequately qualified</td>
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<tr>
<td>Somewhat underqualified</td>
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</tr>
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<td>Somewhat related</td>
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<td>Total</td>
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<td><strong>3. Credential Gap</strong></td>
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</tr>
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<td>Highly underemployed</td>
<td>47.7%</td>
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</tr>
<tr>
<td>Underemployed</td>
<td>52.1%</td>
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</tr>
<tr>
<td>Match</td>
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<tr>
<td>Highly underqualified</td>
<td>44.3%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>51.3%</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>[8.838]</td>
<td>.716</td>
</tr>
<tr>
<td>Sig.</td>
<td>[.065]</td>
<td></td>
</tr>
<tr>
<td><strong>4. Performance Gap</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>50.4%</td>
<td></td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>51.5%</td>
<td></td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>50.2%</td>
<td></td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>54.5%</td>
<td></td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>54.2%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>51.3%</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>[4.061]</td>
<td>.963</td>
</tr>
<tr>
<td>Sig.</td>
<td>[.398]</td>
<td></td>
</tr>
<tr>
<td><strong>5. Involuntary Reduced Hr</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Want more (Underemployed)</td>
<td>51.8%</td>
<td></td>
</tr>
<tr>
<td>Want same hours (Match)</td>
<td>49.3%</td>
<td></td>
</tr>
<tr>
<td>Want fewer hours (Overworked)</td>
<td>54.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>51.2%</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>[7.643]</td>
<td>1.217</td>
</tr>
<tr>
<td>Sig.</td>
<td>[.022]</td>
<td></td>
</tr>
</tbody>
</table>

Source: WALL, 2004. Odds adjusted for age, sex, educational attainment and income.

There is also a low but significant association between education-job mismatch (19% greater probability, odds=1.186) and time-related underemployment (22% greater probability, odds=1.217) for those working less than they desire.
A summary review of determining factors for activity limitation (Table 10.3) shows the highest association with subjective underqualification (P<0.001, Odds = 2.127), and a slightly increased likelihood of activity limitation among overworked employees (P<0.010, Odds = 1.212). There is a slightly increased probability of activity limitation among those who work less than they would prefer (P<0.052, Odds = 1.217), and those with education-job mismatches (Odds = 1.186). Furthermore, there is an inverse relationship between credential underemployment and activity limitation (Odds = 0.716). This is probably caused by the age of the majority of those who experience a credential gap, since younger workers are more likely to be underemployed.

In addition to other determinants of activity limitation (Table 10.4), inadequate working conditions are highly significant, as they increase the probability that workers will experience this problem (e.g. for subjective underemployment, adjusted odds = 1.74, P<0.001). The findings of this study provide additional evidence that greater exposure to risks and injuries, and exposure to other work-related hazards (e.g. chemicals, dust, and vibrations) contribute to increased activity limitation among underemployed workers. Finally, this analysis shows that social networking has a relatively small but statistically significant association with activity limitation (AO=1.34, P < .001).

The results of logistic regression, presented in Table 10.4, also show that employees who report subjective underqualification have a higher probability of suffering activity limitation (AO = 2.12, P<0.015). Additionally, those who experience a relevance gap have a slightly higher probability of this (AO=1.18, P<0.036). Analysis of the EJRM responses to the open-ended questions provides deeper insight into the findings obtained through quantitative analysis.
Table 10.4 Relations between Activity Limitations and Underemployment: Raw Odds, Partially (Model 1) and Completely (Model 2) Adjusted Odds

<table>
<thead>
<tr>
<th>RAW ODDS</th>
<th>Subjective Gap</th>
<th>Relevance Gap*</th>
<th>Credential Gap</th>
<th>Performance Gap</th>
<th>Time-related Undere.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match</td>
<td>Sig. AO</td>
<td>Sig. AO</td>
<td>Sig. AO</td>
<td>Sig. AO</td>
<td>Sig. AO</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1*</td>
<td>1</td>
<td>1</td>
<td>1**</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>1.1</td>
<td>1.11</td>
<td>.85</td>
<td>1.00</td>
<td>.90</td>
</tr>
<tr>
<td>Underemployed</td>
<td>1.12</td>
<td>.006</td>
<td>1.21</td>
<td>1.02</td>
<td>1.05</td>
</tr>
<tr>
<td>Underqualified</td>
<td>1.21</td>
<td>1.12</td>
<td>1.18</td>
<td>1.12</td>
<td>1.18</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000</td>
<td>2.99</td>
<td>.048</td>
<td>.74</td>
<td>1.17</td>
</tr>
</tbody>
</table>

**ADJUSTED ODDS (Model 1)**

<table>
<thead>
<tr>
<th>Match</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1**</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>1.15</td>
<td>1.07</td>
<td>.85</td>
<td>1.01</td>
<td>.86</td>
</tr>
<tr>
<td>Underemployed</td>
<td>1.16</td>
<td>.009</td>
<td>1.21</td>
<td>.98</td>
<td>1.05</td>
</tr>
<tr>
<td>Underqualified</td>
<td>1.22</td>
<td>1.04</td>
<td>1.14</td>
<td>1.04</td>
<td>1.14</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.001</td>
<td>2.57</td>
<td>.013</td>
<td>.69</td>
<td>1.15</td>
</tr>
</tbody>
</table>

**ADJUSTED ODDS (Model 2)**

<table>
<thead>
<tr>
<th>Match</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
<th>Sig. AO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1**</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>1.11</td>
<td>1.09</td>
<td>.84</td>
<td>.96</td>
<td>.052</td>
</tr>
<tr>
<td>Underemployed</td>
<td>1.13</td>
<td>.036</td>
<td>1.18</td>
<td>.98</td>
<td>1.07</td>
</tr>
<tr>
<td>Underqualified</td>
<td>1.10</td>
<td>1.06</td>
<td>1.14</td>
<td>1.06</td>
<td>1.14</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.015</td>
<td>2.12</td>
<td>.036</td>
<td>.71</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Demographic Characteristics

| 65 +     | 1              | 1              | 1              | 1               | 1**                  |
| 18-24    | 1.19           | 1.21           | 1.21           | 1.123           | 1.22                 |
| 25-34    | .002           | 1.46           | .002           | 1.47            | .003                 |
| 35-44    | .009           | 1.39           | .008           | 1.40            | .004                 |
| 45-54    | .012           | 1.46           | .015           | 1.44            | .001                 |
| 55-64    | .013           | 2.13           | .010           | 2.17            | .001                 |
| Gender (Male) | 1.09 | 1.08       | 1.04           | 1.12            | 1.07                 |
| Race (Non-white) | 1.00 | 1.07       | 1.19           | 1.05            | 1.09                 |

Employment Class

| Employers | 1              | 1              | 1              | 1               | 1**                  |
| Self-employed | 1.1  | 1.13       | 1.16           | 1.09            | 1.16                 |
| Managers/supervisors | 1.0  | 1.07       | 1.15           | 1.11            | 1.06                 |
| Professionals  | .89            | .92            | .93            | .89             | .87                  |
| Service workers | .88            | .90            | 1.01           | .91             | .89                  |
| Industrial workers | .83            | .83            | .94            | .85             | .88                  |

Work Environment

| Social Participation | 1.14 | 1.11       | .018           | 1.18            | 1.09                 |
| Social Networking    | .000           | 1.34           | .000           | 1.31            | .000                 |

Control-Demand

| Control over work | 1.08 | 1.09       | 1.01           | 1.04            | 1.05                 |
| Opportunity for learning | .95            | .92            | .96            | .95             | .94                  |

Source: WALL, 2004. [Legend for Specific Underemployment measures: * Closely related vs. Somewhat related and Not related at all; ** Match vs. Underemployed and Overworked].
Analysis of qualitative data from the EJRM Case Studies shows that employees often recognize the sources of their health-related difficulties, but underestimate the impact they have on their overall conditions.

Interviewer: In general, would you say your health is excellent, very good, good, fair, or poor?
Participant: Excellent.

Interviewer: Have there been any significant personal health changes ...
Participant: Varicose veins from standing on cement everyday for 20 years.

Interviewer: Do you have what you consider to be a disability?
Participant: No

In many instances, workers exposed to harmful substances will continue to do their jobs in spite of their awareness of the harm such exposure might be doing to their health.

The chemical... it smells... but you're hair...

[Participant in Auto Work Case Study who reported relevance gap]
According to my study, the association between different forms of underemployment and work-related stress is much stronger than that between underemployment and self-rated health and activity limitation. Those who experience work-related stress are 3.45 (odds $= 3.450$, $P<0.001$) times more likely to report subjective underqualification, 1.57 times more likely to report being overworked and 1.33 times more likely to report performance underqualification (Table 10.5).

Table 10.5 Job Stress and Different Forms of Underemployment

<table>
<thead>
<tr>
<th>Job Stress</th>
<th>Sig.</th>
<th>Adj. Odds*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Subjective Gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td>Somewhat overqualified</td>
<td>11.7</td>
<td></td>
</tr>
<tr>
<td>Adequately qualified</td>
<td>9.6</td>
<td>Adequately qualified</td>
</tr>
<tr>
<td>Somewhat underqualified</td>
<td>10.2</td>
<td>Highly overqualified</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>34.5</td>
<td>Somewhat overqualified</td>
</tr>
<tr>
<td>Total</td>
<td>10.8</td>
<td>Somewhat underqualified</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>59.899</td>
<td>Highly underqualified</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>2. Relevance Gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closely related</td>
<td>10.0%</td>
<td>Closely related</td>
</tr>
<tr>
<td>Somewhat related</td>
<td>8.6%</td>
<td>Somewhat related</td>
</tr>
<tr>
<td>Not at all related</td>
<td>13.0%</td>
<td>Not at all related</td>
</tr>
<tr>
<td>Total</td>
<td>10.7%</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>19.146</td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>3. Credential Gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>8.3%</td>
<td>Match</td>
</tr>
<tr>
<td>Underemployed</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>11.0%</td>
<td>Highly underemployed</td>
</tr>
<tr>
<td>Underqualified</td>
<td>10.6%</td>
<td>Underemployed</td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>12.1%</td>
<td>Underqualified</td>
</tr>
<tr>
<td>Total</td>
<td>10.3%</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>5.660</td>
<td>Highly underqualified</td>
</tr>
<tr>
<td>Sig.</td>
<td>.226</td>
<td></td>
</tr>
<tr>
<td>4. Performance Gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly overqualified</td>
<td>9.9%</td>
<td></td>
</tr>
</tbody>
</table>
As Table 10.5 shows, employees who report subjective underqualification are 1.47 times more likely to have work-related stress, but those credentially underemployed are approximately 30% less likely to experience it. This is probably because younger people are more often involved in temporary or inadequate employment that is poorly matched to their credentials.

There is a notable connection between education-job mismatch (relevance gap) and work-related stress, with a 41% greater likelihood that employees who experience relevance gap feel stress at work. However, the strongest associations with stress exist between lack of control over work (Odds = 2.05) and social networking (Odds = 1.40). It is of note that service workers are approximately 50% less likely to report work-related stress than are other employees.

As Table 10.6 demonstrates, there are relatively few significant associations between work-related stress and economic class, characteristics of work environment and social capital.

Service workers are much less likely to report stress than are workers in other industries (P<0.001, Odds = .45). By contrast, those with a greater level of control over
their work (P<0.001, Odds = 2.01) and those involved in community activities (P<0.001, Odds = 1.36) tend to report greater levels of stress. These findings require greater attention, since there are indications that members of different social groups often attribute different meanings to the term “stress.” Most likely this is because the vast majority of studies explore psychological stress while neglecting that caused by inadequate work environments.

Further analysis of the results (Table 10.6) shows that underemployment is strongly linked to work-related health. The raw odds between subjective underemployment and relevance gap with work-related stress are significant, and remain so after adjustments for employees’ demographic characteristics.

### Table 10.6 Relations between Work-Related Stress and Underemployment: Raw Odds, Partially (Model 1) and Completely (Model 2) Adjusted Odds

<table>
<thead>
<tr>
<th>Subjective Gap</th>
<th>Relevance Gap*</th>
<th>Credential Gap</th>
<th>Performance Gap</th>
<th>Time-rel Underem.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAW ODDS</td>
<td>Sig.</td>
<td>AO</td>
<td>Sig.</td>
<td>AO</td>
</tr>
<tr>
<td>Match</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.004 1.47</td>
<td>.84</td>
<td>.73</td>
<td>.96</td>
</tr>
<tr>
<td>Underemployed</td>
<td>.046 1.25</td>
<td>.003 1.34</td>
<td>.84</td>
<td>.89</td>
</tr>
<tr>
<td>Underqualified</td>
<td>1.08</td>
<td>.96</td>
<td>.039 1.30</td>
<td></td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000 4.89</td>
<td>1.13</td>
<td>.000 1.95</td>
<td></td>
</tr>
<tr>
<td>ADJUSTED ODDS (Model 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.007 1.46</td>
<td>.82</td>
<td>.016 .65</td>
<td>.82</td>
</tr>
<tr>
<td>Underemployed</td>
<td>1.24</td>
<td>.003 1.35</td>
<td>.81</td>
<td>.84</td>
</tr>
<tr>
<td>Underqualified</td>
<td>1.04</td>
<td>.97</td>
<td>.038 1.31</td>
<td></td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000 4.08</td>
<td>1.11</td>
<td>.000 1.93</td>
<td></td>
</tr>
<tr>
<td>ADJUSTED ODDS (Model 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Highly underemployed</td>
<td>.012 1.46</td>
<td>.87</td>
<td>.018 .64</td>
<td>.72</td>
</tr>
<tr>
<td>Underemployed</td>
<td>.020 1.32</td>
<td>.002 1.40</td>
<td>.038 .76</td>
<td>.038 .76</td>
</tr>
<tr>
<td>Underqualified</td>
<td>1.04</td>
<td>.98</td>
<td>.040 1.32</td>
<td></td>
</tr>
<tr>
<td>Highly underqualified</td>
<td>.000 3.45</td>
<td>1.13</td>
<td>.000 2.03</td>
<td></td>
</tr>
<tr>
<td>Demographic Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 +</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>18-24</td>
<td>1.10</td>
<td>1.07</td>
<td>.93</td>
<td>1.02</td>
</tr>
<tr>
<td>25-34</td>
<td>1.09</td>
<td>1.13</td>
<td>.95</td>
<td>1.00</td>
</tr>
<tr>
<td>35-44</td>
<td>1.18</td>
<td>1.22</td>
<td>.92</td>
<td>1.04</td>
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<td>45-54</td>
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<td>1.14</td>
<td>.85</td>
<td>.86</td>
</tr>
<tr>
<td>55-64</td>
<td>.33</td>
<td>.29</td>
<td>.34</td>
<td>.30</td>
</tr>
<tr>
<td>Gender (Male)</td>
<td>.93</td>
<td>.97</td>
<td>1.00</td>
<td>.98</td>
</tr>
<tr>
<td>Race (Non-white)</td>
<td>.013 1.38</td>
<td>.002 1.47</td>
<td>.000 1.60</td>
<td>.002 1.49</td>
</tr>
<tr>
<td>Employment Class</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employers</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Self-employed</td>
<td>.73</td>
<td>.75</td>
<td>.79</td>
<td>.88</td>
</tr>
</tbody>
</table>
Managers/supervisors    .89        .99        .90        .98        .99
Professionals           .84        .97        .85        .85        .91
Service workers         .000       .45        .001      .48        .003      .49        .002      .49        .005      .52
Industrial workers      1.08       1.06       .99        1.19       1.26

Work Environment
Social Capital
Social Participation    1.36       .001      1.41      .001       1.41       .000      1.45       .000      1.45
Social Networking       1.03       1.01       1.10       1.00       1.06
Control-Demand
Control over work       .000       2.01      .000      2.02      .000      1.90      .000      2.10      .000      2.02
Opportunity for learning .93        .87        .96       1.01       .91

Source: WALL, 2004. [Legend: * Closely related vs. Somewhat related and Not related at all; ** Match vs. Underemployed and Overworked].

Further control (Table 10.6) for the complete model, which includes employment class, characteristics of work environment, social capital and control over work, shows that underemployment has a significant independent association with work-related stress (AO = 1.46, P<0.012 for subjective gap and AO=1.40, P<0.002 for relevance gap).

This study also shows that employees who report subjective underqualification are more prone to work-related stress (AO=3.45, P<0.001), as are those who experience performance underqualification (odds= 2.03, P<0.001). Employees who work more hours than they desire also have a higher likelihood of experiencing work-related stress (AO=1.43, P<0.016).

Qualitative evidence reveals some of the reasons for the findings from the quantitative data, based on the Canadian WALL and the US General Social Survey ( ).
Sources of Work-Related Stress

Stress resulting from undesirable (reduced or increased) hours is often added to the stress that is already commonly reported among underemployed workers. Work overload and time pressure are frequent causes of stress, especially when occurring simultaneously. The cyclical nature of activities related to underemployment and overwork is perceived as a significant source of stress:

... [the] past few months it has been stressful all the time. But then again it is just because we work in cycles and basically when we are in a cycle where we are ramping up for a release and at the same time we still have all the constant noise from the customers so it just adds up. ... So it is like the bottom of the wave. And then, you don’t have much work.

[Participant in IT Case Study who reported underemployment and overwork]

Working a greater than desired number of hours can be just as stressful as being underemployed. Underemployment is a complex phenomenon; whether underemployed because of credentials or through work-developed skills, many such employees are overworked. An industrial worker reporting constant work-related stress describes its causes in the following way:

…because it’s an assembly line and if it’s down for two seconds, the bells and whistles go off. It’s shift work and like I was saying, the people that work there are really unhappy and always complaining. You get sick of listening to it. [they are unhappy with] ... their jobs, getting laid off.

[Participant in Auto Work Case Study who reported knowledge and skills mismatch]

Work overload is probably one of the most frequent sources of stress, regardless of the industry or type of work. The following statements, taken from a variety of case studies, demonstrate the association between workload and stress:
… A lot to do and in a service capacity when you are, got three machines down and you are trying to fix them all as quick as you can, so you can get running again and then it gets a little stressful because there is no time …

[Participant in Auto Work Case Study who reported adequate qualification]

Such work-related stress is commonly the result of employees being assigned multiple tasks which they are expected to carry out simultaneously:

… When there are too many things happening at once it gets a little stressful.

[Participant in IT Case Study who reported performance gap and overwork]

In other instances, it is the result of time pressure or lack of a reasonable amount of time to complete duties:

[My job is stressful] …, occasionally… Less than half the time because of too much to do and too little time.

[Participant in IT Case Study who reported performance gap and overwork]

Long hours of work without relief are a major source of stress. In the following case, the participant reports being unable to cope with stress resulting from periods in which their job required them to work an exorbitant amount of hours:

… The last time it was really stressful was the week that I worked 40 hours by Wednesday morning. There were two crises that week. There was a major virus outbreak and that was the week of the power outage. The 60-70 hour weeks that occasionally occur, those are pretty stressful, but the rest of the time I can cope.

[Participant in IT Case Study who reported performance gap]

In addition to overload and time crunch at work, the knowledge that management run evaluations of their employees’ performance can also be a great source of stress:
… That can be stressful if you feel overwhelmed and you can’t complete all of the projects that you have and you don’t want to work a lot of overtime. … So, that can be stressful. It is also stressful if you feel like you are under a certain amount of pressure to show your knowledge or your leadership. Like you are worried that you might not be able, like if you have to present something to people that you feel like they might have more experience than you, it is kind of stressful feeling. [Participant in IT Case Study who reported objective underemployment and overwork]

Certain amounts of stress, as the classic literature on the subject states, may be useful as a means of coping with difficult work environments. According to the fight-or-flight response, stress sometimes assists the individual to produce the additional energy needed in certain situations. Employees and management often perceive stress in this way:

... there’s good stress and bad stress. Like the challenge of the job… it was good stress, there was satisfaction at the end of it. In the middle of it, it was not fun. I would call it too stressful. [Participant in Auto Work Case Study who reported overwork]

As has been well documented in the literature, managers often work under greater stress than do other employees. As the following statement illustrates, the appraisal of employees’ performance and interpersonal relations is a significant source of stress for management:

… You have to have a certain amount of stress to drive you—so I am thinking about the too stressful thing… usually when there is a deadline or when I feel that my staff is overworked and there is not a lot I can do. Or it is just a difficult situation like evaluation or communicating merit increases and that kind of thing is hard—or can be I suppose I should say. A lot of it is self imposed. [Participant in IT Case Study who reported subjective underemployment]
Learning a new job and initial work experience can be other significant sources of stress. With a new job comes the need to develop new skills, gain new information and adapt to an unfamiliar interpersonal network. Such adaptation is yet another source of stress, as indicated here:

… I’d say that [my being new] is a big part of it. Sometimes it’s just that you go from job to job to job. You don’t have time even for your breaks. Some days are just kind of crazy. And sometimes dealing with people is crazy and it can be stressful.

[Participant in Auto Work Case Study who reported overwork]

The following participant cites unexpected work engagement and an awareness of the costliness of mistakes as important sources of stress:

… they can just all of a sudden snap their fingers and everybody has to go, like when they say okay, we need 250,000 extra units in the next couple of weeks, well that means you are working 24/7 nonstop and you are not obligated to do it, but if they have not got anybody to do it, who is going to be there, you know? And you don’t dare shut down [THE COMPANY]. When they say we want this, they want it. We have done one of their assembly lines once we had a crunches problems and it was $127,000 an hour to shut down … assembly line.

[Participant in Auto Work Case Study who reported objective and subjective underemployment]

The responses from employees questioned about work-related stress are consistent with the results from analysis of survey data. A marked association exists between underqualification and stress. This employee cites a lack of knowledge or proper training, and a lack of understanding on the part of management, as sources of stress:

… Again, with a limited knowledge base, a lack of training, some of these jobs, instead of coming straight to the problem, we do a lot of
unnecessary work. It’s frustrating for everybody, especially for management as the machine’s down and they only see the dollars and cents at that point.

[Participant in Auto Work Case Study who reported objective and subjective underemployment]

Changes in a work environment, new organization, and technology often require work intensification, which in turn increases the level of stress. A respondent from the automotive industry case study clearly articulates this:

… The stress level is so high. ... I have never seen this bad ever. Last 4 weeks is the worst I have seen in 20 years. I never thought it would come to what it is and it’s not just my department but it is plant wide. ... they are trying to implement new work techniques ... the transitions are really, really psychologically and physically in some aspects hurting workers. ... We all know we can do more, okay, but there is a limit. I am at my limit ...

[Participant in Auto Work Case Study who reported adequate qualification]

As a psycho-physical state, stress is recognized as an unpleasant condition which can be detrimental to one’s health and the ability to function within an occupation. Some individuals can develop their own coping strategies with varying degrees of success:

… I find that I have to watch the level of stress in my life too so I can handle what I’m doing right now because I’m fairly familiar with it, although recently there have been a few new changes like new evaluation techniques …

[Participant in Disability and Work Case Study who reported overwork]

Common coping mechanisms include situating problems in a wider perspective, minimizing the importance of pressing issues and distancing oneself emotionally from the sources of stress:

… I deal with stress differently than some people. I have friends here who get really stressed out when we get busy. And some people work well in that environment and some people don’t work well. I just try to
keep an even keel. My main thing is that it is only a job.

[Participant in IT Case Study who reported overwork]

The following passages are participants’ answers to the question “How often do you find your job to be stressful?” This participant in the teacher case study emphasized the important impact of the environment on stress and the usefulness of effective coping strategies:

… So, the facility to remove the source of stress or to remove myself from immediately reacting to the stress is incredibly beneficial, and I think that that is something that I have learned in taking those types of courses.

[Participant in Teacher Case Study who reported overwork]

However, the next individual seems to repress or “bottle up” the tension arising from work-related stress:

It’s a mixed bag. It goes over the top a few times. And you know, you can be frustrated with a whole pile of things and then all of a sudden, the first thing that sets you off you might lash out, which might happen once every two years. I’m getting pretty good at being calm.

[Participant in Teacher Case Study who reported overwork]

For many, coping with stress is an extraordinary effort. Factors that affect the level of stress in a work environment, such as physical demands, work intensity, effort required of a job, overtime, and performance expectations form a complex relationship. There are times when the sources of stress can also be sources of stress reduction. As an employee, it can sometimes be impossible to eliminate work-related stress, since addressing one issue will cause another to arise:

… Working overtime causes stress but getting the work done reduces
your stress … but, it steal time from things like exercise.

[Participant in IT Case Study who reported objective underemployment]

**Consequences of Stress**

It has been estimated that more than half of all visits to physicians are stress related, which is illustrative of the extent to which stress affects health. Increased levels of stress in the workplace can have numerous negative consequences, not only for individuals but for organizations as well as influencing particular employees, such stress may result in conflicts with management and a lack of enthusiasm or motivation; it is likely to expect the long-term consequences for an organization whose employees are so detached from their work. For example, an autoworker attributes distancing himself from work and loss of motivation to stress:

…it used to be really stressful in the last two years. To the point that I went to my doctor and was really upset because I get no backup at work, was taking too much responsibility and not getting any support. And so I would say in the last six months, I’ve sort of trained myself not to care anymore. I do, I do, but when it comes to management, I have to just forget about them. It took me years but I learned something. It’s sad that I had to learn it, but I did.

[Participant in Auto Work Case Study who reported overwork]

Similarly to findings obtained through analysis of quantitative data, the interviews show that, sooner or later, increased, continuous work-related stress has significant consequences for employees’ health. A large body of scientific evidence shows that work-related stress, whether short- or long-term, will inevitably have a negative impact (see e.g. Cooper, 1998; CUPE, 2003; IMF, 2003; Farag & Mills, 2004). Quantitative data from my study is also consistent with such findings, as corroborated in the interviews:
The migraines have lessened because of the medication that I am on. I used to get 17-20 migraines a month and now I rarely get them but last month I got a lot—it varies depending on stress level.  

[Participant in Disability and Work Case Study who reported performance gap]

Based on the results, it seems that a comprehensive set of measures addressing both social and individual determinants of health (with a strong focus on improving environmental and psychosocial conditions at work), as well as individual knowledge of how to attain and maintain a healthy lifestyle, are required to positively affect health-related quality of life for workers.

### 10.4 Job Insecurity and Underemployment

As Table 10.4.1 shows, there is a significant association between job insecurity and underemployment. Those working involuntarily reduced hours are more than 1.6 times more likely to report job insecurity, while those working at jobs unrelated to their education are 1.4 times more likely. Also, numerous studies provide evidence of a significant association between underemployment and job satisfaction (Feldman & Turnlry, 1995, 2007; Wald, 2004; Raykov, 2008). This variable is not included in my study, as it is irrelevant to health-related outcomes of underemployment. Job insecurity is a manifestation of work-related stress; because of its high incidence and significant health effects, this variable is included.
Table 10.7 Job Insecurity, Social Class, and Physical and Social Environment

<table>
<thead>
<tr>
<th>Social Class</th>
<th>Sig.</th>
<th>Raw Odds</th>
<th>Sig.</th>
<th>AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employers</td>
<td>.000</td>
<td>1</td>
<td>.010</td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>.048</td>
<td>1.480</td>
<td>.051</td>
<td>1.494</td>
</tr>
<tr>
<td>Managers/Supervisors</td>
<td>.437</td>
<td>1.154</td>
<td>.612</td>
<td>1.102</td>
</tr>
<tr>
<td>Professional Employees</td>
<td>.117</td>
<td>1.390</td>
<td>.230</td>
<td>1.298</td>
</tr>
<tr>
<td>Service Workers</td>
<td>.001</td>
<td>1.837</td>
<td>.037</td>
<td>1.516</td>
</tr>
<tr>
<td>Industrial Workers</td>
<td>.002</td>
<td>1.837</td>
<td>.025</td>
<td>1.595</td>
</tr>
<tr>
<td>Physical and Social Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work Environment</td>
<td>.260</td>
<td>.844</td>
<td>.252</td>
<td>.836</td>
</tr>
<tr>
<td>Opportunity for learning</td>
<td>.060</td>
<td>1.182</td>
<td>.906</td>
<td>.988</td>
</tr>
<tr>
<td>Social Involvement</td>
<td>.019</td>
<td>1.203</td>
<td>.250</td>
<td>1.101</td>
</tr>
<tr>
<td>Social Networking</td>
<td>.303</td>
<td>1.086</td>
<td>.942</td>
<td>.994</td>
</tr>
<tr>
<td>Control over Work</td>
<td>.000</td>
<td>2.063</td>
<td>.000</td>
<td>2.051</td>
</tr>
</tbody>
</table>


Among social determinants of health, the strongest association exists between lack of control over work and social class. Job insecurity is reported by industrial workers (AO = 1.59), service workers (AO = 1.52) and the self-employed (AO = 1.49), as well as those who experience lack of control over work (AO = 2.05).

From the EJRM case studies interviews it is obvious that job security plays a highly important role for workers’ quality of life and health:

... In the workplace I would like to see job security. It is the number one thing that is causing a lot of health for people. If people had job security I think that people would live longer… It would be the first thing that I think of the second thing would be the wages. They have to do something about it.

[Office Work Case Study]

Job security and stress are closely related. According to employees interviewed in the EJRM Auto Work Case Study, experience of job loss and working in an organization that lays off its employees are both significant sources of stress.
There is a lot of stress when there are pending lay-offs and that sort of thing. Job security issues. Other than that, it’s a management-by-stress situation, that’s what they do. When they’ve got everything working with four people, they move it down to two. They always try to lower the paradigm.  

[Auto Work Case Study]

In addition to individual health, job insecurity has a strong effect on employee loyalty and plans for the future:

… I’m looking for more stability. ... But with what is happening right now … I’m not sure that I want to be there right now. I guess I will probably look for new job.  

[Office Work Case Study]

The open-ended responses obtained through the EJRM case studies provide an opportunity for a deeper understanding of the sources that cause satisfaction or dissatisfaction at work, and the impact that underemployment, social relations and workplace environment have on job satisfaction. In addition to the quantitative data from large-scale surveys, these responses help further our understanding of job satisfaction determinants. Such information can be used for evidence-based policymaking and to support negotiations on work-related issues.

As numerous studies and individual stories demonstrate, flexible, interesting and challenging work contributes significantly to job satisfaction. When its financial rewards are combined with social support, a job can become a great source of satisfaction and personal self-respect:

… [How satisfied would you say you are with your job? ... With my job I am] [v]ery satisfied. My job is interesting and as challenging as I could want it to be. I have not had one second of boredom in it. … Company also provides me with a great deal of flexibility. Not many employers
would have let me pick up and move to a small town thousands of kilometers away.

[IT Case Study ]

Lack of opportunities for development or skill use, and social and/or financial considerations are sometimes reasons for people to accept a less preferable job, combined with scarcity in the labour market. If an organization does not provide opportunities for development and promotion, changing jobs may be the only way to obtain satisfaction and the chance for personal development.

*… I was very satisfied when I first started in development too. But it has really made me reevaluate what I wanted to do career wise. When I first got out of university it was just like get a job. Just get a job and start paying for stuff and you start making money and get a car and then, you know. You are going through all these motions. But switching jobs caused me to reevaluate and really think about what I wanted to do and where I want to be in ten years time. And now I'm actually on that path. So that is what has made this job much more rewarding then before.

[IT Case Study ]

Opportunities to use skills and knowledge at work are highly important for all employees. In addition, discretionary control also significantly determines attitudes toward work. An auto industry worker describes the role of discretionary control and the opportunity to use skills:

… ..., I like it now. Because I get a chance to use some skills. You’re driving, you have to make decisions, you have to apply yourself and use your time wisely. Um, it’s not like sitting on an assembly line where everything’s done for you. I shouldn’t say that it’s done for you, but there’s not that repetitiveness.

[Auto Work Case Study]

Overqualification, despite its frequent association with job dissatisfaction in some cases, is, when combined with social support, often a source of sustainable personal satisfaction and a way of coping with the monotony of work requirements:
... [The fact that my computer skills are higher than the requirements of my job] is not due to formal training but my own interest. I just got motivated in that and took off. … They don’t recognize that, that’s the sad thing. When fellows like me come along and we excel at this stuff, they say, wow you catch on fast. ... It’s more personal satisfaction. Knowing more than you need to know. Funny thing is, when I was young, I hated reading. Now I love it. It’s helped keep my job satisfaction up… [Auto Work Case Study]
Underemployment, Work Environment, and Sources of Job Dissatisfaction

According to the control-demand and effort-reward models of work-related health (Karasek, 2005; Siegrist, 2005), high control and appropriate rewards are sources of "healthy" jobs and job satisfaction. If high demands persist without the chance of relief, they can contribute to a loss of confidence in one’s own capabilities. Despite its positive aspects, such a job provokes dissatisfaction and the intention to quit. If work characteristics are unacceptable, low job satisfaction and a tendency to quit are unavoidable. As a respondent from the EJRM Auto Worker Case Study feelingly describes:

... I’m not fed up enough with the place. Everybody I’ve known who has said “I can’t take this anymore” is in production and don’t have that job satisfaction. If all you’re doing is punching some parts on a line over and over again, and then you get treated like dirt, how much of that would you be willing to take? You’re out of there. I know several people who have left for that reason.

[Auto Work Case Study]

Significant satisfaction at work is derived from opportunities for personal development and promotion. When there are no such opportunities, a job often becomes a source of dissatisfaction, regardless of any positive characteristics that it may include:

... I’m not satisfied ... somewhat dissatisfied, because I mean I have it pretty good here it’s pretty flexible and it’s pretty slack in terms of what I can do there and it’s a casual environment but in terms of my actual job and my opportunity to move up the ladder I’m dissatisfied.

[Office Work Case Study]

The EJRM case studies show that the work environment plays a significant role for workers’ health, as well as for their attitudes toward work:
I am satisfied, quite, with the work that I do. I like what I do. I don’t really like the environment but that’s another story for a variety of reasons.

[Auto Work Case Study]

Another spontaneous response on job satisfaction demonstrates that many employees are still exposed to well-known risks at work, a fact that deserves more attention in studies on social and work-related determinants of health.

[Auto Work Case Study]

Regardless of their type of work, participants from different occupational groups indicate that a better work environment and more control significantly determine their attitudes toward work.

[Auto Work Case Study]

If you were to talk to me a year ago, I’d say less satisfied, but now I’d say more. Less shift-work and the environment where I’m at now is a lot nicer. We have a little more control. Somewhat satisfied. My working relationship is nicer between myself and the engineers and management. There’s a lot less stress.

[Auto Work Case Study]

A good working environment is an important source of job satisfaction, and for many people has a greater priority than income:

[IT Case Study]

It is certain that numerous factors determine attitudes toward work. Work characteristics, environment and social relations, including control over work and participation in decision-making, are all significant components of job satisfaction.
Chapter 11

Conclusions

11.1 Discussion of Findings and Conclusions

Applying an information-intensive, integrative, quantitative and qualitative, multi-level and multi-method approach that includes data from different surveys and qualitative research, my study provides evidence on the impact of various forms of education-job mismatch on health-related quality of life (HRQoL) in the general working population.

The major aim of this study is to contribute to the debate on the effect that underemployment has on health, which I conceptualize in this study as health-related quality of life. The study also examines the inconsistent and contradictory findings on underemployment and health, as well as the widely differing conclusions to be drawn from pertinent scholarship. It found that there is evidently a strong positive association between higher educational attainment and better health status, quality of life and disability-free life expectancy. However, research findings on underemployment—a higher educational attainment than is required for work—contradict this evidence, and require further study. Moreover, the research literature provides a vast amount of evidence revealing the strong negative impact of a poor work environment and low socioeconomic status on the health of employed people. Major contemporary theories on the effect of work-related conditions on health neglect the impact of economic class,
despite the fact that it is strongly associated with the type and quality of work and the working environment, which, in turn, profoundly influence health.

Considering the inconsistent findings and contradictory implications of conclusions from previous research on underemployment and health, and the need for a logical and consistent conceptualization of underemployment, this study explores different forms of underemployment, as well as a variety of health indicators operationalized as HRQoL.

According to my approach to underemployment-health relations, it is evident that employment class and physical workplace conditions have a stronger association with underemployment and health than do specific psychosocial work characteristics, such as control over work and social relations. My study shows that the explanation of underemployment-health relations requires a wider theoretical framework—that, in addition to psychosocial conditions, one must take into account the class and characteristics of the work environment, and the exposure and hazards employees experience.

The critical environmental approach that I propose provides evidence that explains the association between underemployment and health more completely than does the demand-control model, which explores demands at and control over work. As well, it offers a better explanation than the social capital theory, which focuses mainly on the effects of social relations, participation and social networking on employees’ health.

The study demonstrates that almost all forms of education-job mismatch significantly decrease health-related quality of life. Underemployment seems to be most significantly associated with self-perceived stress. There is also a notable association
between underemployment and the core indicators of health-related quality of life, self-reported health and activity limitations. My results also demonstrate that these two core indicators are most strongly associated with an unfavourable physical work environment and with employees’ economic class. In order to examine its assumptions and provide evidence for its main argument, this study also presents an extensive empirical assessment of previous research on underemployment and health, which also demonstrates the highly significant relationship of structural and environmental factors with employees’ health-related quality of life. Based on the evidence obtained, it is clear that a significant part of the associations between underemployment and HRQoL can be attributed to usually neglected variables related to environmental work conditions, health hazards and discomfort experienced at work.

The evidence confirms the main assumption that underemployment foster a greater sense of job-related stress and job insecurity among employees. It also confirms the assumption that stress and health-related quality of life for the underemployed are contingent upon their employment and social position, since these variables determine their living conditions, work characteristics, labour relations and workplace environment, including less favourable locations, higher risks and greater discomforts at work.

The study reveals that underqualification has a stronger association with the majority of HRQoL indicators than does underemployment, but that unemployment has the strongest association with HRQoL as a whole. It shows large differences between the underemployed, adequately employed and underqualified concerning the quality of their work environment. The study also demonstrates the differential impact of underemployment on HRQoL among members of different economic groups, as well as a
strong association between characteristics of the work environment and all indicators of HRQoL. As expected, the results demonstrate that industrial workers and the self-employed suffer the greatest environmental risks and discomforts at work.

The empirical evidence indicates that the most appropriate model for explaining underemployment-health relations should include the characteristics of employees’ work environment, economic class, and degree of discretionary control. According to this study, workers’ HRQoL mainly depends on their general social position, as established by their economic class. Economic class determines employees’ work characteristics, position in production, work environment, and discretionary control over work. Economic class also determines employees’ access to the goods and services necessary for health protection and improvement, which likely influences their HRQoL in a significant way.

11.2 Study Limitations

As with the majority of similar research in this field, this empirical study is limited in its scope by the amount of available data. In addition, it is based on cross-sectional data that provides limited opportunities for causal conclusions. The design of this study, the inclusion of a multitude of data sources, the use of integrated qualitative and quantitative methods, and the variety of statistical techniques for data description all represent an attempt to maximize the use of the data available. In this way, its research findings increase the explanatory capacity of this study, as well as its relevance for developing activities to improve employees’ health and working conditions. The combination of quantitative and qualitative measurements, subjective methods, and experts’ estimates
provides cross-validation of the obtained results and to some extent increases their reliability.

11.3 Study Significance

The problems that my study addresses—the associations of different forms of underemployment with health-related quality of life, self-perceived health, work-related stress and activity limitations—are important because of the high and constantly increasing incidence of underemployment. This study is significant because it provides data for creating informed employment and health-related policies. It draws attention to the impact of the work environment on workers’ health-related quality of life, and calls for a permanent re-evaluation of standards related to occupational hazards and limits of exposure. Its results also provide a basis for more comprehensive health-related educational programs and promotion campaigns. Finally, it offers a comprehensive sociological approach applicable to social action for the improvement of employment and general living conditions for the groups most exposed to hazards at work.

The academic relevance of my study consists in providing information on social and work-related determinants of health, and the specific associations between underemployment and health-related quality of life. These results can be applied to the practice of informed decision-making in the fields of employment policy, health promotion and health-related learning. They also contribute to the ongoing debates on underemployment and the social determinants of health. The significance of this study is
multidimensional, since appropriate policy and organizational measures can lead to the
better protection and improvement of workers’ health-related quality of life. A
particularly important finding of this study, in contrast to much recent research, is that the
work environment still represents a high risk to workers’ health.

Numerous national and foreign studies on occupational health and safety show
that organizational and environmental conditions still cause a huge number of injuries,
diseases and fatalities. According to the latest report on occupational injuries in Canada
(Logan & Reeder, 2007), during the past decade, approximately one million occupational
injury claims were reported each year to provincial and territorial Workers’
Compensation Boards and Commissions (WCBs). During this period, slightly more than
one-third of these claims were accepted; in 2005 alone, WCBs paid out almost $7 billion
in benefits (an average of $20,000 per accepted claim) to approximately 350,000
Canadians.

International and Canadian studies also demonstrate a high incidence of
workplace-related fatalities. The number of such fatalities in Canada exceeds the rate of
fatalities in the majority of OECD countries (Osberg & Sharpe, 2003; Sharpe & Hardt,
2006). After a period of declining work-related morbidity and disability (Mustard, 2003),
recent reports indicate that the number of workplace fatalities is increasing. In 2005, this
number was 45% higher than in 1993. In Canada, the number of fatalities increased to
1097 in 2005, or approximately three to five fatalities at work per day (Sharpe & Hardt,
2006; Logan & Reeder, 2007).

Like a number of recent studies (Brun et al., 2007; Flaspöler, Reinert & Brun,
2007), my study indicates that, in addition to well-known risks, there are new risks for
employed people in all occupations, a fact that requires greater research attention. Based on the results from my study, it seems that along with underutilization of education, skills, and knowledge at work, balancing requirements and capabilities is probably the most important factor. A mismatch in either direction, underemployment or underqualification, will likely produce negative health outcomes. As my study shows, the most significant negative impact on health is caused by unemployment, which represents an extreme form of underemployment.

In addition to identifying multidimensional relations between HRQoL, underemployment, employment class and work environment, an important result of this study is the identification of a strong association between underqualification and health. Extreme forms of underqualification have a strong association with work-related stress and a lower association with self-reported health and activity limitations. The study also established the strong impact of economic class and work environment on employees’ health. Based on these results, it can be concluded that any substantial imbalance or mismatch between education and work, underutilization or over utilization of human abilities, leads toward the loss of an employee’s functional capacity and the deterioration of health-related quality of life.

11.4 Policy Implications

The results obtained confirm the main assumption that underemployment significantly affects workers’ health. They also prove that underemployed individuals experience greater levels of job-related stress, including increased job insecurity and lower job satisfaction. In general, my study shows that the demand-control and social capital
models provide only a partial explanation of underemployment-HRQoL relations. The evidence demonstrates that the critical environmental approach, which considers employees’ occupational class and characteristics of work environment, more completely explains the determinants of HRQoL than do psychosocial theories.

Graph 11.1 Incidence of Underemployment, Canada, 2004


The high levels of global (ILO, 2004) and national (Livingstone, 2004) underemployment, and the large number of people affected by its consequences, require urgent action. It is necessary to ameliorate existing underemployment and prevent its expansion, along with its devastating consequences for employees, employers and society at large. According to the WALL Survey, approximately one-third of employees (Graph 11.1) face specific forms of underemployment, while more than two-thirds of the entire active labour force, or approximately 11 million Canadians, experience one or more combined forms of moderate underemployment (Table 11.1). When combined different
forms of underemployment, the study shows that almost half of Canadians (47.6%) experience one or more forms of mismatch between education and work.

Table 11.1 Estimated Number of Employees who Experience Different Forms of Underemployment, Canada, 2004

<table>
<thead>
<tr>
<th>Form of Underemployment</th>
<th>Percent of Underemployed in Canada</th>
<th>Estimated number of Employees who experience Underemployment</th>
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</thead>
<tbody>
<tr>
<td>Relevance Gap</td>
<td>36.8</td>
<td>5,860,000*</td>
</tr>
<tr>
<td>Subjective Gap</td>
<td>27.9</td>
<td>4,450,000*</td>
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<tr>
<td>Credential Gap</td>
<td>34.4</td>
<td>5,450,000*</td>
</tr>
<tr>
<td>Performance Gap</td>
<td>31.5</td>
<td>5,020,000*</td>
</tr>
<tr>
<td>Time-related Gap</td>
<td>14.55</td>
<td>2,320,000*</td>
</tr>
<tr>
<td>Any form of Underemployment</td>
<td>69.8</td>
<td>11,130,000*</td>
</tr>
<tr>
<td>Labour Force (Total)</td>
<td>100</td>
<td>15,947,000**</td>
</tr>
</tbody>
</table>


In addition, other indicators suggest a trend towards increasing nonstandard, part-time, and self-employment. As Graph 11.2 shows, the number of self-employed individuals has doubled over the last 25 years, from approximately 1.36 million in 1980 to 2.63 million in 2008. It should be noted that, in general, the number of self-employed workers gradually increased over the entire period, except during economic slowdowns when it temporarily exceeded the general trend. This sharper increase during times of economic
downturn indicates that self-employment probably represents an involuntary response to worsening economic and employment conditions in the labour market.

Graph 11.2 Self-employment, Historical Summary, Canada 1980–2008

Source: Custom chart based on CANSIM, Table 282-0012 and Catalogue no. 89F0133XIE, Statistics Canada, 2009-01-08.

The constantly increasing number of self-employed individuals in Canada has reached 15.3% (Statistics Canada, 2009) of the entire labour force. Considering that self-employed workers experience harsher conditions than do other workers, one can expect a deterioration in their health-related quality of life. If this trend continues and work conditions do not improve, this group will likely exert increased pressure on the medical system and social services, which in turn will create significant obstacles to overall economic and social development.
In addition to medical care based mainly on the biomedical approach, health protection and prevention should play a much more prominent role than they currently do. Besides primary prevention, additional measures should include efforts to minimize exposure to harmful working environments, to widen medical insurance, and to improve employees’ general living and working conditions. As many authors acknowledge (Kompier & Kristensen, 2001; Vezina et al., 2004; Tsutsumi & Kawakami, 2004), these actions are beyond the capabilities of medical care and require engagement from professional, trade union and community organizations. Similarly, based on an analysis of occupational stress and the effort-rewards imbalance model, Tsutsumi and Kawakami (2004) conclude that intervention driven by the ERI model should go beyond individual characteristics and behaviors and require organizational changes, and employers’ involvement and cooperation. My study also demonstrates the need for a comprehensive system of measures for protection and improvement of employees’ health that should transcend a narrow biomedical model.

Because of their negotiating power, trade unions and professional organizations have a major role in promoting proactive policies that extend beyond minimal occupational health and safety standards and limited health insurance. These organizations can contribute to introducing proactive, comprehensive and effective programs for the prevention of work-related stress and injuries, and the improvement of health-related quality of life (CUPE, 2003; Keith, et al., 2002).

In terms of theory-driven intervention, Kompier (2003) provides a useful systematic review of existing studies on work-related stress. He shows the high level of similarity between different approaches to stress, almost all of which recognize the
significance of job demands, skill variety and the need for autonomy. Less often these approaches consider social support, while a relatively small number of empirical studies analyze the impact of work identity on stress levels. This review indicates an obvious lack of attention to physical environment, and failure to recognize the impact that structural social factors have on health. Current social changes demonstrate how structural social factors and structural transition have a dramatically detrimental effect on the health of the population in many Eastern European countries (for example, Carlson, 2000; Bobak et al., 1998; Nazarova, 2000).

The model proposed in this study provides a wide framework for intervention, demonstrates the complexity of work-health relationships, and indicates the areas that require action: environmental conditions, structural social factors controlling access to health-related services (Kronenfeld, 2005; Public Health Agency of Canada, 2008; Millman, 1993), and individual factors affecting health-related quality of life. If any of these factors is underestimated, there are significant risks that health will deteriorate, and that problems will develop, including increased cardiovascular disease (Kristensen et al., 1998) or the ”new epidemics” associated with a sedentary lifestyle.

In addition to lifestyle and dietary factors (low cost-per-calorie foods and drinks) that lead to cardiovascular and metabolic diseases, new studies demonstrate that factors closely associated with underemployment, economic and work-related stress, and lack of control over work, significantly increase the possibility of getting these diseases (Kristensen et al. 1998; Lloyd, Smith & Weinger, 2005; Melamed et al., 2006; Agardh et al., 2007).
Appropriate and accessible forms of classic and online information and their dissemination through targeted social and communication channels may have a particularly positive effect for health promotion through informal learning. All these measures may contribute to reducing the incidence of disorders, and even Karasek (1999) and Siegrist (2004) note that in addition to medical intervention, it is necessary to change the social conditions that cause increased stress and specific forms of disease or illness. More particularly, through several studies, Lynch et al. (2000) emphasize that social development and health prevention require a significant allocation and redistribution of available resources. This creates a substantial obstacle to the development of more equitable working and living conditions, which are themselves preconditions for minimizing social inequalities in health and the avoidable deterioration of employees’ HRQoL (Krieger & Fee, 1994; Drever, Whitehead & Roden, 1996; Adler et al., 1999; Scambler, 2001; Raykov et al., 2005).

Based on the results of this study, it seems that a comprehensive set of measures addressing both social and individual health determinants (with a strong focus on improving environmental and psychosocial conditions at work), as well as individual education on how to attain and maintain a healthy lifestyle, are required to positively contribute to the improvement of workers’ health-related quality of life.

This study also reveals specific patterns of participation in health-related informal learning that are relevant for practice and policy concerning adult education and training. Multivariate analysis shows an increased level of participation in informal learning about occupational health and safety (OHS) among younger (OR=1.431), less educated (OR=2.137) employees, and less participation in this type of learning among low-income
employees (OR=0.566). Those learning about health and well-being (HWB) are slightly different: males (OR=0.672) and the less educated (OR=0.590) learn significantly less about HWB.

As expected, the study proves that employees working in less favourable conditions participate more in informal learning about health and safety than their counterparts with safe and comfortable jobs. The highest likelihood of participation in informal learning about OHS is among respondents who work in unregulated indoor climates (OR=2.008), who are exposed to falling objects (OR=2.618) or vibrations (OR=2.952), or whose jobs include heavy physical demands (OR=2.787).

The results demonstrate a high participation in informal learning about OHS, particularly among employees who work in hazardous conditions, and indicate a need for the integration of informal and formal learning activities. Future studies should address the existing knowledge gaps regarding the specific health-related educational needs of the entire labour force, and particularly those of underqualified and underemployed workers. Because of the high incidence of work-related stress, occupational diseases and injuries on the job, future studies should determine what kind of education is most suitable for the prevention of occupational health and safety hazards and the minimization of social inequalities in health.

11.5 Directions for Future Studies

My study, which is based on data from the 2004 Canadian Work and Lifelong Learning Survey (WALL), the 2002 US General Social Survey (GSS), and qualitative analysis of
interviews from the 2004 Ontario Survey on Education-Job Requirements Matching (EJRM), indicates a significant direct and indirect association between underemployment and respondents’ economic class and health-related quality of life. These results raise several additional questions that demonstrate need for a more comprehensive understanding of HRQoL, as well as workplace psychosocial conditions, that includes structural and social relations, employees’ economic class, and exposure to hazards and discomfort at work. The study indicates that social determinants of health deserve more attention, since psychosocial conditions are often determined by structural relations.

Public health policies and interventions that address all relevant factors are more likely to significantly reduce work-related health risks, morbidity, mortality, health disparities, and safety hazards than will policies based on narrower approaches. My study found that underemployed workers are exposed to greater negative environmental risks and discomforts, which in turn have a detrimental impact on health. Moreover, the social position of underemployed people, which is determined by their economic class, limits their access to health-related goods and services, additionally contributing to health deterioration.

Based on empirical evidence and a review of the literature, it seems appropriate to conceptualize health as a dynamic process rather than as a stable “state of complete physical, mental and social well-being” (WHO, 1946). The literature on work-related stress (see Karasek, 2005) indicates that it is a fragile and only partially renewable resource. If a person is chronically exposed to harmful environmental conditions that impair the regulative mechanisms responsible for biological functions, health and activity may deteriorate. Discretionary control over work, which is essentially controlled by
economic class, most often determines workers’ ability to optimize the extent of their exposure to a harmful work environment and to prevent overexposure or exhaustion. Economic class also affects the availability of financial resources and access to goods and services essential for health and well-being. Based on the evidence, it seems that underemployment and its association with economic class determines the type and the quality of work environment, exposure to hazards and discomfort, and risk of injury that, together with less access to health-related goods and services, increase the possibility of a lower health-related quality of life.

My study reveals different patterns of relationship between underemployment and health-related measures among people from different economic classes. Class analysis demonstrates that various forms of underemployment, environmental working conditions and labour relations have different associations with HRQoL among employees from diverse economic groups.

My study demonstrates the complex relations between underemployment and health-related quality of life, and highlights the need for further multidisciplinary research and for a multi-level approach to examining the relations between underemployment and health. To provide further insight into the complex and multidimensional chains of causation that determine human health and quality of life, future studies should be directed toward the collection of information regarding underemployment, employment and educational requirements, and environmental working conditions, as well as toward establishing more representative indicators of health status, psychosocial conditions and structural social relations.
To maximize the reliability and relevance of their findings, future studies based on the mixed methodological approach should provide objective and subjective measurements of underemployment and health. They should be customized to analyze complex underemployment-health relations by exploring a variety of underemployment forms (subjective, objective and time-related), as well as a wider array of health indicators that contain an inclusive set of HRQoL variables. Finally, in addition to including existing environmental risk factors, studies on work-related and social determinants of health should evaluate the validity of current standards of risk assessment and explore new forms of risk that employees encounter at work, in order to prevent or minimize the onset of new work-related diseases and the deterioration of health-related quality of life.
References


the adoption of a computerized order communication system. *Int Arch Occup Environ Health, 77*(5), 363-367.


Landsbergis & D. Baker (Eds), *State of the art reviews, Occupational medicine, the workplace and cardiovascular disease, 15*, (pp. 78-83). Philadelphia: Hanley & Belfus, Inc.


Lomas J. Social capital and health: Implications for public health and epidemiology, Social Science & Medicine, 47(9), 1181-1188.


Sundquist, J. and S. E. Johansson (1997). Self-reported poor health and low educational


Appendices

Appendix 1 - Questions from the WALL Survey
Appendix 2 – NOC Environmental Conditions at Work
Appendix 3 – The 2002 US General Social Survey,

Section on Quality of Working Life (QWL)
Appendix 1 WALL Survey


## Section 2: Demographic and Employment Status

<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>rgender</td>
<td>Gender registered by interviewer</td>
</tr>
<tr>
<td>[All respondents]</td>
<td>1 Male</td>
</tr>
<tr>
<td>s2_1</td>
<td>In what year were you born?</td>
</tr>
<tr>
<td>[All respondents]</td>
<td>__________</td>
</tr>
<tr>
<td>s24_6</td>
<td>Do you consider yourself to be a member of a visible minority?</td>
</tr>
<tr>
<td>[If minority status reported]</td>
<td>5 No</td>
</tr>
<tr>
<td>s2_2</td>
<td>Which of the following best describes your current employment status, are you</td>
</tr>
<tr>
<td>[All respondents]</td>
<td>1 self-employed</td>
</tr>
<tr>
<td></td>
<td>2 working for pay</td>
</tr>
<tr>
<td></td>
<td>3 temp. absent from work</td>
</tr>
<tr>
<td></td>
<td>4 unemployed</td>
</tr>
<tr>
<td></td>
<td>6 not in the labour force</td>
</tr>
<tr>
<td></td>
<td>7 going to school</td>
</tr>
<tr>
<td></td>
<td>8 caring for family</td>
</tr>
<tr>
<td></td>
<td>9 on disability</td>
</tr>
<tr>
<td>s2_20</td>
<td>Given the choice, would you like to work more, less, or the same number of hours as you now work?</td>
</tr>
<tr>
<td>[Currently employed or self-employed]</td>
<td>2 Less</td>
</tr>
<tr>
<td></td>
<td>3 Same</td>
</tr>
</tbody>
</table>

## Sections 3 and 12: Time Use and Informal Learning

[All respondents or all currently employed respondents included in study]

Questions about time you spend IN A TYPICAL WEEK in different activities outside of paid work.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>s3_6</td>
<td>In the past year did you do any unpaid volunteer work in any organization or group?</td>
</tr>
<tr>
<td>[All respondents]</td>
<td>5 No</td>
</tr>
<tr>
<td>s12_19</td>
<td>In the past four weeks did you seek advice from someone knowledgeable with the intention of developing your job skills?</td>
</tr>
<tr>
<td></td>
<td>5 No</td>
</tr>
</tbody>
</table>
### Section 17: Economic classification

[Currently and previous 12 months employed]

<table>
<thead>
<tr>
<th>s17_1</th>
<th>Please think of your main job, in answering the following questions. What is [was] your occupation, what do you do, please be as specific as possible?</th>
</tr>
</thead>
<tbody>
<tr>
<td>s17_2</td>
<td>What kind of business, industry or service is [was] this?</td>
</tr>
</tbody>
</table>

**social class**

Derived variable objective class location

Construction of this variable is available in Livingstone & Scholtz, 2006, p. 75-76.

- Employers
- Self-employed
- Managers/Supervisors
- Professional Employees
- Service Workers
- Industrial Workers

### Section 19: Learning and Work Relations

[Currently employed]

<table>
<thead>
<tr>
<th>s6_1</th>
<th>What is the highest level of education you have obtained?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No school</td>
</tr>
<tr>
<td>2</td>
<td>Elementary</td>
</tr>
<tr>
<td>3</td>
<td>Some high school</td>
</tr>
<tr>
<td>4</td>
<td>Completed high school</td>
</tr>
<tr>
<td>5</td>
<td>High school equivalency</td>
</tr>
<tr>
<td>6</td>
<td>Some community college/cegep</td>
</tr>
<tr>
<td>7</td>
<td>Certificate/diploma</td>
</tr>
<tr>
<td>8</td>
<td>Some university</td>
</tr>
<tr>
<td>9</td>
<td>Completed undergraduate degree</td>
</tr>
<tr>
<td>10</td>
<td>Some professional studies</td>
</tr>
<tr>
<td>11</td>
<td>Completed professional degree</td>
</tr>
<tr>
<td>12</td>
<td>Some graduate university</td>
</tr>
<tr>
<td>13</td>
<td>Completed graduate degree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>edatt4</th>
<th>What is the highest level of education you have obtained?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No school</td>
</tr>
<tr>
<td>2</td>
<td>High school diploma</td>
</tr>
<tr>
<td>3</td>
<td>Completed post-sec education</td>
</tr>
<tr>
<td>4</td>
<td>Completed university</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>s19_3</th>
<th>What general education is required for new applicants or for people who want to do the type of job you do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No special education requirements</td>
</tr>
<tr>
<td>2</td>
<td>Elementary school only</td>
</tr>
<tr>
<td>3</td>
<td>Some high school</td>
</tr>
<tr>
<td>4</td>
<td>Completion of high school</td>
</tr>
<tr>
<td>5</td>
<td>Equivalent of high school completion</td>
</tr>
<tr>
<td>6</td>
<td>Some community college/cegep</td>
</tr>
<tr>
<td>7</td>
<td>Some university</td>
</tr>
<tr>
<td>8</td>
<td>Completion of undergraduate degree</td>
</tr>
<tr>
<td>9</td>
<td>Some professional studies</td>
</tr>
<tr>
<td>10</td>
<td>Completion of professional degree</td>
</tr>
<tr>
<td>11</td>
<td>Some graduate university</td>
</tr>
<tr>
<td>12</td>
<td>Completion of graduate degree</td>
</tr>
</tbody>
</table>

| s19_4 | In your own experience, what general                        |
level of education is really needed to perform the tasks of your job?

1 No special education requirements
2 Elementary school only
3 Some high school
4 Completion of high school
5 Equivalent of high school completion
6 Some community college/cegep
7 Some university
8 Completion of undergraduate degree
9 Some professional studies
10 Professional degree
11 Some graduate university
12 Some graduate university
13 Graduate degree

ATTREQ3 Credential underemployment: Credential required minus attained education

-2 Highly Underemployed
-1 Underemployed
0 Match
1 Underqualified
2 Highly Underqualified

ATTUSE3 Performance underemployment: Education used on job minus attained education

-2 Highly Underemployed
-1 Underemployed
0 Match
1 Underqualified
2 Highly Underqualified

s19_5 How closely is your job related to your formal education? Is it closely related, somewhat related, or not at all related?

1 Closely related
2 Somewhat related
3 Not at all related

s19_6 In terms of your schooling, do you feel you are very overqualified somewhat overqualified, adequately qualified, somewhat underqualified or very underqualified for your current job?

1 Very over-qualified
2 Somewhat over-qualified
3 Adequately qualified
4 Somewhat under-qualified
5 Very under-qualified

Section 20: Labour Process Issues

[Currently employed]

DVs20_4 How much choice do you have over the way in which you do your job: a great deal, a moderate amount, a little, or none at all?

1 Great deal & Moderate amount
0 A little & None at all

DVS20_5 Please tell me if you strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, or strongly disagree with the following: Your job often requires you to learn new skills?

1 Strongly / Somewhat agree / Neither
4 Somewhat / Strongly disagree

s20_6 How often do you find your job stressful: would you say all of the time, most of the time, about half the time, seldom or never?

1 All of the time
2 Most of the time
3 About half the time
4 Seldom
5 Never
**Section 23: Health, Disability and Activity Limitations**

[All respondents]

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>s23_1</td>
<td>In general, would you say your health is excellent, very good, good, fair, or poor?</td>
<td>1 Excellent, 2 Very good, 3 Good, 4 Fair, 5 Poor</td>
</tr>
<tr>
<td>srhealth</td>
<td>Self-rated health status [variable derived from question s23_1]</td>
<td>Yes (1, 2, 3), No (4, 5)</td>
</tr>
<tr>
<td>s23_5</td>
<td>To what extent does a long-term physical condition, mental condition, learning or health problem reduce the amount or the kind of activity you can do? Would you say a great deal, quite a lot, a fair amount, a little, or not at all?</td>
<td>1 Great deal, 2 Quite a lot, 3 Fair amount, 4 A little, 5 Not at all</td>
</tr>
<tr>
<td>alimit</td>
<td>Self-reported activity limitation [variable derived from question s23_5]</td>
<td>Yes (1, 2, 3), No (4, 5)</td>
</tr>
</tbody>
</table>

**Section 26A: Social Class and Income** [All respondents]

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>s26_2</td>
<td>IF YOU HAD TO CHOOSE one of the following names for your social class, which one would you say you belong to: upper class, upper middle class, lower middle class, working class, or lower class</td>
<td>1 Upper class, 2 Upper middle class, 3 Middle class, 4 Lower middle class, 5 Working class, 6 Lower class</td>
</tr>
<tr>
<td>sclass</td>
<td>Derived subjective social class</td>
<td>1 Upper /Upper middle class, 2 Middle / Lower middle class, 3 Working / Lower class</td>
</tr>
<tr>
<td>s26_17</td>
<td>Could you please tell me how much income YOU PERSONALLY RECEIVED, from your own employment only, for the year ending December 31, 2002, before taxes and other deductions? To the nearest thousand dollars, what was your personal (employment) income?</td>
<td>_______________</td>
</tr>
<tr>
<td>pincome</td>
<td>Personal income grouped in three categories derived from variable derived from question s26_17</td>
<td>1 -29K, 2 $30-59K, 3 $60+</td>
</tr>
</tbody>
</table>
Appendix 2 ENVIRONMENTAL CONDITIONS AT WORK

Environmental conditions based on the 2004 NOC codes (NOC, 2004) and the WALL Survey 4-digit occupational codes. (See, HRDC, 2004 NOC updates).

Variables included in this study include the following set of indicators:

Location
   L1 Regulated inside climate
   L2 Unregulated inside climate
   L3 Outside
   L4 In a vehicle or cab

Hazards
   H1 Dangerous chemical substances
   H2 Biological agents
   H3 Equipment, machinery, tools
   H4 Electricity
   H5 Radiation
   H6 Flying particles, falling objects
   H7 Fire, steam, hot surfaces
   H8 Dangerous location

Discomfort
   D1 Noise
   D2 Vibration
   D3 Odours
   D4 Non-toxic dusts
   D5 Wetness
   Physical demands
LOCATION

The work performed is carried out indoors in a regulated environment, indoors in an unregulated environment, outdoors or in a vehicle. In many occupations, the main Duties may be performed in more than one location. Therefore, a group may have more than one Location code, for example:

- firefighting and fire prevention duties
- managing operations and paperwork of farms
- maintenance of interior/exterior of buildings

L1 Regulated inside climate
A normal controlled environment such as an office, hospital or school.

L2 Unregulated inside climate
An inside work environment where the temperature or humidity may be considerably different from normal room conditions. In some groups, the nature of the duties affects the temperature or humidity of the work environment.

Examples:
- extracting coal/ore from underground mines
- operating machines that press or blow molten glass
- unloading stock into cold storage freezers

L3 Outside
An outdoor work environment where the worker is exposed to variations in weather conditions and seasonal weather patterns.

Examples:
- maintaining lawns
- repairing buildings, roads, bridges and dams
- operating power saws to thin and space trees
- delivering mail

L4 In a vehicle or cab
An interior space in any form of vehicle or in the cab of heavy equipment operated by the worker.

Examples:
- driving buses
- operating cranes
- providing services to passengers during flights
HAZARDS

Potential hazards to which the worker may be exposed. The codes provide an indication of the type(s) of hazard(s) most likely to be present in the workplace environment. They are not a measure of frequency, duration or degree of exposure to hazards, but an indication of the presence or absence of a particular hazard in the work environment.

H1 Dangerous chemical substances
Exposure to any chemical that may endanger health through inhalation, absorption or ingestion, contact with skin or eyes, or any chemical with the potential for fire or explosion. Substances may be in forms such as solids, liquids, gases, aerosols or particles.
Examples:
- extracting coal (involves exposure to silica particles)
- removing asbestos insulation from buildings
- joining bricks with mortar (contains lime)
- mixing pesticides to spray crops
- painting building interiors

H2 Biological agents
Exposure to infectious bacteria and viruses as a result of indirect contact with, or direct handling of, infectious materials or micro-organisms that may cause illness.
Examples:
- treating sick animals
- performing autopsies
- providing nursing care
- investigating outbreaks of food and environment-related diseases and poisonings
- conducting microbiological tests and laboratory analyses

H3 Equipment, machinery, tools
Working near or with equipment, instruments, machinery or power/hand tools that may be a potential source of accident or injury.
Examples:
- operating metal machining tools to shape metal
- using power tools to shape metal
- using hand tools to fabricate wood products
- operating power saws to thin trees
- performing surgical procedures

H4 Electricity
Exposure to electrical circuitry, high tension wires, transformers or other equipment that may be a potential source of electrical shock.
Examples:
- installing or repairing electrical wiring, motors and generators
- maintaining underground power transmission and distribution systems
- operating semi-automatic electric arc welding equipment

H5 Radiation
Exposure to ionizing radiation such as X-rays and radioactive substances or non-ionizing radiation such as radio frequencies and infrared, ultraviolet or visible light that may affect health adversely.
Examples:
- taking dental X-rays
- preparing and administering radioactive drugs
- operating welding equipment (ultraviolet)
- controlling to flow of air traffic using radar monitors, radio and other equipment (radio frequencies)
-conducting atmospheric research (visible laser light)
-creating glass objects (infrared)

H6 Flying particles, falling objects
Exposure to flying particles and falling objects in the work environment that pose the risk of bodily injury. Flying particles refer to particles such as wood chips, metal particles and rock chips generated by the handling, crushing, grinding, rapid impact or explosion of materials.
Examples:
- operating machining tools such as lathes/grinders
- maintaining or constructing underground installations in mines using power/hand tools
- operating chainsaws to fell, delimb and buck trees
- transferring cargo to or from ships
- laying brick to construct or repair walls

H7 Fire, steam, hot surfaces
Exposure to fire (rather than exposure to flammable substances that may ignite), to emissions of steam or to intensely hot surfaces that are potential sources of injury.
Examples:
- fighting fires
- operating gas flame welding equipment
- cooking food
- forging metal items by hand or with forging machinery
- tending industrial ovens/furnaces

H8 Dangerous locations
Working in locations that are inherently treacherous and are potential sources of injury. Such work locations include construction sites, underground sites, erected support structures and marine environments.
Examples:
- building underground passageways in mines
- installing roof shingles
- washing exterior windows of buildings
- commanding fishing vessels
- operating underwater video, sonar, recording and related equipment
DISCOMFORT

Work conditions that create disturbances but are not hazardous. In general, these conditions create discomfort, but are not direct source of injury. In extreme instances, however, these conditions might cause injury.

D1 Noise
Work that produces sufficient noise—constant or intermittent—to cause marked distraction or possible loss of hearing.
Examples:
- operating drilling equipment in underground mines
- using power saws in logging operations
- blasting rock surfaces in mining
- operating heavy equipment for construction jobs
- using firearms

D2 Vibration
Work that produces an oscillating or quivering motion of the body.
Examples:
- operating jackhammers to break up pavement
- driving tractors
- operating drills to produce blasting holes in mines

D3 Odours
The presence of noxious, intense or prolonged odours in the work environment.
Examples:
- cooking meals
- colouring, waving and styling hair
- preserving and sanitizing human remains
- using industrial cleaning solutions
- tanning raw hides
- preparing standard cuts of meat, poultry and fish products for sale

D4 Non-toxic dusts
The presence of non-poisonous airborne particles such as textile dust, flour, sand, sawdust and feathers in the work environment.
Examples:
- preparing dough or batter
- cutting fur pelts or fabric for garments
- operating woodworking machines
- cleaning chimneys
- removing poultry feathers

D5 Wetness
Work that involves contact with water or other liquids.
Examples:
- digging ditches and trenches
- sorting, cleaning and packing fish in ice
- performing lifeguard duties
- operating underwater sonar equipment
- cleaning/disinfecting laboratory equipment
- preparing food in restaurant kitchens
PHYSICAL ACTIVITIES

STRENGTH
Use of strength in the handling of loads such as pulling, pushing, lifting and/or moving objects during the work performed.

1 Limited
Work activities involve handling loads up to 5 kg.
Examples:
- examining and analyzing financial information
- selling insurance to clients
- conducting economic and technical feasibility studies

2 Light
Work activities involve handling loads of 5 kg but less than 10 kg.
Examples:
- repairing soles, heels and other parts of footwear
- filing materials in drawers, cabinets and storage boxes
- preparing and cooking meals

3 Medium
Work activities involve handling loads between 10 kg and 20 kg.
Examples:
- setting up and operating finishing machines or finishing furniture by hand
- measuring, cutting and applying wallpaper to walls
- adjusting, replacing or repairing mechanical or electrical components using hand tools and equipment

4 Heavy
Work activities involve handling loads more than 20 kg.
Examples:
- operating and maintaining deck equipment and performing other deck duties aboard ships
- shovelling cement and other materials into cement mixers and performing other activities to assist in the maintenance and repair of roads
- measuring, cutting and fitting drywall sheets for installation on walls and ceilings
BODY POSITION

Primary type of posture or body movement involved in performing the work. These postures or body movements range from simple to complex and from sedentary to mobile.

1 Sitting
Work activities primarily involve sitting. **Standing and/or walking (2)** may occur but is incidental to the work being performed.

Examples:
- reading and editing copy to be published or broadcast
- preparing financial statements
- issuing aircraft take-off and landing instructions to pilots

2 Standing and/or walking
Work activities primarily involve standing or walking.

Examples:
- cutting and styling hair
- dispensing prescribed medications to customers
- preparing and cooking meals
- delivering mail

3 Sitting, standing, walking
This scale involves work activities in combinations and varying degrees of **Sitting (1)** and **Standing and/or walking (2)**.

Examples:
- teaching students using methods such as lectures, discussions, audio-visual presentations and field studies
- assessing land values for taxation purposes
- ensuring that systems and equipment are working efficiently on job sites
- supervising, co-ordinating and scheduling the activities of workers who cut or stitch fabric, fur or leather garments

4 Other body positions
Work activities involve body postures other than, or in addition to, **Sitting (1)** and **Standing and/or walking (2)** such as bending, stooping, kneeling and crouching.

Examples:
- performing labouring duties in warehouses
- measuring, cutting and installing carpeting
- adjusting, repairing or replacing parts and components of automotive systems
- treating patients' disorders of the spine and body through corrective manipulation
Appendix 3  The 2002 US General Social Survey (USGSS 2002)
The 2002 Topical Module: Quality of Working Life (Qs. 872-913, Pg. 1122)

SECTION D QWL/NIOSH

5.1 How would you describe your work arrangement in your main job?
1. I work as an independent contractor, independent consultant, or freelance worker
2. I am on-call, and work only when called to work
3. I am paid by a temporary agency
4. I work for a contractor who provides workers and services to others under contract

5.2. I am a regular, permanent employee (standard work arrangement)
1. INDEPENDENT CONTRACTOR/CONSULTANT/FREELANCE WORKER
2. ON-CALL, WORK ONLY WHEN CALLED TO WORK
3. PAID BY A TEMPORARY AGENCY
4. WORK FOR CONTRACTOR WHO PROVIDES WORKERS/SERVICES UNDER CONTRACT
5. REGULAR, PERMANENT EMPLOYEE

5.3 How long have you worked in your present job for your current employer?
1. LESS THAN 6 MONTHS
2. 6-12 MONTHS
3. ENTER YEARS
4. Years at current job ___________________________

5.4 In your main job, are you salaried, paid by the hour, or what?
1. Salaried
2. Paid by the hour
3. Other (SPECIFY)  _____________________________________

5.5 Which of the following best describes your usual work schedule?
1. Day shift
2. Afternoon shift
3. Night shift
4. Split shift
5. Irregular shift/on-call
6. Rotating shifts

5.6 How many days per month do you work extra hours beyond your usual schedule?

5.7 When you work extra hours on your main job, is it mandatory (required by your employer)?
1. YES
2. NO

5.8 How often are you allowed to change your starting and quitting times on a daily basis?
1. Often
2. Sometimes
3. Rarely
4. Never

5.9 How often do you work at home as part of your job?
1. Never
2. A few times a year
3. About once a month
4. About once a week
5. More than once a week
6. Worker works mainly at home

5.10 Is it usually because you want to, you have to in order to keep up with your job, or for some other reason?
   1. Worker wants to work at home
   2. Worker has to work at home to keep up with job
   3. Other combinations and other reasons

5.11 How hard is it to take time off during your work to take care of personal or family matters?
   1. Not at all hard
   2. Not too hard
   3. Somewhat hard
   4. Very hard

5.12 How often do the demands of your job interfere with your family life?
   1. Often
   2. Sometimes
   3. Rarely
   4. Never

5.15 How often do the demands of your family interfere with your work on the job?
   1. Often
   2. Sometimes
   3. Rarely
   4. Never

5.16 After an average work day, about how many hours do you have to relax or pursue activities that you enjoy? __________

5.17 Do you have any jobs besides your main job or do any other work for pay?
   1. YES
   2. NO

Now I'm going to read you a list of statements that might or might not describe your main job. Please tell me whether you strongly agree, agree, disagree, or strongly disagree with each of these statements.

5.15 My job requires that I keep learning new things
   1. Strongly Agree
   2. Agree
   3. Disagree
   4. Strongly Disagree

5.19 My job requires that I work very fast
   1. Strongly Agree
   2. Agree
   3. Disagree
   4. Strongly Disagree

5.20 I get to do a number of different things on my job
   1. Strongly Agree
   2. Agree
   3. Disagree
4 Strongly Disagree

5.21 I have a lot of say about what happens on my job
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.22 My main satisfaction in life comes from my work
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.23 I have too much work to do everything well
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.24 On my job, I know exactly what is expected of me
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.25 My job lets me use my skills and abilities
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.26 At the place where I work, I am treated with respect
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.27 I trust the management at the place where I work
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.28 The safety of workers is a high priority with management where I work
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.29 There are no significant compromises or shortcuts taken when worker safety is at stake
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree
5.30 Where I work, employees and management work together to ensure the safest possible working conditions
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.31 The safety and health conditions where I work are good
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.32 I am proud to be working for my employer
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.33 Conditions on my job allow me to be about as productive as I could be
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.34 The place where I work is run in a smooth and effective manner
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.35 Workers need strong trade unions to protect their interests
   1 Strongly Agree
   2 Agree
   3 Disagree
   4 Strongly Disagree

5.36 In your job, do you normally work as part of a team, or do you work mostly on your own?
   1 Yes, I work as part of a team
   2 No, I work mostly on my own

5.37 In your job, how often do you take part with others in making decisions that affect you?
   1. Often
   2. Sometimes
   3. Rarely
   4. Never

5.38 How often do you participate with others in helping set the way things are done on your job?
   1. Often
   2. Sometimes
   3. Rarely
   4. Never

5.39 How often are there not enough people or staff to get all the work done?
   1. Often
   2. Sometimes
Now I'm going to read you another list of statements about your main job. For each, please tell me if the statement is very true, somewhat true, not too true, or not at all true with respect to the work you do.

5.40 The chances for promotion are good
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.41 I have an opportunity to develop my own special abilities
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.42 I receive enough help and equipment to get the job done
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.43 I have enough information to get the job done
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.44 I am given a lot of freedom to decide how to do my own work
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.45 My fringe benefits are good
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.46 My supervisor is concerned about the welfare of those under him or her
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.47 I am free from the conflicting demands that other people make of me
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.48 Promotions are handled fairly
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.49 The people I work with take a personal interest in me
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.50 The job security is good
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.51 My supervisor is helpful to me in getting the job done
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.52 I have enough time to get the job done
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.53 The people I work with can be relied on when I need help
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.54 I have the training opportunities I need to perform my job safely and competently
1 Very true
2 Somewhat true
3 Not too true
4 Not at all true

5.55 In general, how would you describe relations in your workplace between management and employees?
1. Very good
2. Quite good
3. Neither good nor bad
4. Quite bad
5. Very bad

5.56 Does your job require you to do repeated lifting, pushing, pulling or bending?
1 YES
2 NO

5.57 Does your job regularly require you to perform repetitive or forceful hand movements or involve awkward postures?
1 YES
2 NO
5.58 When you do your job well, are you likely to be praised by your supervisor or employer?
   1. Yes
   2. Maybe
   3. No

5.59 When you do your job well, are you likely to get a bonus or pay increase?
   1. Yes
   2. Maybe
   3. No

5.60 How fair is what you earn on your job in comparison to others doing the same type of work you do?
   1. Much less than you deserve
   2. Somewhat less than you deserve
   3. About as much as you deserve
   4. Somewhat more than you deserve
   5. Much more than you deserve

5.61 Do you feel that the income from your job alone is enough to meet your family's usual monthly expenses and bills?
   1. YES
   2. NO

5.62 Were you laid off your main job at any time in the last year?
   1. YES
   2. NO

5.63 How easy would it be for you to find a job with another employer with approximately the same income and fringe benefits as you have now?
   1. Very easy to find similar job
   2. Somewhat easy to find similar job
   3. Not easy at all to find similar job

5.64 Taking everything into consideration, how likely is it you will make a genuine effort to find a new job with another employer within the next year?
   1. Very likely
   2. Somewhat likely
   3. Not at all likely

5.65 Do you feel in any way discriminated against on your job because of your age?
   1. YES
   2. NO

5.66 Do you feel in any way discriminated against on your job because of your race or ethnic origin?
   1. YES
   2. NO

5.67 Do you feel in any way discriminated against on your job because of your gender?
   1. YES
   2. NO

5.68 In the last 12 months, were you sexually harassed by anyone while you were on the job?
   1. YES
   2. NO
5.69 In the last 12 months, were you threatened or harassed in any other way by anyone while you were on the job?
  1. YES
  2. NO

5.70 Would you say that in general your health is Excellent, Very good, Good, Fair, or Poor?
  [IF WRKSTAT <> 1/3 AND BALLOT = 4/6, GO TO VAR50]
  1. Excellent
  2. Very good
  3. Good
  4. Fair
  5. Poor

5.71 Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good? _____________

5.72 Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good. _____________

5.73 During the past 30 days, for about how many days did your poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation? _____________

5.74 How often do you find your work stressful?
  1. Always
  2. Often
  3. Sometimes
  4. Hardly ever
  5. Never

5.75 How often during the past month have you felt used up at the end of the day?
  1. Very often
  2. Often
  3. Sometimes
  4. Rarely
  5. Never

5.76 In the past 12 months, have you had back pain every day for a week or more?
  1. YES
  2. NO

5.77 In the past 12 months, have you had pain in the hands, wrists, arms, or shoulders every day for a week or more?
  1. YES
  2. NO

5.78 In the past 12 months, how many times have you been injured on the job? _____________

5.79 All in all, how satisfied would you say you are with your job?
  1. Very satisfied
  2. Somewhat satisfied
  3. Not too satisfied
  4. Not at all satisfied