

**Are Quebecers More Stressed Out at Work than Others?
A Follow-up Study on the Differences between Quebec, Ontario and the Rest of Canada
in Level of Perceived Work Stress**

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Abstract

Work stress can decrease productivity and create economic losses. People with long-term work stress are likely to suffer other illnesses. Using microdata from the 2015-2016 Canadian Community Health Survey: annual component, this paper investigates the impact of several potential determinants of work stress across regions of Canada. The paper is a follow-up of a previous study by Sedigh, Devlin and Grenier (2017) that pointed out that Quebecers are more likely to report high work stress than other Canadians. The main findings of this paper are different from those of that study. While Quebecers showed a 4.4 percentage point higher probability of having high work stress than Ontarians, residents of Ontario are as stressful at work as Quebecers after controlling for personal, work, family, and health and behaviour characteristics. An Oaxaca decomposition between Quebec and Ontario shows that the difference in work stress can be explained by differences in characteristics. However, living in Quebec is still persistently associated with higher work stress compared with people who live in the other provinces and an Oaxaca decomposition shows that the difference is unexplained by differences in characteristics.

Table of Contents

1. Introduction	4
2. Literature Review	5
3. Data and summary statistics	15
4. Econometric Model	24
4.1 Regression Analysis	24
4.2 Oaxaca Decomposition	27
4.3 Limitations	28
5. Empirical Results	30
5.1 Regression for all regions	30
5.2 Separate regressions by regions	36
5.3 Oaxaca Decomposition Analysis	39
6. Conclusion	43
References	45
Tables	52

1. Introduction

Work stress is defined as the “harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker” by the National Institute for Occupational Safety and Health (NIOSH, 1999). An increasing number of Canadians consider work as a main source of stress (Bickford, 2005). Furthermore, a recent survey found that 71 percent of workers reported living with some levels of stress (Crompton, 2011). In addition, untreated workplace stress and related mental health problems are associated with increased levels of absenteeism and loss of productivity (Connor, 2005). Moreover, several illnesses have been shown to be highly correlated with long-term exposure to work stress, such as anxiety, depression and chronic fatigue (Clark, 2002).

A large amount of literature has focused on the impacts of work stress and the factors that are related to it. However, a limited amount of research exists on the differences in work stress levels across different regions. In Canada, Sedigh, Devlin and Grenier (2017) recently found that workers in Quebec have significantly higher work stress than those in the rest of Canada. They analyzed data from various waves of the Canadian Community Health Survey covering the years 2003-2012, but the regression analyses did not find a complete explanation of that result. This paper seeks to bring further insight into the impact of potential socioeconomic factors on work stress in the regions in Canada by using recent data from the 2015-2016 Canadian Community Health Survey annual component. I estimate the probability of having high work stress by after controlling for different groups of characteristics.

The major findings of this paper are different from those of Sedigh, Devlin and Grenier (2017). First, the empirical results show that after controlling for the various groups of characteristics that affect work stress, residents of Ontario are as stressful at work as those in Quebec, and people in these two provinces

have higher work stress than those in the other Canadian provinces. Second, by taking a look at the differences in stress levels between Quebec and Ontario specifically with an Oaxaca decomposition, the gaps can be explained by differences in characteristics between the two provinces.

The remaining sections of the paper are structured as follows. In section 2, I present a literature review featuring the perspectives on the correlates of work stress. In section 3, I introduce the data, variables and summary statistics. Section 4 specifies the econometric models which are divided into seven specifications. This is followed by a presentation of the Oaxaca decomposition technique to compare the differences of work stress level between Quebecers and residents of Ontario and other provinces; limitations of the analysis are also discussed. Section 5 discusses the empirical results, starting with discussions at the aggregate level, and then focusing on differences between regions; this is followed by the Oaxaca decomposition analysis. Section 6 concludes.

2. Literature Review

Mental health status is a significant factor of labour market outcome, and high level of work stress may lead to serious mental health problems such as depression and result in economic loss due to stress-related illness (Dewa et al, 2002; Bender and Farvolden, 2008). Although stress in small quantity may help workers become more productive, too much stress in the workplace can be harmful and create serious problems in economic, social and in family environments (Heisz and LaRochelle-Cote, 2006; Greiner, 2008; Satpathy and Mitra, 2015). The existing studies have pointed out several characteristics influencing work stress, such as demography, socio-economic circumstances, marital status and sense of social belonging (Cooper, 1998; Barling, Kelloway and Frone, 2005). Specifically, demographic and socio-economic factors such as gender, age, education, income and immigration status have been widely studied

in both Canadian and foreign literatures and have been shown to have impacts on work stress (Smith et al., 2000). Besides, family, health and behaviour characteristics such as smoking, drinking habits, and diet are considered as stimuli that affect work stress. In this section, I analyze the literature about the overall status of stress in the labour market and the outcomes of various specific factors on work stress.

Researchers have emphasized different demographic and socio-economic determinants of work stressors. For example, Sharma and Kaur (2013) identified age, income, and length of work experience as three main factors of stress. Swaminathan and Rajkumar (2013) divided the work stress factors into age, job type, and duration of work in stressful environment. By using the 2000 Canadian General Social Survey (GSS), Williams (2003) listed several sources that may cause work stress, such as gender, age, presence of children and occupation condition. The main finding of the study is that older male workers are significantly more stressful than younger workers due to the worries about learning computer skills and too long working hours.

The previous studies concluded that work stress levels were different between genders. The vast majority of findings in the literature are that women face higher work stress than men (Jick and Mitz, 1985; Bellavia and Frone, 2005), since women experience more family responsibilities such as child care responsibilities and household activities as discussed in Michie (2002). Moreover, the unfair treatments that females face, such as discrimination and stereotyping, are unique stressors that cause different work stress outcomes between genders (Nelson and Quick, 1985).

By using both cross-sectional data from the 2002 Canadian Community Health Survey (CCHS) and some cycles of the National Population Health Survey (NPHS), Park (2007) analyzed the relationship between job stress and work performance, pointing out job strain as one of the primary sources of stress.

Park categorized four types of work environments, which are high-strain jobs, active jobs, low-strain jobs, and passive jobs, which are identified by different levels of freedom and responsibilities. First, the model shows that women prefer to be employed in high-strain jobs more than men but are less likely to participate in low-strain actions. More specifically, 28 percent of women work in high-strain jobs, and 17 percent of them worked in low-strain jobs, while these numbers are respectively 20 percent and 24 percent for men; this is similar to results of the study by Vermeulen and Mustard (2000). Second, by taking a look at work stress, women have a four percentage point higher proportion of self-perceived work stress and are 1.2 times more likely to report a problem of high work stress than men. This result is consistent with the literature not only in Canada but also in other countries, such as the study by Bogg and Cooper (1994) in the UK. Women have higher stress not only in male-dominated environment (Davidson and Cooper, 1983), but in all industries and environment (Powell, 1988; Solanki et al., 2015).

Gardiner and Tiggemann (1999) surveyed managers. A total of 120 participants who were evenly distributed by gender in male and female dominated industries completed the Survey of Work Pressure to report their job stress. Women report significantly higher work stress than men in all of the organizations. By applying gender times domination interaction analyses on the factors of discrimination, they found that female managers reported higher stress levels in male-dominated industries than any of other groups. It is evident that gender inequality still exists in the workplace and cause a significant impact on the labour market outcomes and mental health conditions.

However, some studies reported that there is no significant difference in stress level between genders since they experience different work roles and other life roles. Some researchers pointed out that males and females react differently to the work-family conflict (WFC), which was introduced Kahn et al. (1964)

and Greenhaus and Beutell (1985) as an incompatible work-nowork interrole conflict between work and family. The literature found that females were more likely to spend time on family and childcare where male workers concentrated more on their work. Netemeyer, Boles and McMurrian (1996) further studied this point of view and conceptualized it as a bidirectional work-to-family conflict and family-to-work conflict.

In today's society, work interference with family (WIF) and family interference with work (FIW) are highly correlated (Frone, 2003); in other words, women are more likely to work outside the home and men need to take more responsibilities at home (Duxbury, Higgins and Lee, 1994). Thus, it is hard to conclude that gender differences directly affect high stress for women and conflicts between work and family (Mcelwain and Korabik, 2005; Ahmad and Omar, 2008). Moreover, some existing studies found that there was no significant difference on the level of work stress between the two genders. (Spielberger and Reheiser; 1994; Rout, 1999; Gyllensten and Palmer, 2005; Makhbul and Hasun, 2011).

White and Spector (1987) find the age difference may create different stress level between workers. By taking a survey on 496 full-time managers with a mean age of 46 years old who worked in Florida, they found a lower work stress among older workers because of the higher salary and longer tenure. This finding was confirmed by other researchers such as Siu et al. (2001). In their study, older workers are believed to have better coping on work stress and to have a higher satisfaction from their jobs. It is also interesting to notice that they found a strong relationship between age and work well-being in relation to the Chinese cultural characteristics of filial piety and that it leads to a better attitude toward work. Antoniou, Polychroni and Vlachakis. (2006) surveyed 493 teachers in Greek public primary and secondary schools and asked questions about specific occupational stress; a similar result was found, and gender

pressures were found as well. This result confirmed the hypothesis that new and younger teachers in the profession present a higher level of stress in the workplace due to the lack of job experience. This was supported by the existing literature (Pines and Aronson, 1988; Byrne, 1991).

Several empirical results have confirmed that those who belong to a visible minority face a higher level of work stress than the native-born who do not belong to a visible minority (Mays, 1995; Rosmond, Lapidus and Björntorp, 1998; Mulia et al., 2008). Mays, Coleman and Jackson (1996) find that Blacks often experience role strain and conflicts in a white work environment, which makes them in a position of double jeopardy for the experience of discrimination and job-related stress in the workplace. Mays, Coleman and Jackson (1996) conducted their research by using data obtained from the National Survey of Black Americans in 1991. A positive relationship is achieved in all instances of a race-based discrimination model related to job stress. Interestingly, some opposite conclusions were also found on the impact of immigration status on stress level. For example, Smith et al. (2007) and Frank, Hou and Schellenbery (2016) compared mental health condition between immigrants and native-born Canadians and found that immigrants report to be happier and to have a lower level of depression than with their native-born counterparts.

Education, as an essential socio-economic characteristic, shows a significant influence on an individual's health and mental health conditions (Muurinen, 1982; Ross and Mirowsky, 2010). Current studies have pointed out that stress happens in higher education workplace, especially among high education institutions. Winefield and Jarrett (2001) conducted a review on university staffs' work stress in Australia, by receiving the responses from 2040 employees of the University of Adelaide. They found that the universities were not low stress working environments anymore, as multiple challenges due to

contracts, personnel practices, and workloads became more serious ever than before.

Interestingly, teaching and student demands were not ranked highly among the stressors in most of the studies; the main concerns were the lack of individual control and the difficulty to maintain a proper work-life balance. Tytherleigh et al. (2005) studied occupational stress in UK higher education institutions to confirm the findings of higher work stress among university employees by using samples from fourteen UK higher education institutions (HEIs). Compared to the normative data, HEI staff faced more stress by work relationships, lack of control and resources, and communications, which is consistent with Winefield and Jarrett (2001)'s result. Furthermore, employees who worked in old universities (pre-1992) faced more trouble due to work-life balance and stress than employees who worked in new universities (post-1992). Besides, they found that the main reason for those staffs with high level of stress is lacking commitment from their work institution.

Conversely, some researchers found a negative relationship between work stress and educational attainment. For example, Lunau et al. (2015) studied the differences in work stress between educational groups across European countries. They used data from two comparative studies between 2010 and 2011, the Survey of Health, Ageing and Retirement in Europe and the English Longitudinal Study of Ageing, with a total sample size of 13,695 observations. The first finding from the model is that the policy indicators including "integrative" and "protective" labour market policies are positively correlated to overall work stress, and the second is that the policy indicators vary by level of education. More specifically, in all countries, positive coefficients were found for low education people, which means a higher level of work stress compared to individuals with high education.

To conclude about education, there exists a two-way relationship with work stress. A variety of studies

concluded that institutional factors are highly correlated with stress in the workplace with both positive and negative effects. Low-educated people face low pay and stressful work which may result in anxiety, while high-educated people cannot fix the work-family conflict and have low confidence about job security, which is a stressor as well. Researchers also emphasized the importance of lifelong education and extended labour market policies to enhance individual working environment and work-related health condition.

Work characteristics such as wage level, unemployment, and working environment, are stressors for individuals in the labour market. Specifically, working with high stress for a long time may cause a bad mental health situation such as depression and cost economic loss (Park, 2007; Park, 2008). Firstly, people with low-income level have a higher level of stress in general (Akhtar-Danesh and Landeen, 2007). The same conclusion was found by Crompton (2011), who used the 2011 General Social Survey (GSS) on time used to examine the workers who reported being highly stressed. The empirical results are consistent with those of other researchers that for females, the well-educated are more stressful at work. Besides, the results also showed that the high level of stress was mainly due to the financial concerns; more specifically, 40 percent of workers with household income less than \$60,000 per year reported high stress, compared to only 18 percent for those who receive \$100,000 or more. Furthermore, some empirical results showed that managers were facing more stress than ordinary workers. Clark and Watson (1991), as cited in Sathasivam, Malek and Abdullah (2015), stated that managers have a high level of stress because they are in the middle of the organization hierarchy, and this may cause many conflicts during the work.

In addition to work stress, other mental health disorders may appear among workers who work in the different environments. Cottini and Lucifora (2013) used data from three waves of the European Working

Conditions Survey (EWCS), 1995, 2000 and 2005, to examine the relationship between working conditions and mental health. The paper discusses the results for mental health at work across countries and between different workplaces. The main result is that working conditions are positively correlated with mental health. For example, workers who have complex tasks or extended working hours have a higher probability of mental health problems. For the studies across countries, the differences are relegated to the country fixed effects. However, it is still hard to summarize the overall pattern across countries. In the end, they conclude the increasing job demands have a 6 % more impact on reporting mental health problems, compare to job hazards, by 2.3%.

Most of the problems between work stress and family are due to the work-family conflict and marital status. Work-family conflict, which is mainly found among women workers, was discussed as a gender difference. Women are more stressed out about family issues than men; for example, female workers were 1.5 times more likely to report stress due to work-family conflict, especially when having a child at home (Crompton, 2011). However, different marital statuses may lead to various mental health conditions. Smith et al. (2007) used the 2000-2001 Canadian Community Health Survey data and concluded that depression rates were high among single, separated or divorced individuals; the same conclusion was made by Akhtar-Danesh and Landeen (2007) and Crompton (2011).

Health status and personal behaviour are significant predictors of an individual's mental health conditions, since unhealthy lifestyle can influence mental disorders, and chronic diseases such as diabetes are contributors to labour market outcomes as well. Adverse mental health conditions may affect performance during work. Baldwin and Marcus (2007) discussed the influences of mental disorders on the labour market, especially on employment rate and wages. As the first national study on unexplained

employment and wage differentials for U.S, they used the data from a component of the 1999 Medical Expenditure Panel Survey (MEPS), which is a time-series dataset that records health conditions through in-person interviews. They build up models to compare the employment rate between healthy people and those who have mental problems. Firstly, they find that the employment rates for persons with mental disorders are significantly lower than those of persons without mental issues; however, the employment rate goes back to normal after they adjust for mental disorders. The second conclusion that they make is that the mean wage for workers with mental disorders is about 6 percent lower than the one for workers without. They also notice that gender is one of the critical explaining factors on labour market outcome, which confirmed our researches above.

Chronic diseases such as diabetes hurt labour market outcomes. Kraut et al. (2001) utilized a seven-year longitudinal dataset between 1983 and 1990 on individual encounters with the Manitoba health system in Canada to build regression equations between employment probability and diabetes. The study showed that people with complications from diabetes are twice as likely not to be in the labour force than those who do not have diabetes. They also found that those who have diabetes with complications earned only 72 percent of the total income that nondiabetics receive. High unemployment rate and low-income level can create pressure on work life and result in high work stress levels.

Kouvonen et al. (2005) built binary logistic regression models for the prevalence of smoking among 46,190 employees between 17 to 65 years old in Finland, to examine the relationship between smoking status and work stress. The main finding was that smoking intensity was associated with higher job strain and higher effort-reward imbalance. Smoking habits are stronger among active women and those in passive jobs. Another conclusion was that former smokers with high work stress and unfair treatment have

a higher probability of becoming current smokers. Patten et al. (2017) used pooled cross-sectional data from the 2001 to 2003 CCHS to study the changes in mental disorders due to smoking cessation. The result showed that the proportion of mental depression was higher among those daily smokers and the mental health condition was improved among those who quit smoking. Despite smoking habits, high consumption of alcohol and drinking problems were found to be related to work stress by Frone (1999). Moreover, empirical results show that a healthy lifestyle, such as doing physical activities and having healthy diets, brings significant improvements in individuals' stress and related mental health condition (McMartin, Jacka and Colman, 2013; Orhani and Shehu, 2017).

Sense of belonging to the community can be considered an indication of individual's social support and was identified as a basic human need toward a positive mental health condition (Maslow, 1954; Anant, 1967). Choenarom, Williams and Hagerty (2005) did a longitudinal study to examine the role of sense of belonging among 90 individuals. Five self-report instruments were used to measure individuals' depressive symptoms, which are perceived stress, sense of belonging, perceived social support and perceived spousal support. They showed that increased perceived stress and lower sense of belonging had significant direct effects on the depression factors. The result emphasized that the promotion of a sense of belonging should directly decrease of depression.

Some researchers noted that cultural differences might react as job stressors in a multi-culture environment since individuals may experience different perceptions and behave differently with different organizational culture. Liu and Spector (2005) and Chang and Lu (2007) are two studies that are related to cultural difference linked to stressors. In these studies, organizational culture was categorized into four characteristics, which are family-kin, informal work obligations, organizational loyalty and subgroup

involvement, which are similar to the conception of social support. The main conclusion was that individuals from different cultures would have different perceptions about work stress, and these organizational culture characteristics as stress moderators prompt both the alleviation or aggravation effects on anxiety.

The issue of cultural differences was further explored by Sedigh, Devlin and Grenier (2017). They used pooled data from eight cycles of the Canadian Community Health Survey between 2003 and 2012 and studied the impact of several socioeconomic factors on the work stress level between residents of different Canadian jurisdictions. They found that Quebecers were more stressed out at work than all other regions, even after controlling for a wide range of characteristics. They concluded that it is still difficult to explain the reasons from observable characteristics.

To sum up, the existing literature has examined several variables that influence the level of work stress in different characteristics such as gender, age, income, and geographical differences. This paper will update Sedigh, Devlin and Grenier (2017)'s study by using the data from the 2015-2016 Canada Community Health Survey annual component (CCHS) to look at the changes in the work stress level across different regions in Canada.

3. Data and summary statistics

This study is based on public use data of the year 2015-2016 Canadian Community Health Survey: Annual Component (CCHS 2015-2016: Annual Component). This survey asks a series of questions related to health status and health determinants to a sample of the Canadian population, such as drug use, stressors, and health care services. That survey was created by Statistic Canada and Health Canada with the primary purpose of health monitoring and professional research. Agencies from government

departments and researchers in different health organizations can use the information to become aware of the concerned health issues and to improve the health of Canadians. As well, the survey collects data on socioeconomic variables such as education, labour force status, and social conditions. The CCHS began collecting data at the provincial and intra-provincial level in 2001, first every two years and then annually since 2007. Additionally, a two-year combination of data is also released every even year to include all two-year theme contents and core content for both years. This study uses the public use microdata of the two-year data file of 2015 and 2016. In this dataset, the unit of observation is the individual, and the survey collects cross-sectional data to depict a portrait for an individual at a certain point in time. The target population for the survey is all persons over 12 years old in the ten provinces and three territories of Canada. Fewer than 3% of the Canadian population are excluded from the survey; they include: Persons living on reserves and other Aboriginal settlements in the provinces; full-time members of the Canadian Forces; the institutionalized population, children aged 12-17 that are living in foster care; and persons living in the Quebec health regions of Région du Nunavik and Région des Terres-Cries-de-la-Baie-James. The number of observations in the original dataset is 109,659, corresponding to a response rate of 59.5 per cent at the Canadian level. Survey weights are applied to the dataset in this study in order to make the sample data representative.

Several restrictions are made in this study. More specifically, in order to analyze the level of stress at work, the sample only includes individuals who work between 18 and 64 years old and who are living in the ten provinces of Canada. The majority of individuals under 18 years old are still at school and cannot be considered as being in the labour force; similarly, people who are over 64 years old are removed since they are eligible to retire from work, and their health conditions may affect their labour market outcome.

Employed people are the target group of this study. Consequently, individuals who reported zero hours of work were also dropped. After removing the missing values for the variables in this study, the remaining dataset left contains 42,388 useable observations, with 20,832 males and 21,556 females.

This study used CCHS to investigate work stress in Quebec and other provinces. One of the related questions in the survey is about the perceived stress at work and contains five levels of answer. If the individual answered their most days at work are quite a bit or extremely stressful, they are defined as people with high work stress and the dummy independent variable is equal to one. Otherwise, those who reported that their work days were not at all, not very and a bit stressful are identified as people with low work stress and the dummy variable is equal to 0. This way of defining a variable for life and work stress has been used in other studies. (e.g., Park 2007, 2008; Crompton 2011; Sedigh, Devlin and Grenier, 2017). In the sample, there are 11,907 individuals with high work stress and 30,481 with low work stress.

As a follow-up study on the same topic, the model structure of this study follows Sedigh, Devlin and Grenier (2017) for most of the characteristic variables, with just a few differences. Starting in 2012, the CCHS redesigned the frame together with contents and the change was implemented in the 2015 cycle. This caused some of the questions in 2015-2016 CCHS survey to differ from those of the 2003-2013's CCHS databases. For example, the student status variable is dropped because of the small sample size. CMA areas are not included in this study, because of the lack of information on asking whether the respondents were in a CMA region or not. Due to the difference between surveys, slightly different variables are used to replace those of Sedigh, Devlin and Grenier (2017) other than the CMA variable in geographical characteristics; for example, educational attainment, language use and work time will be discussed in detail below.

The main independent variable of interest for this study is the region, represented by three dummy variables. In order to analyze if Quebecers face more stressed at work, one binary variable takes the value of one of the individual lives in Quebec and zero otherwise. Two other dummy variables are generated to identify those who live in Ontario and those live in the other eight provinces of Canada. In the sample, 9,681 observations are from Quebec, 12,520 are from Ontario and 20,187 are from the rest of Canada. About 28.7 percent of the entire respondents after weighting have relative high work stress (27 percent of the males and 30.6 percent of the females). Individuals from Quebec report the highest weighted proportion with work stress among the three regions, at 33.4 percent; this numbers are 29.0 percent and 25.4 percent for Ontario and the rest of Canada respectively.

Apart from the regional variables, I define four other categories of characteristics which are similar to those of Sedigh, Devlin and Grenier (2017) to study the factors that relate to work stress. The four groups of characteristics are personal, work, family, and health and behaviour. In addition to the regional variable, 17 variables are generated in this study: gender, age, immigrant status, visible minority, educational attainment and language use as *personal characteristics*; total usual work hours per week and income as *work characteristics*; marital status and the presence of children in two age groups as *family characteristics*; self-accessed health and mental health, physical activities, smoking habits, alcohol use habits and sense of belonging to community as *health and behaviour characteristics*. Most of these characteristics, such as gender and income, were cited in the literature that was reviewed.

Table 1 reports the weighted mean values of the selected 2015-2016 data. The first column presents all the observations, and the other columns show the information by gender, by work stress level and by region respectively. First, looking at the regional variable, the largest proportion of the population is in the

eight other provinces, with a proportion of 38.2 percent compared to 24.3 percent for Quebec and 37.5 percent for Ontario. Gender did not change the population distribution by province.

Taking a look at gender as the first variable in the personal characteristics, 47.4 percent of the entire sample are women. The gender difference is distributed almost the same within the three identified regions. However, when the sample is divided based by work stress, the difference between males and females becomes larger, where 50.6 percent of high-stress workers are women, while only 46.2 percent of the people with low work stress are women.

Age is generated as a continuous variable and set at the midpoint for each age category in the dataset. By using this method, the entire sample population has a mean age of 40.9 years. Male respondents have an average of 41.2 years old and the mean age is 40.7 for all female participants. There is no significant change when the sample is stratified into different regions. By dividing the sample between people with different work stress, high stressed individuals have a mean age of 42 years; people are slightly younger if they have low stress, with an average age of 40.5 years.

Immigrants take the proportion of 25.1 percent of total respondents and 21.9 percent of the total sample are visible minorities. Gender has no significant influences on these two variables. For those who have high work stress, 23.4 percent are immigrants and 19.7 percent belong to visible minorities. These numbers are higher for individuals with low work stress, at 25.8 percent and 22.8 percent respectively. It is interesting to see that the proportions are unevenly distributed among the three regions, where Quebec has the lowest percentage of immigrant people and visible minority people as well, with 16.6 percent and 12.3 percent respectively. Respondents in Ontario have the most diversified population structure, where 32.5 percent of them are immigrants and 28.9 percent belong to visible minorities.

There are three education attainment categories: less than secondary school, secondary school graduation, and post-secondary or university degree. In the 2015-2016 CCHS questionnaire, some post-secondary, post-secondary graduation, and university degree are combined as one variable. Therefore, this variable could not replicate Sedigh, Devlin and Grenier (2017) since there are only three categories on educational attainment rather than four. The reference group for the education level is secondary school graduation. Among these education categories, post-secondary or university degree takes the most substantial proportion with 72.5 percent of the total, where the individuals with less than secondary school only take 6.4 percent. Females have a relatively higher proportion which achieved the highest education attainment than men, at 74.8 percent compared to 70.4 percent. This difference exists between people with high and low work stress as well, since 78.5 percent of the respondents who belong to the high stressed workers have the highest educational attainment, while only 70 percent of low stressed respondents have the same level of education. In Canada other than Ontario and Quebec, respondents are less educated, with only 70 percent having a post-secondary or university degree, compared to about 75 percent in Quebec and 73.3 percent in Ontario.

The variable of the language spoken at home is categorized into three groups: English with or without other, French or English and French with or without others, and neither English nor French. I replicated the same strategy as Sedigh, Devlin and Grenier (2017) paper to generate language dummy variables and use the English with or without other languages as the reference group as well. However, the questions asked in the survey was not the same. In 2015-2016's CCHS, participants were asked to indicate the most spoken language at home rather than their mother tongue, and this may create slight deviations since the most spoken language can change if they took bilingual education or lost practice on their first language

(Fillmore, 1991). Most of the respondents speak English with or without other languages, accounting for 67.6 percent of the total. Gender and work stress have no significant influence on speaking habits. As expected, significant linguistic differences are present among regions, as about 85.4 percent of Ontarians and 88.2 percent of people in the rest of Canada are classified as using English as their preferred language. However, among those who live in Quebec, about 87.2 percent use French or English and French with or without another language, and only 7.9 percent use English with or without other languages.

Work characteristics are classified into two groups, personal income and total usual work hours per week. As with the age variable, personal income is generated as a continuous variable based on categories. First, for those who have no income or loss, the income counts as zero. There are five other income groups, among them the lowest income group is less than \$20,000 and the highest group is more than \$80,000. The second strategy for the income variable is to divide \$20,000 by 1.5 as the lower limit income group and to multiply \$80,000 by 1.5 as the upper limit of the income category. The other groups of income take the midpoint to follow the method used for the age variable. The average income of the total population is estimated as \$57,600, and a significant difference appears on the income between genders. Male respondents receive much higher income with an average of \$65,300, compared to \$49,000 for female workers. Those who have high work stress receive \$66,400 on average; however, individuals with low work stress earn only \$54,000 on average. It is evident that Quebecers have a lower income level than Ontario and the rest of Canada; Quebecer have an average income of \$52,300, where respondents who live in the rest of Canada receive the highest income at about \$60,600 on average.

The other variable in work characteristics is the weekly working hours. This variable is not exactly the same as in Sedigh, Devlin and Grenier (2017). In their data, people were asked the hours worked in the

primary job, but in the 2015-2016 CCHS survey they were asked the total usual hours worked per week. In this database, the variable for working hours is a continuous variable. People who had no hours of work were dropped. By taking a look on summary statistics for working time, the entire sample worked on average 40.1 hours per week, where males worked 43.2 hours and females 36.7 hours. High work stress people worked 43.4 hours per week on average, which is much higher than low work stress people, with only 38.8 hours. There exist differences on work time across the regions as well, residents of Quebec work with an average of 38.6 hours per week, where this number showed as 40.3 and 40.9 for residents of Ontario and the rest of Canada respectively.

Family characteristics include marital status and children in the household in two age groups. Marital status includes four categories which are married, common-law, single, and a combined group for those who are widowed, divorced, or separated. Married people take the most significant proportion with a proportion of 49.2 percent of the population, and the smallest group is those who are widowed, divorced, and separated, with a proportion of 8.4 percent. The control group is the group of single individuals who account for 26.4 percent of the sample. Quebecers have a different marital status structure than the other regions where the common-law group accounts for the largest proportion, at 32.5 percent of the population, compared to 9.6% in Ontario and 11.7 in the rest of Canada. Two categories were defined for children in the household; individuals were asked if they have a child under five years old and a child between 6 and 11. A minority of the population have children whatever the age, accounting for 16.6 percent and 17.9 percent respectively in the two age categories; a higher proportion of male participants have the child (17.6 percent and 18.1 percent) compared to women (15.5 percent and 17.6 percent).

Health and behaviour characteristics are the last group of individual characteristics used to analyze the

effects on work stress. The variables in this category are self-assessed health, self-perceived mental health, physical activities situation, smoking habits, drinking habits, and whether the individual has a good sense of belonging to the community. The whole section of health and behaviour replicates the study by Sedigh, Devlin and Grenier (2017) and smoking habits was defined by the World Health Organization in 2008. The perceived self-assessed health variable is divided into two groups: the first includes those who rated their health condition as excellent, very good or good and is used as the control group; the other group combines those who rated their health as fair or poor. The proportion of the population with bad self-assessed health is 5.3 percent. For those who have high work stress, a larger proportion of 7.1 percent rated their health in poor or fair. Individuals who live in the rest of Canada believe they have worse health condition compared with people who live in Quebec and Ontario. The perceived mental health follows the same classification as self-assessed health condition, where 4.7 percent among the entire population are rated in poor or fair mental health condition. A higher proportion of bad self-assessed mental health is found for females and those have a high level of work stress with proportions of 5.5 percent and 7.2 percent respectively. It is interesting to find that even if Quebecers have a high level of work stress, their self-rated mental health condition as poor or fair is the lowest among all regions, at 3.6 percent, while the residents in the rest of Canada have the highest proportion of bad mental health situation, at 5.3 percent.

Individuals were asked about their physical activity, smoking and alcohol consumption habits as well. Among the entire population, 40 percent did not have any physical activities last week, and a similar distribution was found between genders and people with different levels of work stress. Referring to the definition from the World Health Organization, those who smoke daily or occasionally are classified as smokers. In the total sample, 18.7 percent were smokers, while among male, 21.6 percent smoke daily or

occasionally, and this number is much higher than the number among female, which is 15.5 percent. For those people with high work stress and who live in Quebec, the smoking habit is more common than for the other groups, with a proportion of 20.1 percent and 20.3 percent respectively. A majority of the respondents in the sample consume alcohol regularly as regular drinkers, in a proportion of 72.7 percent, and the proportion is smaller among women (66.6 percent) than among men (78.2 percent). Like the smoking habits, the regular drinkers are in larger proportions among those who have high work stress at 75.1 percent and those who live in Quebec at 79 percent. Lastly, 34.4 percent of the respondents have a weak or very weak sense of belonging to the community, and a slightly larger proportion of males and of people who have high work stress (35.1 percent and 37.9 percent) have a lower sense of belonging to the community. However, a significant difference was found among those who live in Quebec, with a proportion of 45.1 percent, which is much higher than in Ontario and the rest of Canada.

4. Econometric model

4.1 Regression model

The effects of the above variables on the impact of high work stress are studied by linear probability regression model. The linear probability model is used in this study to facilitate interpretation, as almost identical results were obtained by using other methods such as probit or logit model. Robust standard errors were used to address the possibility of heteroscedasticity.

I include alternative specifications that combine different subsets of variables to estimate the various socioeconomic effects of influencing factors. Firstly, I regress the work stress level in the full sample by adding different categories of variables in sequence. In addition to geography, the other four categories of characteristics are used in seven specific regressions in total to estimate the probability of having high

work stress. The regional variables are the main independent variables to investigate the level of different work stress between different areas. Secondly, I use separate regressions to estimate the level of work stress in Quebec, Ontario and the rest of Canada specifically.

I first estimate a raw regression that contains only the geography independent variables:

$$HWS_i = \beta_0 + \beta_1 geography_i + \varepsilon_i \quad (1)$$

where HWS_i is a binary variable such that HWS_i equal 1 if an individual i is under high work stress and 0 otherwise, and where $geography_i$ is a vector of three variables to classify individuals who live in Quebec, Ontario and RoC (Rest of Canada). Specifically, the rest of Canada is included the other eight provinces other than Quebec and Ontario, which are Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Manitoba, Saskatchewan, Alberta and British Columbia. Each variable is equal to 1 if individual i lives in Quebec, Ontario and RoC respectively and 0 otherwise, individuals in the rest of Canada are the reference group.

The next specification adds the second category of variables, denoted as $personal_i$, which is a vector of characteristics with the following variable: gender, age, age square, immigrant, visible minority, education and language spoken. The variables of female, immigrant, and visible minority are each binary, whereby each is equal to 1 if individual i is a female, an immigrant, or a visible minority and 0 otherwise. The age is presented by category in the data set, then I made the age variable as a continuous variable by taking the midpoint of each age category; age squared is also used in the regression. I classify individuals' highest education attainment into three groups, each of them being a binary variable: less than secondary school, secondary school graduation with no post-secondary education (reference category) and post-secondary certificate diploma or university degree. Languages spoken is used the question ask individual's

language speak most often at home in the survey, and represented by three binary variables: those who speak English with or without another language; French with or without another language, or both English and French with or without another language; and neither English nor French. The English-speaking individuals are used as reference group.

$$HWS_i = \beta_0 + \beta_1 geography_i + \beta_2 personal_i + \varepsilon_i \quad (2)$$

The third category of variables, denoted as $work_i$, contains the usual work hours per week and personal income. The usual work hours per week is a continuous variable ranging between one hour to ninety-nine hours per week. Restricting individual's work hour to be more than zero means that the sample population includes only people who are employed. The income variable is also a continuous variable.

$$HWS_i = \beta_0 + \beta_1 geography_i + \beta_2 personal_i + \beta_3 work_i + \varepsilon_i \quad (3)$$

In the fourth specification, variables related to family characteristics are added to the regression. The family characteristics include marital status and two variables that describe the children status, which are whether the household have one or more children aged under 5 or between 6 to 11 respectively. Marital status is divided into four binary variables: married; common-law; windowed, divorced or separated; and single, with the single group as the reference. Two binary variables are equal to 1 to represent that there are children under 5 or between 6 to 11 in the respondent's home respectively, and zero otherwise.

$$HWS_i = \beta_0 + \beta_1 geography_i + \beta_2 personal_i + \beta_3 work_i + \beta_4 family_i + \varepsilon_i \quad (4)$$

In the fifth specification, a last vector that includes health and behaviour variables is added to the model. Bad self-assessed health and bad self-assessed mental health are two binary variables which are equal to 1 if the respondent rate themselves' health and mental health as poor or fair, and 0 otherwise.

Personal behaviours such as smoking, drinking and having physical activities during the previous week

are all binary variables as well. The last binary variable in this category is the sense of belonging to community, which is equal to 1 if individual rates sense as belonging as weak or very weak and 0 otherwise.

$$HWS_i = \beta_0 + \beta_1 geography_i + \beta_2 personal_i + \beta_3 behaviour_i + \varepsilon_i \quad (5)$$

Finally, the last two specifications combine the categories of variables as follows:

$$HWS_i = \beta_0 + \beta_1 geography_i + \beta_2 personal_i + \beta_3 work_i + \beta_4 family_i + \varepsilon_i \quad (6)$$

$$HWS_i = \beta_0 + \beta_1 geography_i + \beta_2 personal_i + \beta_3 work_i + \beta_4 family_i + \beta_5 behaviour_i + \varepsilon_i \quad (7)$$

4.2 Oaxaca Decomposition

In order to make a deeper analysis on the difference work stress level between different regions, following Sedigh (2014), the Oaxaca decomposition technique is used to investigate the disparity between individuals in Quebec and Ontario as well as between individuals in Quebec and the rest of Canada in the probability of having high work stress. An explained and an unexplained part are estimated in the decomposition model to decompose the difference in the level of work stress between Quebecers and Ontarians as well as Quebecers and people in the rest of Canada respectively.

The models for individuals in the three areas are shown as:

Regression for Quebecers:

$$(HWS_i^{QC}) = \chi_i^{QC} \beta_i^{QC} + \varepsilon_i^{QC} \quad (8)$$

Regression for Ontarians:

$$(HWS_i^{ON}) = \chi_i^{ON} \beta_i^{ON} + \varepsilon_i^{ON} \quad (9)$$

Regression for individuals in the rest of Canada:

$$(HWS_i^{RoC}) = \chi_i^{RoC} \beta_i^{RoC} + \varepsilon_i^{RoC} \quad (10)$$

where HWS_i^{QC} , HWS_i^{ON} and HWS_i^{RoC} are the probability of getting high work stress level of individual i for those who live in Quebec, Ontario and the rest of Canada respectively. All the independent variables in the four groups of characteristic vectors for individual i are noted as χ_i^{QC} , χ_i^{ON} and χ_i^{RoC} , and the error term for the regressions are ε_i^{QC} , ε_i^{ON} and ε_i^{RoC} respectively.

Two Oaxaca decompositions are done, which are shown as:

$$\overline{(HWS^{QC})} - \overline{(HWS^{ON})} = (\overline{\chi^{QC}} - \overline{\chi^{ON}})\beta^{ON} + \overline{\chi^{QC}}(\beta^{QC} - \beta^{ON}) \quad (11)$$

$$\overline{(HWS^{QC})} - \overline{(HWS^{RoC})} = (\overline{\chi^{QC}} - \overline{\chi^{RoC}})\beta^{RoC} + \overline{\chi^{QC}}(\beta^{QC} - \beta^{RoC}) \quad (12)$$

where the left-hand side of the equation shows the average difference in the probability of having high level of stress between individuals in Quebec and in Ontario as well as individuals in Quebec and in the rest of Canada respectively, and the bar signs over the variables indicate the mean values. The right-hand side is composed of two parts. The first part is the explained part and represents the difference in the probability of having high work stress due to the differences in the mean values of the factor variables, where those variables are evaluated with the Ontario respondents' coefficient in equation 11, and evaluated with the coefficient of people in the rest of Canada in equation 12. The second part is the unexplained part and shows the difference in the probability of having high work stress due to the differences in the coefficient in the regression models.

4.3 Limitations

It is worth mentioning some limitations in the econometric models that were introduced above and that may affect the properties of the regression results.

First, measurement errors may exist in the variables in the model, which may bring bias into the regression and influence the accuracy of the results. To be specific, since this is an update study of a

previous research, all the variables should be replicated exactly in order to build the same model. However, due to the change of the Canadian Community Health Survey and the selection of two-year annual component data as mentioned in the data section, some variables are not replicated and must be replaced by substitution variables. For example, the language spoken variable was changed from mother tongue to the language individual most spoken at home. In addition, the student status is missing in the 2015-2016 CCHS database. Furthermore, since the CCHS questionnaire can only depict a portrait of the population at one specific point of time, the result of work stress level may be under-identified or over-identified due to time issue or accidental event that may affect their stress level. Moreover, some respondents may not be willing to report reliably their high work stress level, and this would cause an underestimating of the stress level for the population and create bias on the results as well.

Second, this paper aims to study the effect of the demographic, socioeconomic, health and behaviour variables on the level of work stress by replicating and updating the study of Sedigh, Devlin and Grenier (2017)'s work. The main target is to investigate the differences in the level of work stress in Quebec, Ontario, and the RoC. However, other unobserved characteristics may affect high work stress as well, and reverse causality may also exist in the regression. In other words, the probability of having high work stress may cause one to have specific characteristics, such as perceiving mental health as fair or poor; people may suffer also from mental health condition after experiencing high stress at work (Baldwin and Marcus, 2007). A two-way causation between mental health and labour market performance has been identified by many researchers, making it difficult to determine the direction of causality between the dependent and independent variables. In order to solve the problem of endogeneity, instrumental variables could be used, but it is not easy to select appropriate instruments.

5. Empirical Results

5.1 Regression model for all regions

Table 2 shows the regression results for the probability of having high level stress after controlling for the five groups of characteristics (*geography, personal, work, family, and health and behaviour*), with seven different combinations in total. In the first column, the high work stress rates are regressed on the geography variables only; in column (2), personal characteristics are added; work, family, and health and behaviour characteristics are added in columns (3) to (5) respectively; in column (6), personal, work and family characteristics are added; and in column (7), characteristics in all categories are included. For each regression, a statistical test was performed for the null hypothesis that the variables of Quebec and Ontario have the same coefficient. As a follow up study for Sedigh, Devlin and Grenier (2017) with recent data, the consistency of testing the hypothesis that Quebecers are most stressed out at work than others will be discussed.

First looking on the geography variables as my main focus, Quebecers and Ontarians are observed to be respectively 7.9 and 3.5 percentage point more likely to have high work stress than the rest of Canada, for a difference of 4.4 percentage points for the gap between Quebec and Ontario, in the first raw regression of column (1) where only the geography variables are included; the result is consistent with the summary statistics in table 1. In this specification, based on the test at the bottom of the table, the null hypothesis is rejected indicating that the coefficients of Quebec and Ontario are not the same. In columns (3), (6) and (7), Quebecers are shown to be between 5 and 5.5 percentage point more likely to have high work stress than the residents of the rest of Canada, which is significant at the 1% level and consistent with the findings of Sedigh, Devlin and Grenier (2017). However, when controls for personal and family

characteristics are included in columns (2) and (4), Quebecers are shown to be 3 and 2.9 percentage point more likely to have high work stress than people in rest of Canada and this is significant only at the 10% level; also, respondents in Ontario are shown to have a higher probability of 3.6 percentage points and it is significant at the 1% level. Moreover, by controlling for personal and health and behaviour characteristics, respondents in Ontario are observed to have a 3.5 percentage point higher probability than those in the rest of Canada and it is significant at the 1% level; however, the coefficient for Quebecers is not significant in column (5). In general, by taking a look at the geography variables, we find that the results are consistent with those of Sedigh, Devlin and Grenier for the individuals in the rest of Canada, but they are not consistent for residents of Ontario, as individuals in Ontario show a similar or higher probability of having high work stress than Quebecers in some regressions. It is also worth noticing that by testing the equality of the coefficients of Ontario and Quebec, only the first raw regression in column (1) shows a significant difference; the null hypothesis is not rejected in columns (2) to (7).

In order to find why residents of Quebec and Ontario both show high work stress, other variables need to be taken into consideration. By taking a look at gender differentials, the key consistent finding is that females are shown to be between 3.1 to 8.7 percentage point more likely to have high work stress than males, across all combinations of controls. Females are more likely to have high work stress than males and difference is significant at the 1% the level in all columns. When all the characteristics are controlled for in column (7), female workers have the highest probability of having high work stress, with a difference of 8.9 percentage points compared to male workers. Comparing all columns, female respondents showed much higher probabilities of having work stress than males when work characteristics are added, and I believe that gender difference and discrimination during work exist in my study; this finding is consistent

with many previous researches such as Michie (2002) and Park (2007).

Age is also associated with work stress. Across the board, work stress increases with age at a slightly decreasing rate no matter what characteristics are controlled for. This is true at the 1% significance level in the specifications (2), (4), (5), (6) and significant at the 5% level in specifications (3) and (7). To be more specific, individuals receive more work stress between 1.9 to 2 percentage point per year when controlling for geography, personal, family and health and behaviour characteristics in specifications (2), (4) and (5). When work variables are added, the difference decreases to around 0.5 percentage point as shown in columns (3), (6) and (7). The coefficient of age squared shows a negative sign in all regressions, meaning that the curve is concave down and has a downward trend on the effect of work stress when age increases.

Individuals who are immigrants seem to have less work stress than non-immigrants. Controlling for only geography and personal characteristics in column (2), a difference of 2.2 percentage points at the 10% significance level is shown. When more characteristics are added, immigrants still have lower work stress, but the coefficients become insignificant. Across all seven specifications of the grouped characteristics in table 2, none of the coefficients of visible minority is significant at the 10% level and the sign is not constant.

Table 2 also presents the effect of education attainment on the level of work stress where secondary school education is used as the reference group. In general, individuals who have a higher level of education attainment have greater work stress, which is similar to the findings in some of the literature discussed above (e.g. Marmot et al, 1991; Winefield and Jarrett, 2001). Across all combinations of controls, individuals who only have less than secondary school education are observed to be between 3.7 to 4.5

percentage point less likely to have work stress than the reference group, and those who have post-secondary certificate or university degree show a higher probability of work stress between 3.8 to 6.2 percentage points. Those with post-secondary and university degree show the most work stress when controlling for geography, personal and health and behaviour in column (5), with a level of 6.7 percentage points higher than the one of the reference group. Meanwhile, comparing with individuals with secondary school education, those who did not complete secondary school have the least work stress in specification (5) as well, with a difference of 4.5 percentage points from the reference group and significant at the 1% level. Taking a look on all six specifications with education attainment controls, personal, family, and health and behaviour are the most influential factors of high work stress for those well-educated respondents, with a difference between 6 to 7 percentage point compared to people with secondary school educational level.

Table 2 also presents the effect of language on work stress level. In general, those who spoke French or both 'English and French' were more likely to have high work stress than the reference group of those who mostly speak English at home. Francophones and bilingual person were shown more work stress than Anglophones in all the specifications, with differences between 5 to 6 percentage point and this is significant at the 1% level. When adding controls on all groups of characteristics in specification (7), workers who speak mostly French or both languages at home show the highest work stress compared to Anglophones, with a difference of 5.7 percentage points. People who spoke neither English nor French show no significant difference on work stress compared with the reference group.

Looking now at the next category of variables, work characteristics, total usual work hours per week and personal income are defined as continuous variables and studied for the effects on work stress. Across

all the specifications, longer working hours are associated with increased work stress, with one additional hour increasing work stress by about 0.5 percentage points. This is true at the 1% significance level. Increasing personal income by one thousand dollars increases work stress by about 0.1 percentage points in all the specifications from columns (2) to (7).

In the next step, the family characteristics group is added that contains marital status and whether or not children are present. The marital status regression coefficients indicate that compared to single individuals, common law partners have a higher probability of having work stress in specification (4) that includes geography, personal and family characteristics, by 3.3 percentage points. This is true at the 1% level of significance. When all groups of characteristics are added, people whose marital status is common law are more likely to have work stress than single individuals by 2.1 percentage points, and this is significant at the 10% level. For those who are widowed, divorced or separated, a difference of 2.8 percentage points with single individuals is reported at the 10% significant level in specification (4) that includes geography, personal and family characteristics. This result is consistent with Sedigh, Devlin and Grenier (2017). Those who have children less than five years old at home have a lower probability of high work stress in specifications (4), (6) and (7) by 2.9, 2.8 and 2.6 percentage points respectively. This is true at the 1% level of significance. People who have children between 6 and 11 years old are also shown to have less work stress, by a difference of 1.8 percentage points at the 10% significance level in specification (4) that includes geography, personal and family characteristics only. It is interesting to note that these results are different from much of the literature, where individuals with children at home have more work stress due to work to family conflicts (Michie, 2002; Williams, 2003); however, the empirical results showed insignificant coefficients whether people have children or not in the study of Sedigh, Devlin and

Grenier (2017).

Finally, seven different health and behaviour characteristics are included, which are self-assessed health and mental health condition, smoking and drinking habits, sense of belonging to community and whether individuals do physical activities or not. Respondents who have poor or fair self-assessed health are 6.2 percentage point more likely of having high work stress than those who assessed their health as excellent, very good or good in specification (5); in the same specification, people who perceived poor or fair mental health report a 15 percentage point higher work stress than those who rated their mental health condition as excellent, very good or good. This is true at the 1% level of significance. When all the characteristics are added in specification (7), people who self-rated their health as fair or poor are 8 percentage point more likely to have high work stress than the reference group, and those who reported poor or fair on self-assessed mental health are 15.9 percentage point more likely to report high work stress than people with excellent, very good or good mental health condition; this is the largest coefficient among all the variables in this study. This is true at the 1% level of significance. It is obvious that bad health and mental health condition have big influence on perceived work stress level, and that mental health shows the greatest impact, which is consistent with all the previous literature; however, as mentioned above in the section on limitations, the causality can be in both directions. In specifications (5) and (7), smokers have 2.9 percentage point and 3.3 percentage point higher probabilities of work stress than non-smokers respectively, which is similar to what was found in Patten et al (2017). People who drink alcohol regularly are 2.8 percentage point more likely to have work stress at the 1% significant level, compared to those who did not drink or drink occasionally, in specification (5) where geography, personal and health and behaviour characteristics were controlled for. In the same specification, individuals who thought

themselves as having weak or very weak sense of belonging to community have a higher probability to have work stress of 3.3 percentage points. Apart from these negative behaviours on health, sport exercise would be expected to have a negative effect on work stress; however, the regression results cannot prove this point of view since the coefficient of having physical activities last week is insignificant at any level.

To conclude, the major finding of this study so far is that Sedigh, Devlin and Grenier (2017)'s conclusion with respect to provincial differences does not hold entirely. Residents of Ontario were as stressful as those in Quebec in all specifications other than the one that includes only geography. Since the null hypothesis that the coefficients of Ontario and Quebec are the same failed to be rejected, the regressions cannot explain away this affect why people in these two areas were more likely to report work stress. Besides, gender difference and gaps due to educational attainment are consistent with the literature. Also, those who have longer working hours, have poor or fair self-assessed health and mental health, and who smoke are more likely to have high work stress. Since the geography differences are not obvious when I regress on the whole sample, separate regressions are now done by region.

5.2 Separate regressions by region

My empirical results from Table 2 support only partly those of Sedigh, Devlin and Grenier (2017), as individuals in Ontario are as stressful at work as Quebecers. In this section, I regress the specification that include the four groups of characteristics separately for Quebec, Ontario and the rest of Canada and present the results in table 3. This is to further study how work stress is affected differently in different areas.

Looking at personal characteristics, the first key consistent finding is that females are observed to be more likely to have high work stress than males across all geography areas, and gender differences are significant at the 1% level. Specifically, females in Quebec and Ontario face the most work stress gap

compared to males, with a difference of 10.3 percentage points and 9 percentage points respectively, while females in the rest of Canada have higher probability of having work stress than males with the difference of 7.8 percentage points. Although the fact that older people had more work stress when studied for the whole sample, when studied by different regions, this is significant only for Quebec. Compared to the reference group of those who have a secondary school education, individuals in Quebec with less than secondary school education have lower work stress by 7.2 percentage points significant at the 1% level; this difference is only 4.9 percentage points in Ontario (significant at the 10% level). For those with post-secondary or university degree, the coefficient for Quebecers are insignificant, while individuals in Ontario and the rest of Canada report higher work stress, by 5.5 and 4.1 percentage points respectively compared to the reference group (at the 1% level of significance). People in Quebec who speak French or both 'English and French' are more likely to have work stress with a magnitude of 6.2 percentage point compared to people who only speaks English at home, which is significant at the 5% level. The effect of language use at home on the work stress is not significant for Ontario's respondents. Unlike the residents of Ontario, individuals in the rest of Canada who mostly speak French or both 'English and French' at home were more likely to report work stress than those who only speak English, by 5.5 percentage point (at the 5% level of significance), where a negative effect was found for those who speaks neither English nor French, by 4.3 percentage points and significant at the 10% level.

In the work characteristics category, the impact of total usual work hours per week and income are highly significant at the 1% level for all the regions in Canada. The longer working hours have the most influence on work stress among individuals who live in Ontario, by 0.6 percentage points per hour, where the second large coefficient was found for Quebecers, at 0.5 percentage points. When they receive higher

income, Quebecers are 0.2 percentage point more stressful at work for each unit of \$1,000, for those in Ontario and rest of Canada, the magnitude is 0.1 percentage point.

In the family characteristics group, the effects on high work stress are significant for individuals in Ontario only in the common-law category and in the presence of children under 5 years old category. Individuals in Ontario with common-law partners are more likely to have work stress than the reference group who are single by 5.7 percentage points (significant at the 5% level). Ontarians with children under 5 years old are 4.6 percentage point less likely to have work stress than those who do not have children (significant at the 5% level). Individuals in the rest of Canada who are married have a 3.6 percentage point higher probability of having work stress than those who are single (significant at the 1% level); for those who are widowed, divorced or separated, a magnitude of 3.8 percentage point difference is reported on work stress compared to single individuals (significant at the 5% level). Moreover, for individuals who have children under 5 years old in the rest of Canada, this magnitude is 2.5 percentage points and significant at the 10% level. However, the coefficients of these variables are not significant for Quebecers.

Lastly, looking on the group of health and behaviour characteristics, the impact of fair or poor self-assessed mental health is highly significant for individuals in all regions. Fair or poor perceived mental health increase the probability of having work stress by 22.3 percentage points for Quebecers, 9.6 percentage points for Ontarians and 18.5 percentage points for individuals in the rest of Canada. People who rated their health condition as poor or fair in Ontario and the rest of Canada also faced higher probability of work stress by 6.6 percentage points and 9.9 percentage points respectively (significant at the 1% level) compared to those who have excellent, very good or good self-assessed health. However, the coefficient of self-assessed health is not significant for respondents in Quebec. Smoking habits have a

positive effect of having high work stress on Quebecers and Ontarians, by 5.5 percentage points (significant at the 1% level) and 3.4 percentage points (significant at the 10% level) respectively. Moreover, for Quebecers and people in the rest of Canada, weak or very weak sense of belonging to community also has positive effect on work stress of 4.3 percentage points and 2.7 percentage points respectively.

In conclusion, although individuals in different regions respond to the same variables, some notable differences were found in the effects of personal, family and health and behaviour characteristic groups. In order to better understand the differences on work stress between Quebec, Ontario and the rest of Canada, Oaxaca decompositions are performed to capture some of these subtle differences.

5.3 Oaxaca decomposition analysis

Table 4 presents the empirical results on the impact of differences in socioeconomic factors and on differences in regression coefficients on the difference in the probability of having high work stress between Quebecers and Ontarians as well as between Quebecers and people in the rest of Canada, using the Oaxaca decomposition method.

First, in order to focus on the different findings between residents of Quebec and Ontario from Sedigh, Devlin and Grenier (2017), the individuals who live in the rest of Canada are excluded; the total sample size decreases to 22,201, including 9,681 and 12,520 observations from Quebec and Ontario respectively. In this specification, all 23 variables are used and they are categorized into the four groups of characteristics defined before, which are *personal*, *work*, *family*, and *health and behaviour*. The main fact is that the difference between individuals in Quebec and Ontario in the probability of high work stress is 4.4 percentage points. This result is shown in the raw regression result in specification (1) in table 2. Sedigh, Devlin and Grenier (2017)'s key conclusion that Quebecers are more stress out at works is also

supported in this specification, but it was not in the other ones.

As shown in table 4, the difference is composed of a total explained due to the gap in the mean values of the characteristics between two groups as well as a total unexplained part because of the gaps in the regression coefficients. The total explained part is 0.041 and significant at the 10% level. The rest is the unexplained part, which is small and insignificant. This means that the largest part of the difference can be explained by differences in the mean values of the variables in the four groups of characteristics, which are *personal*, *work*, *family*, and *health and behaviour*. First, in the explained part, the part due to *personal* characteristics is positive at 0.058, and it is significant at the 1% level. The positive sign implies that personal characteristics cause more work stress in Quebec than in Ontario. Firstly, by taking a look at the summary statistics in Table 1, higher proportions of females, post-secondary or university educated people and bilingual speakers were found in Quebec more than in Ontario, and all those factors make it more likely to have work stress for Quebecers. Secondly, the *work* characteristics have a coefficient of minus 0.022 which is also significant at the 1% level. This negative sign indicates that the individuals in Ontario are more likely to have work stress due to work characteristics. Respondents in Ontario have longer usual work hours and higher personal income levels than Quebecers, as was shown in Table 1. Thirdly, the *health and behaviour* characteristics have a positive coefficient 0.005 and significant at the 10% level, which means the *health and behaviour* characteristics benefit individuals in Ontario and causes more stress for Quebecers. Smoking and drinking habits and weak sense of belonging to community have a negative effect on work stress, but they take higher proportions in Quebec than in Ontario, leading to higher work stress. To summarize, *personal* and *health and behaviour* characteristics are the two main factors that explain that Quebecers have a higher probability of getting work stress than Ontarians. The

work characteristics benefit Quebecers in reducing work stress, but their magnitude is too small to compensate for the effects of the gaps in the other two characteristics.

The magnitude for the total unexplained part is very small, where the constant term shows the largest difference between two groups, which is difficult to attribute to a particular cause. However, all the elements including the constant in the unexplained part are insignificant; this implies that differences in the effects of the variables in the four groups of characteristics are not crucial determinants of the difference between the two provinces in having work stress.

Furthermore, for the purpose of testing whether Quebecers were still more stressful than people in the rest of Canada as found by Sedigh, Devlin and Grenier (2017), the impact of socioeconomics factors on the difference of having high work stress between residents of Quebec and the rest of Canada were also examined by using the Oaxaca decomposition technique. In this specification, the individuals who live in Ontario are excluded; the total sample size changes to 29,868, including 9,681 and 20,187 observations from Quebec and the rest of Canada respectively. The main fact in this specification is that the difference between individuals in Quebec and the rest of Canada in the probability of high work stress is 7.9 percentage points, which is consistent with the finding of Sedigh, Devlin and Grenier (2017). In this decomposition, the total explained part is 0.028 but not significant at the 10% level; however the total unexplained part due to the differences in the regression coefficients is positive at 0.051 and significant at the 5% level. This means that the largest part of the difference is unexplained between residents of Quebec and those of the rest of Canada. First, in the explained part, the coefficient of the *work* characteristics is positive at 0.056, and it is significant at the 5% level; this is similar to the decomposition for Ontario and it implies that Quebecers were more stressed out due to the impact of personal characteristics. As was

shown in Table 1, more female respondents and bilingual speakers were found in Quebec than in the rest of Canada, as a result, it is more likely to have work stress for Quebecers. Second, the *work* characteristics has a coefficient of negative 0.031 which is significant at the 1% level and also similar to the decomposition for Ontario. The negative sign implies that the work characteristics cause residents of Quebec less stress than those in the rest of Canada, consistent with the finding that Quebecers work less hours per week than people in the rest of Canada, as shown in Table 1. However, even if the effect of these two characteristics was significant and consistent with the summary statistics, the total explained part is still insignificant.

The magnitude of the total unexplained part is not only significant (at the 5% level of significance) but also larger than in the decomposition for Ontario, where the constant is the most important contributor. Consistently with the separate regressions by region shown in Table 3, Quebecers perceived more work stress than people in the rest of Canada due to the high value of the constant as well as the *work* characteristics. The coefficient of the *work* characteristics showed a positive 0.1 (significant at the 1% level), but the family characteristics showed a negative 0.031 (significant at the 10% level) in the unexplained part. Similar results were found in Table 3, where the work characteristics affect more residents of Quebec, while the *family* characteristics affect people in the rest of Canada more than Quebecers.

6. Conclusion

This paper used microdata from the 2015-2016 Canadian Community Health Survey annual component to examine the impact of various socioeconomic factors on perceived work stress between Quebec, Ontario and the rest of Canada. The regression model was composed of seven specifications that included five groups of characteristics that may influence the probability of having work stress: *geography, personal, work, family, and health and behaviour*.

As a follow-up research of Sedigh, Devlin and Grenier (2017)'s with the latest data, several conclusions were found from the empirical results. Residents of Quebec were 8.1 percentage more likely to report work stress than the rest of Canada according to Sedigh, Devlin and Grenier (2017)'s study. However, it was observed in this study that individuals in Ontario were as stressful as Quebecers compared to people in rest of Canada in the models that controlled for the different characteristics. Specifically, individuals in Quebec had a higher probability of having work stress by 4.4 percentage points than residents of Ontario when work stress is regressed only on geography variables, but when more controls were added, the differences became insignificant.

This research provided an in-depth study of how various factors affect work stress in Canada and in its regions. Further analysis of the potential causes of the differences in the level of work stress between individuals in Quebec and Ontario as well as between residents of Quebec and the rest of Canada was done through an Oaxaca decomposition.

At the aggregate level, personal, work, family and health and behaviour factors that influence the probability of high work stress were mostly consistent with the results of the existing literature, but the geography variables showed different findings from those of Sedigh, Devlin and Grenier (2017). Residents

of Ontario were as stressful as those of Quebec. When analyzed only by regions, the effects of gender, work characteristics and self-rated mental health condition were highly significant for both residents of Quebec and Ontario. However, age, language use, self-assessed health condition and sense of belongings to community were significant for Quebecers but not for Ontarians. In contrast, family characteristics and whether respondents have physical activities were significant for Ontarians but not for Quebecers. These empirical results indicated that, compared to the rest of Canada, the existence of higher stress level can be explained by different characteristics for people in Quebec and Ontario and the Oaxaca decomposition results further supported that finding.

Finally, the current study found that residents of Quebec and Ontario reported more work stress than those of the rest of Canada, and the differences in stress level between Quebec and Ontario can be explained by differences in characteristics. Since the findings were not consistent with those of Sedigh, Devlin and Grenier (2017), it would be necessary to collect more recent data on a longer period of time, and additional research should be done to study why residents of Ontario have become more stressful at work recently. Meanwhile, the financial costs of work stress as well as the potential risks were noticed in the introduction to this article, and it is worthwhile to establish relevant policies to reduce these costs in the future.

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Table 1: Mean values of selected variables, Weighted

Variables	All	Males	Females	People with High Work Stress	People with Low Work Stress	Quebec	Ontario	Rest of Canada
High Level of Work Stress	0.287	0.270	0.306	1	0	0.334	0.290	0.254
A. Geography variables								
Quebec	0.243	0.240	0.245	0.282	0.227			
Ontario	0.375	0.374	0.377	0.379	0.374			
Rest of Canada	0.382	0.386	0.377	0.339	0.399			
B. Personal Characteristics								
Female	0.474	0	1	0.506	0.462	0.480	0.477	0.469
Age	40.9	41.2	40.7	42.0	40.5	41.0	41.0	40.8
Immigrant	0.251	0.257	0.245	0.234	0.258	0.166	0.325	0.233
Visible Minority	0.219	0.220	0.219	0.197	0.228	0.123	0.289	0.212
Education attainment: Less than secondary school	0.062	0.070	0.053	0.044	0.069	0.075	0.054	0.061
Education attainment: Secondary school education	0.213	0.226	0.199	0.170	0.231	0.175	0.213	0.239
Education attainment: Post-secondary/university degree	0.725	0.704	0.748	0.785	0.700	0.750	0.733	0.700
Language use: English with or without another language	0.676	0.676	0.676	0.641	0.690	0.079	0.854	0.882
Language use: French or English and French	0.238	0.234	0.241	0.282	0.220	0.872	0.036	0.032
Language use: Neither English nor French	0.086	0.090	0.082	0.077	0.090	0.049	0.110	0.086
C. Work Characteristics								
Total usual work hours per week	40.1	43.2	36.7	43.4	38.8	38.6	40.3	40.9
Personal income (in thousand)	57.6	65.3	49.0	66.4	54.0	52.3	57.8	60.6
D. Family characteristics								
Marital Status: Married	0.492	0.513	0.469	0.502	0.488	0.322	0.544	0.550
Marital Status: Common-law	0.160	0.162	0.157	0.181	0.151	0.325	0.096	0.117
Marital Status: Windowed/Divorced/Separated	0.084	0.060	0.111	0.093	0.080	0.080	0.089	0.082
Marital Status: Single	0.264	0.265	0.263	0.225	0.280	0.272	0.271	0.252
Children <5	0.166	0.176	0.155	0.160	0.169	0.177	0.161	0.165
Children 6-11	0.179	0.181	0.176	0.181	0.178	0.176	0.180	0.179
E. Health and Behaviour								
Self-assessed Health: poor or fair	0.053	0.051	0.055	0.071	0.046	0.041	0.054	0.061
Self-assessed mental health: poor or fair	0.047	0.040	0.055	0.072	0.037	0.036	0.047	0.053
No physical activities last week	0.400	0.402	0.398	0.404	0.398	0.400	0.417	0.383
Type of smoker: daily or occasionally	0.187	0.216	0.155	0.201	0.182	0.203	0.184	0.181
Type of drinker: regular	0.727	0.782	0.666	0.751	0.717	0.790	0.702	0.711
Sense of belonging to community: weak or very weak	0.344	0.351	0.336	0.379	0.330	0.451	0.314	0.305
Observations	42,388	20,832	21,556	11,907	30,481	9,681	12,520	20,187

Note: Source: Canadian Community Health Survey, 2015-2016: Annual Component.

Table 2: Linear Probability Model Regression Results of having high work stress

Variables	Geography (Raw)	Personal	Personal & Work	Personal & Family	Personal & Health & Behaviour	Personal, Work &Family	Personal, Work, Family & Health & Behaviour
A. Geography variables (Ref: RoC)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Quebec	0.079*** (0.009)	0.030* (0.017)	0.055*** (0.017)	0.029* (0.017)	0.022 (0.017)	0.054*** (0.017)	0.050*** (0.017)
Ontario	0.035*** (0.009)	0.036*** (0.009)	0.040*** (0.008)	0.036*** (0.009)	0.035*** (0.008)	0.040*** (0.008)	0.041*** (0.008)
B. Personal Characteristics							
Female		0.033*** (0.017)	0.087*** (0.008)	0.031*** (0.007)	0.036*** (0.007)	0.086*** (0.008)	0.089*** (0.008)
Age		0.019*** (0.002)	0.005** (0.002)	0.020*** (0.002)	0.019*** (0.002)	0.006*** (0.002)	0.005** (0.002)
Age squared		-0.000*** (0.000)	-0.000** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000** (0.000)
Immigrant		-0.022* (0.013)	-0.015 (0.013)	-0.020 (0.013)	-0.019 (0.013)	-0.012 (0.013)	-0.012 (0.013)
Visible Minority		-0.017 (0.014)	0.002 (0.013)	-0.015 (0.014)	-0.009 (0.014)	0.003 (0.013)	0.008 (0.013)
Education (Ref: Secondary school education)							
Education attainment: Less than secondary school		-0.040*** (0.015)	-0.038*** (0.014)	-0.039*** (0.015)	-0.045*** (0.015)	-0.037*** (0.014)	-0.045*** (0.015)
Education attainment: Post-secondary/university degree		0.062*** (0.009)	0.038*** (0.009)	0.063*** (0.009)	0.067*** (0.009)	0.039*** (0.009)	0.044*** (0.009)
Language (Ref: English with or without another language)							
Language use: French or English and French		0.050*** (0.016)	0.052*** (0.016)	0.049*** (0.017)	0.056*** (0.016)	0.051*** (0.016)	0.057*** (0.016)
Language use: Neither English nor French		0.002 (0.021)	0.009 (0.021)	0.002 (0.021)	0.007 (0.021)	0.010 (0.021)	0.013 (0.021)
C. Work Characteristics							
Total usual work hours per week			0.005*** (0.000)			0.005*** (0.000)	0.005*** (0.000)
Personal income (in thousand)			0.001*** (0.000)			0.001*** (0.000)	0.001*** (0.000)

Variables	Geography (Raw)	Personal	Personal & Work	Personal & Family	Personal & Health & Behaviour	Personal & Work & Family	Personal, Work, Family & Health & Behaviour
D. Family characteristics							
Marital Status (<i>Ref: Single</i>)							
Marital Status: Married				0.017 (0.011)		0.000 (0.011)	0.014 (0.011)
Marital Status: Common-law				0.033*** (0.012)		0.018 (0.012)	0.021* (0.012)
Marital Status: Widowed/Divorced/Separated				0.028* (0.015)		0.012 (0.015)	0.009 (0.015)
Children <5				-0.029*** (0.011)		-0.028*** (0.011)	-0.026** (0.011)
Children 6-11				-0.018* (0.010)		-0.010 (0.010)	-0.007 (0.010)
E. Health and Behaviour							
Self-assessed Health: poor or fair					0.062*** (0.017)		0.080*** (0.017)
Self-assessed mental health: poor or fair					0.150*** (0.019)		0.159*** (0.018)
No physical activities last week					0.004 (0.008)		0.008 (0.008)
Type of smoker: daily or occasionally					0.029*** (0.010)		0.033*** (0.010)
Type of drinker: regular					0.028*** (0.009)		0.009 (0.009)
Sense of belonging to community: weak or very weak					0.033*** (0.008)		0.032*** (0.008)
<i>Constant</i>	0.254*** (0.005)	-0.195*** (0.040)	-0.198*** (0.041)	-0.204*** (0.042)	-0.254*** (0.041)	-0.216*** (0.042)	-0.240*** (0.043)
R ²	0.005	0.022	0.057	0.023	0.032	0.058	0.069
Observations	42,388	42,388	42,388	42,388	42,388	42,388	42,388
Test coefficient <i>Quebec = Ontario</i>	17.94 (0.000)	0.09 (0.7658)	0.75 (0.388)	0.14 (0.709)	0.54 (0.465)	0.58 (0.447)	0.25 (0.619)

Note: Weighted data are used. Robust standard errors in brackets. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

F test was used with Prob > F in brackets for test coefficient *Quebec = Ontario*.

Table 3: Linear Probability Model Regression Results of having high work stress, by region

Variables	Quebec	Ontario	Rest of Canada
A. Personal Characteristics			
Female	0.103*** (0.015)	0.090*** (0.014)	0.078*** (0.010)
Age	0.012*** (0.004)	0.001 (0.005)	0.003 (0.003)
Age squared	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)
Immigrant	-0.041 (0.033)	0.007 (0.021)	-0.015 (0.017)
Visible Minority	-0.014 (0.034)	0.002 (0.021)	0.025 (0.018)
<i>Education (Ref: Secondary school education)</i>			
Education attainment: Less than secondary school	-0.072*** (0.026)	-0.049* (0.027)	-0.010 (0.021)
Education attainment: Post-secondary/university degree	0.027 (0.019)	0.055*** (0.017)	0.041*** (0.011)
<i>Language (Ref: English with or without another language)</i>			
Language use: French or English and French	0.062** (0.028)	0.034 (0.030)	0.055** (0.025)
Language use: Neither English nor French	0.036 (0.052)	0.036 (0.035)	-0.043* (0.023)
B. Work Characteristics			
Total usual work hours per week	0.005*** (0.001)	0.006*** (0.001)	0.004*** (0.000)
Personal income (in thousand)	0.002*** (0.000)	0.001*** (0.000)	0.001*** (0.000)

Variables	Quebec	Ontario	Rest of Canada
C. Family characteristics			
<i>Marital Status (Ref: Single)</i>			
Marital Status: Married	-0.013 (0.021)	0.013 (0.021)	0.036*** (0.013)
Marital Status: Common-law	-0.017 (0.019)	0.057** (0.027)	0.017 (0.016)
Marital Status: Windowed/Divorced/Separated	0.038 (0.030)	-0.032 (0.027)	0.038** (0.018)
Children <5	0.002 (0.021)	-0.046** (0.021)	-0.025* (0.014)
Children 6-11	-0.026 (0.020)	-0.003 (0.019)	-0.002 (0.013)
D. Health and Behaviour			
Self-assessed Health: poor or fair	0.059 (0.038)	0.066** (0.030)	0.099*** (0.024)
Self-assessed mental health: poor or fair	0.223*** (0.043)	0.096*** (0.031)	0.185*** (0.023)
No physical activities last week	-0.012 (0.015)	0.036** (0.015)	-0.006 (0.010)
Type of smoker: daily or occasionally	0.055*** (0.017)	0.034* (0.019)	0.019 (0.012)
Type of drinker: regular	0.014 (0.018)	0.003 (0.016)	0.008 (0.011)
Sense of belonging to community: weak or very weak	0.043*** (0.014)	0.024 (0.016)	0.027*** (0.011)
<i>Constant</i>	-0.339*** (0.083)	-0.173** (0.083)	-0.171*** (0.054)
R ²	0.090	0.069	0.061
Observations	9,681	12,520	20,187

Note: Weighted data are used. Robust standard errors in brackets. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 4: Oaxaca Decomposition of the difference in probability of having high work stress between individuals who live in Quebec, Ontario and the rest of Canada, by characteristics

	Quebec and Ontario	Quebec and the rest of Canada
Individuals in Quebec with high work stress	0.334*** (0.007)	0.334*** (0.007)
Individuals in Ontario with high work stress	0.290*** (0.007)	
Individuals in the rest of Canada with high work stress		0.254*** (0.005)
Difference	0.044*** (0.010)	0.079*** (0.009)
Total Explained	0.041* (0.022)	0.028 (0.023)
Total Unexplained	0.003 (0.024)	0.051** (0.025)
<i>Explained Part</i>		
Personal	0.058*** (0.022)	0.056** (0.023)
Work	-0.022*** (0.003)	-0.031*** (0.003)
Family	-0.001 (0.004)	-0.001 (0.004)
Health and Behaviour	0.005* (0.003)	0.003 (0.003)
<i>Unexplained Part</i>		
Personal	0.167 (0.124)	0.137 (0.102)
Work	0.011 (0.037)	0.100*** (0.033)
Family	-0.012 (0.019)	-0.031* (0.016)
Health and Behaviour	0.004 (0.022)	0.013 (0.018)
<i>Constant</i>	-0.166 (0.117)	-0.168* (0.099)

Note: Weighted data are used. Robust standard errors in brackets. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.