Socioeconomic Happiness Inequalities in Canada (2012)

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CONTENTS

Abstract

In recent years more attention has been paid to happiness, that is, the satisfaction to life. Economists are interested in analyzing how the average and dispersion of happiness change across the socioeconomic line, thus find out which levels of socioeconomic characteristics have the lowest happiness inequality. By doing this, a social planner could intervene to affect socioeconomic characteristics to alleviate happiness inequality and improve the overall happiness in a society. In this paper, we present a methodology for evaluating happiness average and inequality based on Canadian residence across 11 regions (i.e. the 10 provinces and 1 territory aggregation) and analysis of the relationship between happiness average and inequality and different levels of a consistent set of socioeconomic characteristics. The data is from Canadian Community Health Survey of 2012 and seems to find that high average level of happiness is consistent with high level of socioeconomic factors. However, there is no clear dominate pattern exists in socioeconomic happiness inequality.

1. Introduction

The most critical question I consider in this paper is whether happiness is distributed equally in the population, or do people with different socioeconomic characteristics obtain an unequal amount of happiness? If happiness inequality exists, which levels of socioeconomic characteristics have the smallest happiness inequality? The answer of this question should be explored since it provides the basic evidence for improving social welfare. There are separate literatures dealing with two topics. First, there is a literature on health inequality which has proposed methods to compare distributions of categorical variables that applied to happiness. Second, there is a strand of the literature dealing with the overall level of life satisfaction and determinants of happiness for Canada. But there is no literature on inequality in the distribution of happiness in Canada. Therefore, this paper aims to fill this research gap in the literature.

The concept of 'happiness' has different meanings for different people. In this paper, we use the official definition of 'happiness': "a state of well-being, contentment and a pleasurable or satisfying experience" [1]. We regard life satisfaction, utility or subjective well-being as happiness, since life satisfaction is the overall feeling about our lives.

Many kinds of health and socioeconomic factors have an impact on life

[1] Source from Merriam-Webster dictionary

satisfaction, such as physical and mental health, employment, income, education, language, and so on. Intuitively, individuals who have excellent health, high income, and decent jobs are more likely to feel happy and have higher level of life satisfaction. This paper will use data for 2012 from the Canadian Community Health Survey (CCHS) to see if this intuitive belief is supported by empirical evidence. Will high income, good health and a decent job bring a corresponding high level of life satisfaction? Analysis to answer this question will focus on the differences in averages. In addition, I will also look at deviations of all categories of every socioeconomic characteristic to assess happiness inequality.

The paper is organized as follows. Second 2 is a literature review. Section 3 focuses on explaining the problem with mean-based approach and defining a better method to calculate average life satisfaction and deviation. Section 4 is an empirical illustration to compare means and deviations of happiness across regions in Canada and socioeconomic characteristics. The result of socioeconomic happiness inequality is obtained. Section 5 provides conclusions from the research.

2. Literature Review

First part of literature review focus on the development of the basic concept of happiness and data used for the study of Canadian happiness, almost all researchers defined subjective well-being (SWB) as the happiness. The second part is about methods that address the arbitrariness of mean obtained from

rescaling exists under the condition of categorical variables. The final part explains the socioeconomic determinants of happiness and the lack of research involving socioeconomic happiness inequality in Canada.

Happiness is always treated as a heated topic from year to year. The earliest analyst to study happiness is thought to be Aristotle, who indicates that happiness is complete and sufficient good and originates from virtue (The Nicomachean Ethics of Aristotle, source). With the development of the happiness study of more people began to regard happiness as a measurable quoting. Some individuals believe what accumulating wealth brings them the highest happiness; others believe that happiness comes from personal accomplishment. Happiness had been specified as materials and feelings.

In recent years, many researchers put forward new definitions of happiness, and they have tend to use subjective well-being or life satisfaction to represent happiness. Helliwell (2002) indicates that well-being is supposed to defined by the individual's subjective well-being, and used large international samples of data combining individual with societal variables to permit individual-level and societal-level determinants of well-being simultaneously. Diener et al.(2009) also used the concept of subjective well-being (SWB) to analyze factors that predict SWB in 55 nations and explored other factors that impact on SWB. Furthermore, Deaton & Kahneman (2010) separated SWB into two aspects, life

evaluation and emotional well-being.

Sharpe et al. (2011) distinguished the different meanings of subjective and objective well-being, which depends on the perspective from which lives are being evaluated. Objective well-being is more related to the ideal rather than personal, since it is based on some norms. In contrast, subjective well-being focuses on people's preferences, interests and feelings. Finally, they believe subjective well-being is a more personalized assessment because, it captures both beneficial and adverse life experiences.

Helliwell and Barrington-Leigh (2010) also pay attention to the measurement of SWB and separate measures into three main categories；life evaluation, positive emotions，and negative emotions. They used the SWB data to do international comparisons and arrived at the conclusion that SWB gap was mainly generated by income inequality between richest and poorest countries. In addition, doing research based on cross-province comparisons within Canada leads to a different result, namely that the relationship between average incomes and average life satisfaction is negative.

As the most significant researchers in study of happiness, Clark, Frijters and Shields (2008) put forward the idea that the relative income terms in the utility

function could explain the coexistence of well-known Easterlin paradox[1] and the finding of positive correlations between individual income and SWB obtained from a micro literature. Relative income includes income relative to himself/herself in the past (habituation) or to other individuals (comparison). Similarly, Luis Angeles (2010) points out two findings to explain the well-known Easterlin paradox by using a panel of British households. The first one is social comparison; the proportional increase of all income in economy will not change the average happiness. The second is the adaptation to the arguments of the utility function. Consequently, the existence of adaptation effects is supported by much more evidence, but there is little evidence in favor of social comparison.

Next, another vital question is what data should be applied if we plan to measure happiness in Canada? Most researchers apply Statistics Canada's General Social Survey (GSS) and the Canadian Community Health Survey (CCHS). Bonikowska et al. (2013) used the GSS and the CCHS to examine the stability of life satisfaction and their correlations from year to year within a consistent analytical framework. Barrington-Leigh (2013) focused only on the GSS cycles. The GSS, which began in 1985, aims to monitor alterations in the well-being and living conditions of Canadians over time. Sharpe et al. (2011) use micro-data from CCHS for 2007 and 2008 to ascertain whether people living in some certain

[1]Easterlin Paradox is named for the economist and USC professor Richard Easterlin, who did research about factors contributing to happiness in 1974. According to the University of Kent, the paradox means, "high income is related to happiness, but in the long term, increased happiness doesn't correlate with increased income".

regions of Canada experience higher levels of life satisfaction, and if so why.

Many papers referred to happiness inequality have the problem that the arbitrariness of mean obtained from rescaling exists under the condition of categorical variables. Sharpe et al. (2011) present a cross-sectional comparison of average happiness in Canada at three levels of geography – provincial, CMA, and Health Region (HR). However, the average is a problematic statistic with categorical data. Similarly, Allison and Foster (2004) cast doubt on the use of standard inequality measures, since the ranking of two distributions by the average may be dependent of scale. In order to address this problem, they developed and proved a Theorem that uses CDF to compare the averages of health distributions first, and then proposed a stochastic dominance approach to identify robust rankings of health distributions. However, they neglected to discuss the socioeconomic dimensions of health inequality.

Many papers focus on the socioeconomic happiness inequality, but relatively few deal with papers health inequality. Becchetti, Massari and Naticchioni (2013) point out that happiness inequality is mainly driven by composition effects instead of coefficient effects. Increasing of attainment education and the increase in average income would contribute to a decrease in happiness inequality. However, increase in unemployment would lead to an increase in happiness inequality. In addition, there is no evident relationship between income

inequality and happiness inequality. The data are based on the German Socio-Economic Panel (GSOEP). Stevenson and Wolfers (2008) explored the evolution of the mean and the dispersion of self-reported happiness across socioeconomic and demographic lines from 1972 to 2006 in United States. They found that the aggregate level of happiness did not change that much, but the happiness inequality had fallen substantially, especially with respect to the whit-black and gender gap.

Focusing on the life satisfaction in Canada, Sharpe and Capeluck (2012) offer an overview of trends in life satisfaction in Canada from 2003 to 2011 based on the data drawn from Statistics Canada's Canadian Community Health Survey (CCHS). They found that between 2003 and 2011, and the percentage of the population belonging to the category of those individuals satisfied or very satisfied with life increased a small but statistically significant 1.0-percentage points from 91.3 to 92.3. However, no happiness inequality was mentioned in this paper.

Sharpe et al. (2011) pay attention to the reason why people living in certain regions in Canada experience higher levels of life satisfaction. Some statistically significant determinants of happiness were chosen and they made a conclusion that the sense of belonging to local communities is the most important factor that lead to the geographical variations in happiness in Canada. However, no socioeconomic happiness inequality referred although they explored enough

socioeconomic characteristics that impact on happiness.

Thus, the main purpose for this paper is to combine health inequality and socioeconomic determinants of happiness together in order to do research on socioeconomic happiness inequality of Canada in 2012.

3. Basic theorems

3.1 Problems with mean-based approach of two distributions

The average is always regarded as the most significant indicator to measure across a population a quantity such as the aggregate level of life satisfaction. There are many different methods to calculate the average. The well-known mean-based approach applies the followed equation:

$$\mu = \sum_{i=1}^{s} Pi * C(i) \qquad (1),$$

where μ represents the mean life satisfaction, $C(i)$ represents the numerical value of category i for scale C, Pi represents the population share of category i, and s is the total number of categories. For example, let there be 5 categories for a scale representing life satisfaction where $C(i)$ = [1,2,3,4,5] represents "VERY DISSATISFIED (1), DISSATISFIED (2), NEITHER SATISFIED NOR DISSATISFIED (3), SATISFIED (4), VERY SATISFIED (5)". This scale is applied to individuals residing in QUEBEC and MANITOBA, for example, each of which has a distribution. Thirty-nine percent of the Quebec population is in the fifth category，

which is “VERY SATISFIED”, as showed in Table 3.1.1.

Table 3.1.1. The Proportion of category satisfaction to population in QUEBEC and MANITOBA in Canada, 2012

Category of scale	Category of Satisfaction	QUEBEC	MANITOBA
5	VERY SATISFIED	0.39	0.40
4	SATISFIED	0.54	0.50
3	NEITHER NOR	0.05	0.07
2	DISSATISFIED	0.01	0.02
1	VERY DISSATISFIED	0.01	0.01

The mean of the QUEBEC life satisfaction distribution (μ_Q) is 4.31, and the mean of the MANITOBA distribution (μ_M) is 4.28. Obviously, $\mu_Q > \mu_M$ where the mean life satisfaction of QUEBEC is higher than the mean life satisfaction of MANITOBA.

However, If we change the scale C_A = [1,2,3,4,5] to C_B = [1,2,3,4,10], which only changes the value of the category VERY SATISFIED and the distributions are not otherwise altered. μ_Q will be equal to 6.26 and μ_M will become 6.30. In this case, $\mu_Q < \mu_M$. Table 3.1.2 shows different averages under different scales.

Table 3.1.2 Averages life satisfaction in QUEBEC and MANITOBA under two different scales in Canada, 2012

	μ Q	μ M
Mean under C_A	4.31	4.28
Mean under C_B	6.26	6.30

The problem is that the relative ordering under A and B depend on the scale, and mean-ordering is sensitive to the alteration of scale. Therefore, such a mean-based approach seems less reasonable because we have no idea about how to decide the fixed value of every category. So another effective method should be introduced to compare averages across different distributions.

3.2 A CDF-based approach to compare two distributions

The cumulative distribution function (CDF) of a random variable is defined as:

$$F(i) = \sum_{j=1}^{i} Pj \qquad (2)$$

where Pj represents the population share of category j, and the rank of category i is not less than the rank of category j.

Definition 1 One distribution, A, first order dominates another distribution, B, if and only if the probability value of cumulative distribution of A is less than the probability value of cumulative distribution of B for every category i.

Theorem 1 (based on Allison and Foster (2004)). $\mu_A \geqslant \mu_B$ for all possible increasing numerical scales that one can apply on the categories if and only if $F_B(i) \geqslant F_A(i)$ for all i.

As scale does not play a role, the arbitrariness problem is avoided. We just need to consider the value of CDF for every category and compare them respectively between two distributions. The result of larger average would be obtained if and only if there is a higher value of the CDF for all categories.

Consider a situation where the fraction of total population in the lowest category (VERY DISSATISFIED) of distribution A is less than the faction of the same category of distribution B, and the same situation occurs for the lowest two categories, and the lowest three categories, etc. This means the CDF of distribution A is smaller (or not higher) than the CDF of distribution B for every category. In this case, many more people will be in the highest category (VERY SATISFIED) for distribution A. Then the intuitive result is that the average level of life satisfaction of distribution A is higher than that of distribution B. Therefore, the CDF-based approach is more precise than the mean-based approach.

3.3 A median-based approach to compare deviation

Paying attention to the dispersion is another key step to judge whether the

distribution is good or not. Recalling the problem that the mean is sensitive to scaling, another practical approach to calculate the deviation from average needs to be found. Since average could not be regarded as the reference point anymore, the first step is to find a suitable reference point, which is supposed to be independent of scale because using fixed categories of scale may lead to the opposite result with reality. In this case, using median as the reference point is a better idea.

The median is the numerical value separating the higher half of a data sample, a population, or a probability distribution, from the lower half[1]. In a cardinal and continuous setting, the median is the numerical value separating the higher half of the distribution from its lower half. In a categorical context, the median is the category such that half of the population has a satisfaction level higher than or equal to this category. Assume that we have the following distribution (very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied, very satisfied)… there are 2 individuals in each category and the 3 following numerical scales: (1,2,3,4,5), (1,10,11,12,13) and (1,2,3,4,10). The mean of the distribution is 3 under the first numerical scale, 9.4 under the second, and 4 under the last scale. In the first case, the mean of the distribution is associated with a "neither satisfied nor dissatisfied" category. In the second case, it is between the "very dissatisfied" and "dissatisfied" categories, and in the last case

[1] Definition From Wikipedia

it is associated with the “satisfied" category. Deviation from the average is not a meaningful statistic in this case, since we do not know which category we are deviating from. However, the median category always stays the same for all numerical scales since its identification is independent of the numerical scale. This implies that, in the context of categorical variables, taking of deviation from the median makes more sense.

Table 3.3.1 Cumulative Distributions of Satisfaction in QUEBEC and MANITOBA in Canada, 2012

Level of scale	Category of Satisfaction	QUEBEC	MANITOBA
5	VERY SATISFIED	1	1
4	SATISFIED	0.61	0.60
3	NEITHER NOR	0.06	0.09
2	DISSATISFIED	0.02	0.03
1	VERY DISSATISFIED	0.01	0.01

We also would like to take QUEBEC and MANITOBA for example. The data in Table 3.3.1 is the cumulative distribution of life satisfaction. Notice that 4 is the median is of both distributions regardless of the scale. A comparison of deviation is based on the condition that two distributions have the same median. So it is meaningful to compare deviations of the life satisfaction distributions for QUEBEC and MANITOBA based on the median approach, since we will compare deviation from the same category. We use “average deviation around the median” represented as $E(|x\text{-median}|)$ to measure dispersion. However, its numerical

value may be contingent on the choice of the numerical scale. In this context, it may be useful to identify orderings that remain robust under any increasing numerical scale.

Theorem 2. Inequality and Deviation in Distributions (Makdissi and Yazbeck, 2014) Given any two life satisfaction distributions, if the median category is 4, we say the deviation of A is larger than deviation of B for any numerical scale if and only if

$$\begin{cases} F_A(j) \geq F_B(j) \;\; j = 1,2,3 \\ \text{and} \\ P_A(5) \geq P_B(5) \end{cases}$$

In theory, the identification of the distribution with the higher level of happiness among two distributions should be an arbitrage between having a higher average and a smaller deviation. This implies that if distribution A has a higher average and a smaller deviation than distribution B, then it will be deemed better by any analyst, since there is no arbitrage to consider in such a case.

4. Empirical illustration

There are two main components to this section. First, we compare the average life satisfaction for 11 regions of Canada in 2012. The second is to choose eight

(8) relatively significant socioeconomic characteristics. In this paper I select: 1) mental and physical health, 2) physical activity, 3) income, 4) education, 5) marital status, 6) language, 7) employment, and 8) gender to measure which of these characteristics is associated with the least life satisfaction inequality. Meanwhile, for every socioeconomic determinant, like language, there are four categories, ENGLISH ONLY, FRENCH ONLY, BOTH FRENCH AND ENGLISH, NEITHER FRENCH NOR ENGLISH. For each category, five levels of happiness have been defined. In this case, we would like to focus on comparing happiness inequality of these four distributions in order to find which distribution has the lowest happiness inequality. The theorem and methodology are similar to those employed in previous research of health inequality. I apply them to the empirical research on Canadian happiness data in 2012.

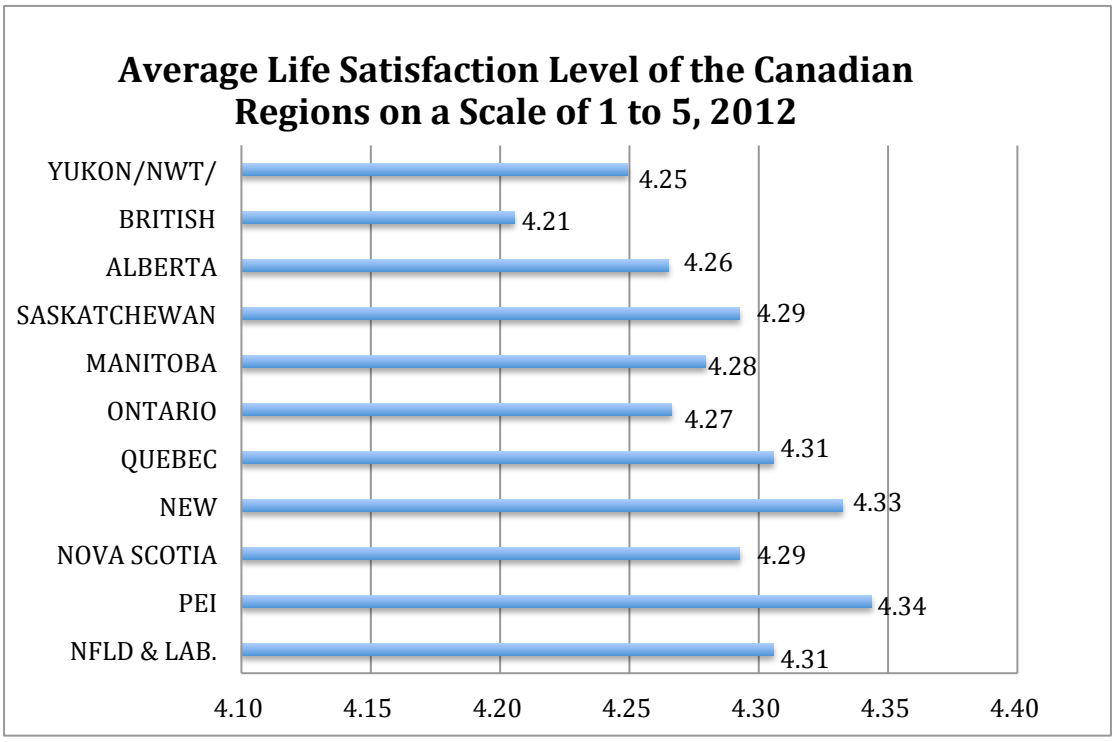
4.1 Data

As for the micro-level data, it is drawn from the Canadian Community Health Survey (CCHS) for 2012. The CCHS data are always collected from people aged 12 and older who live in private dwellings in all provinces and territories. Excluded from the sampling frame are individuals living on Indian Reserves and Crown Lands, institutionalized residents, full-time members of the Canadian Forces, and residents of certain remote regions. The CCHS data set covers approximately 98% of the Canadian population aged 12 and over.

4.2 Geographical Variation in Happiness across 11 regions

There are ten provinces in Canada and three territories. The three territories, Yukon, Nunavut and Northwester Territories, are pooled together to form one region in this paper. Comparing happiness status of 11 regions constitutes preliminary research as it motivates researchers to explore the reasons deeply. First, averages according to mean-based approach are obtained.

Graph 4.2.1 Average Life Satisfaction Level of the Canadian Regions on a Scale of 1 to 5, 2012



The result of Graph 4.2.1 from the method of choosing "1-5" categories and using equation $\mu = \sum_{i=1}^{s} Pi * C(i)$ to calculate the value of the average life satisfaction index. It is appear that the value of the average life satisfaction of all regions is situated between category 4 (SATISFIED) and category 5 (VERY SATISFIED) in

2012. The overall level of life satisfaction is relatively favorable. Prince Edward Island has the highest level of life satisfaction (4.34), followed by New Brunswick (4.33). The province which exhibits the lowest level of life satisfaction is British Columbia (4.21).

Applying the approach contained in Theorem 1, we could compare the cumulative distribution of life satisfaction for every category, and the results are as followed.

Table 4.2.2 Comparison of Average Life Satisfaction of the Canadian Regions, 2012

Row to	NFLD &	PEI	NOVA	NEW	QUEBEC	ONTARIO	MANITOB	SASKATCH	ALBERTA	BRITISH	YUKON/N
NFLD &	/	ND	ND	ND	ND	ND	–	ND	ND	–	–
PEI		/	–	ND	–	–	–	ND	–	–	–
NOVA			/	+	+	ND	ND	ND	–	ND	ND
NEW				/	ND	–	–	ND	–	–	–
QUEBEC					/	–	ND	ND	–	–	ND
ONTARIO						/	ND	ND	ND	–	ND
MANITOB							/	ND	ND	–	–
SASKATCH								/	ND	–	–
ALBERTA									/	ND	ND
BRITISH										/	ND
YUKON/N											/

Notes: "+" means the average satisfaction of one region (row) is larger than average satisfaction of another region (column). "-" means the average satisfaction of one region (row) is smaller than average satisfaction of another region (column). "ND" means not determined.

There are many undetermined comparison between regions and I could not identify which region has the highest value of average life satisfaction and which regions the lowest values of average life satisfaction. The dominated relationships are showed in Table 4.2.2. Taking the region of PEI for example, the region which exhibit higher average happiness between PEI and NFLD & LAB cannot be determined. The same situation occurs for the comparison between PEI and ALBERTA. However, the certain result that the average level of happiness of PEI is larger than other regions excluding from NFLD & LAB and ALBERTA is showed in Table 4.2.2. The rest of the table can be interpreted in the same way.

Table 4.2.3 Comparison of Deviations of Life Satisfaction over Canadian Regions, 2012

Row to	NFLD &	PEI	NOVA	NEW	QUEBEC	ONTARIO	MANITOB	SASKATCH	ALBERTA	BRITISH	YUKON/N
NFLD &	/	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEI		/	ND	–	ND	ND	ND	ND	ND	ND	ND
NOVA			/	ND	ND	ND	ND	ND	ND	ND	–
NEW				/	ND	ND	ND	ND	ND	ND	ND
QUEBEC					/	ND	–	ND	ND	ND	–
ONTARIO						/	ND	ND	ND	ND	–
MANITOB							/	+	ND	ND	ND
SASKATCH								/	ND	ND	ND
ALBERTA									/	ND	–
BRITISH										/	–

Note: "+" means the deviation of category (row) is less than the deviation of category (column). "-" means the deviation of category (row) is larger than the deviation of category (column). "ND" means not determined.

Table 4.2.3 reveals the deviation of the life satisfaction index across Canadian Regions. The ranking of most of the deviation comparisons cannot be determined. However, compared with Table 4.2.2, some conclusions can be reached, For example, we cannot determine the comparison of average between NEW BRUNSWICK and PEI in Table 4.2.2, but PEI dominates New Brunswick under the condition of deviation. The same situation occurs with respect to the comparison between NOVA SCOTIA and YUKON/NWT/NUNA, MANITOBA and SASKATCHEWAN, MANITOBA and SASKATCHEWAN. But I cannot find a distribution that exhibits both a larger average and a lower deviation.

4.3 Happiness inequality within socioeconomic characteristics

There are many different kinds of socioeconomic characteristics affect one's happiness in lifetime, such as physical and mental health, physical activity, income, education, marital status and so forth. At first glance we judge the relationship between socioeconomic characteristic and life satisfaction by relying on intuition. However, real data need to be taken into consideration, since intuition may fail to explain the true situation.

In order to analyze life satisfaction inequality more systematically, CCHS categorized every socioeconomic characteristic according to its different levels. It is meaningful to compare deviations between different levels of one socioeconomic characteristic, since it offers the social welfare policymaker useful evidence.

4.3.1 Physical health and Mental Health

Health status is probably the most important attribute for individuals, and is always categorized into two aspects, physical health and mental health. Physical health includes everything from physical fitness to overall well-being. People who have lower levels of injury or disease are more likely to enjoy life since they feel comfortable at most of the time and do not suffer much pain. So most researchers claim that happiness, life satisfaction, and other positive psychological attributes are closely associated with good health.

Mental health status is the psychological state of someone who is functioning at a satisfactory level of emotional and behavioral adjustment[1]. It plays an increasingly significant role in daily life. Less negative emotion or the ability of regulate emotion immediately will bring people a deep sense of happiness and well-being. The following data pertain to the average level of life satisfaction of all categories of physical health and mental health.

[1] Source from "http://dictionary.reference.com/browse/mental+health"

Table 4.3.1.1 Average level of Life Satisfaction at Different Levels of Health and Mental Health Status in Canada, 2012

	Physical health		Mental Health	
	Average level of Life Satisfaction	share of Population	Average level of Life Satisfaction	share of Population
POOR	3.05	0.02	2.78	0.01
FAIR	3.77	0.08	3.54	0.05
GOOD	4.16	0.29	4.03	0.22
VERY GOOD	4.37	0.40	4.31	0.38
EXCELLENT	4.57	0.21	4.54	0.34

From Table 4.3.1.1, we could find the average level of life satisfaction of people who have poor, fair, good, very good, excellent physical health are respectively 3.05, 3.77, 4.16, 4.37, 4.57. Obviously, the increasing value of the mean is consistent with having a better state of physical health, which indicates the positive relationship between life satisfaction and physical health.

As for mental health, the average life satisfactions of people who have poor, fair, good, very good, excellent mental health are respectively 2.78, 3.54, 4.03, 4.31, 4.54. Better mental heath helps people attain higher level of life satisfaction, which is also consistent with our intuition.

In order to omit the effect of arbitrariness, the result could be acquired according to Theorem 1.

Table 4.3.1.2 Comparison of average level of life Satisfaction at Different Levels of Physical Health (same as Mental Health) in Canada, 2012

Row to Column	POOR	FAIR	GOOD	VERY GOOD	EXCELLENT
POOR	/				
FAIR	＋	/			
GOOD	＋	＋	/		
VERY GOOD	＋	＋	＋	/	
EXCELLENT	＋	＋	＋	ND	/

Note: "+" means the average level of life satisfaction of category (row) is larger than the average level of life satisfaction of category (column). "-" means the average level of life satisfaction of category (row) is less than the average level of life satisfaction of category (column). "ND" means not determined.

Table 4.3.1.2 indicates that when focus is on the average level of life satisfaction, the following relationship can be obtained.

POOR≤ FAIR≤ GOOD≤ VERY GOOD ≤EXCELLENT

Based on the CDF for heath status, we could find medians of different categories are not same. The median of level POOR is 3, and the median of level FAIR, GOOD, VERY GOOD is 4. But the median of level EXCELLENT is 5. Maybe it is owing to the special attribute of health. Most people regard health as the most important attribute, when the status of health reaches a higher level, their levels of satisfactions will tend to increase more than one level. In this case, we resort to comparing deviations of FAIR, GOOD, VERY GOOD, which have the same medians.

Table 4.3.1.3 Comparison of Deviations at Different Levels of Physical Health (same as Mental Health) in Canada, 2012

Row to Column	FAIR	GOOD	VERY GOOD
FAIR	/		
GOOD	ND	/	
VERY GOOD	ND	ND	/

Note: "+" means the deviation of category (row) is less than the deviation of category (column). "-" means the deviation of category (row) is larger than the deviation of category (column). "ND" means not determined.

After calculating according to the statistic of Theorem 2, the comparison among the health statistic of FAIR, GOOD and VERY GOOD cannot be determined. We

have no basis to judge which level of Physical Health exhibits the largest or lowest deviation from median. The results pertaining to the deviation are not consistent the result of derived from the average.

Turning to mental health status, the same situation occurs. The median of level POOR is 3, the median for level of FAIR, GOOD and VERY GOOD is 4 , and the median for level of EXCELLENT is 5. Since average satisfactions at 5 levels and the comparison of deviation are the same as physical health, so the same result could be obtained for mental health status.

4.3.2 Physical Activity

Intuitively, engaging in exercise frequently enables people to feel active and bring energy to pursue their goals. Furthermore, participating in sports often helps people avoid some diseases and keep healthy. Here physical activity is categorized into three levels, REGULAR, OCCASIONAL AND INFREQUENT. Results below pertain to average level of life satisfactions for different levels of physical activity.

Table 4.3.2.1 Average Life Satisfaction by Level of Physical Activity in Canada, 2012

Level of Physical Activity	Average Life Satisfaction	% of Population
REGULAR	4.33	0.68
OCCASIONAL	4.25	0.15
INFREQUENT	4.07	0.17

From the table, we could find the average level of life satisfaction of people who engage in physical activity regularly, occasionally, and infrequently are respectively 4.33, 4.25, 4.07. It seems that taking regular exercise increases the level of life satisfaction. Due to the problem of arbitrariness that is inherent with the average approach. In this case, I also need calculate the cumulative distribution.

Table 4.3.2.2 Comparison of average for 3 level of physical activity in Canada, 2012

Row to Column	REGULAR	OCCASIONAL	INFREQUENT
REGULAR	/		
OCCASIONAL	—	/	
INFREQUENT	—	—	/

Note: "+" means the average level of life satisfaction of category (row) is larger than the average level of life satisfaction of category (column). "-" means the average level of life satisfaction of category (row) is less than the average level of life satisfaction of category (column). "ND" means not determined.

Table 4.3.2.2 indicates that the largest level of average life satisfaction lies is found in the distribution of REGULAR, and the distribution that has the second largest average life satisfaction is for the occasional exercises. The distribution of INFREQUENT has the lowest level of average life satisfaction.

Focusing on deviation, the result are as followed. Since the four levels of physical activity have the same value of the median 4, it is feasible to compare deviations with each other.

Table 4.3.2.3 Comparison of deviation for the three level of Physical Activity in Canada, 2012

Row to Column	REGULAR	OCCASIONAL	INFREQUENT
REGULAR	/		
OCCASIONAL	ND	/	
INFREQUENT	ND	ND	/

Note: "+" means the level of deviation of category (row) is less than the level of deviation of category (column). "-" means the level of deviation of category (row) is larger than the level of deviation of category (column). "ND" means not determined.

The comparison of deviations for levels of Physical Activity cannot be obtained easily, as the results reveal no clear dominance patterns from Table 4.3.2.3 according to Theorem2.

4.3.3 Income

Considering that income supports our basic needs like food, house, transportation, energy and so on, income should be another critical factor to affect happiness. It seems that individuals who earn higher incomes are supposed to attain greater levels of happiness. I appeal to data to find the true relationship between income and life satisfaction. Here household income is categorized into ten deciles. DECILE 1 represents the lowest income group, and DECILE 10 represents the highest income group

Table 4.3.3.1 Average Life Satisfaction at different level of Household Income in Canada, 2012

Household Income level	Average level of life satisfaction	Share of Population
DECILE 1	4.04	0.099
DECILE 2	4.10	0.099
DECILE 3	4.19	0.100
DECILE 4	4.24	0.098
DECILE 5	4.28	0.099
DECILE 6	4.32	0.103
DECILE 7	4.33	0.101
DECILE 8	4.36	0.098
DECILE 9	4.39	0.100
DECILE 10	4.45	0.101

Table 4.3.3.1 shows the positive monotonic relationship between household income and the level of life satisfaction. The lowest level of average life satisfaction (4.04) realized by DECILE 1, and DECILE 10 exhibits the highest level of average life satisfaction (4.45). The gap between the lowest and highest average life satisfaction is 0.41. The value of the average life satisfactions of these 10 DECILES are all between the level of SATISFIED and the level of VERY SATISFIED. Next Table 5.3.2 shows the comparison of values of the average life satisfaction for all ten deciles of the income.

Table 4.3.3.2 Comparison of average level of life satisfaction for 10 Deciles of Household Income in Canada, 2012

Row to Column	DECILE 1	DECILE 2	DECILE 3	DECILE 4	DECILE 5	DECILE 6	DECILE 7	DECILE 8	DECILE 9	DECILE 10
DECILE 1	/									
DECILE 2	＋	/								
DECILE 3	＋	＋	/							
DECILE 4	＋	＋	＋	/						
DECILE 5	＋	＋	＋	ND	/					
DECILE 6	＋	＋	＋	＋	＋	/				
DECILE 7	＋	＋	＋	＋	＋	ND	/			
DECILE 8	＋	＋	＋	＋	＋	＋	＋	/		
DECILE 9	＋	＋	＋	ND	＋	ND	ND	ND	/	
DECILE 10	＋	＋	＋	＋	＋	＋	＋	ND	＋	/

Note: "+" means the average life satisfaction of category (row) is larger than the average life satisfaction of category (column). "-" means the average life satisfaction of category (row) is less than the average life satisfaction of category (column). "ND" means not determined.

According to Table 4.3.3.2, the lowest value of average life satisfaction is for DECILE 1; the remaining deciles levels of average happiness all are larger than DECILE 1's. This result can be explained by the fact that low-income status is often associated both with poor life evaluation and poor emotional well-being.

The second lowest value is for DECILE 2, and the third lowest value is for DECILE 3. However, the average level of life satisfaction of DECILE 4 cannot be assessed as the fourth lowest since the comparison between DECILE 4 and DECILE 5 is indeterminate, the same situation applies for DECILE 4 and DECILE 9.

In addition, DECILE 10 cannot be regarded as the group that exhibits the highest average life satisfaction, although DECILE 10 dominates DECILE 9. The reason for this result could be explained by Deaton, Angus & Kahneman, Daniel (2010) who explored the relationship between income and life evaluation and the relationship between income and emotional well-being. They assert that high income status improves the evaluation of life but not necessarily emotional well-being. We could find that DECILE 10 dominates all DECILES except for DECILE 8. Focus on DECILE 8, it dominates all DECILES that lower than itself but cannot be compared with DECILE 9 and DECILE 10. So the result is altered when the effect of rescaling is avoided.

Consider that medians of ten DECILES are all equal to 4 according to the CDF, therefore, it is meaningful to compare their deviations from the mean in order to find which DECILE posses the least inequality of happiness.

Table 4.3.3.3 Comparison of the deviations for 10 Deciles of Household Income in Canada, 2012

Row to Column	DECILE 1	DECILE 2	DECILE 3	DECILE 4	DECILE 5	DECILE 6	DECILE 7	DECILE 8	DECILE 9	DECILE 10
DECILE 1	/									
DECILE 2	ND	/								
DECILE 3	ND	ND	/							
DECILE 4	ND	ND	ND	/						
DECILE 5	ND	ND	ND	ND	/					
DECILE 6	ND	ND	ND	ND	ND	/				
DECILE 7	ND	ND	ND	ND	ND	ND	/			
DECILE 8	ND	ND	ND	ND	ND	ND	ND	/		
DECILE 9	ND	ND	ND	ND	ND	ND	ND	—	/	
DECILE 10	ND	ND	ND	ND	ND	ND	ND	ND	ND	/

Note: "+" means the deviation of category (row) is less than the deviation of category (column). "-" means the deviation of category (row) is larger than the deviation of category (column). "ND" means not determined.

From Table 4.3.3.3, no comparisons can be determined except for the comparison between DECILE 8 and DECILE 9. According to the tool laid out in Theorem 2, the deviation of DECILE 8 is lower than the deviation of DECILE 9.

However, the distribution for DECILE 8 is not lower than the distribution of DECILE 9 considering their unclear average pattern for average values.

4.3.4 Education

Science and technology are the primary for economic development human productive forces, which are accompanied by high levels of capital. In order to investigate the impact of education, the education indicator was categorized as 4 categories, less than secondary school graduate (represented as < SEC. SCHOOL GR), secondary school graduate (represented as SEC. SCHOOL. GR), some post-secondary education (represented as SOME POST-SEC ED) like college, and post-secondary certification (represented as POST-SEC CERT) such as university.

Table 4.3.4.1 Average level of Life Satisfaction by educational attainment in Canada, 2012

Education level	Average level of life satisfaction	Share of Population
< SEC. SCHOOL GR	4.29	0.19
SEC. SCHOOL. GR	4.28	0.17
SOME POST-SEC ED	4.27	0.06
POST-SEC CERT	4.33	0.57

People who obtain lower case exhibit the highest level of life satisfaction (4.33). The lowest level of life satisfaction is for the group SOME POST-SECONDARY

EDUCATION (4.27). The differences between LESS THAN SECONDARY SCHOOL GRADUATE, and SOME POST-SECONDARY EDUCATION are enormous. The table which follows shows averages which have not been adjusted for scale.

Table 4.3.4.2 Comparison of average for 4 levels of Education in Canada, 2012

Row to Column	< SEC. SCHOOL GR	SEC. SCHOOL. GR.	SOME POST-SEC ED	POST-SEC CERT
< SEC. SCHOOL GR	/			
SEC. SCHOOL. GR.	ND	/		
SOME POST-SEC ED	ND	ND	/	
POST-SEC CERT	ND	＋	＋	/

Note: "+" means the average level of life satisfaction of category (row) is larger than the average level of life satisfaction of category (column). "-" means the average level of life satisfaction of category (row) is less than the average level of life satisfaction of category (column). "ND" means not determined.

Table 4.3.4.2 shows that the mean level of life satisfaction of the group of POST-SECONDARY CERTIFICATION is larger than the average level of life satisfaction of the group of SECONDARY SCHOOL GRADUATE and the group of SOME POST-SECONDARY EDUCATION. Other comparisons cannot be determined. Since the medians of the four levels are all 4, so deviation of every level can be compared with each other.

Table 4.3.4.3 Comparison of deviations for four levels of Education in Canada, 2012

Row to Column	< SEC. SCHOOL GR	SEC. SCHOOL. GR.	SOME POST-SEC ED	POST-SEC CERT
< SEC. SCHOOL GR	/			
SEC. SCHOOL. GR.	＋	/		
SOME POST-SEC ED	＋	ND	/	
POST-SEC CERT	＋	ND	ND	/

Note: "+" means the deviation of category (row) is less than the deviation of category (column). "-" means the deviation of category (row) is larger than the deviation of category (column). "ND" means not determined.

Table 4.3.4.3 indicates the results for the deviations, which shows that the life satisfaction dispersion for the group of < SEC. SCHOOL GR is larger than all other 3 categories.

However, which distribution is better cannot be determined by Table 4.3.4.2 and Table 4.3.4.3 since no larger average also has a lower deviation.

4.3.5 Marital Status

Life satisfaction definitely is influenced by close personal relationship, especially through affecting mental health. In order to investigate the impact of the marital

status indicator, it is categorized into 4 levels, MARRIED, COMMON-LAW, WIDOW/SEPERATE/DIVORCED and SINGLE/NEVER MAR according to CCHS.

Table 4.3.5.1 Average Life Satisfaction By Marital Status in Canada, 2012

Marital Status level	Average level of Life Satisfaction	Share of Population
MARRIED	4.32	0.47
COMMON-LAW	4.34	0.11
WIDOW/SEP/DIV	4.10	0.12
SINGLE/NEVER MAR	4.24	0.30

Table 4.3.5.1 shows that people in the COMMON-LAW group have the highest average level of life satisfaction (4.34). The second highest one (4.32) is exhibited for lower case. The gap between the values of these two categories is not very obvious. However, the category that has the lowest level of average life satisfaction is WIDOW/SEP/DIV. The average level of life satisfaction of SINGLE/NEVER MAR is 4.24. Not that the value of average level of life satisfactions are above the level of SATISFIED for all groups.

Table 4.3.5.2 Comparisons of the average level of satisfaction for the four levels of Marital Status in Canada, 2012

Row to Column	MARRIED	COMMON-LAW	WIDOW/SEP/DIV	SINGLE/NEVER MAR
MARRIED	/			
COMMON-LAW	ND	/		
WIDOW/SEP/DIV	－	－	/	
SINGLE/NEVER MAR	－	－	＋	/

Note: "+" means the average life satisfaction of category (row) is larger than the average life satisfaction of category (column). "-" means the average life satisfaction of category (row) is less than the average life satisfaction of category (column). "ND" means not determined.

According to the result listed in Table 4.3.5.2, the average value of life satisfactions of MARRIED group and COMMON-LAW group are all larger than the value of WIDOW/SEP/DIV group and SINGLE/NEVER MAR group, which is consistent with the analyses only on media. As for the relationship between the WIDOW/SEP/DIV group and SINGLE/NEVER MAR group, category SINGLE/NEVER MAR dominates category WIDOW/SEP/DIV because of larger average. There is a tendency for those in fixed relationship to exhibit higher levels of life satisfaction between the comparison of MARRIED group and COMMON-LAW group cannot be determined.

The medians of these four categories are all equal to 4, so comparisons of deviation are obtained as followed according to the tool laid out in Theorem 2.

Table 4.3.5.3 Comparison of deviations for 4 levels of Marital Status in Canada, 2012

Row to Column	MARRIED	COMMON-LAW	WIDOW/SEP/DIV	SINGLE/NEVER MAR
MARRIED	/			
COMMON-LAW	ND	/		
WIDOW/SEP/DIV	ND	ND	/	
SINGLE/NEVER MAR	ND	ND	ND	/

Note: "+" means the deviation of category (row) is less than the deviation of category (column). "-" means the deviation of category (row) is larger than the deviation of category (column). "ND" means not determined.

Focusing on Table 4.3.5.3, it is hard to determine which type of the marital status exhibits the lowest level of life satisfaction dispersions.

4.3.6 Language

Canada is a bilingual country. French and English are both official languages simultaneously. Besides these two languages, other languages like Spanish, Chinese, and so on are also used relatively frequently. Barrier-free communication is the foundation of a good life. For example, most residences in Quebec speak French. If someone is able to speak only English, it is not very convenient for him/her to communicate with other people in daily life. In this

case, the quality of life will decline. However, the impact of language on people's well-being need to be further explored. CCHS categorize language into four attributes, ENGLISH ONLY, FRENCH ONLY, BOTH FRENCH AND ENGLISH and NEITHER FRENCH NOR ENGLISH.

Table 4.3.6.1 Average Life Satisfaction by Knowledge of official languages in Canada, 2012

Official languages	Average value for Life Satisfaction	Share of Population
ENGLISH ONLY	4.25	0.68
FRENCH ONLY	4.28	0.11
BOTH FR. AND EN	4.34	0.20
NEITHER FR NOR EN	3.98	0.01

Table 4.3.6.1 indicates that the average level of life satisfaction of people whose official language is BOTH FRENCH AND ENGLISH equals 4.34, which is the highest value. The lowest value is for NEITHER FR NOR EN, which is out of the range for the fourth category for life satisfaction, namely SATISFIED. It is within the range of the third category for life satisfaction, that is, NEITHER SATISFIED

NOR DISSATISFIED. As for the attributes of FRENCH ONLY and ENGLISH ONLY, households that could speak FRENCH ONLY exhibit higher levels of average satisfaction. But the difference between the value of the average life satisfaction of FRENCH ONLY and ENGLISH ONLY is not gigantic. Therefore, a more precise analysis should be carried out.

Table 4.3.6.2 Comparison of average levels of satisfaction for four levels of official languages in Canada, 2012

Row to Column	ENGLISH ONLY	FRENCH ONLY	BOTH FR. AND EN	NEITHER FR NOR EN
ENGLISH ONLY	/			
FRENCH ONLY	+	/		
BOTH FR. AND EN	+	+	/	
NEITHER FR NOR EN	ND	−	−	/

Note: "+" means the average life satisfaction of category (row) is larger than the average life satisfaction of category (column). "-" means the average life satisfaction of category (row) is less than the average life satisfaction of category (column). "ND" means not determined.

From Table 4.3.6.3, the distribution for the group of BOTH FR. AND EN dominates the other three distributions because of the largest average. Next, the

level of average happiness of FRENCH ONLY is larger than the level of average life satisfactions of ENGLISH ONLY group and NEITHER FR NOR EN group. However, the comparison between ENGLISH ONLY group and NEITHER FR NOR EN group cannot be assessed. It is little unexpected that the value of average life satisfaction of category ENGLISH ONLY is relatively small in reality.

Since medians of the four categories all equals 4, their deviations can be compared directly.

Table 4.3.6.3 Comparison of deviation for four groups of official languages in Canada, 2012

Row to Column	ENGLISH ONLY	FRENCH ONLY	BOTH FR. AND EN	NEITHER FR NOR EN
ENGLISH ONLY	/			
FRENCH ONLY	ND	/		
BOTH FR. AND EN	ND	ND	/	
NEITHER FR NOR EN	ND	ND	ND	/

Note: “+” means the deviation of category (row) is less than the deviation of category (column). “-” means the deviation of category (row) is larger than the deviation of category (column). “ND” means not determined.

As was the case for the analysis for most of the socioeconomic characteristics, table 4.3.6.3 shows that the comparison of happiness dispersions within each group cannot be determined, and thus we cannot conclude which distribution exhibit less happiness inequality.

4.3.7 Employment

The status of Employment is another important factor that affects the quality of people’ s lives since it enables them to obtain income and realize professional and vocational fulfillment. Not only provides material satisfaction, but it also provides spiritual satisfaction. However, its impact on satisfaction could be ambiguous due to job-related pressures. Therefore, it is necessary to make use of the data in order to conduct scientific analysis in order to simplify the analysis, the variable of employment status has just two attributes, EMPLOYED and UNEMPLOYED. About 76.7% individuals have jobs, and about 23.3% people are unemployed.

Table 4.3.7.1 Average level of Life Satisfaction by Employment Status in Canada, 2012

Employment Status	Average value of Life Satisfaction	share of Population
EMPLOYED	4.30	0.77
UNEMPLOYED	4.15	0.23

Table 4.3.7.1 shows the average values of life satisfaction for the two attributes. The value of mean life satisfaction of the EMPLOYED group is 4.30 and the UNEMPLOYED group is 4.15. The difference between two is 0.15. So if we choose the linear scale C(i)= (1,2,3,4,5), the average life satisfaction of EMPLOYED is larger than the average life satisfaction of UNEMPLOYED, which indicates that people who have a job are easier to receive happiness.

Table 4.3.7.2 Comparison of averages for two types of Employment status in Canada, 2012

Row to Column	EMPLOYED	UNEMPLOYED
EMPLOYED	/	
UNEMPLOYED	—	/

Note: "+" means the average life satisfaction of category (row) is larger than the average life satisfaction of category (column). "-" means the average life satisfaction of category (row) is less than the average life satisfaction of category (column). "ND" means not determined.

Table 4.3.7.2 shows the comparisons of averages based on the statistic described in theorem 1. Category EMPLOYED has larger average life satisfaction than category UNEMPLOYED.

In addition, the medians of the 2 categories are equal to 4. Therefore, comparison of deviation is meaningful.

Table 4.3.7.3 Comparison of deviations for two types of Employment in Canada, 2012

Row to Column	EMPLOYED	UNEMPLOYED
EMPLOYED	/	
UNEMPLOYED	ND	/

Note: "+" means the deviation of category (row) is less than the deviation of category (column). "-" means the deviation of category (row) is larger than the deviation of category (column). "ND" means not determined.

The result reported in Table 4.3.7.3 indicates that the comparison of the deviations for distribution of EMPLOYED and UNEMPLOYED cannot be determined.

4.3.8 Gender

Considering the distinction between men and women, gender may be another factor to impact happiness. But we cannot clarify the relationship clearly by

intuition since there is no huge difference between male and female. Thus, it is necessary to appeal help from the empirical data.

Table 4.3.8.1 Average Life Satisfaction by Gender in Canada, 2012

Gender	Average Life Satisfaction	share of Population
MALE	4.26	0.49
FEMALE	4.28	0.51

Table 4.3.8.1 shows the average values of life satisfaction for MALE (4.26) and FEMALE (4.28). The difference between these two average values is not very large. However, the mean value of happiness of FEMALE is little larger than MALE.

Table 4.3.8.2 Comparison of averages for 2 levels of Gender in Canada, 2012

	MALE	FEMALE
MALE	/	
FEMALE	ND	/

Note: "+" means the average value of life satisfaction of category (row) is larger than the average value of life satisfaction of category (column). "-" means the average life satisfaction of category (row) is less than the average life satisfaction of category (column). "ND" means not determined.

From the result reported in Table 4.3.8.2, comparison of average values for MALE and FEMALE cannot be determined, which means there is no apparent gap between these two categories. Gender may not be a significant socioeconomic

characteristic that affects the life satisfaction although the difference exists between male and female.

Considering that medians of these 2 categories are both equal to 4, deviations could be compared.

Table 4.3.8.3 Comparison of deviations for the two Genders in Canada, 2012

	MALE	FEMALE
MALE	/	
FEMALE	ND	/

Note: "+" means the deviation of category (row) is less than the deviation of category (column). "-" means the deviation of category (row) is larger than the deviation of category (column). "ND" means not determined.

As reported in Table 4.3.8.3, the difference of deviation between distribution MALE and FEMALE is not evident. Therefore, we cannot jump the conclusion about the effect of gender on happiness.

5. Conclusion

According to the analysis of data drawn from the CCHS, the results obtained are as follows.

- Focusing on the geographical variation in the value of life satisfaction across 11 regions, the highest and lowest values cannot be determined based on the criterion set out in Theorem 1 (based on Allison and Foster (2004)). However,

the average value of life satisfaction of PEI is relatively high since it is higher than other regions except for New Brunswick and Sasktchewan. Similarly, the average life the satisfaction index of British Columbia is relatively low since it is lower than other regions except for Nova Scotia and Alberta. However, the pattern of deviation is not very clear, most dominated relationship cannot be determined.

♦ Higher average levels of life satisfaction are discerned among the distribution of higher individuals who report good physical health and mental health, which is consistent with intuition. But the comparison between the distribution of VERY GOOD health and EXCELLENT health cannot be determined. In addition, considering that the comparison of deviation across distributions should be based on equal medians, so we just could compare deviation partially, but the result is not clear.

♦ As for physical activity, the life satisfaction is positively related with the frequency of doing physical activity. However, there is no enough evidence to say which distribution has the largest or the lowest happiness inequality, as measured by the standard deviation with respect to a common median.

♦ Exploring happiness inequality across different levels of income is more interesting because the result is not consistent with intuition. Individuals who receive the lowest level of income definitely exhibit the lowest average level of life satisfaction. But as for the happiness inequality, only one comparison can be ascertained, the comparison between the DECILE 8 group and DECILE 9 group. The life satisfaction inequality of DECILE 8 is smaller than DECILE 9.

- The distribution of group having the highest education level has the larger average life satisfaction level than the second and the third highest education level, groups but the comparison of the highest category (POST-SEC CERT) and lowest category (< SEC. SCHOOL) is not clear. In addition, the lowest category (< SEC. SCHOOL) of education has the largest life satisfaction inequality. Other comparisons cannot be determined.

- Focusing on marital status, the values of average life satisfactions of the MARRIED group and the COMMON-LAW group are all larger than the WIDOW/SEP/DIV group and the SINGLE/NEVER MAR group, and category SINGLE/NEVER MAR dominates category WIDOW/SEP/DIV because of larger average. But the comparison between MARRIED and COMMON-LAW cannot be determined. As for the degree of inequality of life satisfaction, no specific result can be obtained.

- In regard to language status, the BOTH FR. AND EN group dominates the other three distributions because the average value is higher. The second largest category is FRENCH ONLY group. However, the comparison between ENGLISH ONLY group and NEITHER FR NOR EN group cannot be assessed. All the comparisons of deviations cannot be determined.

- Individuals who are employed tend to report higher levels of happiness than people who do not have a job. And the inequality in happiness cannot be compared between the employed and the unemployed groups.

- Finally, the difference between the average value of life satisfaction of

category MALE and FEMALE is not obvious, which is also the case for the comparison of happiness inequality has the same situation.

The result from the empirical illustration seems to indicate that when we introduce socioeconomic happiness inequality, the dominance patterns across groups becomes unclear. Maybe it is owning to the reason that robust ordering is difficult to identify without imposing a specific numerical scale. This means when applying the statistics laid out in Theorem 2, the orderings are not robust. For some numerical scale, the life satisfaction inequality in A is lower than B and for some other scale, the opposite result will hold. We must than conclude that the ranking between A and B is not identified. Indeed acquiring robust ordering while including socioeconomic attributes in the analysis comes at the cost of incomplete ordering, which is also regarded as the direction of extended research.

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