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Examining the Relationship between Body Mass Index and Health-Related Quality of Life Perception among People with Mental Illness

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Abstract

People suffering from mental illness are three times more likely to die prematurely from 'natural' causes than those without mental disorders as a result of their physical condition. Their life expectancy is reduced by 12-20 years. Obesity is commonly associated with mental illness and accounts for increased risk of cardiovascular disease, diabetes mellitus, stroke, heart disease, some cancers and osteoarthritis. This paper examined the relationship between body mass index (BMI) and health-related quality of life perception using the Short-Form Health Survey 36 among people living with mental illness. A Multivariate Multiple Regression model was employed to estimate the variables that influence and/or contribute to the relationship between body mass index and the three domains of health perception chosen based on preliminary tests. Sex, perception of financial change, presence of chronic physical illness and unmet needs of healthcare were used in this model. BMI, chronic physical illness and unmet needs of healthcare estimated a relationship of a participant's physical functioning.

Keywords

Mental illness, Body Mass Index, Obesity, Health-Related Quality of Life, Health Perceptions, Psychiatric Survivors, Chronic Physical Illness.

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Chapter 1

1 Review of Literature

1.1 Introduction

Approximately 6.7 million people in Canada are living with a mental illness (Mental Health Commissions of Canada, 2013). One in three Canadians experience varying forms of mental illness or substance abuse in their lifetime (Public Health Agency of Canada, 2017), with mood or anxiety disorders being the most common mental illnesses encountered (Mental Health Commissions of Canada, 2009). Among Canadians living with mental illness approximately 27% of psychiatric survivors live in poverty compared to 13% of their able-bodied counterparts (Wilton, 2004). People with mental illness are at an increased risk of facing other challenges such as poverty, social stigma, lack of employment opportunities and inadequate housing (Boydell, Gladstone, Crawford, & Trainor, 1999). Poverty and social exclusion are two common factors experienced by psychiatric survivors that contribute to increased mental health and physical health problems (Allison & Forchuk, 2008).

Compared to the general population, individuals with mental illness have a greater incidence of physical illness (Northey & Barnett, 2012). This is an international phenomenon among people with mental illness and is recognized as a serious public health concern (Northey & Barnett, 2012). There are a number of factors that contribute to the development of chronic physical conditions among people with a mental illness, such as poverty, unemployment, lack of stable housing, and social isolation (Brown et al., 2006, Roick et al., 2007, Smith et al, 2007). People suffering from mental illness are three times more likely to die prematurely from ‘natural’ causes than those without mental disorders as a result of their physical conditions (Brown, 1997). Their life expectancy is reduced by 12-20 years (Chang et al, 2011; DeHert et al., 2011; Laursen, 2011; Lausren et al., 2014; Tihonen et al., 2009). The contributory factors towards their premature death includes, poor diet, physical inactivity, obesity and smoking (McCreadie, 2003). In addition, psychotropic medications (e.g. antipsychotics) can

induce weight gain and increase vulnerability to chronic health conditions such as metabolic syndrome (Torrent et al., 2008; Tschoner et al., 2007). Individuals with mental illness have higher prevalence of obesity than the general population (Dixon et al., 1999; Felker et al., 1996). Obesity is commonly associated with mental illness and accounts for increased risk of cardiovascular disease, diabetes mellitus, stroke, heart disease, some cancers and osteoarthritis (Brown et al., 2006).

1.2 Theoretical Framework

1.2.1 Obesity and Mental Illness

Mental disorders and obesity are widely viewed as major public health concerns. Markowitz et al. (2008) and Napolitano et al.'s (2008) theoretical approach systematically considers biological, psychological, and social factors and their complex interactions in understanding health, illness, and health care delivery. The bidirectional pathway between obesity and mental disorders is identified using the framework adapted from Markowitz et al (2008) and Napolitano et al. (2008) (Gatineau & Dent., 2011). It is important to understand multidimensional construct of health in a culture that stigmatizes both obesity and mental disorders. The causal pathways between obesity and mental disorders include mediators and moderators that contribute and/or influence the relationship. Psychiatric disorders may be a consequence of severe obesity, or obesity and psychiatric disorders may have a shared disposition (Kalarchian et al., 2007). Recognizing the interaction of which aspects of biological, psychological, and social domains exist in a continuum natural system is important in promoting an individual's health.

1.3 Prevalence of Obesity and Other Physical Illness among People with Mental Illness

Many studies have emphasized the increasing rates of obesity in people with mental illness (Scott & Happell, 2011). A Canadian study used a clinic-based sample of individuals with schizophrenia to conduct a comparison study of body mass index, found that both men and women with schizophrenia had a higher prevalence of obesity than their counterpart (Coodin, 2001). The prevalence of obesity in the United States is 46%

of 200 outpatients with schizophrenia or major mood disorder, this percentage is approximately twice the observed prevalence in patients without a mental illness (Dickerson et al., 2006). Similarly, data from the United Kingdom gathered that 35% of a sample of 600 individuals with schizophrenia are classified as obese compared to 19% of the general population without a mental illness (Filik et al., 2006).

Data collected from the World Mental Health Survey of over 62,000 adults of 13 multinational general population highlighted that the prevalence of obesity is unique to the region. Interestingly, Canada was not one of the 13 countries surveyed in this study, however, the prevalence of obesity among people with mental illness in Japan, Lebanon, Germany, Italy and Spain is 10%; that is two-folds of the country's specific obesity prevalence. On the higher end of the scale is New Zealand, the United States and the Netherlands with approximately 43-48%. Thus, proving that obesity as a worldwide epidemic exceeds its prevalence among individuals with mental illness (Scott et al., 2008).

Furthermore, obesity is commonly associated with mental illness and accounts for increased risk of cardiovascular disease, diabetes mellitus, stroke, heart disease, some cancers and osteoarthritis (Brown et al., 2006). Metabolic syndrome includes disorders such as central obesity, insulin resistance and hypertension (Scott & Happell, 2011). Obesity and metabolic syndromes are primary factors are cardiovascular disease and type II diabetes mellitus (Alberti, Zimmet & Shaw, 2005). Therefore, it is crucial to address the prevalence of obesity in order to reduce the comorbidity of chronic physical health conditions that result from being overweight and/or obese, especially in people with mental illness.

The Canadian Institute for Health Information (2008) reported that Canadians who report symptoms of depression also report experiencing three times as many chronic physical conditions as the general populations. Similarly, Government of Canada (2006) stated that Canadians with chronic physical conditions are twice as likely to experience a mood or anxiety disorder compared to individuals without a chronic physical condition. This demonstrates the inverse pattern of the likelihood for people with chronic physical health

conditions to develop mental health problems. Patten (1999) states that one in every two Canadians experience disturbance in day-to-day activities due to a coexisting mental illness and a chronic physical condition.

Elevated obesity and obesity-related conditions are prominent in people with mood disorder and schizophrenia (McIntrye et al., 2006; Saarni et al., 2008). Rates of obesity in groups of people with bipolar disorder is almost twice the prevalence compared to people without bipolar disorder with 41% and 27%, respectively (Sicras et al., 2008). Concurring with Sicras et al. (2008), Dickerson et al. (2006) also found that 41-50% of people with mental illness were obese. Thus, verifying that obesity is in fact a rampant matter with implications for further chronic physical health diagnosis.

In a discussion paper published by Canadian Mental Health Association (CMHA, 2008), CMHA emphasizes the increasing growth of people living with mental illness and its correlation with higher risk of developing chronic physical conditions. The co-occurrence of mental and physical health conditions leads to a decline in quality of life, longer illness duration resulting in the exacerbation of health outcomes (Patten, 1999). This emphasizes the cogent issue of the strong association between chronic physical conditions and mental illnesses. Furthermore, the majority of the literature agrees that individuals with mental illness experiencing chronic physical health conditions have significantly shorter life expectancy than individuals without either illness (Brown et al., 1999; Brown et al., 2002; Brown, 1997; Prior et al., 1996; Daumit et al., 2005).

Compared to individuals without mental illness, individuals with mental illness experience higher morbidity and mortality rates (Jolles, Haynes-Maslow, Roberts & Dusetzina, 2015). This increasing rate of comorbidities and deaths are attributed to untreated and preventable chronic physical health conditions, such as hypertension, cardiovascular disease and type II diabetes mellitus (Colton & Manderscheid, 2006; Banerjea et al., 2007; CMHA 2008; PHAC, 2006). An estimated 15–20-year mortality gap exists for adults with mental illness in high-income countries (Wahlbeck, Westman, Nordentoft, Gissler, & Laursen, 2011). This is a serious public health concern, not only nationally in Canada, but world-wide.

1.4 Obesity, Mental illness and Poverty

In addition to the challenges posed by mental illness, individuals also face structural barriers, such as poverty, unaffordable housing, social stigma, discrimination and loss of or lack of employment (Boydell, Gladstone, Crawford & Trainor, 1999; Wahl, 1999; Ware and Goldfinger, 1997). In Canada, poverty is determined by Statistics Canada's "Low-Income Cut-offs" (LICO), however, this official definition fails to understand the manifold effects of poverty on people's lives. Consequently, poverty will be defined as "having insufficient money, goods or means of support" (Wilton, 2004). Poverty has adverse implications for physical, mental and social health. It profoundly affects self-esteem, education, participation in social activities, safety, housing and relationship attainments (Wilton, 2004; Lott & Bullock, 2001). Individuals with mental illness are heavily populated among people living in poverty (Wilton, 2004). Evidently, this representation is found in Canada, with approximately 27% of people with mental illness living in poverty, compared to 13% of their non-disabled counterpart (Wilton, 2004). Hannum et al., (1994) states that poverty has an inverse correlation with opportunities to develop social networks. This is supported by Kearns's (1990) findings that individual's satisfaction with community life is significantly correlated with income. Eaton and Muntaner's (1999) two frameworks that have been proposed by many studies used to explain a similar relationship; indirect association and direct association. Indirect association proposes that certain individuals may be predisposed to both a mental illness and lower motivation and expectations, which results in lower levels of education achieved. The indirect association of poverty and mental illness is due to the lower educational attainment that was a predisposition of low expectations and ambition, which in turn resulted in poverty. The direct association is known as social causation. This infers that individuals who are poor are at an increased risk of developing a mental illness. For instance, living in poverty includes lack of opportunity and consequently leads to hopelessness, anger and despair. The direct association also occurs when poverty is combined with a genetic predisposition to a mental illness. (Eaton & Muntaner, 1999). In relation to obesity, poverty and mental illness, Ball and Crawford (2005) therefore

suggest a shift in focus on socioeconomically disadvantages, particularly in low income status or unemployment. Although individual responsibility is essential, it is not effective when there is a systemic disadvantage and inequitable distribution of resources.

1.5 Obesity, Mental Illness and Health-Related Quality of Life

Obesity has psycho-social implications. Weight gain impacts the physical appearance of an individual, but it also results in low self-esteem, social alienation or depression (Shin et al., 2008). Obesity is highly stigmatized as it increases social isolation, reduces self-esteem and community integration into an active life (Radke et al., 2010).

Mental illness and chronic physical health have adverse effects on individual's sense of self, quality of life, employability and integration in society (Radke et al., 2010). In order to ensure a holistic approach is given in the provision of care, the biological, psychological, sociological factors must be addressed among people with mental illness. As alluded to earlier, obesity is multifactorial and a solution for the general population cannot be applied without adequately tailoring the interventions to the needs of this specific subpopulation. Health-related quality of life (HRQOL) is a multidimensional construct that focuses on the individual's perception of health; it includes physical, mental, social and emotional health (Milder, Hollander, Picavet et al., 2014). Health-related quality of life has been found to be related to outcomes of well-being, healthcare service use and a significant predictor of mortality and morbidity (Cott, Gignac & Badley, 1999).

Obesity is associated with lower health-related quality of life. A few studies have demonstrated an association between obesity and health-related quality of life in the general population. Those who had a higher BMI showed lower HRQOL scores in the physical, emotional and mental health components, and these impairments were more prominent in the physical dimensions than the others (Fontaine & Barofsky, 2001; Jia & Luketkin, 2005; Renzaho, Wooden & Houng, 2010; Catres et al 2010). However, limited studies have comprehensively examined correlates of body weight and HRQOL among people with mental illness (Cott, Gignac, Badley, 1999; Kennedy, Salsberry, Nickel,

Hunt and Chipps, 2005; Wang, Sereika, Styn and Burke, 2013). One study has found that participants with psychiatric disorders scored much lower in physical health than the general population (Kennedy, Salsberry, Nickel, Hunt and Chipps, 2005). However, despite this finding, little attention has been paid to the physical aspect of this subpopulation's health care. People with mental illness are at risk of shortened life expectancy compared to the general population. A better understanding of the relationship between BMI and health-related quality of life among people with mental illness and its confounding factors is needed. Implications of this study could inform health promotion strategies and developmental policies to improve the health of people living with mental illness.

1.6 Causes of Obesity among People with Mental Illness

1.6.1 Antipsychotic Medication Use

Psychotropic medications, including antidepressants, mood stabilizers and antipsychotics are associated with increased weight gain (Torrent et al., 2008; Tschoner et al., 2007). In addition, second-generation antipsychotics (SGA) has been clinically proven to increase weight gain in people with mental illness (Gibson et al., 2011; Leuchtm et al., 2009) and it is increasingly prescribed to young adults (Correll & Carlson, 2006; Dean et al., 2006).

Prevalence of obesity among antipsychotic medication users is four times higher than nonusers (Daumit et al., 2003). Similarly, the likelihood of obesity for men taking antidepressants medication and mood stabilizer were 70% higher than men who did not take these specific medications (Daumit et al., 2003). According to the study results of Daumit et al., (2003) almost three quarters of prevalent obesity in men using atypical antipsychotics may be accredited to these medications.

In a retrospective study, Copeland et al., (2012) assessed the interaction effect of psychiatric disorders by 'obesogenic' psychotropic medications and found that a total of 5,729 patients who were using obesogenic psychotropics did not have a psychiatric comorbidity; 4,475 had psychiatric comorbidity and were not using any obesogenic psychotropic and 5,118 had both psychiatric comorbidity and were using obesogenic

psychotropics. Although this study achieved statistical significant, Copeland et al (2012) stated that it was not of a meaningful magnitude due to the study design not permitting them to assess causality more in-depth.

In a systematic review conducted by McCloughen and Foster (2011) perceived barriers of not being physically active were due to psychotropic medication use. The weight-gain due to medication impacted the participants' self-image and led to feeling socially alienated (Tweedell et al., 2004). Participants who experienced medication-induced weight gain associated weight gain to poorer quality of life (Allison et al., 2003) and decreased quality of life due to feelings of self-blame, hopelessness and worthlessness (Covell et al., 2007).

1.6.2 Diet

Another potential mechanism that contributes to increased rates of obesity is changes in dietary intake and energy expenditures increasing fat storage; these changes are characterized under lifestyle and dietary changes (Tschoner et al. 2007). Increased food intake is potentially due to the consummation some antipsychotics that interact with receptors such as dopamine, serotonin and histamine (Tschoner et al., 2007).

Poverty and unstable conditions contribute to poor diet due to frequent consumption of high-fat, high-sugar intake from fast food restaurants. Food insecurity among people with mental illness is common risk factor to obesity. Fast food chains and convenience stores are geographically located in low socioeconomic status neighbourhoods, thus making it difficult for people with low income to access healthy foods from grocery stores and farmer's market. This is a systemic disadvantage people living in poverty encounter. (Bell et al., 2013; Larson et al., 2009)

1.6.3 Physical Inactivity

Although many studies highlight sedentary behaviour among people with mental illness as lack of motivation, one study acknowledges physical inactivity among people with mental illness may be due to poverty, negative symptoms, institutionalization and sedative effects of medications (Dixon, 2003). People with mental illness are more

sedentary compared to the general population (Richardson et al., 2005). People with mental illness are said to be 75% less likely to participate in vigorous physical activity and less than 5% meet their recommended dietary intake of fruits and vegetables (Davidson et al., 2001a, b)

1.7 Conclusion

In summary, the prevalence of obesity among people with mental illness is a worldwide phenomenon. Individuals with mental illness also face structural barriers, such as poverty, unaffordable housing, social stigma, discrimination and loss of or lack of employment. Poverty has adverse implications for physical, mental and social health. It profoundly affects self-esteem, education, housing and physical and mental health. In addition, the implications associated with obesity and mental illness has been widely studied in the literature, however, limited knowledge was found about the health-related quality of life among people with mental illness in Canada. More research needs to be conducted about the perception of health by understanding the biological, psychological and social barriers faced by people with mental illness. Individuals with mental illness, who are living in poverty and are overweight or obese face many complex challenges that need to be addressed in ensure recovery.

Chapter 2

2 Methods

2.1 Problem Statement

. There are limited studies conducted in Canada about the relationship between BMI and perception of health among people with mental illness. This study will add to existing literature by examining and understanding the relationship between BMI and perception of health among people with mental illness, while considering biopsychosocial factors influencing the relationship. This analysis will evaluate sociodemographic and biopsychosocial factors associated with health-related quality of life (HRQOL) among people with mental illness to help identify those who are at greater risk for deteriorating functioning and improve delivery and implementation of health promotion initiatives. Thus, using HRQOL to investigate perception of health can provide insights into psychiatric consumer/survivors' physical and mental functioning, role limitations, social relationships and perceptions of their overall health and well-being.

2.2 Summary of Theoretical Conceptual Model

A conceptual framework will be employed to rationalize the analysis. Adapted from Markowitz et al. (2008) and Napolitano et al. (2008), the figure below provides an explanation of the relationship between obesity and mental illness, using mediators and moderators to determine the influences of the relationship (Gatineau & Dent., 2011). This model is a bidirectional pathway identifying behavioral, cognitive, physiological, and social mechanisms that may potentially elucidate links between obesity and mental illnesses. According to Markowitz et al and Napolitano et al., more research is needed to test these models using advanced statistical methodologies to explain psychological, biological, behavioural, cognitive and social mediators such as stigma, coping and moderators such as level of specific mental illnesses, socioeconomic status, body mass index pathways to better inform clinical practice and future research. For this thesis study, a specific focus will be on the relationship of the psychological and biological factors. Biological factors will include the presence of chronic physical illness and sex;

psychological factors will be the health-related quality of life and unmet healthcare needs. The effects of intersectionality supported by the conceptual framework will be investigated in this vulnerable population.

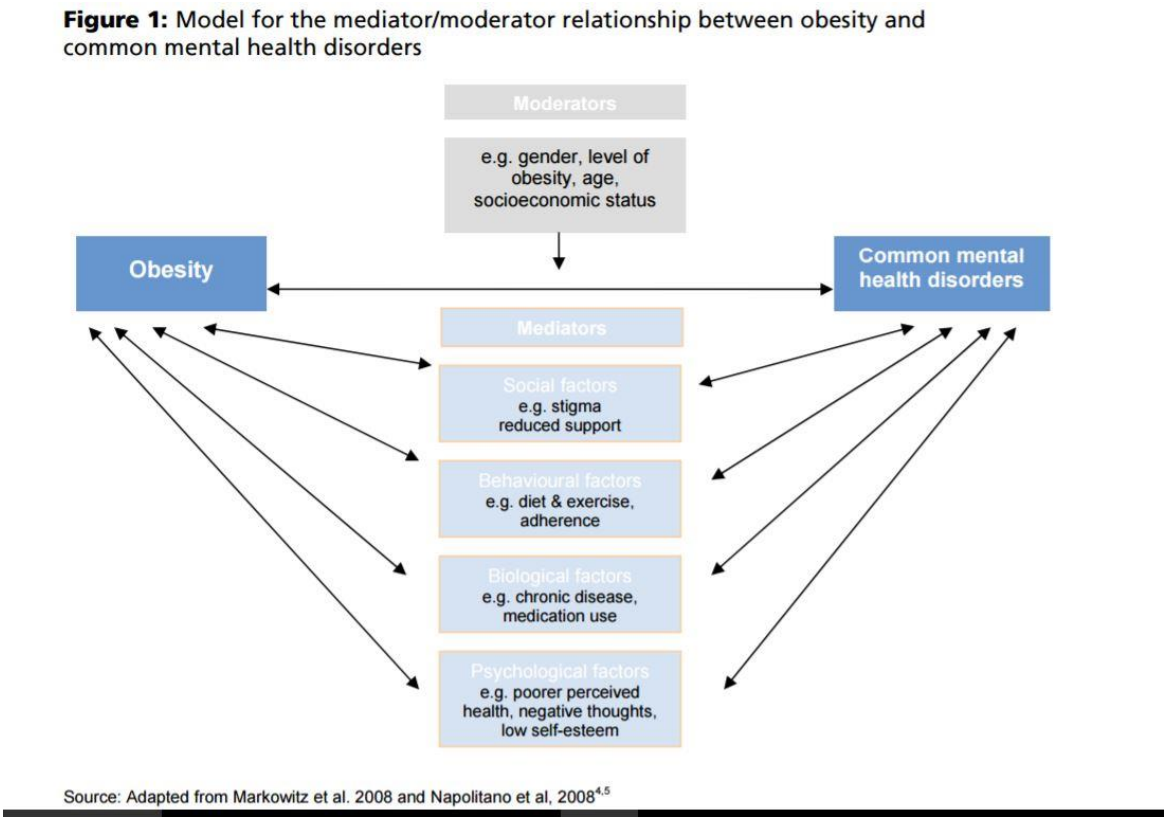

Figure 1 Conceptual Model of Obesity and Common Mental Health Disorders

2.3 Research Questions

1) What is the relationship between BMI and the eight components of health perception?

2) What is the relationship among the eight components of health perception?

3) How do health perceptions differ among perception of financial change categories?

4) Is there a difference in BMI between those who accessed or did not access healthcare services within the past 12 months?

5) Is there a difference in health perception between those who accessed healthcare services and those who did not? What were the specific treatment of care needed but were unable to access? Is there a difference in health perception among different unmet healthcare needs?

6) What factors contribute to the relationship between BMI and health perception?

2.4 Study Design

This is a secondary data analysis of a four-year longitudinal study, however, for the scope of this master's degree, only the baseline interview will be used for analysis. Quantitative data gathered from a Community University Research Alliance (CURA2) exploring the inter-relationship between poverty and social inclusion of psychiatric survivors will be used. The primary study investigated issues related to poverty and social inclusion for psychiatric survivors. Specifically, it focused on discovering, developing, and proposing community-based solutions that promote social inclusion to improve the lives of low-income psychiatric survivors.

2.4.1 Research Ethics

Research ethics approval was obtained from Western University's Research Ethics Board for Non-Medical Research involving Human Subjects at the initial start of the original study. Ethics approval was also received for future secondary data analysis.

2.5 Setting

Interviews were conducted in London, Ontario and surrounding area including Middlesex and Elgin counties, at the convenience of the participants who voluntarily agreed to participate in the study.

2.6 Sample

English speaking individuals between 18 and 75 years of age with a diagnosed mental illness for a minimum of 1 year were recruited as study participants. A total of 380 participants were recruited (190 males and 190 females). Purposive sampling was used to

recruit participants for the study to ensure adequate subsamples regarding sex and housing types, Table 1 refers to the description of the sample population.

Table 1 Sample Description

Subgroup	**Male**	**Female**
Unhoused	55	55
Group Home	45	45
Housed/Unemployed	45	45
Housed/Employed	45	45
Total	**190**	**190**

2.7 Operational Definitions

2.7.1 Independent Variable

Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, normal, overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of the body's height in meters (kg/m2). For adults, WHO defines the classification of BMI as follows: underweight is a BMI less than or equal to 18.5, normal BMI is a range between 18.5- 24.9, overweight is a BMI greater than or equal to 25; and obesity is a BMI greater than or equal to 30 (World's Health Organization, 2017

2.7.2 Dependent Variable

Health Perception (Health-related Quality of Life) is patient-reported survey derived from the Short Form (36) Health Survey that consists of eight scaled scores, which are the weighted sums of the questions in their section. Each scale is directly transformed into a 0-100 scale. The lower the score the more disability and the higher the score the less disability an individual has. The eight sections are: vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning and mental health.

2.7.3 Mediators and Moderators

A Mediator variable explains the 'how or why' between the independent and the dependent variables. A mediator can be a potential mechanism by which an independent

variable can produce changes on a dependent variable (Baron & Kenny, 1986). A *moderator* variable is a variable that influences the strength of the relation between independent and dependent variables (Baron & Kenny, 1986). Perception of Financial Change, chronic physical illness and healthcare utilization will be used as mediators in this study , while sex will be used as a moderator variable in this study.

. Perception of Financial Change: For this study a narrower focus will be on the perceived change in finances within the past year of the interview date. The question posed was: In the past year, has your economic status; greatly worsened, somewhat worsened, stayed the same, somewhat improved or greatly improved? Perception of Financial Change encompasses quality of life attributes, opportunities and privileges afforded to people within society. The perception of financial change is an important indictor to draw association from because it encompasses not only income but financial security.

Chronic Physical Illness: Participants were asked if they have any chronic physical illness present at the time of the interview.

Health Care Utilization (Unmet healthcare needs): Derived from the National Population Health Survey, health care utilization is defined by whether a participant has had access or has utilized a health service needed in the past year. Specifically, two questions were used to comprehensively analyze unmet healthcare needs: 1) If there was a time during the past 12 months they felt that they needed health care but did not receive it, 2) if so, what was the type of care needed; physical or emotional health?

Sex: During the interview the participants had the choice to identify as male, female, or neither.

2.8 Instruments

The demographic questionnaire is a 38-item questionnaire developed by the CURA2 research team specifically for this study. It was used to gather details regarding socio-demographic variables pertaining to the study sample.

The SF-36 questionnaire (SF-36)was originally developed by John Ware and colleagues to measure health status or health-related quality of life of patients (Ware et al., 1993). Studies that have tested the reliability of SF-36 found it exceeded 0.80 (McHorney et al., 1994; Ware at el., 1993). This internationally validated instrument for generic health is often used in obesity research. The eight dimensions measured by the SF-36 are: physical functioning (PF) for the limitation in performing all physical activities including bathing and dressing, role limitations due to physical health (RLPH) for problems with work or other daily activities, bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitations due to emotional health (RLEH), and mental health (MH). Physical functioning, role limitations due to physical health and bodily pain reflect the physical component of health; social functioning, role limitations due to emotional health and mental health are under the psychosocial aspect; and vitality and general health gave an overall idea of subjective health.

The National Population Health Survey (NPHS) is a 137-item questionnaire developed by Statistics Canada to collect data regarding health status and related socio-demographic factors of the Canadian population (Statistics Canada, 2012). The NPHS is organized into the following subsections: health behaviours and conditions, mental health, disability status, social and lifestyle factors and healthcare utilization. For this study, NPHS was used to elicit measures pertaining to physical disability health care utilization.

2.9 Data Collection Procedures

Research staff were trained on the instruments to ensure accurate and proper delivery of the interview questions. A letter of information was reviewed, and consent was obtained by each interviewee prior to the start of the interview. Interviews were approximately 1-2 hours long and participants were given $20 honoraria after each interview.

2.10 Data Analysis

Quantitative data was collected from the demographic, SF-36 and NPHS surveys distributed throughout baseline interview: descriptive statistics, including means, standard deviations, and ranges, were computed on all variables of interest. The level of

statistical significance was set at 0.05. All statistical analyses were executed using the Statistical Package for the Social Sciences Version 24.0. The independent variable BMI is a continuous variable derived from self-reported height and weight. Since both independent and dependent variables are continuous in nature, statistical analyses were summarized in an analysis summary table (Table 1 & 2).

2.10.1 Simple Linear Regression (SLR)

Simple linear regression was used to determine if there is a relationship between BMI and any of the eight domains of HRQOL. Only statistical significant linear relationships were used for further analysis.

2.10.2 ANOVA

Analysis of Variance was used to determine a participant's health perception among different perceptions of financial change categories. The difference in means was used to assess if there is a difference in health perception between 'worsened', 'stayed the same' or 'improved' categories.

2.10.3 T-Tests

T-tests are used to compare two means to see if they are significantly different from one another. Independent sample t-test uses one categorical or nominal independent variable and one continuous or interval scaled dependent variable. This was used to determine if there is a difference in BMI among difference sexes, male or female. In addition, t-test was used to assess a difference in mean between BMI and whether participant accessed healthcare services, 'yes' or 'no' responses. Healthcare utilization was further investigated to determine which of the treatments were needed but not accessed by participants, physical or emotional health. T-test was used to also determine the health perception scores of the participants who needed healthcare but were not unable to access it.

2.10.4 Correlations

The most commonly used correlation coefficient is the Pearson product-moment correlation coefficient (r). The purpose of correlation coefficient is to determine whether two continuous variables correspond with one another, not to determine causation. Generally, a strong relationship is represented by coefficients values larger than -/+.50, a moderate relationship values between -/+ .20 to -/+ .50 and a weak relationship values less than -/+.20. (Hinkle, Wiersma & Jurs., 1998). A correlation analysis was used to determine the relationship between BMI and the eight domains of health perception. Correlations between the eight domains of health perception were also assessed. Partial correlation was used to control for the mediating variables. Significant correlations between BMI and any of the eight domains were carried forward to use in multivariate multiple regression model. In addition, correlations and collinearity diagnostics were used to assess for multicollinearity.

2.10.5 Multivariate Multiple Regression

Multivariate multiple regression is used when there are more than one predictor variables and outcomes variables. To determine the predictors and outcomes variables that will be used in this model, preliminary analysis of significant variable was employed using correlations and simple linear regression. BMI is the independent variable of interest and health perception domains are the dependent variable of interest. The controlled variables identified are sex, perception of financial change, chronic physical illness and unmet healthcare needs. To carry out this analysis, the following assumptions of MMR were met: 1) assumption of linear relationship between independent and dependent variables; outliers/influential cases, 2) assumption of homoscedasticity using residuals, 3) multicollinearity, and 4) normally disturbed residuals.

The Model 1 included predictor variables, controlled variables and outcome variables. Using the results from Model 1, only significant variables were included in Model 2 to determine a more accurate prediction of relationship between BMI and significant health perception domains.

Table 2: Variables Summary Table

Variable	Item Description	Instrument
Body Mass Index	Continuous variable	National Population Health Survey
Perception of Financial Change	Single item categorical response	Demographic Questionnaire
Sex	Single item categorical response	Demographic Questionnaire
Chronic Physical Illness	Single item categorical response	Demographic Questionnaire
Health Perception	8 categories	Short Form Health Survey 36
Health Utilization	Single item categorical response	National Population Health Survey

Table 3: Analysis Summary Table

Research Questions	Variables	Statistical Test
1. What is the relationship between BMI and the eight components of health perception?	▪ BMI ▪ SF-36	▪ Simple Linear Regression ▪ Correlations
2. What is the relationship between the eight components of health perception?	▪ SF-36	▪ Correlations
3. What are the health perceptions between Perception of Financial Change categories?	▪ SF-36 ▪ Perception of Financial Change	▪ ANOVA
4. Is there a difference in BMI between those who accessed or did not access healthcare services within the past 12 months?	▪ BMI ▪ Healthcare Utilization	▪ T-test
5. Is there a difference in health perception between those who accessed healthcare services and those who did not? What were the specific treatment of	▪ SF-36 ▪ Healthcare Utilization	▪ T-test

care needed but were unable to access? Is there a difference in health perception among different unmet healthcare needs?		
6. What factors contribute to the relationship between BMI and health perception?	▪ BMI ▪ SF-36 ▪ Perception of Financial Change ▪ Healthcare Utilization ▪ Chronic Physical illness ▪ Sex	▪ Multivariate Multiple Regression

Chapter 3

3 Results

3.1 Sample Demographics

The study sample for visit one included n=380 participants (190 men and 190 women) with an average mean age of 40.65 years. A summary of the sample demographics is included as Table 3. Statistical output can be found in Appendix A.

Table 4: Demographic Statistics

Characteristics	Mean ± SD, *n* (%)
Age	40.65± 14.001
Sex	
Female	190 (50%)
Male	190 (50%)
Marital Status	
Single-never married	234 (61.6%)
Separated-divorced	82 (21.9%)
Married-common law	49 (12.9%)
Widowed	12 (3.2%)
Other	3 (0.8%)
Education	
Grade School	180 (47.4%)
High School	113 (29.7%)
Community College/University	83 (21.8)
Employed	
Yes	94 (24.7%)
No	286 (75.3%)
Experienced Homelessness	
Yes	254 (66.8%)
No	126 (33.2%)
Perception of Financial Change	
Worsened	112 (29.5%)
Stayed the same	184 (48.4%)
Improved	84 (22.1%)
Psychiatric Disorder	
Mood Disorder	247 (65%)
Anxiety Disorder	144 (37.9%)

Substance-Related Disorder	110 (28.9%)
Schizophrenia	88 (23.2%)
Chronic Physical Illness	
Yes	236 (62.1%)
No	144 (37.9%)
Concurrent Physical Illness	
Arthritis	64 (16.8%)
Respiratory Illness	61 (16.1%)
Diabetes	51 (13.4%)
High Blood Pressure	43 (11.3%)
Heart Condition	29 (7.6%)
Neurological Brain Disorder	19 (5%)
Osteoporosis	17 (4.5%)
Cancer	12 (3.2%)
Other	84 (22%)
Healthcare Utilization	
Yes	149 (39.2%)
No	229 (60.3%)
Healthcare Utilization type of care	
Physical health problem	92 (61.7%)
Emotional or mental health problem	60 (40.2%)

3.2 Descriptive Statistics for Variable of Interest

The mean of BMI among the participants is 27.49 (SD ± 6.98), falling within the overweight scale. BMI was calculated for 344 participants due to missing cases (n=36). A summary of the distribution of BMI among the sample is given as Table 4 and Figure 2. Statistical output can be found in Appendix B.

Table 5: Distribution of BMI

BMI as continuous and categorical

	Mean ± SD, *n* (%)
BMI	27.49± 6.980, 344
BMI categories	
Underweight	16 (4.2%)
Normal	135 (35.5%)
Overweight	90 (23.7%)
Obese	103 (27.1%)

Missing	36 (9.5%)

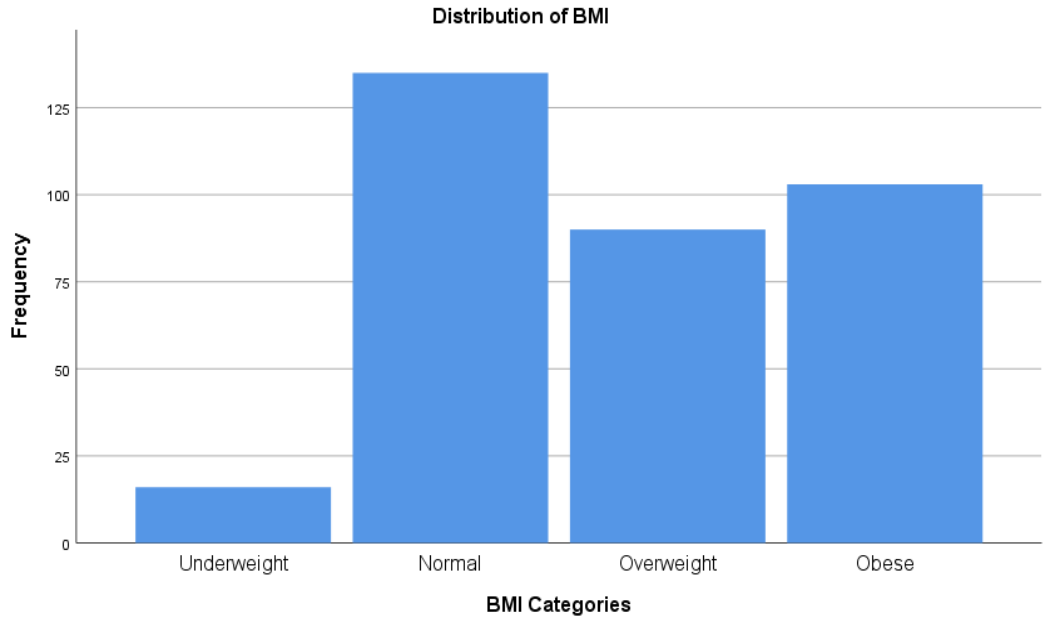

Figure 2 Bar Graph of Distribution of BMI

The SF36 instrument is sub-sectioned into eight domains;

1. Physical Functioning
2. Role limitation due to Physical health
3. Role limitation due to Emotional health
4. Energy/Vitality
5. Emotional Well-Being
6. Social Functioning
7. Bodily Pain
8. General Health

Table 5 displays the mean and standard deviation of each subscale (n=344). Lower scores represent negative health perception i.e. lower physical functioning, higher role limitations due to physical health and emotional health, lower energy and vitality, lower perception of emotional wellbeing, lower social functioning, higher perception of pain, and lower overall general health.

Table 6: Distribution of SF-36 Domains

	Mean ± SD, *n*

SF-36	
Physical Functioning	77.16 ± 24.94, 344
Role Limitations due to Physical Health	53.05 ± 41.05, 344
Role Limitations due to Emotional Health	44.76 ± 40.86, 344
Energy/Vitality	45.48 ± 24.19, 344
Emotional Well-being	56.31 ± 21.61, 344
Social Functioning	61.11 ± 28.10, 344
Bodily Pain	56.03 ± 32.80, 344
General Health	46.31± 27.28, 344

3.3 Research Questions

3.3.1 What is the relationship between BMI and the eight components of health perception?

BMI and Health Perception (HRQOL) - Correlations

A Pearson Correlation analysis was used to determine which of SF-36 eight domains corresponds with BMI. Table 6 illustrates the correlations and the significance; alpha level is set at α=0.05. There is statistical significance between BMI and physical functioning (r=-.268, p<0.01), role limitations due to physical health (r=-.147, p< 0.01) and bodily pain (r=-.134, p<0.05). Statistical output can be found in Appendix C.

Table 7: Pearson Correlations between BMI and SF-36 Domains

Pearson Correlations between BMI and SF-36 Domains

	Body Mass Index
	Correlations
Physical Functioning	**-.268****
Role Limitations due to Physical Health	**-.147 ****
Role Limitations due to Emotional Health	.042
Energy/Vitality	-.047
Emotional Well-being	.091

Social Functioning	-.036
Bodily Pain	**-.134 ***
General Health	-.068

** $p < 0.01$

* $p < 0.05$

BMI and Health Perception (HRQOL)- Simple Linear Regression

A simple linear regression analysis was calculated to estimate a relationship between BMI and health perception. Aligning with the correlations between BMI and three of the health perception domains; physical functioning, RLPH and bodily pain.

i. Physical Functioning and BMI

A significant regression equation was found between physical functioning and BMI (F (1,342) = 26.554, p <0.01), with an R^2 of 0.072. The scatterplot showed that there was a moderate negative linear relationship between the two, which was confirmed with a Pearson's correlation coefficient of -0.268. The slope coefficient for BMI was β= -0.96, thus, there is an inverse relationship as BMI increases by a unit the physical functioning perception score decreases by 0.96 units. The R^2 of 0.072 represents 7.2% of the variation in physical functioning can be explained by the model containing only BMI. The linear regression equation is γ=1.04E2-0.96*x.

ii. Role Limitations Due to Physical Health and BMI

A significant regression equation was found between RLPH and BMI (F (1,342) = 7.553, p <0.01), with an R^2 of 0.022. The scatterplot showed that there was a weak negative linear relationship between the two, which was confirmed with a Pearson's correlation coefficient of -0.147. The slope coefficient for BMI was β= -0.86, thus, for every unit increase of BMI, RLPH perception scores decrease by 0.86 units. The R^2 of 0.022 represents 2.2% of the variation in RLPH can be explained by the model containing only BMI. The linear regression equation is γ=76.82-0.86*x.

iii. Bodily Pain and BMI

A significant regression equation was found between bodily pain and BMI (F (1,342) = 6.282, p <0.01), with an R^2 of 0.018. The scatterplot showed that there was a weak negative linear relationship between the two, which was confirmed with a Pearson's

correlation coefficient of -0.134. The slope coefficient for BMI was β= -0.631. For every unit increase of BMI, bodily pain perception scores decrease by 0.63 units, thus, as BMI increases participants perceive greater pain. The R^2 of 0.018 represents 1.8% of the variation in pain can be explained by the model containing only BMI. The linear regression equation is γ=73.38-0.63*x.

3.3.2 What is the relationship among the eight components of health perception?

Statistical significances were found within the SF-36 domains provided in Table 7. It is important to note the strong positive correlation between physical functioning (r=.565, p<0.01), RLPH (r=.594, p<0.01) and bodily pain (r=.584, p<0.01). Statistical output can be found in Appendix D.

Table 8: Pearson Correlation among SF-36 Subscales

Pearson Correlation among SF-36 Subscales

	PF	RLPH	RLEM	Energy / Vitality	Emotional Well-being	Social Functioning	Bodily Pain	General Health
Physical Functioning	1							
Role Limitations due to Physical Health	**.565***	1						
Role Limitations due to Emotional Health	**.246***	**.445***	1					
Energy/Vitality	**.437***	**.442***	**.448***	1				
Emotional Well-being	**.248***	**.308***	**.531***	**.704***	1			
Social Functioning	**.409***	**.526***	**.538***	**.626***	**.601***	1		
Bodily Pain	**.584***	**.594***	**.299***	**.420***	**.336***	**.476***	1	
General Health	**.530***	**.469***	**.387***	**.604***	**.508***	**.575***	**.481***	1

*** p < 0.01**

3.3.3 How do health perceptions differ among perception of financial change categories?

Perception of Financial Change and Health Perception (HRQOL)

Although there were no correlations when controlling for financial adequacy between BMI and health perception, it remains important to understand financial

adequacy as a confounding factor. ANOVA was a statistical method used to analyze health perception among the three categories of financial adequacy; worsened, stayed the same or improved. A statistical significance was found within the financial adequacy categories in seven out of eight health perceptions given as Table 9. Bodily pain was the only health perception subgroup that had no statistical significant (F (2,376) = 1.504 p=0.223). A post hoc test was conducted for the values that were statistically significant using Tukey HSD, to determine which categories have a difference in variance. The post hoc results showed statistically significance among participants in the 'worsened' category and 'stayed the same' (Appendix E).

Table 9: ANOVA: Perception of Financial Change by SF-36 Domains

Financial Adequacy by SF-36 Domains

	Mean ± SD			F	Sig.
	Worsened	Stayed the Same	Improved		
Physical Functioning	73.71±24.08	76.96±24.69	82.53±24.73	**3.107**	.046
Role Limitations due to Physical Health	45.76±39.69	55.98±40.97	59.04±41.24	**3.140**	.044
Role Limitations due to Emotional Health	28.87±35.93	50.00±41.23	56.22±41.94	**13.878**	.000
Energy/Vitality	36.85±21.38	48.60±24.05	51.14±25.21	**11.517**	.000
Emotional Well-being	47.18±21.59	60.25±20.53	60.77±21.47	**15.598**	.000
Social Functioning	51.67±29.85	64.81±26.68	66.27±27.65	**9.461**	.000
Bodily Pain	52.37±31.37	58.98±33.51	56.89±32.92	1.504	.223
General Health	37.83±24.51	47.93±27.74	56.92±27.16	**12.502**	.000

Note. All SF36 domains contained 2 df

***p* < .05**

3.3.4 Is there a difference in BMI between those who accessed or did not access healthcare services within the past 12 months?

BMI and Health Care Utilization (Unmet healthcare needs) - T-Test

A t-test analysis was employed to analyze the different means of BMI between whether participants accessed a healthcare service they needed. There was no statistical significance between BMI and any of the health care utilization questions. Both responses from participants yielded a similar BMI mean of 27. Statistical output can be found in Appendix F.

3.3.5 Is there a difference in health perception between those who accessed healthcare services and those who did not? What were the specific treatment of care needed but were unable to access? Is there a difference in health perception among different unmet healthcare needs?

Health Perception (HRQOL) and Healthcare Utilization (Unmet healthcare needs) - T-Test

The three health perception domains that were tested using t-test analysis were physical functioning, RLPH and bodily pain. Levene's Test for equality of variance were met as the F statistic was not significant and therefore equal variances were assumed. Statistical output can be found in Appendix G.

i. Physical Functioning and Healthcare Utilization

The t-test results revealed that there was a statistically significant difference in scores for participants who reported 'yes' to needing healthcare but did not receive (μ= 72.55, SD ± 25.978) compared to the participants who reported 'no' (μ= 80.26, SD ± 23.376); (t (376) = 2.999, p=0.003). Participants who reported 'yes' had a lower mean score on their physical functioning perception compared to their counterparts who reported 'no'.

ii. Role Limitations Due to Physical Health and Healthcare Utilization

The t-test results revealed that there was a statistically significant difference in scores for participants who reported 'yes' to needing healthcare but did not receive (μ= 38.42, SD ± 38.612) compared to the participants who reported 'no' (μ= 63.32, SD ± 39.355); (t (376) = 6.055, p<0.001). Participants who reported 'yes' had a lower mean score on their RLPH perception compared to their counterparts who reported 'no'.

iii. Bodily Pain and Healthcare Utilization

The t-test results revealed that there was a statistically significant difference in scores for participants who reported 'yes' to answering the question (μ= 43.59, SD ± 30.784) compared to the participants who reported 'no' (μ= 65.35, SD ± 31.410); (t (376) = 6.633, p<0.001). Participants who reported 'yes' had a lower mean score on their pain perception compared to their counterparts who reported 'no'.

Health Perception (HRQOL) and Healthcare Utilization- Physical Health - T-Test

The second question for health care utilization assessed only the participants who reported 'yes' to the previous health care utilization (unmet healthcare needs) question. Participants were asked if the service they needed at the time when they did not receive the health care was for physical health problems. The three health perception domains that were tested using t-test analysis were physical functioning, RLPH and bodily pain. Levene's Test for equality of variance were met as the F statistic was not significant and therefore equal variances were assumed.

i. Physical Functioning and Physical Health

There was a statistical significance found between physical functioning and physical health problems experienced by the participants who needed health care service but did not receive it, (μ= 68.75, SD ± 27.049); (t (147) = 2.301, p=0.023). Participants scored lower on the physical functioning perception experienced physical health problems that were unattended to.

ii. Role Limitation Due to Physical Health and Physical Health

There was no statistical significance found between RLPH and physical health problems experienced by the participants who needed health care service but did not receive it, (μ= 35.05, SD ± 37.989); (t (147) = 1.357, p=0.177). Although it was not statistically significant, participants who answered 'yes' to needing healthcare due to physical health problems scored lower on the RLPH perception.

iii. Bodily Pain and Physical Health

There was a statistical significance found between bodily pain and physical health problems experienced by the participants who needed health care service but did not receive it, (μ= 39.24, SD ± 29.482); (t (147) = 2.221, p=0.028). Participants scored lower on the pain perception (lower score= more pain perception) experienced physical health problems that were unattended to.

Health Perception (HRQOL) and Healthcare Utilization- Emotional Health- T-Test

The third question for health care utilization assessed only the participants who reported 'yes' to the previous health care utilization (unmet healthcare needs) question. Participants were asked if the service they needed at the time when they did not receive the health care was for emotional health problems. The three health perception domains that were tested using t-test analysis were physical functioning, RLPH and bodily pain. Levene's Test for equality of variance were met as the F statistic was not significant and therefore equal variances were assumed.

i. Physical Functioning and Emotional Health

There was no statistical significance found between physical functioning and emotional health problems experienced by the participants who needed health care service but did not receive it, (μ= 70.50, SD ± 23.876); (t (147) = -1.139, p=.257).

ii. Role Limitation Due to Physical Health and Emotional Health

There was no statistical significance found between RLPH and emotional health problems experienced by the participants who needed health care service but did not receive it, μ= 43.75, SD ± 40.028); (t (147) = -1.387, p=.168).

iii. Bodily Pain and Emotional Health

There was no statistical significance found between pain and emotional health problems experienced by the participants who needed health care service but did not receive it, (μ= 46.75, SD ± 31.801); (t (147) = -1.029, p=.305).

3.3.6 What factors contribute to the relationship between BMI and health perception?

Multivariate Multiple Regression Model:

To estimate the variables that influence the relationship between BMI and the three significant health perception domains, a multivariate multiple regression analysis was employed. The following control factors were used: sex, perception of financial change, chronic physical illness, and healthcare utilization. Assumption of multicollinearity was assessed using correlation analysis and collinearity diagnostic statistics. Collinearity statistics were generated for independent, controls and dependent variables (Appendix H). Tolerance values and variance inflation factor (VIF) values were consistently less than 10 across all variables, indicating that the variables included within the model were not highly inter-correlated.

Two models were developed: Model 1 used all the control factors to test which were significant; Model 2: used only the significant factors found in Model 1 to develop a more accurate representation of the variables influencing health perception (HRQOL).

Table 10: Model 1 and Model 2

Variables	Model 1	Model 2
Dependent Variable	• Physical Functioning • Role Limitations Due to Physical Health • Bodily Pain	• Physical Functioning • Role Limitations Due to Physical Health • Bodily Pain
Covariate Independent Variable	• BMI	• BMI
Controls	• Sex • Perception of Financial Change • Chronic Physical Illness • Healthcare Utilization	• Chronic Physical Illness • Healthcare Utilization

Model 1:

As seen in Table 10, Model 1, only two significant fixed factors that predicted a relationship between BMI and the three-health perception (HRQOL) domains are chronic physical illness and health care utilization. BMI (β=-.702, p<0.001) was only found to be significant predictor in physical functioning. BMI was not found significant predictor in RLPH (β=-.528, p=0.068) or bodily pain (β=-.386, p=0.099). Sex and perception of financial change were not seen as significant predictors in any of the three domains.

Chronic physical illness and unmet healthcare needs significance found in Model 1 were further discussed in Model 2.

Table 11: MMR Model 1

Multivariate Multiple Regression: Model 1

Model 1	Physical Functioning [a]	Role Limitations Due to Physical Health [b]	Bodily Pain [c]
	β (F)	β (F)	β (F)
BMI	**-.702 (15.989) ***	-.528 (3.353)	-.386 (2.737)
Sex	2.504 (1.066)	-5.589 (1.967)	-3.084 (.913)
Perception of Financial Change	-4.979 (1.528)	-7.124 (1.583)	-2.788(.620)
Chronic Physical Illness	**18.378 (52.397) ***	**30.383 (53.033) ***	**22.152 (42.982) ***
Healthcare Utilization	**5.184 (4.393) ***	**20.524 (25.496) ***	**17.803 (29.246) ***

**p-value <0.05*
a. R-Squared=.237 (Adjusted R-Squared=.224)
b. R-Squared=.240 (Adjusted R-Squared=.226)
c. R-Squared=.219 (Adjusted R-Squared=.205)

Model 2:

The multivariate multiple regression model showed a significance in Wilk's Lambda (*p*=.001). By removing the two non-significant fixed factors and rerunning the statistical test, a smaller adjustment was seen to the R-Squared and Adjusted R-Squared ensuing that the while taking the factors into the equation the effect size is consistent. Our findings shown in Table 9 indicated that BMI (β=-.698, *p*<0.001), chronic physical illness status (β=18.862, *p*<0.001) and unmet healthcare needs (β= 6.039, *p*=0.014) were significant predictors of PF, accounting for approximately 22% of variance (R^2=.228, F (3,340) =33.49, *p*<0.01). The regression model estimated a .698 decrease in physical functioning perception score for every unit increase in BMI. Participants who reported the presence of chronic physical illness had, on average, an 18.86-point deficit in their physical functioning scores. Similarly, those who reported unmet healthcare needs had a

6.04 deficit in physical functioning scores. Role limitation due to physical health (RLPH) had a 22% (R^2=.228, F (3,340) = 33.47, p<0.01) of variance explained by chronic physical illness (β= 29.839, p<0.001) and unmet healthcare needs (β= 20.839, p<0.001). Participants who reported presence of chronic physical illness had a decreased RLPH score by 29.83 Additionally, their RLPH score decreased by 20.83 for unmet healthcare needs. Approximately 20 % (R^2=.228, F (3,340) = 30.85, p<0.01) of variance in bodily pain is attributed to presence of chronic physical illness (β=21.767, p<0.001) and unmet healthcare needs (β= 17.931, p<0.001). In the presence of chronic physical illness, participants bodily pain score decreased by 21.76. While having unmet healthcare needs decreased their bodily pain score by 17.93. Low bodily pain scores indicate high pain perception.

Table 12: MMR Model 2

Multivariate Multiple Regression: Model 2

Model 2	Physical Functioning [a]	Role Limitations Due to Physical Health [b]	Bodily Pain [c]
	β (F)	β (F)	β (F)
BMI	**-0.698 (16.013) ***	-.476 (2.746)	-.353 (2.332)
Chronic Physical Illness	**18.862 (56.229) ***	**29.839 (51.947) ***	**21.767 (42.517) ***
Healthcare Utilization	**6.039 (6.139) ***	**20.84 (26.988) ***	**17.931 (30.734) ***

**p-value <0.01*
a. R-Squared=.228 (Adjusted R-Squared=.221)
b. R-Squared=.228 (Adjusted R-Squared=.221)
c. R-Squared=.214 (Adjusted R-Squared=.207)

3.3.7 Summary of Results

In summary, the hypothesis originally stated that there will be an inverse relationship between BMI and at least one of the eight domains of health perception. The findings indicate that BMI had a statistically significant inverse relationship with physical

functioning, role limitation due to physical health (RLPH) and bodily pain. Individuals experiencing low perception of perception of financial change reported lower health perception scores, except in one domain, bodily pain. There was a difference in health perception scores in physical functioning, RLPH and bodily pain between individuals who accessed healthcare services and those who did not. Individuals who had unmet healthcare needs scored lower on the health perception scale for the three domains. The follow up question to the participants that did not receive health care when needed was whether the health care services were for a physical health or emotional health concern. It was found that participants that needed treatment for physical health problems scored lower on the physical functioning and bodily pain perception. However, no significance was found for emotional health problems. Lastly, an inverse relationship was found between BMI, physical functioning, healthcare utilization and presence of chronic physical illness. However, BMI was not to be a contributing factor in the relationship between the mediators (healthcare utilization and chronic physical illness) and RLPH or bodily pain.

Chapter 4

4 Discussion

4.1 Summary of Findings

The participant sample included 380 participants with a history of mental illness residing in London, Ontario and surrounding areas. Approximately 62% of the participants also experienced a concurrent chronic physical illness. In addition, over two-thirds of the participants have experienced homelessness at least once in their lifetime. The average mean of BMI among participants was 27.49, falling within the overweight category. According to Statistics Canada (2017), 33.8% of adults living in London are overweight, similar to Ontario average (35.2%); and similar to Canada-wide average (35.8%). The independent variable, BMI was assessed with mediators found in literature such as perception of financial change, presence of chronic physical illness and unmet healthcare needs. Health-related quality of life (HRQOL; health perception) was the dependent variable that was also assessed with the independent variable and mediators.

BMI was found to not be significant between males or females, resulting in only a slightest difference between means, 27.03 and 28.01, respectively. BMI has significant correlations with three of the health perception domains; physical functioning ($r=-.268$, $p<0.01$), role limitations due to physical health ($r=-.147$, $p<0.01$) and pain ($r=-.134$, $p<0.05$). This study looked at the perception of perception of financial change experienced by participants within the year prior to the interview. Results summarized that seven of the eight domains had significance between at least one of the three categories of perception of financial change; worsened, stayed the same or improved. Pain was the only domain to have no statistical significance.

In a simple linear regression model between BMI and heath perception, only physical functioning, RLPH and bodily pain had significance. The moderate negative correlation ($r=-.268$, $p<0.01$) between BMI and physical functioning states that as BMI increases the health perception of physical functioning decreases. As mentioned earlier, lower physical-functioning scores symbolize a negative perception. Participants with higher

BMI experienced higher levels of role of limitations due to physical health (RLPH) as noted by the weak negative correlation ($r=-.147$, $p<0.01$) between BMI and RLPH, however statistically significant. There was a weak negative correlation between BMI and pain ($r=-.134$, $p<0.05$), higher BMI correlates with lower pain scores, lower pain scores indicate that participants experience higher pain perception. There was statistical significance within the SF36 domains. It is important to note the strong positive correlation between physical functioning ($r=.565$, $p<0.01$), RLPH ($r=.594$, $p<0.01$) and pain ($r=.584$, $p<0.01$). These three domains were carried forward for further analysis.

The follow up question to the participants who did not receive health care when needed was whether the health care services were for a physical health or emotional health concern. It was found that participants that needed treatment for physical health problems scored lower on the physical functioning and bodily pain perception. However, no significance was found for emotional health problems.

A multivariate multiple regression model was employed to estimate the variables that influence and/or contribute to the relationship between BMI and the three domains of health perception chosen based on preliminary tests. Sex, perception of financial change, presence of chronic physical illness and unmet needs of healthcare were used in this model. It was found that in addition to BMI, chronic physical illness and unmet needs of healthcare estimate the relationship of a participant's physical functioning resulting in a 22% variance. Model 2 estimated a .698 decrease in physical functioning perception score for every unit increase in BMI. Participants who reported the presence of chronic physical illness had, on average, an 18.86-point decrease in their physical functioning scores and those who reported unmet healthcare needs had a 6.04-point decrease.

Although, significance was seen between BMI and both RLPH and bodily pain in a simple linear regression model, when mediators were added into the equation, no significance was found with BMI. However, the relationship for both RLPH and pain can be explained by the presence of chronic physical illnesses and unmet needs of healthcare. Participants who reported presence of chronic physical illness had a decreased RLPH score by 29.83. Additionally, their RLPH score decreased by 20.83 for unmet healthcare

needs. In the presence of chronic physical illness, participants bodily pain score decreased by 21.76. While having unmet healthcare needs decreased their bodily pain score by 17.93.

4.2 Discussion of Findings

The Short- Form Health Survey (SF-36) is an internationally validated tool used to assess health-related quality of life (HRQOL) among various populations with unique health concerns. This tool is often used in obesity research (Doll et al., 2000; Corica et al., 2006 Castres et al., 2010), however, only a few studies used this tool or a variation of the tool SF-12 with this specific population (Kennedy, Salsberry, Nickel, Hunt & Chipps, 2005; Wang, Sereika, Styn & Burke, 2013). Although SF-36 has a mental health component to assess the mental status of individuals in the general population, it was important to see its assessment against other domains among individuals who were clinically diagnosed with a mental illness. BMI in this study was a continuous, predictor variable, thus, focusing the perception of health on the physical health of individuals with mental illness. The focus of this discussion will be on the alarming results found in this study regarding high BMI, overweight and obesity. As previously mentioned, the mean BMI for this sample was within the overweight range, making them susceptible to obesity and increased risk of cardiovascular disease, diabetes mellitus, stroke, heart disease, some cancers and osteoarthritis.

In this study's findings, higher BMI had a greater negative effect on the physical aspect of quality of life than on the mental aspect. Lower physical health scores maybe due to the stigmatization of having a mental illness, thus, causing negligence of physical health concerns (Metz et al., 2009; Nash, 2013; Lasalvia et al. 2013; Harangozo et al., 2014). It was found that BMI was not significantly correlated with any of the mental health components. Although, other researchers have found correlation with BMI and general health, vitality, role limitations due to emotional health (Castres et al., 2010; Kennedy et al., 2005), our findings do not negate the fact that the participants still reported low scores in similar domains, independent of BMI. In addition, Metz et al. (2009) suggested that reduced mental health scores might be due to stigmatization and social exclusion of being overweight or obese. Similar to Castres, et al. (2010), this study found strong positive

correlation between physical functioning, RLPH and bodily pain. According to Castres et al (2010) the decline of quality of life in physical aspect is caused by higher BMI. However, it should be noted that the statistically significant correlation between BMI and the three physical components of quality of life was only present when no mediators were controlled for, such as perception of financial change, chronic physical illnesses and unmet healthcare needs. When the presence of chronic physical illness and unmet healthcare needs were controlled, BMI remained statistically significant with only physical functioning. Our findings explained that 22% of the variance of physical functioning can be attributed to BMI, presence of chronic physical illness and unmet health care needs. As for RLPH and pain, only the presence of chronic physical illness and unmet healthcare needs contributed to the relationships, BMI was no longer found to be statistically significant when both meditators were controlled for.

One study investigated disease burden on a community diagnosed with severe mental illness which were compared by gender and five chronic illnesses (Kennedy et al., 2005). Individuals with mental illness scored lower on the overall mental health components and physical health compared to the general population in the United States. Similarly, participants in our study also reported lower physical health scores, suggesting that people with mental illness suffer greatly with physical illnesses which impair their quality of life; this finding was consistent across other studies (Corica et al., 2006; Wang et al., 2013). Additionally, lending support to Kennedy, Salsberry and Nickel's (2001) supposition that people with mental illness have problems obtaining quality health care; unmet health care needs was found to be a strong predicator in lower physical functioning scores, bodily pain and RLPH. It was found that majority of the participants needed treatment for a physical health concern but were not able to receive adequate health care, suggesting that low perception of physical functioning may be due to physical health problems not attended to by health care providers. In addition, one study found that when participants accessed health care for concerns or discomfort regarding a physical aliment, they were often overlooked or not prioritized due to the interference of their mental illness (Kennedy et al., 2005). This is known as diagnostic overshadowing; when physical symptoms are attributed to an individual's mental illness (Nash, 2013). This may be problematic because physical health issues may present with psychological

symptoms that are frequently associated with mental illness (Schildkrout, 2011; Wilber, 2006). Furthermore, Kennedy et al. (2005) stated that people with mental illness suffering from chronic physical illnesses reported lower physical component scores than those of the general population with the same chronic physical illnesses. Suggesting that having a mental illness can exacerbate the presence of physical illnesses. Moreover, Doll et al., (2000) found the risk of suffering from long-term illness was associated with increased BMI. Thus, in addition to high BMI, the presence of chronic physical illnesses can greatly deteriorate physical well-being.

Individuals suffering from overweight and obesity experienced more physical health-related limitations than those with lower BMI. Along with our study, BMI was found to be associated with more bodily pain perception and higher role limitations due to physical health. Our results were similar to two studies that found limitations specifically to physical functioning, role limitations and bodily pain (Corica et al., 2006; Wang et al., 2013). Sayer et al., (2005) suggested the correlation between BMI and lower physical health perception and increased bodily pain was due to metabolic abnormalities related to insulin resistance that can decrease muscle strength and reduce physical functioning.

The primary study of this secondary analysis, Community-University Research Alliance (CURA2), examined the interrelationship of poverty and social inclusion among psychiatric survivors/consumers. Psychiatric survivors/consumers struggled with homelessness and poverty as many of them were using social assistance programs such as Ontario Works or Ontario Disability Support Program. Perception of Financial Change was an important mediator to assess as it encompasses quality of life attributes such as physical and psychological health. The majority of the participants in our study perceived their financial status to have worsened or stayed the same within the year prior to the interview. Two studies that investigated perception of financial change in the form of socioeconomic status, have stated that socioeconomic status is a strong predictor in an individual's perception of health-related quality of life (Wang et al., 2011; Zeller et al.,2006). It is important to note that although we found a statistical mean difference between the categories of perception of financial change, it was not a strong mediator between the relationship of BMI and health-related quality of life. However, it remains

evident in the post-hoc results that people with perceived lower financial status reported low perception of quality of life scores.

A study conducted in five cities of China investigated BMI and HRQOL in adults found that participants with pre-obesity had lower physical component scores than their non-obese counterparts (Wang et al., 2011). There were no significance observed in bodily pain, social functioning, role limitations due to emotional problems and mental health scales (Wang et al., 2011). Although this specific study surveyed the public and not specifically people with mental illness, it is noteworthy to emphasize that obesity impairs physical health and is prevalent among people with or without mental illness. On the contrary, a German study investigated obesity and risk for mental disorders in an adult sample did not find psychosocial disadvantages among people with obesity, concluding that obesity is not associated with reduced emotional well-being, instead mental health scores were slightly elevated among this sample (Hach et al., 2006). This was not a consistent finding among other studies in the literature as it is for a very specific sample and data cannot be transferrable to other communities. Even though it was found that obesity was not significantly associated with reduced mental health component, participants still reported low scores on the mental health component. This is an opportunity for more research to be done.

The sex of an individual is another strong moderator found in the literature. Wang et al., (2013) found significance between the two sexes, stating that women had more health-related quality of life impairment compared to men, especially on physical health. Conversely, Kennedy et al. (2005) found that women had notably lower scores than their male counterparts. Women, in Kennedy et al.'s (2005) study, had lower mean scores in the physical health domain and the mental health domain compared to men. The sex of an individual was investigated in our study; however, no significance was found to contribute to the relationship between BMI and health perception. Perhaps, if a statistical analysis of means were conducted between both sexes, a difference may have been seen. Another explanation may be due to the larger sample size of these studies compared to our sample size; even though we had an equal representation of both sexes in our study.

To conclude, high BMI, presence of chronic physical illness and unmet healthcare needs were significant correlates to the relationship between BMI and low physical functioning perception of health-related quality of life among people with mental illness. This finding is supported with Kennedy et al. (2005) research suggesting that participants with mental illness had lower mean score on the physical health component inferring that participants suffering from comorbidity of obesity and mental illness had poorer physical health compared to the general population with mental illness.

The theoretical framework used to drive the analysis of this thesis was Markowitz et al. (2008) and Napolitano et al. (2008) conceptual model on the bidirectional relationship of obesity and mental illness (Gatineau & Dent., 2011). Health is a multidimensional construct with interaction between psychological, social, biological and behavioural mechanisms. The mediator and moderator factors were tested among people with mental illness in London, Ontario, to better understand the relationship between BMI and HRQOL. Biological factors investigated were the presence of chronic physical illness and sex; psychological factors were the health-related quality of life and unmet healthcare needs. The effects of intersectionality supported by the conceptual framework were present in this vulnerable population. Psychiatric survivors/consumers, in this study, have experienced homelessness and/or lower socioeconomic status, with comorbidity of chronic physical health illnesses. Over half of the participants were found to be overweight or obese and have notably reduced health-related quality of life that is attributed to being overweight and/or obese and often lack of adequate health care accessed for their specific needs. This is intersectionality because people who are currently stigmatized and discriminated against within the community are placed at a further disadvantage due to physical illness. The mental and physical comorbidities experienced, along with low perception of financial change and unmet healthcare needs, resulted in low perception of quality of life. Health promotion initiatives need to acknowledge the systemic disadvantage that has caused hindrance among a vulnerable yet marginalized community.

4.3 Healthcare Implications and Recommendations

Implications for Practice and Policy

In this study, high BMI, presence of chronic physical illness and unmet healthcare needs were significant correlates to the relationship between BMI and low physical functioning perception of health-related quality of life among people with mental illness. Participants who reported the presence of chronic physical illness had, on average, an 18.86-point decrease in their physical functioning scores and those who reported unmet healthcare needs had a 6.04-point decrease. Given the complexity of mental and physical health needs of people with mental illness and its interaction of factors influencing both mental and physical health, the mental health system needs to redesign the accessibility, delivery and implementation of health care services for this population. People with mental illness may experience barriers to accessing physical healthcare, and as a result are considerably less likely than the general population to have their physical health needs identified, assessed or treated (Happell et al., 2012). Unmet healthcare needs for physical health problems was a significant finding in this study, illustrating that individuals with mental illness had physical illnesses unattended to and thus affected their perception of physical functioning and bodily pain. Solutions surrounding the accessibility and delivery of patient-centered care is essential in addressing the physical health of individuals with mental illness.

Tailored integrative health care, interdisciplinary research, peer supports, and patient-centered care are recommendations that may help address two prominent health issues at hand, mental health and the physical health. There is a need for population specific, interdisciplinary research to guide integration of mental and physical health care for individuals with mental illness to improve their quality of life. Understanding the complexity of obesity among people with mental illness can ameliorate long-term effects of comorbid mental and physical illnesses. Individuals with mental illnesses have struggled navigating the healthcare system due to fear of discrimination. . Lasalvia et al. (2013) and Harangozo et al., (2014) found that approximately one in five people with mental illness experience stigma when accessing physical healthcare. Providing patient-centered, high-quality physical healthcare for patients with mental illnesses has been a major challenge. Muir-Cochrane (2006) argued that there is a lack of time and recourses to address physical health care needs due to the focus being on the mental status of the

patient. A holistic approach would strongly affect the overall health of individuals with mental illnesses seeking help.

Wang Sereika, Styn and Burke (2013) suggested for healthcare professionals in frontline roles to consider the following strategies for individuals suffering with a mental illness and obesity: reducing barriers to healthy eating, facilitating stress management, enhancing self-efficacy for following a cholesterol-lowering diet and improving problem-solving abilities. In addition, high rates of physical morbidity among patients with bipolar disorder and schizophrenia highlights the need for primary care providers practice holistic approach that addresses physical health needs of individuals with mental illness (Ratcliffe, Dabin, Baker, 2011). Roberts et al. (2007) argued that barriers to physical healthcare should be addressed at the practitioner or service level, rather than focusing on the patient's behaviour of not seeking healthcare. Similarly, Ratcliffe, Dabin and Baker (2011) suggested that primary care organizations, practitioners, mental health services and any stakeholders working with individuals with mental illness, should work together to define practice standards for monitoring physical health for this specific population. Psychiatric nurses are in an excellent position to assist patients with mental illness to avoid and overcome health related issues such as obesity and hypertension and to address poor nutrition, lack of exercise, and smoking. (Kennedy, Salsberry, Nickel, Hunt and Chips, 2005). This will allow patients to vocalize and address chronic physical illnesses that need to be treated at an early stage to improve their quality of life.

Implications for Education

Approaches that promote individuals to be proactive in their health to increase self-efficacy, self-management, that are group-based and peer supported, may be effective for people with mental illness (Sajatvoic et al., 2011). Sajatvoic et al., (2011) suggests an increase in peer support groups as it can improve positive health behaviours among people with mental illness. Optimal care provided to people with mental illness should include concurrent care for mental and physical illnesses, minimization of barriers, maximization of individual's strength and utilization of social environment to promote health (Sajatvoic et al., 2011).

Inform more patient-centered care regarding prescription of antipsychotic medication. Primary care provider and patient need to have an open dialogue about the proper prescription medication with guidance of maintaining a healthy diet. In addition, health literacy is vital in this dialogue, along with full disclosure of side effects including weight gain. Screening and monitoring of physical illnesses through regular checkups needs to be established. Radkhe et al. (2014) suggests that physical, mental and substance use should all be treated concurrently to achieve highest level of recovery.

A 2016 report by the Royal College of Psychiatrists (UK) recommends training and empowering healthcare professionals with necessary tools to ensure they are equipped to treat the physical health of individuals with mental illness. Robson and Gray (2007) suggest monitoring physical health should start alongside any psychiatric treatment. This also includes increasing health literacy, through an open communication about lifestyle interventions throughout the psychiatric treatment (Robson and Gray, 2007).

Implications for Research

This study found that BMI, presence of chronic physical illness and the extent of unmet healthcare needs were significant correlates of the self-perceived physical functioning component of health-related quality of life among people with mental illness. Although findings from this study support the role of biological, psychological, and social factors as significant mediators of BMI and mental illness as proposed by the conceptual framework for BMI and Common Mental illness, more research is needed to investigate the behavioural factors regarding obesity to better inform clinical practice and future research in Canada. Future research should also focus on evaluating integrative healthcare models to address both mental and physical health of individuals with mental illness. While research has yielded important advances in understanding mental illness, knowledge dissemination remains a key factor in implementing a holistic health care system.

4.4 Study Limitations

A limitation presented in this study was the nature of secondary analyses. As previously noted, this study was extracted from Community-University Research Alliance (CURA; Forchuk et al., 2010-2015) exploring the inter-relationship between poverty and social inclusion of psychiatric survivors. Limitations of instruments are another factor to consider. Although a full instrument, SF-36, was used to analyze Health-related Quality of Life, some variables were limited due to the overall aims and objective of the primary study. In addition, BMI was calculated using self-reported weight and the height for the individual. A limitation pertaining to self-reported BMI, is the chance of the data being skewed due to people's tendency to underestimate or overestimate height and body weight. Since the primary objective was not to measure BMI it remains difficult to ensure accuracy of the measurements.

4.5 Conclusion

This study sought to examine the relationship between BMI and perception of health among people with mental illness using a SF-36, a health-related quality of life (HRQOL) instrument. It was critical to investigate the biopsychosocial indicators that may be associated with HRQOL. Hypotheses were drawn from the conceptual model adapted from Markowitz et al. (2008) and Napolitano et al. (2008) on the relationship between obesity and common mental health disorders with mediators and moderators explaining the relationship (Gatineau & Dent., 2011). Markowitz et al. (2008) and Napolitano et al. (2008) proposed this theoretical model as a bidirectional pathway identifying behavioral, cognitive, physiological, and social mechanisms that may potentially elucidate links between obesity and mental illnesses and vice versa. The pathways suggested by Markowitz et al. (2008), and Napolitano et al. (2008) were used to drive the analyses of this study. We tested social factors using socioeconomic status in a form of perceived perception of financial change, psychological factors in a form of perceived health-related quality of life and unmet healthcare needs, biological factors by the presence of chronic physical illnesses and sex. The statistical analyses estimated an inverse relationship between BMI and three HRQOL domains, physical functioning, role limitation due to physical health and bodily pain. It was also discovered that the presence

of chronic physical illnesses and unmet healthcare needs were the only two mediators contributing to the relationship between BMI and physical functioning. Additionally, these two mediators were stronger predictors than BMI for estimating bodily pain and role limitations due to physical health scores. Perception of Financial Change and sex did not result in significant contribution to the relationship between BMI and the three domains. Health implications and recommendations regarding the importance physical health and addressing unmet healthcare needs should be tailored to this specific populations based on the findings of this study.

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Appendices

Appendix A: Descriptive Statistics

SexR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	190	50.0	50.0	50.0
	Female	190	50.0	50.0	100.0
	Total	380	100.0	100.0	

MaritalR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single/Never married	237	62.4	62.4	62.4
	Separated/Divorced	82	21.6	21.6	83.9
	Widowed	12	3.2	3.2	87.1
	Married/Common-law	49	12.9	12.9	100.0
	Total	380	100.0	100.0	

Ed_R

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Grade School	181	47.6	47.6	47.6
	High School	114	30.0	30.0	77.6
	Community College/University	83	21.8	21.8	99.5
	No School	2	.5	.5	100.0
	Total	380	100.0	100.0	

CurrentlyEmployedR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	286	75.3	75.3	75.3
	Yes	94	24.7	24.7	100.0
	Total	380	100.0	100.0	

FinancialAdequacy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Worsened	112	29.5	29.5	29.5
	Stayed the Same	184	48.4	48.4	77.9
	Improved	84	22.1	22.1	100.0
	Total	380	100.0	100.0	

HomelessR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	126	33.2	33.2	33.2
	Yes	254	66.8	66.8	100.0
	Total	380	100.0	100.0	

HealthcareUtili_NeededHealthCareButNotReceived

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	229	60.3	60.6	60.6
	Yes	149	39.2	39.4	100.0
	Total	378	99.5	100.0	
Missing	System	2	.5		
Total		380	100.0		

PsychiatricDiagn_DevelopHandicap

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	371	97.6	97.6	97.6
	Yes	9	2.4	2.4	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_DisorderOfChildhood-Adolescence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	307	80.8	80.8	80.8
	Yes	73	19.2	19.2	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_SubstanceRelatedDisorder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	270	71.1	71.1	71.1
	Yes	110	28.9	28.9	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_Schizophrenia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	292	76.8	76.8	76.8
	Yes	88	23.2	23.2	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_MoodDisorder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	133	35.0	35.0	35.0
	Yes	247	65.0	65.0	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_AnxietyDisorder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	236	62.1	62.1	62.1
	Yes	144	37.9	37.9	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_OrganicDisorder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	378	99.5	99.5	99.5
	Yes	2	.5	.5	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_PersonalityDisorder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	357	93.9	93.9	93.9
	Yes	23	6.1	6.1	100.0
	Total	380	100.0	100.0	

PsychiatricDiagn_Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	345	90.8	90.8	90.8
	Yes	35	9.2	9.2	100.0
	Total	380	100.0	100.0	

PsychiatricHospitalization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	153	40.3	40.3	40.3
	Yes	227	59.7	59.7	100.0
	Total	380	100.0	100.0	

ChronicPhysicalIllness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	144	37.9	37.9	37.9
	Yes	236	62.1	62.1	100.0
	Total	380	100.0	100.0	

Diabetes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	329	86.6	86.6	86.6
	Yes	51	13.4	13.4	100.0
	Total	380	100.0	100.0	

HeartCondition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	351	92.4	92.4	92.4
	Yes	29	7.6	7.6	100.0
	Total	380	100.0	100.0	

Arthritis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	316	83.2	83.2	83.2
	Yes	64	16.8	16.8	100.0
	Total	380	100.0	100.0	

HighBloodPressure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	337	88.7	88.7	88.7
	Yes	43	11.3	11.3	100.0
	Total	380	100.0	100.0	

Cancer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	368	96.8	96.8	96.8
	Yes	12	3.2	3.2	100.0
	Total	380	100.0	100.0	

RespiratoryIllness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	319	83.9	83.9	83.9
	Yes	61	16.1	16.1	100.0
	Total	380	100.0	100.0	

KidnesUrinaryIllness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	367	96.6	96.6	96.6
	Yes	13	3.4	3.4	100.0
	Total	380	100.0	100.0	

HepatitisLiverIllness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	342	90.0	90.0	90.0
	Yes	38	10.0	10.0	100.0
	Total	380	100.0	100.0	

HIVAIDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	378	99.5	99.5	99.5
	Yes	2	.5	.5	100.0
	Total	380	100.0	100.0	

Osteoporosis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	363	95.5	95.5	95.5
	Yes	17	4.5	4.5	100.0
	Total	380	100.0	100.0	

NeurologicalBrainDisorder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	361	95.0	95.0	95.0
	Yes	19	5.0	5.0	100.0
	Total	380	100.0	100.0	

Appendix B: Research Question 1 SPSS Output

Pearson Correlation Coefficient and Simple Linear Regression

Descriptive Statistics

	Mean	Std. Deviation	N
BodyMassIndex	27.4921	6.98077	344
Physical Functioning	77.22	24.658	379
Role Limitations Due to Physical Health	53.63	40.886	379
Role Limitations Due to Emotional Health	45.12	41.241	379
Energy/Vitality	45.68	24.206	379
Emotional Well-Being	56.50	21.856	379
Social Functioning	61.25	28.480	379
Pain	56.89	32.926	379
General Health	46.94	27.503	380

Pearson Correlations

	BodyMass Index	Physical Functioning	Role Limitations Due to Physical Health	Role Limitations Due to Emotional Health	Energy/Vitality	Emotional Well-Being	Social Functioning	Pain	General Health
BodyMassIndex	1	-.268**	-.147**	.042	-.047	.091	-.036	-.134*	-.068
Physical Functioning	-.221**	1	.565	.246	.437	.248	.409	.584	.530
Role Limitations Due to Physical Health	-.147**	.565**	1	.445	.442	.308	.526	.594	.469
Role Limitations Due to Emotional Health	.042	.246**	.445**	1	.448	.531	.538	.299	.387
Energy/Vitality	-.047	.437**	.442**	.448**	1	.704	.626	.420	.604
Emotional Well-Being	.091	.248**	.308**	.531**	.704**	1	.601	.336	.508
Social Functioning	-.036	.409**	.526**	.538**	.626**	.601**	1	.476	.575
Pain	-.134*	.584**	.594**	.299**	.420**	.336**	.476**	1	.481
General Health	-.068	.530**	.469**	.387**	.604**	.508**	.575**	.481**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Descriptive Statistics

	Mean	Std. Deviation	N
Social Functioning	61.12	28.104	344
BodyMassIndex	27.4921	6.98077	344

Correlations

		Social Functioning	BodyMassIndex
Pearson Correlation	Social Functioning	1.000	-.036
	BodyMassIndex	-.036	1.000
Sig. (1-tailed)	Social Functioning	.	.252
	BodyMassIndex	.252	.
N	Social Functioning	344	344
	BodyMassIndex	344	344

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	BodyMassIndex[b]	.	Enter

a. Dependent Variable: Social Functioning

b. All requested variables entered.

Model Summary

					Change Statistic		
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1
1	.036[a]	.001	-.002	28.126	.001	.448	1

a. Predictors: (Constant), BodyMassIndex

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	354.616	1	354.616	.448	.504[b]

	Residual	270551.997	342	791.088		
	Total	270906.613	343			

a. Dependent Variable: Social Functioning

b. Predictors: (Constant), BodyMassIndex

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			
		B	Std. Error	Beta	t	Sig.	Zero-orde
1	(Constant)	65.124	6.170		10.555	.000	
	BodyMassIndex	-.146	.218	-.036	-.670	.504	-.0

a. Dependent Variable: Social Functioning

Appendix C: Research Question 2 SPSS Output

Descriptive Statistics

	Mean	Std. Deviation	N
BodyMassIndex	27.4921	6.98077	344
Role Limitations Due to Physical Health	53.05	41.052	344
Role Limitations Due to Emotional Health	44.77	40.865	344
Physical Functioning	77.17	24.944	344
Energy/Vitality	45.48	24.191	344
Emotional Well-Being	56.31	21.618	344
Social Functioning	61.12	28.104	344
Pain	56.03	32.804	344
General Health	46.31	27.281	344

Correlations

		BMI	Role Limitations Due to Physical Health	Role Limitations Due to Emotional Health	Physical Functioning	Energy/Vitality	Emotional Well-Being	Social Functioning	Pain	General Health
Pearson Correlation	BodyMassIndex	1.000	-.147	.042	-.268	-.047	.091	-.036	-.134	-.068
	Role Limitations Due to Physical Health	-.147	1.000	.430	.573	.441	.305	.519	.589	.477
	Role Limitations Due to Emotional Health	.042	.430	1.000	.233	.433	.529	.533	.287	.373
	Physical Functioning	-.268	.573	.233	1.000	.443	.253	.405	.586	.538
	Energy/Vitality	-.047	.441	.433	.443	1.000	.690	.605	.416	.591
	Emotional Well-Being	.091	.305	.529	.253	.690	1.000	.586	.329	.494
	Social Functioning	-.036	.519	.533	.405	.605	.586	1.000	.469	.545
	Pain	-.134	.589	.287	.586	.416	.329	.469	1.000	.478
	General Health	-.068	.477	.373	.538	.591	.494	.545	.478	1.000

Sig. (1-tailed)	BodyMassIndex	.	.003	.221	.000	.191	.047	.252	.006	.104
	Role Limitations Due to Physical Health	.003	.	.000	.000	.000	.000	.000	.000	.000
	Role Limitations Due to Emotional Health	.221	.000	.	.000	.000	.000	.000	.000	.000
	Physical Functioning	.000	.000	.000	.	.000	.000	.000	.000	.000
	Energy/Vitality	.191	.000	.000	.000	.	.000	.000	.000	.000
	Emotional Well-Being	.047	.000	.000	.000	.000	.	.000	.000	.000
	Social Functioning	.252	.000	.000	.000	.000	.000	.	.000	.000
	Pain	.006	.000	.000	.000	.000	.000	.000	.	.000
	General Health	.104	.000	.000	.000	.000	.000	.000	.000	.
N	BodyMassIndex	344	344	344	344	344	344	344	344	344
	Role Limitations Due to Physical Health	344	344	344	344	344	344	344	344	344
	Role Limitations Due to Emotional Health	344	344	344	344	344	344	344	344	344
	Physical Functioning	344	344	344	344	344	344	344	344	344
	Energy/Vitality	344	344	344	344	344	344	344	344	344
	Emotional Well-Being	344	344	344	344	344	344	344	344	344
	Social Functioning	344	344	344	344	344	344	344	344	344
	Pain	344	344	344	344	344	344	344	344	344
	General Health	344	344	344	344	344	344	344	344	344

Appendix D: Research Question 3 SPSS Output

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Physical Functioning	Between Groups	3736.655	2	1868.327	3.107	.046
	Within Groups	226101.604	376	601.334		
	Total	229838.259	378			
Role Limitations Due to Physical Health	Between Groups	10379.248	2	5189.624	3.140	.044
	Within Groups	621507.296	376	1652.945		
	Total	631886.544	378			
Role Limitations Due to Emotional Health	Between Groups	44195.776	2	22097.888	13.878	.000
	Within Groups	598718.326	376	1592.336		
	Total	642914.101	378			
Energy/Vitality	Between Groups	12785.029	2	6392.515	11.517	.000
	Within Groups	208702.775	376	555.061		
	Total	221487.804	378			
Emotional Well-Being	Between Groups	13833.170	2	6916.585	15.598	.000
	Within Groups	166731.579	376	443.435		
	Total	180564.749	378			
Social Functioning	Between Groups	14689.317	2	7344.659	9.461	.000
	Within Groups	291902.866	376	776.337		
	Total	306592.183	378			
Pain	Between Groups	3253.222	2	1626.611	1.504	.223
	Within Groups	406547.899	376	1081.244		
	Total	409801.121	378			
General Health	Between Groups	17830.720	2	8915.360	12.502	.000
	Within Groups	268847.323	377	713.123		
	Total	286678.043	379			

Post Hoc Tests

Multiple Comparisons

Dependent Variable		(I) Delta_FinancialAdequacy	(J) Delta_FinancialAdequacy	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Physical Functioning	Bonferroni	Worsened	Stayed the Same	-3.251	2.939	.808	-10.32	3.82
			Improved	-8.825*	3.552	.040	-17.37	-.28
		Stayed the Same	Worsened	3.251	2.939	.808	-3.82	10.32
			Improved	-5.574	3.242	.259	-13.37	2.22
		Improved	Worsened	8.825*	3.552	.040	.28	17.37
			Stayed the Same	5.574	3.242	.259	-2.22	13.37
	Sidak	Worsened	Stayed the Same	-3.251	2.939	.610	-10.30	3.80
			Improved	-8.825*	3.552	.040	-17.34	-.31
		Stayed the Same	Worsened	3.251	2.939	.610	-3.80	10.30
			Improved	-5.574	3.242	.238	-13.35	2.20
		Improved	Worsened	8.825*	3.552	.040	.31	17.34
			Stayed the Same	5.574	3.242	.238	-2.20	13.35
Role Limitations Due to Physical Health	Bonferroni	Worsened	Stayed the Same	-10.219	4.873	.110	-21.94	1.50
			Improved	-13.277	5.888	.074	-27.44	.88
		Stayed the Same	Worsened	10.219	4.873	.110	-1.50	21.94
			Improved	-3.058	5.376	1.000	-15.99	9.87
		Improved	Worsened	13.277	5.888	.074	-.88	27.44
			Stayed the Same	3.058	5.376	1.000	-9.87	15.99
	Sidak	Worsened	Stayed the Same	-10.219	4.873	.106	-21.91	1.47
			Improved	-13.277	5.888	.072	-27.40	.85
		Stayed the Same	Worsened	10.219	4.873	.106	-1.47	21.91
			Improved	-3.058	5.376	.920	-15.95	9.84
		Improved	Worsened	13.277	5.888	.072	-.85	27.40
			Stayed the Same	3.058	5.376	.920	-9.84	15.95
Role Limitations Due to Emotional Health	Bonferroni	Worsened	Stayed the Same	-21.131*	4.782	.000	-32.63	-9.63
			Improved	-27.356*	5.779	.000	-41.25	-13.46
		Stayed the Same	Worsened	21.131*	4.782	.000	9.63	32.63
			Improved	-6.225	5.276	.716	-18.91	6.46
		Improved	Worsened	27.356*	5.779	.000	13.46	41.25
			Stayed the Same	6.225	5.276	.716	-6.46	18.91

	Sidak	Worsened	Stayed the Same	-21.131*	4.782	.000	-32.60	-9.66
			Improved	-27.356*	5.779	.000	-41.22	-13.49
		Stayed the Same	Worsened	21.131*	4.782	.000	9.66	32.60
			Improved	-6.225	5.276	.559	-18.88	6.43
		Improved	Worsened	27.356*	5.779	.000	13.49	41.22
			Stayed the Same	6.225	5.276	.559	-6.43	18.88
Energy/Vitality	Bonferroni	Worsened	Stayed the Same	-11.751*	2.824	.000	-18.54	-4.96
			Improved	-14.299*	3.412	.000	-22.50	-6.09
		Stayed the Same	Worsened	11.751*	2.824	.000	4.96	18.54
			Improved	-2.549	3.115	1.000	-10.04	4.94
		Improved	Worsened	14.299*	3.412	.000	6.09	22.50
			Stayed the Same	2.549	3.115	1.000	-4.94	10.04
	Sidak	Worsened	Stayed the Same	-11.751*	2.824	.000	-18.52	-4.98
			Improved	-14.299*	3.412	.000	-22.48	-6.12
		Stayed the Same	Worsened	11.751*	2.824	.000	4.98	18.52
			Improved	-2.549	3.115	.799	-10.02	4.92
		Improved	Worsened	14.299*	3.412	.000	6.12	22.48
			Stayed the Same	2.549	3.115	.799	-4.92	10.02
Emotional Well-Being	Bonferroni	Worsened	Stayed the Same	-13.071*	2.524	.000	-19.14	-7.00
			Improved	-13.593*	3.050	.000	-20.93	-6.26
		Stayed the Same	Worsened	13.071*	2.524	.000	7.00	19.14
			Improved	-.521	2.784	1.000	-7.22	6.17
		Improved	Worsened	13.593*	3.050	.000	6.26	20.93
			Stayed the Same	.521	2.784	1.000	-6.17	7.22
	Sidak	Worsened	Stayed the Same	-13.071*	2.524	.000	-19.12	-7.02
			Improved	-13.593*	3.050	.000	-20.91	-6.28
		Stayed the Same	Worsened	13.071*	2.524	.000	7.02	19.12
			Improved	-.521	2.784	.997	-7.20	6.16
		Improved	Worsened	13.593*	3.050	.000	6.28	20.91
			Stayed the Same	.521	2.784	.997	-6.16	7.20
Social Functioning	Bonferroni	Worsened	Stayed the Same	-13.136*	3.339	.000	-21.17	-5.11
			Improved	-14.591*	4.035	.001	-24.30	-4.89
		Stayed the Same	Worsened	13.136*	3.339	.000	5.11	21.17
			Improved	-1.455	3.684	1.000	-10.31	7.40
		Improved	Worsened	14.591*	4.035	.001	4.89	24.30
			Stayed the Same	1.455	3.684	1.000	-7.40	10.31
	Sidak	Worsened	Stayed the Same	-13.136*	3.339	.000	-21.14	-5.13
			Improved	-14.591*	4.035	.001	-24.27	-4.91

		Stayed the Same	Worsened	13.136*	3.339	.000	5.13	21.14
			Improved	-1.455	3.684	.971	-10.29	7.38
		Improved	Worsened	14.591*	4.035	.001	4.91	24.27
			Stayed the Same	1.455	3.684	.971	-7.38	10.29
Pain	Bonferroni	Worsened	Stayed the Same	-6.330	3.941	.327	-15.81	3.15
			Improved	-6.610	4.762	.498	-18.06	4.84
		Stayed the Same	Worsened	6.330	3.941	.327	-3.15	15.81
			Improved	-.280	4.348	1.000	-10.74	10.18
		Improved	Worsened	6.610	4.762	.498	-4.84	18.06
			Stayed the Same	.280	4.348	1.000	-10.18	10.74
	Sidak	Worsened	Stayed the Same	-6.330	3.941	.293	-15.78	3.12
			Improved	-6.610	4.762	.420	-18.03	4.81
		Stayed the Same	Worsened	6.330	3.941	.293	-3.12	15.78
			Improved	-.280	4.348	1.000	-10.71	10.15
		Improved	Worsened	6.610	4.762	.420	-4.81	18.03
			Stayed the Same	.280	4.348	1.000	-10.15	10.71
General Health	Bonferroni	Worsened	Stayed the Same	-10.093*	3.200	.005	-17.79	-2.40
			Improved	-19.085*	3.854	.000	-28.35	-9.82
		Stayed the Same	Worsened	10.093*	3.200	.005	2.40	17.79
			Improved	-8.992*	3.516	.033	-17.45	-.54
		Improved	Worsened	19.085*	3.854	.000	9.82	28.35
			Stayed the Same	8.992*	3.516	.033	.54	17.45
	Sidak	Worsened	Stayed the Same	-10.093*	3.200	.005	-17.77	-2.42
			Improved	-19.085*	3.854	.000	-28.33	-9.84
		Stayed the Same	Worsened	10.093*	3.200	.005	2.42	17.77
			Improved	-8.992*	3.516	.032	-17.43	-.56
		Improved	Worsened	19.085*	3.854	.000	9.84	28.33
			Stayed the Same	8.992*	3.516	.032	.56	17.43

*. The mean difference is significant at the 0.05 level.

Oneway
Post Hoc Tests

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Delta_Financial Adequacy	(J) Delta_FinancialAdequacy	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Physical Functioning	Worsened	Stayed the Same	-3.251	2.939	.511	-10.17	3.66
		Improved	-8.825*	3.552	.036	-17.18	-.47
	Stayed the Same	Worsened	3.251	2.939	.511	-3.66	10.17
		Improved	-5.574	3.242	.199	-13.20	2.06
	Improved	Worsened	8.825*	3.552	.036	.47	17.18
		Stayed the Same	5.574	3.242	.199	-2.06	13.20
Role Limitations Due to Physical Health	Worsened	Stayed the Same	-10.219	4.873	.092	-21.68	1.25
		Improved	-13.277	5.888	.064	-27.13	.58
	Stayed the Same	Worsened	10.219	4.873	.092	-1.25	21.68
		Improved	-3.058	5.376	.837	-15.71	9.59
	Improved	Worsened	13.277	5.888	.064	-.58	27.13
		Stayed the Same	3.058	5.376	.837	-9.59	15.71
Role Limitations Due to Emotional Health	Worsened	Stayed the Same	-21.131*	4.782	.000	-32.38	-9.88
		Improved	-27.356*	5.779	.000	-40.96	-13.76
	Stayed the Same	Worsened	21.131*	4.782	.000	9.88	32.38
		Improved	-6.225	5.276	.466	-18.64	6.19
	Improved	Worsened	27.356*	5.779	.000	13.76	40.96
		Stayed the Same	6.225	5.276	.466	-6.19	18.64
Energy/Vitality	Worsened	Stayed the Same	-11.751*	2.824	.000	-18.39	-5.11
		Improved	-14.299*	3.412	.000	-22.33	-6.27
	Stayed the Same	Worsened	11.751*	2.824	.000	5.11	18.39
		Improved	-2.549	3.115	.692	-9.88	4.78
	Improved	Worsened	14.299*	3.412	.000	6.27	22.33
		Stayed the Same	2.549	3.115	.692	-4.78	9.88
Emotional Well-Being	Worsened	Stayed the Same	-13.071*	2.524	.000	-19.01	-7.13
		Improved	-13.593*	3.050	.000	-20.77	-6.42
	Stayed the Same	Worsened	13.071*	2.524	.000	7.13	19.01
		Improved	-.521	2.784	.981	-7.07	6.03
	Improved	Worsened	13.593*	3.050	.000	6.42	20.77

		Stayed the Same	.521	2.784	.981	-6.03	7.07
Social Functioning	Worsened	Stayed the Same	-13.136*	3.339	.000	-20.99	-5.28
		Improved	-14.591*	4.035	.001	-24.09	-5.10
	Stayed the Same	Worsened	13.136*	3.339	.000	5.28	20.99
		Improved	-1.455	3.684	.918	-10.12	7.21
	Improved	Worsened	14.591*	4.035	.001	5.10	24.09
		Stayed the Same	1.455	3.684	.918	-7.21	10.12
Pain	Worsened	Stayed the Same	-6.330	3.941	.244	-15.60	2.94
		Improved	-6.610	4.762	.348	-17.82	4.60
	Stayed the Same	Worsened	6.330	3.941	.244	-2.94	15.60
		Improved	-.280	4.348	.998	-10.51	9.95
	Improved	Worsened	6.610	4.762	.348	-4.60	17.82
		Stayed the Same	.280	4.348	.998	-9.95	10.51
General Health	Worsened	Stayed the Same	-10.093*	3.200	.005	-17.62	-2.56
		Improved	-19.085*	3.854	.000	-28.15	-10.02
	Stayed the Same	Worsened	10.093*	3.200	.005	2.56	17.62
		Improved	-8.992*	3.516	.029	-17.27	-.72
	Improved	Worsened	19.085*	3.854	.000	10.02	28.15
		Stayed the Same	8.992*	3.516	.029	.72	17.27

*. The mean difference is significant at the 0.05 level.

Appendix E: Research Question 4 SPSS Output

Group Statistics

	HCUtil8_NeededHealthCareButNotReceived	N	Mean	Std. Deviation	Std. Error Mean
BodyMassIndex	No	203	27.6715	6.71272	.47114
	Yes	141	27.2339	7.36624	.62035

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Eq			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
BodyMassIndex	Equal variances assumed	.777	.379	.571	342	.568	.43760
	Equal variances not assumed			.562	282.860	.575	.43760

Appendix F: Research Question 5 SPSS Output

T-Test

Group Statistics

	HCUtil8_NeededHealthCareBut NotReceived	N	Mean	Std. Deviation	Std. Error Mean
Physical Functioning	No	229	80.26	23.376	1.545
	Yes	149	72.55	25.978	2.128
Role Limitations Due to Physical Health	No	229	63.32	39.355	2.601
	Yes	149	38.42	38.612	3.163
Pain	No	229	65.35	31.410	2.076
	Yes	149	43.59	30.784	2.522

Independent Samples Test

		Levene's Test for Equality of Variances: F	Sig.	t	df	Sig. (2-tailed)
Physical Functioning	Equal variances assumed	2.966	.086	2.999	376	.003
	Equal variances not assumed			2.933	292.345	.004
Role Limitations Due to Physical Health	Equal variances assumed	.178	.673	6.055	376	.000
	Equal variances not assumed			6.080	320.609	.000
Pain	Equal variances assumed	.293	.589	6.633	376	.000
	Equal variances not assumed			6.662	320.852	.000

T-Test

Group Statistics

	HCUtil10_PhysicalHealthProbR	N	Mean	Std. Deviation	Std. Error Mean

Physical Functioning	No	57	78.68	23.078	3.057
	Yes	92	68.75	27.049	2.820
Role Limitations Due to Physical Health	No	57	43.86	39.325	5.209
	Yes	92	35.05	37.989	3.961
Pain	No	57	50.61	31.793	4.211
	Yes	92	39.24	29.482	3.074

Independent Samples Test

		Levene's Test for Equality of Variances		t	df	Sig. (2-tailed)
		F	Sig.			
Physical Functioning	Equal variances assumed	3.071	.082	2.301	147	.023
	Equal variances not assumed			2.389	132.725	.018
Role Limitations Due to Physical Health	Equal variances assumed	.285	.594	1.357	147	.177
	Equal variances not assumed			1.346	115.679	.181
Pain	Equal variances assumed	.729	.395	2.221	147	.028
	Equal variances not assumed			2.182	112.003	.031

T-Test

Group Statistics

	HCUtil10_EmotMHProbR	N	Mean	Std. Deviation	Std. Error Mean
Physical Functioning	No	89	70.56	27.256	2.889
	Yes	60	75.50	23.876	3.082
Role Limitations Due to Physical Health	No	89	34.83	37.428	3.967
	Yes	60	43.75	40.028	5.168
Pain	No	89	41.46	30.073	3.188
	Yes	60	46.75	31.801	4.105

Independent Samples Test

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed
Physical Functioning	Equal variances assumed	2.501	.116	-1.139	147	.257
	Equal variances not assumed			-1.169	137.203	.244
Role Limitations Due to Physical Health	Equal variances assumed	1.363	.245	-1.387	147	.168
	Equal variances not assumed			-1.369	120.890	.174
Pain	Equal variances assumed	.118	.731	-1.029	147	.305
	Equal variances not assumed			-1.018	121.883	.311

Appendix G: Research Question 6 SPSS Output

Collinearity Diagnostic (VIF)

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Sex	.963	1.039
	FinancialAdequacy	.981	1.019
	ChronicPhysicalIllness	.921	1.086
	HealthcareUtili_NeededHealthCareButNotReceived	.958	1.044
	BodyMassIndex	.951	1.052

a. Dependent Variable: Physical Functioning

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	Sex	FinancialAdequacy
1	1	4.349	1.000	.00	.02	.01
	2	.582	2.734	.00	.04	.21
	3	.473	3.033	.00	.73	.06
	4	.374	3.409	.00	.17	.20
	5	.193	4.742	.06	.04	.47
	6	.029	12.309	.94	.00	.04

Collinearity Diagnostics[a]

Model	Dimension	Variance Proportions		
		ChronicPhysicalIllness	HealthcareUtili_NeededHealthCareButNotReceived	BodyMassIndex
1	1	.01	.02	.00
	2	.00	.56	.00
	3	.00	.28	.00
	4	.58	.09	.00
	5	.40	.03	.09
	6	.00	.03	.90

a. Dependent Variable: Physical Functioning

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Sex	.963	1.039
	FinancialAdequacy	.981	1.019
	ChronicPhysicalIllness	.921	1.086
	HealthcareUtili_NeededHealthCareButNotReceived	.958	1.044
	BodyMassIndex	.951	1.052

a. Dependent Variable: Role Limitations Due to Physical Health

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Sex	FinancialAdequacy
1	1	4.349	1.000	.00	.02	.01
	2	.582	2.734	.00	.04	.21
	3	.473	3.033	.00	.73	.06
	4	.374	3.409	.00	.17	.20
	5	.193	4.742	.06	.04	.47
	6	.029	12.309	.94	.00	.04

Collinearity Diagnostics[a]

Model	Dimension	Variance Proportions ChronicPhysicalIllness	HealthcareUtili_NeededHealthCareButNotReceived	BodyMassIndex
1	1	.01	.02	.00
	2	.00	.56	.00
	3	.00	.28	.00
	4	.58	.09	.00
	5	.40	.03	.09
	6	.00	.03	.90

a. Dependent Variable: Role Limitations Due to Physical Health

Coefficients[a]

Model		Collinearity Statistics Tolerance	VIF
1	Sex	.963	1.039
	FinancialAdequacy	.981	1.019
	ChronicPhysicalIllness	.921	1.086
	HealthcareUtili_NeededHealthCareButNotReceived	.958	1.044
	BodyMassIndex	.951	1.052

a. Dependent Variable: Pain

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Sex	FinancialAdequacy
1	1	4.349	1.000	.00	.02	.01
	2	.582	2.734	.00	.04	.21
	3	.473	3.033	.00	.73	.06
	4	.374	3.409	.00	.17	.20
	5	.193	4.742	.06	.04	.47
	6	.029	12.309	.94	.00	.04

Collinearity Diagnostics[a]

Model	Dimension	Variance Proportions ChronicPhysicalIllness	HealthcareUtili_NeededHealthCareButNotReceived	BodyMassIndex
1	1	.01	.02	.00
	2	.00	.56	.00
	3	.00	.28	.00
	4	.58	.09	.00
	5	.40	.03	.09
	6	.00	.03	.90

a. Dependent Variable: Pain

General Linear Model 1

Between-Subjects Factors

		Value Label	N
Sex	0	Male	183
	1	Female	161
FinancialAdequacy	.00	Worsened	105
	1.00	Stayed the Same	162
	2.00	Improved	77
ChronicPhysicalIllness	0	No	133
	1	Yes	211
HealthcareUtili_NeededHealthC	.00	No	203
areButNotReceived	1.00	Yes	141

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.544	133.368[b]	3.000	335.000	.000
	Wilks' Lambda	.456	133.368[b]	3.000	335.000	.000
	Hotelling's Trace	1.194	133.368[b]	3.000	335.000	.000
	Roy's Largest Root	1.194	133.368[b]	3.000	335.000	.000
Sex	Pillai's Trace	.020	2.261[b]	3.000	335.000	.081
	Wilks' Lambda	.980	2.261[b]	3.000	335.000	.081
	Hotelling's Trace	.020	2.261[b]	3.000	335.000	.081
	Roy's Largest Root	.020	2.261[b]	3.000	335.000	.081
FinancialAdequacy	Pillai's Trace	.013	.748	6.000	672.000	.611
	Wilks' Lambda	.987	.747[b]	6.000	670.000	.612
	Hotelling's Trace	.013	.747	6.000	668.000	.612
	Roy's Largest Root	.012	1.398[c]	3.000	336.000	.243
ChronicPhysicalIllness	Pillai's Trace	.185	25.319[b]	3.000	335.000	.000
	Wilks' Lambda	.815	25.319[b]	3.000	335.000	.000
	Hotelling's Trace	.227	25.319[b]	3.000	335.000	.000
	Roy's Largest Root	.227	25.319[b]	3.000	335.000	.000
HealthcareUtili_NeededHealth CareButNotReceived	Pillai's Trace	.106	13.270[b]	3.000	335.000	.000
	Wilks' Lambda	.894	13.270[b]	3.000	335.000	.000
	Hotelling's Trace	.119	13.270[b]	3.000	335.000	.000
	Roy's Largest Root	.119	13.270[b]	3.000	335.000	.000
BodyMassIndex	Pillai's Trace	.046	5.349[b]	3.000	335.000	.001
	Wilks' Lambda	.954	5.349[b]	3.000	335.000	.001
	Hotelling's Trace	.048	5.349[b]	3.000	335.000	.001
	Roy's Largest Root	.048	5.349[b]	3.000	335.000	.001

a. Design: Intercept + Sex + FinancialAdequacy + ChronicPhysicalIllness + HealthcareUtili_NeededHealthCareButNotReceived + BodyMassIndex
b. Exact statistic
c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Tests of Between-Subjects Effects

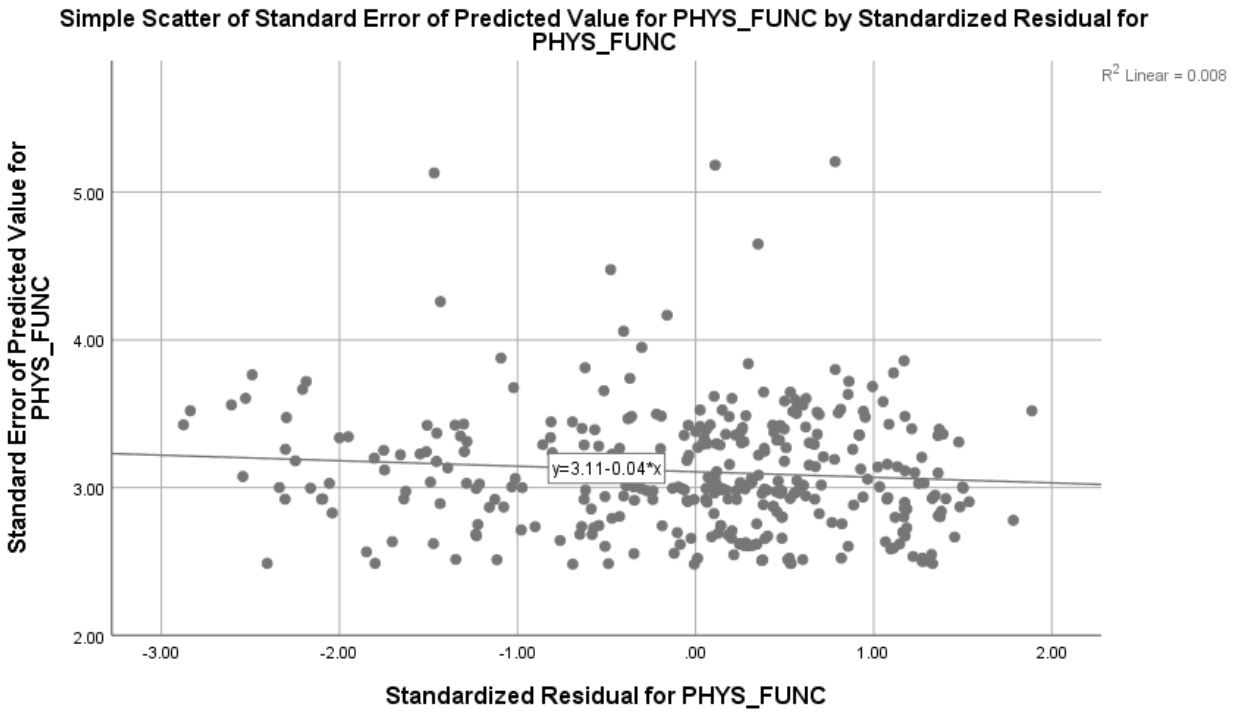
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Physical Functioning	50684.424[a]	6	8447.404	17.494	.000
	Role Limitations Due to Physical Health	138598.013[b]	6	23099.669	17.715	.000
	Pain	80879.875[c]	6	13479.979	15.761	.000
Intercept	Physical Functioning	193659.930	1	193659.930	401.060	.000
	Role Limitations Due to Physical Health	96238.650	1	96238.650	73.803	.000
	Pain	91688.687	1	91688.687	107.203	.000
Sex	Physical Functioning	514.948	1	514.948	1.066	.302
	Role Limitations Due to Physical Health	2565.334	1	2565.334	1.967	.162
	Pain	781.297	1	781.297	.913	.340
FinancialAdequacy	Physical Functioning	1476.112	2	738.056	1.528	.218
	Role Limitations Due to Physical Health	4129.257	2	2064.628	1.583	.207
	Pain	1060.629	2	530.315	.620	.539
ChronicPhysicalIllness	Physical Functioning	25301.073	1	25301.073	52.397	.000
	Role Limitations Due to Physical Health	69155.208	1	69155.208	53.033	.000
	Pain	36761.438	1	36761.438	42.982	.000
HealthcareUtili_NeededHealth CareButNotReceived	Physical Functioning	2121.130	1	2121.130	4.393	.037
	Role Limitations Due to Physical Health	33246.752	1	33246.752	25.496	.000
	Pain	25013.808	1	25013.808	29.246	.000
BodyMassIndex	Physical Functioning	7720.502	1	7720.502	15.989	.000
	Role Limitations Due to Physical Health	4372.258	1	4372.258	3.353	.068
	Pain	2340.756	1	2340.756	2.737	.099
Error	Physical Functioning	162727.131	337	482.870		
	Role Limitations Due to Physical Health	439447.045	337	1303.997		
	Pain	288228.773	337	855.278		
Total	Physical Functioning	2261775.000	344			
	Role Limitations Due to Physical Health	1546250.000	344			
	Pain	1449125.000	344			
Corrected Total	Physical Functioning	213411.555	343			
	Role Limitations Due to Physical Health	578045.058	343			
	Pain	369108.648	343			

a. R Squared = .237 (Adjusted R Squared = .224)
b. R Squared = .240 (Adjusted R Squared = .226)
c. R Squared = .219 (Adjusted R Squared = .205)

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Physical Functioning	Intercept	86.812	5.846	14.851	.000	75.314	98.310
	[Sex=0]	2.504	2.425	1.033	.302	-2.266	7.274
	[Sex=1]	0[a]	.	.	.	.	.
	[FinancialAdequacy=.00]	-4.979	3.329	-1.495	.136	-11.528	1.570
	[FinancialAdequacy=1.00]	-.692	3.088	-.224	.823	-6.767	5.383
	[FinancialAdequacy=2.00]	0[a]	.	.	.	.	.
	[ChronicPhysicalIllness=0]	18.378	2.539	7.239	.000	13.384	23.372
	[ChronicPhysicalIllness=1]	0[a]	.	.	.	.	.
	[HealthcareUtili_NeededHealthCareButNotReceived=.00]	5.184	2.473	2.096	.037	.319	10.050
	[HealthcareUtili_NeededHealthCareButNotReceived=1.00]	0[a]	.	.	.	.	.
	BodyMassIndex	-.702	.176	-3.999	.000	-1.047	-.357
Role Limitations Due to Physical Health	Intercept	48.537	9.606	5.053	.000	29.642	67.433
	[Sex=0]	-5.589	3.985	-1.403	.162	-13.427	2.249
	[Sex=1]	0[a]	.	.	.	.	.
	[FinancialAdequacy=.00]	-7.124	5.471	-1.302	.194	-17.886	3.637
	[FinancialAdequacy=1.00]	.693	5.075	.137	.891	-9.290	10.677
	[FinancialAdequacy=2.00]	0[a]	.	.	.	.	.
	[ChronicPhysicalIllness=0]	30.383	4.172	7.282	.000	22.176	38.590
	[ChronicPhysicalIllness=1]	0[a]	.	.	.	.	.
	[HealthcareUtili_NeededHealthCareButNotReceived=.00]	20.524	4.065	5.049	.000	12.529	28.520
	[HealthcareUtili_NeededHealthCareButNotReceived=1.00]	0[a]	.	.	.	.	.
	BodyMassIndex	-.528	.288	-1.831	.068	-1.096	.039
Pain	Intercept	49.448	7.780	6.356	.000	34.145	64.751
	[Sex=0]	-3.084	3.227	-.956	.340	-9.432	3.264
	[Sex=1]	0[a]	.	.	.	.	.
	[FinancialAdequacy=.00]	-2.788	4.431	-.629	.530	-11.503	5.928
	[FinancialAdequacy=1.00]	1.341	4.110	.326	.744	-6.744	9.426
	[FinancialAdequacy=2.00]	0[a]	.	.	.	.	.
	[ChronicPhysicalIllness=0]	22.152	3.379	6.556	.000	15.506	28.798
	[ChronicPhysicalIllness=1]	0[a]	.	.	.	.	.
	[HealthcareUtili_NeededHealthCareButNotReceived=.00]	17.803	3.292	5.408	.000	11.327	24.278
	[HealthcareUtili_NeededHealthCareButNotReceived=1.00]	0[a]	.	.	.	.	.
	BodyMassIndex	-.386	.234	-1.654	.099	-.846	.073

a. This parameter is set to zero because it is redundant.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R² Linear = 0.008
Standard Error of Predicted Value for PHYS_FUNC
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4.00
3.00
2.00
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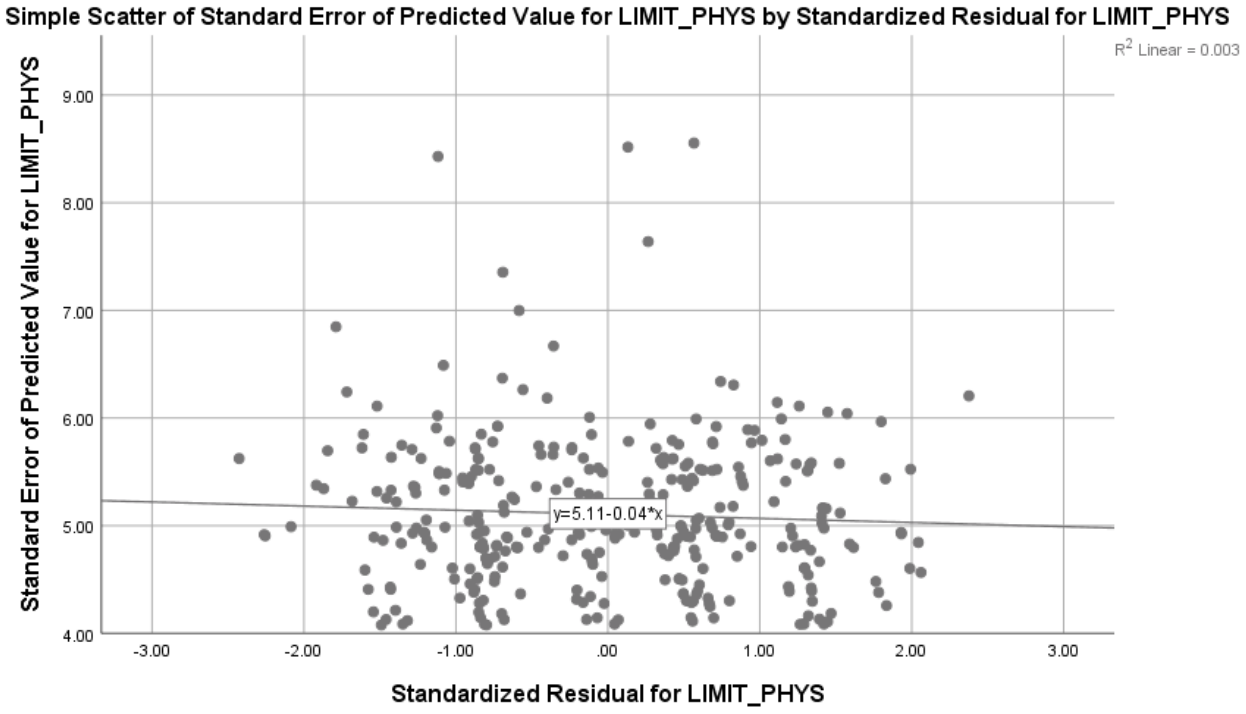
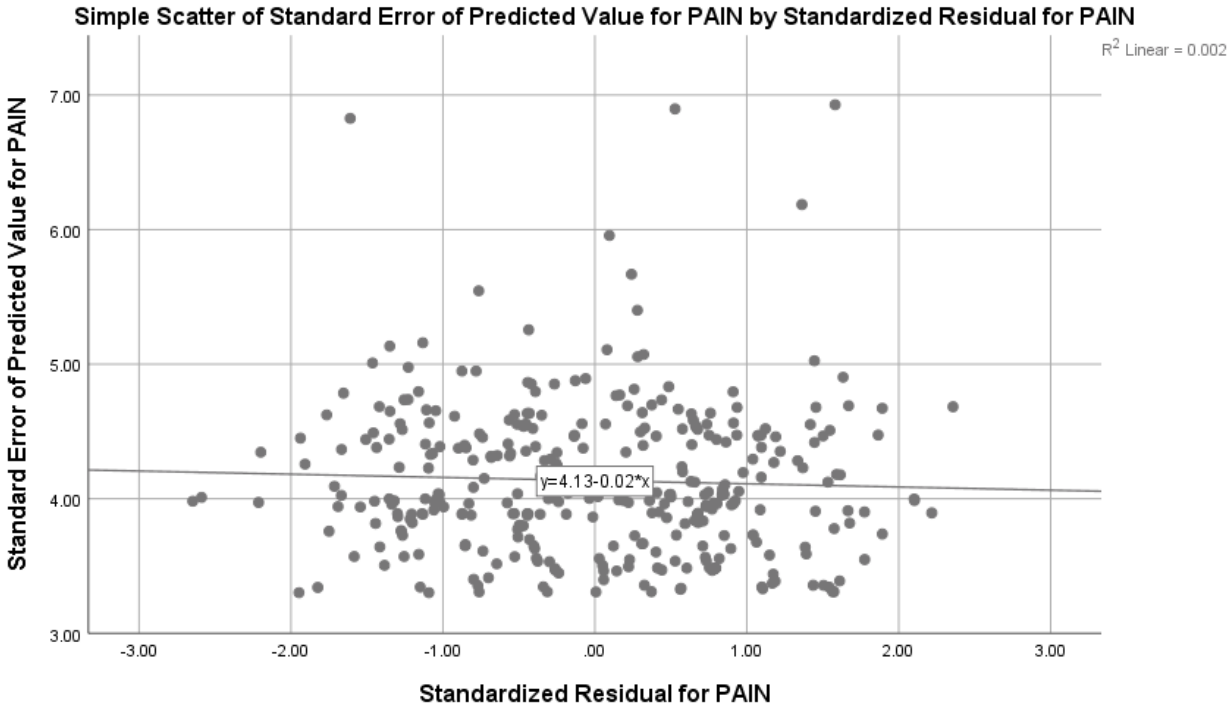
-3.00
-2.00
-1.00
.00
1.00
2.00
Standardized Residual for PHYS_FUNC


Simple Scatter of Standard Error of Predicted Value for LIMIT_PHYS by Standardized Residual for LIMIT_PHYS
R² Linear = 0.003
Standard Error of Predicted Value for LIMIT_PHYS
9.00
8.00
7.00
6.00
5.00
4.00
y=5.11-0.04*x
-3.00
-2.00
-1.00
.00
1.00
2.00
3.00
Standardized Residual for LIMIT_PHYS


Simple Scatter of Standard Error of Predicted Value for PAIN by Standardized Residual for PAIN
R2 Linear = 0.002
Standard Error of Predicted Value for PAIN
7.00
6.00
5.00
4.00
3.00
y=4.13-0.02*x
-3.00
-2.00
-1.00
.00
1.00
2.00
3.00
Standardized Residual for PAIN

General Linear Model 2

Between-Subjects Factors

		Value Label	N
ChronicPhysicalIllness	0	No	133
	1	Yes	211
HealthcareUtili_NeededHealthC areButNotReceived	.00	No	203
	1.00	Yes	141

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Physical Functioning	48687.410[a]	3	16229.137	33.498	.00
	Role Limitations Due to Physical Health	131808.661[b]	3	43936.220	33.476	.00
	Pain	78983.365[c]	3	26327.788	30.854	.00
Intercept	Physical Functioning	195056.214	1	195056.214	402.607	.00
	Role Limitations Due to Physical Health	93005.118	1	93005.118	70.863	.00
	Pain	90189.691	1	90189.691	105.694	.00
ChronicPhysicalIllness	Physical Functioning	27242.091	1	27242.091	56.229	.00
	Role Limitations Due to Physical Health	68177.728	1	68177.728	51.947	.00
	Pain	36280.367	1	36280.367	42.517	.00
HealthcareUtili_NeededHealthC areButNotReceived	Physical Functioning	2974.143	1	2974.143	6.139	.01
	Role Limitations Due to Physical Health	35420.661	1	35420.661	26.988	.00
	Pain	26225.589	1	26225.589	30.734	.00
BodyMassIndex	Physical Functioning	7757.827	1	7757.827	16.013	.00
	Role Limitations Due to Physical Health	3603.394	1	3603.394	2.746	.09
	Pain	1990.056	1	1990.056	2.332	.12
Error	Physical Functioning	164724.145	340	484.483		
	Role Limitations Due to Physical Health	446236.398	340	1312.460		
	Pain	290125.283	340	853.310		
Total	Physical Functioning	2261775.000	344			
	Role Limitations Due to Physical Health	1546250.000	344			
	Pain	1449125.000	344			
Corrected Total	Physical Functioning	213411.555	343			
	Role Limitations Due to Physical Health	578045.058	343			
	Pain	369108.648	343			

a. R Squared = .228 (Adjusted R Squared = .221)
b. R Squared = .228 (Adjusted R Squared = .221)
c. R Squared = .214 (Adjusted R Squared = .207)

Multivariate Tests[a]

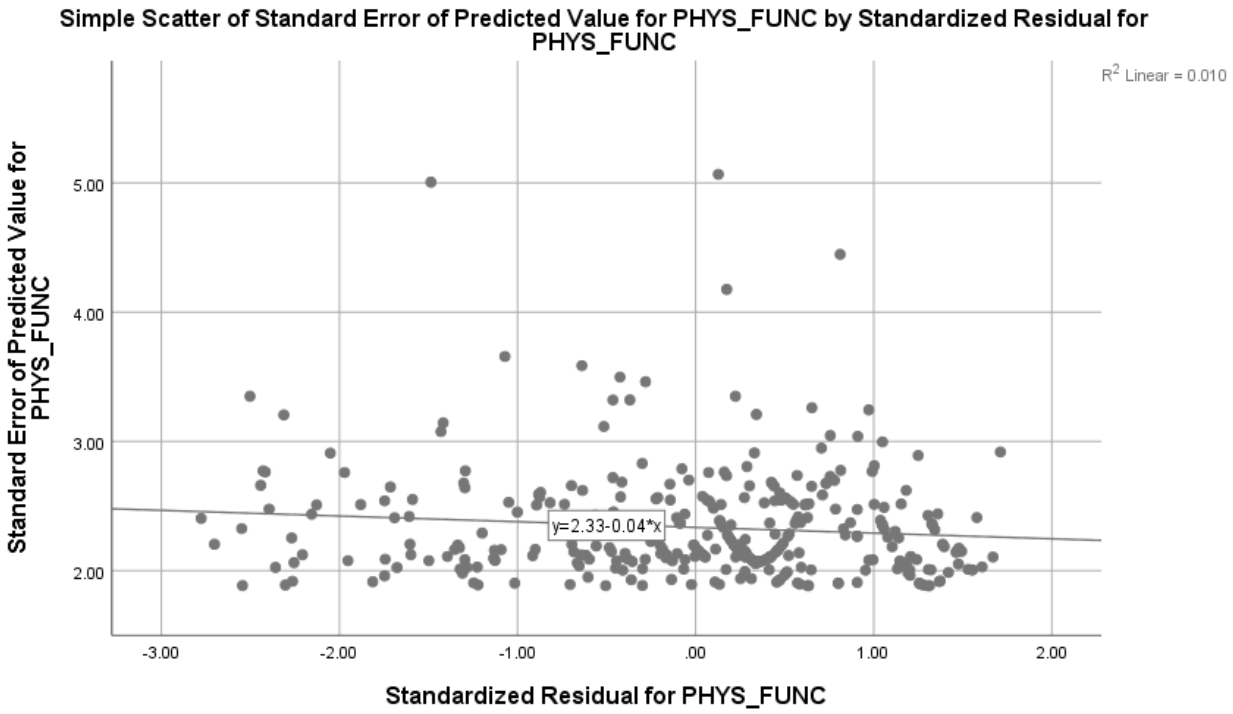
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.543	134.011[b]	3.000	338.000	.000
	Wilks' Lambda	.457	134.011[b]	3.000	338.000	.000
	Hotelling's Trace	1.189	134.011[b]	3.000	338.000	.000
	Roy's Largest Root	1.189	134.011[b]	3.000	338.000	.000
ChronicPhysicalIllness	Pillai's Trace	.186	25.788[b]	3.000	338.000	.000
	Wilks' Lambda	.814	25.788[b]	3.000	338.000	.000
	Hotelling's Trace	.229	25.788[b]	3.000	338.000	.000
	Roy's Largest Root	.229	25.788[b]	3.000	338.000	.000
HealthcareUtili_NeededHealthCareButNotReceived	Pillai's Trace	.107	13.528[b]	3.000	338.000	.000
	Wilks' Lambda	.893	13.528[b]	3.000	338.000	.000
	Hotelling's Trace	.120	13.528[b]	3.000	338.000	.000
	Roy's Largest Root	.120	13.528[b]	3.000	338.000	.000
BodyMassIndex	Pillai's Trace	.046	5.399[b]	3.000	338.000	.001
	Wilks' Lambda	.954	5.399[b]	3.000	338.000	.001
	Hotelling's Trace	.048	5.399[b]	3.000	338.000	.001
	Roy's Largest Root	.048	5.399[b]	3.000	338.000	.001

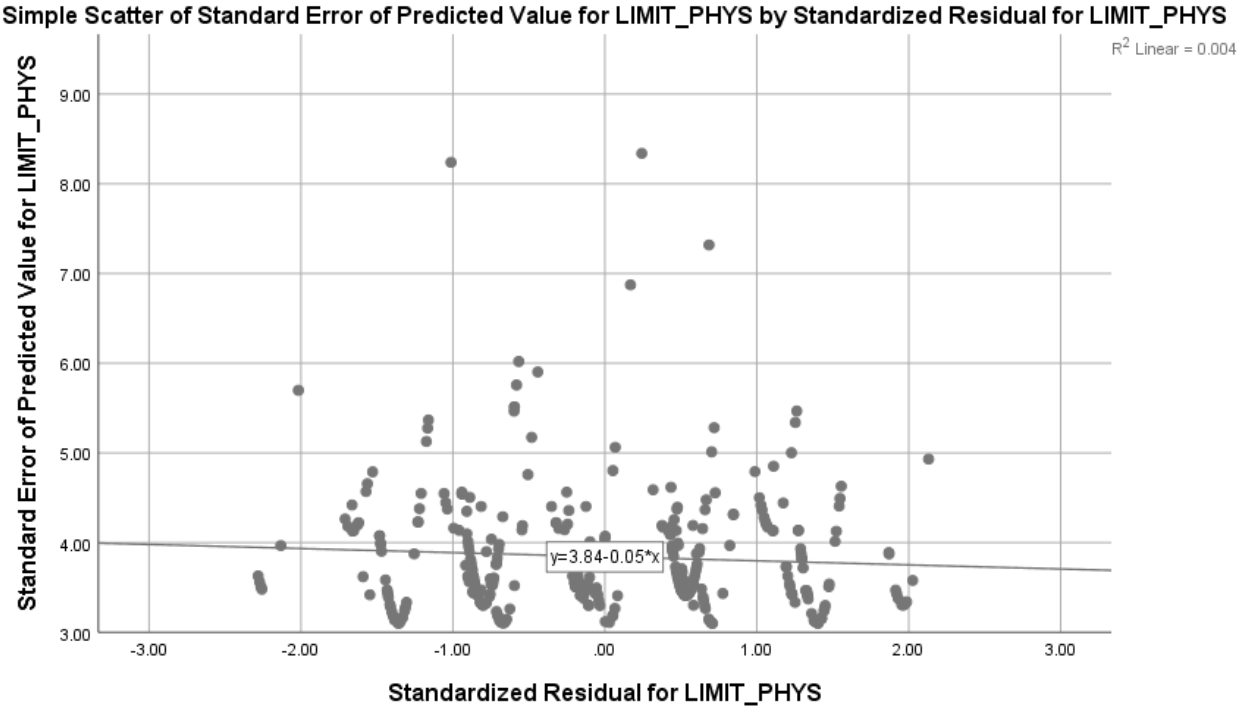
a. Design: Intercept + ChronicPhysicalIllness + HealthcareUtili_NeededHealthCareButNotReceived + BodyMassIndex
b. Exact statistic

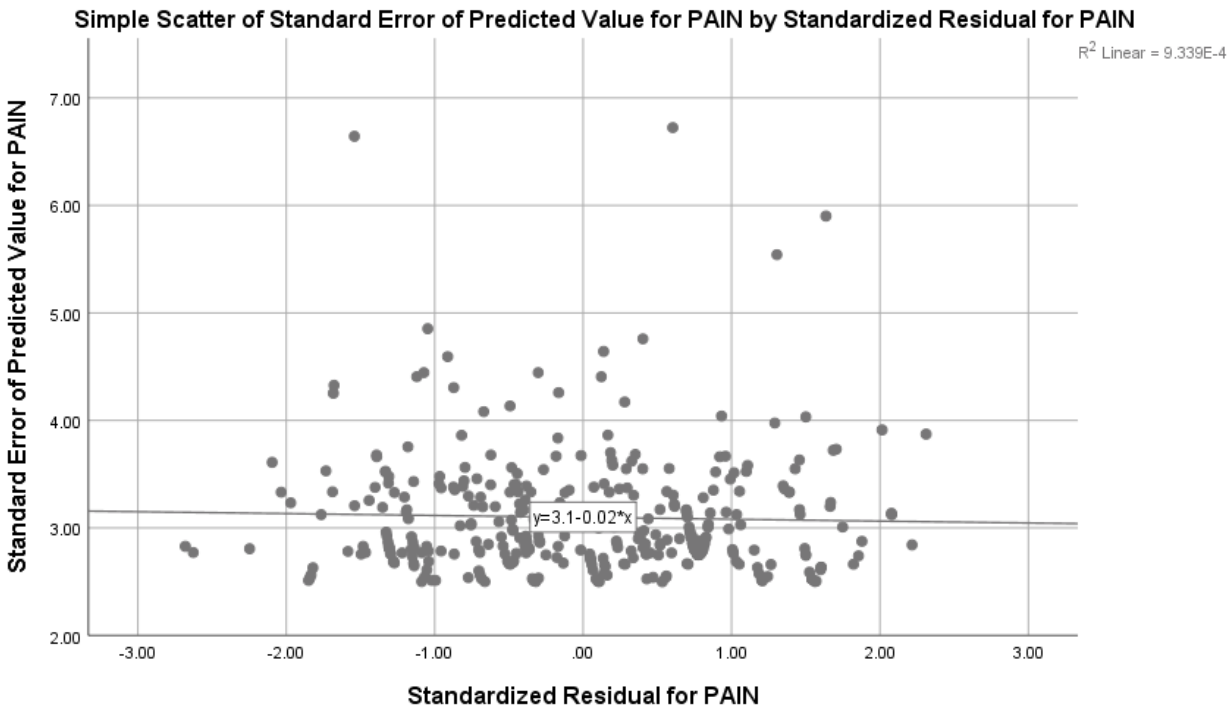
Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Physical Functioning	Intercept	85.493	5.310	16.099	.000	75.048	95.938
	[ChronicPhysicalIllness=0]	18.862	2.515	7.499	.000	13.914	23.810
	[ChronicPhysicalIllness=1]	0[a]	.	.	.	.	.
	[HealthcareUtili_NeededHealthCareButNotReceived=.00]	6.039	2.437	2.478	.014	1.245	10.832
	[HealthcareUtili_NeededHealthCareButNotReceived=1.00]	0[a]	.	.	.	.	.
	BodyMassIndex	-.698	.174	-4.002	.000	-1.041	-.355
Role Limitations Due to Physical Health	Intercept	42.292	8.740	4.839	.000	25.100	59.484
	[ChronicPhysicalIllness=0]	29.839	4.140	7.207	.000	21.696	37.983
	[ChronicPhysicalIllness=1]	0[a]	.	.	.	.	.
	[HealthcareUtili_NeededHealthCareButNotReceived=.00]	20.839	4.011	5.195	.000	12.949	28.729
	[HealthcareUtili_NeededHealthCareButNotReceived=1.00]	0[a]	.	.	.	.	.
	BodyMassIndex	-.476	.287	-1.657	.098	-1.040	.089
Pain	Intercept	46.751	7.048	6.634	.000	32.888	60.613
	[ChronicPhysicalIllness=0]	21.767	3.338	6.521	.000	15.201	28.334
	[ChronicPhysicalIllness=1]	0[a]	.	.	.	.	.
	[HealthcareUtili_NeededHealthCareButNotReceived=.00]	17.931	3.234	5.544	.000	11.569	24.293
	[HealthcareUtili_NeededHealthCareButNotReceived=1.00]	0[a]	.	.	.	.	.
	BodyMassIndex	-.353	.231	-1.527	.128	-.809	.102

a. This parameter is set to zero because it is redundant.


Simple Scatter of Standard Error of Predicted Value for PHYS_FUNC by Standardized Residual for PHYS_FUNC
R² Linear = 0.010
Standard Error of Predicted Value for PHYS_FUNC
5.00
4.00
3.00
2.00
y=2.33-0.04*x
-3.00
-2.00
-1.00
.00
1.00
2.00
Standardized Residual for PHYS_FUNC


Simple Scatter of Standard Error of Predicted Value for LIMIT_PHYS by Standardized Residual for LIMIT_PHYS
R² Linear = 0.004
Standard Error of Predicted Value for LIMIT_PHYS
9.00
8.00
7.00
6.00
5.00
4.00
3.00
y=3.84-0.05*x
-3.00
-2.00
-1.00
.00
1.00
2.00
3.00
Standardized Residual for LIMIT_PHYS


Simple Scatter of Standard Error of Predicted Value for PAIN by Standardized Residual for PAIN
R2 Linear = 9.339E-4
Standard Error of Predicted Value for PAIN
7.00
6.00
5.00
4.00
3.00
2.00
y=3.1-0.02*x
-3.00
-2.00
-1.00
.00
1.00
2.00
3.00
Standardized Residual for PAIN

Curriculum Vitae

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Post-secondary Education and Degrees:
The University of Western Ontario
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2011-2015

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Related Work Experience
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Forchuk, C., Rudnick, A., MacIntosh, J., **Bukair, F**. & Hoch, J. (2016). Evaluation Framework for Smart Technology Mental health Intervientions. Springer International Publishing, Switzerland, C.K Chang et al (Eds) ICOST 2016 LNCS 9677 pp. 203-210, 2016. DOI 10.1007/978-3-319-39601-9_18

Forchuk,C., Donelle, L., Capretz, M., **Bukair, F**., Kok, J. (Submitted). Evaluating Iris Scanning Technology to Link Data Related to Homelessness and other Disadvantaged Populations with Mental Illness and Addiction.