

**HOUSING AND HOMELESSNESS:
TWO MODELS OF THE RELATIONSHIP BETWEEN QUALITY OF LIFE,
PHYSICAL HEALTH, AND MENTAL HEALTH**

by

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Abstract

With the increase in quality of life (QoL) research in recent years and its relationship to physical and mental health, building a model of these relationships is an important pursuit for researchers with the aim of creating targeted social policy and programs. Two studies were designed to test a model of the relationship between quality of life, physical health, and mental health on two different groups in the National-Capital region: a housed sample and a homeless and vulnerably housed sample. Study 1 consisted of 1,339 adults who took part in the 2007-2008 Canadian Community Health Survey and were stably housed in either a rented or owned residence. Study 2 consisted of 395 single adults who participated in the City of Ottawa baseline measure of the Health and Housing in Transition (HHiT) study (Hwang, Aubry, et al., 2011) and were homeless or vulnerably housed. Subjective levels of various physical and mental health indicators were measured for each of the samples, along with subjective quality of life indicators. Of interest in each of the studies was: 1) The effect that physical and mental health factors have on quality of life in each of the samples, and 2) determining if mental health or physical health is a better predictor of quality of life. Structural analysis of the housed sample model resulted in both physical and mental health having a significant positive effect on QoL, although neither physical nor mental health was a better predictor of quality of life. For the homeless and vulnerably housed model, structural analysis determined mental health to have a significant direct positive effect on QoL, while physical health showed a non-significant negative effect. Mental health was determined to be a significantly better predictor of QoL in the homeless and vulnerably housed model, accounting for 30.47 percent of the variance in quality of life. Implications of this research are discussed.

Statement of the Contributions of Collaborators

The two manuscripts included in this dissertation were prepared in collaboration with my primary dissertation supervisor, Dr. Susan Farrell. The second manuscript also involved the contributions of Drs. Stephen Hwang, Tim Aubry, Anita Palepu, and Anita Hubley, as portions of their original participants were recruited in the study. As the primary author on all manuscripts, I was responsible for the conceptualization of research questions and methods, planning and executing of statistical analyses, and preparation of the manuscripts. Dr. Farrell provided guidance and assistance in all aspects of the project.

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Table of Contents

Abstract	ii
Statement of Contributions of Collaborators	iii
Acknowledgement.....	iv
List of Tables.....	x
List of Figures	xi
List of Appendices	xiii
Housing and Homelessness: Two Models of the Relationship between Quality of Life, Physical Health, and Mental Health.....	1
Quality of Life.....	5
Measures of quality of life in the present study	5
Quality of life indicators important to Canadians	6
Health-related quality of life	8
Quality of life and physical health	9
Quality of life and body weight	11
Quality of life, depression, and mental health.....	13
Etiology of depression.....	16
Hopelessness and the diathesis-stress model	17
Depression comorbidity	18
Quality of life and substance use	19
Quality of life and social support.....	21
Quality of life and socio-economic factors	23

Quality of life and housing.....	25
Homelessness	27
Pathways to homelessness.....	28
Homelessness and housing.....	30
Homelessness and quality of life.....	32
Homelessness and physical health	35
Homelessness and mental health.....	40
<i>Homelessness, depression, and hopelessness</i>	43
Hopelessness in current study	44
Homelessness and substance use	45
Homelessness and social support.....	48
The Current Studies.....	51
Contribution to the Literature.....	53
Study One: The Relationship between Health, Mental Health, and Quality of Life in a Housed Canadian Sample	57
Hypotheses and Research Questions.....	57
Method	58
Participants.....	58
Measures	59
Variables	61
Procedure.....	61
Sampling procedure	62
The area frame.....	62

The list frame	63
The random digit dialling frame	63
Analytical Strategy	64
Results	65
Sample size	65
Preliminary Analysis	66
Demographics	68
Analysis of Study Variables	71
Sex Comparisons of Indicator Variables	73
The Measurement Model	73
The Structural Model	80
Predicting quality of life	83
Group Analyses	83
Discussion	88
The Effect of Health and Mental Health Status on Quality of Life	88
Predicting Quality of Life	90
Sex Comparisons	91
The Model	94
Limitations and Future Research	96
Study Two: The Relationship between Health, Mental Health, and Quality of Life in a Homeless and Vulnerably Housed Canadian Sample	98
Hypotheses and Research Questions	98
Method	99

Participants	99
Measures	100
12 Item Short-Form Health Survey (SF-12)	100
National Survey of Homeless Assistance Providers and Clients	102
Canadian Community Health Survey	103
The Housing Quality Score	103
Quality of Life in Homeless and Hard to House Individuals Scale	103
Social Provisions Scale	104
Beck Hopelessness Scale	106
Variables	108
Procedure.....	108
Analytical Strategy	110
Results	110
Sample size.....	111
Preliminary Analysis	111
Demographics	115
Analysis of Study Variables.....	115
Group Comparisons	121
The Measurement Model	122
The Structural Model	129
Predicting quality of life.....	131
Discussion	131
Factors Affecting Quality of Life.....	133

Predicting Quality of Life	136
Group Comparisons	139
The Model	143
Limitations and Future Research	145
Overall Discussion	146
Comparing the Two Studies.....	149
Limitations and Future Research	151
References	153
Appendix A: List of Study Variables and Abbreviation.....	204
Appendix B: Description of Fit Indices	206
Appendix C: Measures used by the Health and Housing in Transition Study.....	208
Appendix D: List of Items Adapted from the Short Form 12-Item Health Survey (SF – 12)	210
Appendix E: Items Adapted from the National Survey of Homeless Assistance Providers and Clients	213
Appendix F: Items Adapted from the Quality of Life in Homeless and Hard-to-House Individuals (QoLHHI) Scale	215

List of Tables

Study One: The Relationship between Physical Health, Mental Health, and Quality of Life in a Housed Canadian Sample

Table 1: Descriptive Statistics and Correlations between Study Indicator Variables.....	69
Table 2: Variance / Covariance Matrix of Observed Variables	70
Table 3: Participant Characteristics and Demographics	72
Table 4: Fit Statistics of Measurement Model	79
Table 5: Confirmatory Factor Analysis: Standardized & Unstandardized Regression Weights & Squared Multiple Correlations	78
Table 6: Standardized & Unstandardized Regression Weights & Squared Multiple Correlations (SMC) of the Structural Model	82
Table 7: Fit Statistics of Sex Analyses.....	86

Study Two: The Relationship between Physical Health, Mental Health, and Quality of Life in a Homeless and Vulnerably Housed Canadian Sample

Table 8: Descriptive Statistics and Correlations Between Observed Variables	114
Table 9: Variance-Covariance Matrix of the Observed Variables.....	116
Table 10: Descriptive Statistics of Demographic Variables	117
Table 11: Descriptive Statistics of Observed Variables.....	118
Table 12: Fit Statistics of Measurement and Structural Models	125
Table 13: Confirmatory Factor Analysis: Standardized & Unstandardized Regression Weights & Squared Multiple Correlations (SMC).....	128
Table 14: Results of the Structural Model: Standardized & Unstandardized Regression Weights & Squared Multiple Correlations (R^2)	132

List of Figures

Housing and Homelessness: Two Models of the Relationship between Quality of Life, Physical Health, and Mental Health

Figure 1: Hypothesized structural model of the relationship between mental health, quality of life, and physical health in a housed sample of Canadians residing in Ottawa55

Figure 2. Hypothesized structural model of the relationship between mental health, quality of life, and physical health in a homeless and vulnerably housed sample of Canadians residing in Ottawa56

Study One: The Relationship between Physical Health, Mental Health, and Quality of Life in a Housed Canadian Sample

Figure 3. Final measurement model of the relationship between mental health, quality of life, and physical health in a housed sample78

Figure 4. Final structural and measurement model of the relationship between physical health, mental health, and quality of life.....81

Figure 5. Mean and covariance structure (MACS) model of the relationship between Physical Health, Mental Health, and Quality of Life in a housed sample85

Study Two: The Relationship between Physical Health, Mental Health, and Quality of Life in a Homeless and Vulnerably Housed Canadian Sample

Figure 6. Final measurement model of the relationship between quality of life, mental health, and physical health in a homeless and vulnerably housed sample..... 127

Figure 7. Final structural model of the relationship between quality of life, mental health, and physical health in a homeless and vulnerably housed sample	130
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List of Appendices

Appendix A: List of Study Variables and Abbreviation	204
Appendix B: Description of Fit Indices	206
Appendix C: Measures used by the Health and Housing in Transition Study	208
Appendix D: List of Items Adapted from the Short Form 12-Item Health Survey (SF – 12)	210
Appendix E: Items Adapted from the National Survey of Homeless Assistance Providers and Clients	213
Appendix F: Items Adapted from the Quality of Life in Homeless and Hard-to-House Individuals (QoLHHI) Scale	215

Housing and Homelessness: Two Models of the Relationship between Quality of Life, Physical Health, and Mental Health

Quality of life (QoL) is a term used to describe the level of satisfaction with one's life as whole, or specific aspects of one's life. It is a term that has been used by a number of different disciplines and that has been applied to different areas of life, including in reference to personal health and the community at large, like the quality of neighbourhood waste management services or the amenities of a community. In discussions and applications of social policy, quality of life, or the well-being and satisfaction of community members, is often considered. At the individual level, the term is often discussed in reference to health and disability (Phillips, 2006). Quality of life encompasses many areas of well-being and includes both objective and subjective perspectives. Debate has ensued regarding the differences between objective and subjective indicators of quality of life (see Cummins, 1998); however, Cummins (2000) clarifies this by making the distinction in terms of public versus private experience. He asserts that although objective and subjective QoL indicators are generally independent estimates, their dependency increases when objective living conditions are very poor. For example, housing status (whether one resides in a permanent home, is vulnerably housed, or homeless) can be understood as an objective indicator of quality of life, which would clearly influence other subjective indicators of QoL such as health, happiness, and satisfaction. Quality of life, as defined by the World Health Organization, focuses primarily on the private and subjective experiences of individuals within their own cultural and social context (Williams, 2000). As such, quality of life is understood as personal satisfaction with basic and social needs, including individual well-being, satisfaction with one's state of health, having the independence to enjoy social connectivity, and having a fulfilling and prosperous life (Phillips, 2006).

Research and interest in the field of quality of life has gained momentum over the last 20 years, specifically studies focusing on life quality and physical health. Studies have emerged looking at the quality of life of people living with health conditions such as diabetes (Bradley & Speight, 2002; Coffey, et al., 2002; Linkeschova, Raoul, Bott, Berger, & Spraul, 2002; Lloyd, Sawyer, & Hopkinson, 2001), heart disease (Carels, 2004; Lane, Lip, & Millane, 2002; Thompson & Yu, 2003), cancer (Bottomley, 2002; Calman, 1984; Weymuller et al., 2000), asthma (Juniper et al., 2004; Leynaert, Neukirch, Liard, Bousquet, & Neukirch, 2000; Vollmer, et al., 1999), and hepatitis (Foster, Goldin, & Thomas, 1998; Rodger, Jolley, Thompson, Lanigan, & Crofts, 1999; Ware, Bayliss, Mannocchia, & Davis, 1999). Additionally, research has also focused on the quality of life of persons suffering from psychiatric disorders and mental health disorders such as schizophrenia (Browne, et al., 1996; Ho, Nopoulos, Flaum, Arndt, & Andreasen, 1998; Saarni et al., 2010), bipolar disorder (Depp, Davis, Mittal, Patterson, & Jeste, 2006; Robb, Cooke, Devins, Young, & Joffe, 1997; Vojta, Kinosian, Glick, Altshuler, & Bauer, 2001), anxiety (Mendlowicz & Stein, 2000), and depression (Rapaport, Clary, Fayyad, & Endicott, 2005; Wittchen, Carter, Pfister, Montgomery, & Kessler, 2000). However, research in this area of health-related quality of life has, until recently, not focused much on the homeless population. In fact, research on such a specific population as the homeless has remained almost solely focused on persons who have a mental illness or substance use.

The topic of quality of life among those who are homeless in general has received far less attention (Lagory, Ritchey, & Mullis, 1990; Marshall, Burnam, Koegel, Sullivan, & Benjamin, 1996; Schutt, Meschede, & Rierdan, 1994; Sullivan, Burnam, Koegel, & Hollenberg, 2000). However, this gap in the literature appears to be changing, particularly in the last five years, as more research has started to focus on the quality of life of homeless

persons (Argintaru et al., 2014; Gadermann, Hubley, Russell, & Palepu, 2013; Hubley, Russell, Palepu, & Hwang, 2012; Hwang, Aubry, et al., 2011; Hwang, Gogosis, et al., 2011; Mares & Rosenheck, 2010; Palepu, Hubley, Russell, Gadermann, & Chinni, 2012; Russell, Gadermann, Hubley, & Palepu, 2008; Russell, Hubley, Gadermann, & Palepu, 2008; Tsai, Mares, & Rosenheck, 2010; Tsai, Kaspro, & Rosenheck, 2011).

Studying the homeless and hard-to-house population is important because it allows researchers to clarify the important and specific needs of this transient group of individuals. Quality of life research, and all research in general, has traditionally not taken into account the unique social context in which homeless individuals reside. Homeless and vulnerably housed persons inhabit a social context that is considerably different from the rest of society (Russell, Hubley, & Palepu, 2005), a social experience that is often episodic (Aubry, Klodawsky, Hay, & Birnie, 2003; Culhane, Dejowski, Ibañez, Needham, & Macchia, 1994), and as such, it is important to compare them to their housed counterparts as a means of gaining better understanding and hopefully coming up with solutions that are helpful to them.

Homelessness is a national social concern that can only be resolved with social policy that ensures all Canadian citizens are safely housed, regardless of the personal challenges experienced such as depression, substance addiction, poverty, or mental illness. As a means of narrowing the research gap of a specialized population like the homeless, the second study in this dissertation examines the varying needs of the homeless and vulnerably housed in the city of Ottawa, Ontario, as a way to determine the factors that most affect quality of life within this population. This can possibly help create better programs and policy that can directly benefit the homeless and vulnerably housed.

The purpose of this dissertation is to examine the quality of life of individuals residing within the city of Ottawa whose living conditions are stable, unstable, and homeless. Other factors contributing to quality of life are also examined including, subjective physical health status, mental health status, and housing quality.

As such, this dissertation is comprised of two studies. The first study assesses the relationships between various physical health and mental health factors and quality of life in a housed sample of the Canadian population. The second study identifies relationships between similar physical health and mental factors and quality of life in a homeless and vulnerably housed sample. Additionally, the second study measures the degree of hopelessness in homeless and vulnerably housed individuals to better understand its relationship with quality of life in this particular population.

Identifying relationships between a variety of health factors and quality of life in both housed and homeless Canadians is information that can be used in policy changes to enhance the lives of homeless Canadians and better treat their specific housing and health needs. Moreover, measuring their degree of hopelessness may in turn help identify factors that keep this population hopeful or resilient; and identifying said factors that contribute to hopelessness has implications that can help social policy by focusing on these more specific issues. This can ultimately lead to developing programs that cultivate such factors and help homeless and vulnerably housed individuals out of their unstable housing situations.

The following is a review of the literature regarding quality of life and its influencing factors including physical health, mental health, depression, social support, socio-economic factors, housing, and substance use. Additionally, the literature on the homeless population and the implications homelessness has on quality of life, physical health, mental health, social support, substance use, and housing, is also reviewed.

Quality of Life

Defining the term ‘quality of life’ has been a challenge since the concept was first introduced. Broadly, the term can be said to encompass all the indicators in one’s life that make it a good life (Michalos, 2004). These indicators are typically grouped in one of two ways: subjective indicators and objective indicators. Sirgy, et al. (2006) clarify subjective indicators to be those that refer to preferences, opinions, personal feelings, attitudes, judgements, or beliefs. Objective indicators are relatively easily observable and measurable. Michalos (2004) posits that the use of the phrase ‘quality of life’ is used to contrast the amount of these subjective and objective indicators, which then leads to two distinct outcomes the term can refer to; it can be used in a primarily descriptive way, or in an evaluative way. Michalos (2004) further explains that when using the term ‘quality of life’ in a descriptive way, it could refer to kinds, types, or sorts of something rather than just the amount of something; like not just the number of people admitted to a hospital, but whether they were male or female, how long they stayed, their age, and the reason for admittance. Additionally, using the term ‘quality of life’ in an evaluative manner would mean referring to the value or worth of something, such as trading a high salary for better working conditions, which are considered to be of higher value than the high salary. Although Michalos (2004) argues that the use of the term in both senses is important because it is necessary to both describe and evaluate “human existence in a fairly reliable and valid fashion” (Michalos, 2004, p. 33), there continues to lack agreement in how both of these measures should be used and in what proportion when referring to quality of life research (Sirgy et al., 2006).

Measures of quality of life in the present study. The following research used primarily subjective measures of quality of life, under the assumption that individuals are the best judges of the value or worth of their own lives. The two studies are concerned with the

subjective evaluation of Canadians and their level of life satisfaction, given their physical health status, their mental health status, and their housing status. The studies do not assess such objective indicators as air quality, noise levels, or neighbourhood crime rates; instead, they assess participants' subjective feelings of how satisfied they are with various aspects of their own lives. As such, when their reported levels of satisfaction decrease or increase, so too does their quality of life (Michalos, 2004). Additionally, measuring subjective quality of life while taking into consideration the differences in physical and mental health among individuals may lead to more information about what impacts quality of life most.

Altogether, the aim of the two studies is to further understand the relationship between quality of life, physical health, mental health, and housing status so as to create a model of what impacts quality of life. This model will then help identify areas of focus to improve the lives of Canadian citizens.

Quality of life indicators important to Canadians. To identify what indicators were important to the quality of life of Canadians, the Quality of Life Indicators Project (Wyman, 2001), with the input of citizens across the country, created a prototype set of national indicators and identified nine themes that Canadians found to be of most importance to their quality of life. Combining both subjective and objective indicators, the project identified: 1) democratic rights and participation; 2) health; 3) education; 4) the environment; 5) social conditions and programs; 6) community; 7) personal well-being; 8) the economy and employment; and 9) government, as being important indicators of Canadian quality of life (Michalski, 2002). In addition to these nine indicators, Zagon (2001) observed four overarching themes, the most prevalent of which was that of accessibility. This included having access to health care, education, housing, social programs, a healthy environment, and the labour market. In general, the notion of accessibility refers to Canadians having

access to a fair share of available resources. This theme in particular is said to be one of the elements that defines quality of life as a separate concept from subjective well-being.

Closely tied to the concept of accessibility is the idea of availability; the second over-arching theme identified by Zagon (2001). The Project often made reference to the presence or absence of conditions that are believed to affect quality of life. Some of these conditions included social programs and education (like school breakfast programs), emergency services, respite care, and low-cost housing.

The third over-arching theme observed by Zagon (2001) was that of personal security or personal control. This theme refers to not only lower crime rates and a higher sense of personal safety, but to the security of employment and control over one's own finances and time. Personal control also includes the linking of education, social programs, employment opportunities, civic involvement, and families and communities. In general, having control over these aspects of one's life is judged important to quality of life.

Lastly, the fourth theme underlying the quality of life indicators was that of equity and fairness, specifically in the areas of the tax system and the distribution of wealth in Canadian society (Zagon, 2001). Participants in the project expressed concern about the lack of impartial and effective fiscal policies in government. Others expressed the need to address the growing gap between the lower and higher income brackets, citing the need to increase minimum wage to above living wages.

It is evident how the homeless population is at a disadvantage among the themes identified by Zagon (2001). Certainly, the lack of accessibility to housing, education, and social programs can have a far-reaching impact on health and life quality. Moreover, the high need of low-cost housing and social services that are not available further exacerbate the negative impact on quality of life. Additionally, living on the street, in a shelter, or a public

space leaves very little room for personal control, and certainly exemplifies the unequal distribution of the wealth in Canadian society. As such, it is important to subjectively measure the quality of life of individuals who are without stable shelter.

Health-related quality of life. The conceptualization of quality of life in Zagon's study (2001) is a very broad one. Other research (Michalos, Hubley, Zumbo, & Hemingway, 2001; Michalos & Zumbo, 2002; Michalos, Zumbo, & Hubley, 2000) has focused on what could be seen as a more narrow area of quality of life, that of health-related quality of life (HRQoL). Although the majority of the literature on HRQoL has focused recently on psycho-oncology (Gustavsson-Lilius, Julkunen, & Hiertanen, 2007), studies have also involved research in a wide variety of health-related areas such as mental health disorders (Schelling, et al., 1998; van Straten, Cuijpers, van Zuuren, Smits, & Donker, 2007), severe mental illness (Bechdolf, Veith, & Pukrop, 2007; Michalak, Murray, Young, & Lam, 2007), heart disease (Stafford, Berk, & Jackson, 2009; Stafford, Berk, Reddy, & Jackson, 2007), diabetes (Goldney, Phillips, Fisher, & Wilson, 2004), obesity (Jia & Lubetkin, 2005), bowel disorders (Chang, 2004; Cohen R. D., 2002; Lea & Whorwell, 2001), chronic pain (Hunfeld, et al., 2001; Skevington, 1998), and neurological disorders (Nordeson, Engstrom, & Norberg, 1998).

Justification for the measurement of a specific type of quality of life, such as health-related quality of life, can be supported by the World Health Organization's (WHO) definition of health. The 1986 "Charter for Health Promotion" (World Health Organization, 1986) states that a secure foundation in "peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity" is necessary for health improvement (WHO, 2006, para. 2). As such, health-related quality of life becomes less of a

narrow measure of QoL, for the reason that health is also a key resource for economic, social, and personal growth (WHO, 2006). Moreover, the World Health Organization's (2006) definition holds health as the encompassing factor of all other quality of life indicators, rather than health as an indicator of life quality. Thus, from this perspective, it becomes important to identify the health factors influencing Canadians' quality of life.

Quality of life and physical health. Physical health status, or how healthy a person is, is generally understood as an extension of how well a person can perform a number of daily living activities; this is what is known as functional status (Michalos et al., 2000). This normally includes measures of such things as performance of daily living activities, "body functions, emotional status, symptoms, and cognitive functions" (Michalos et al., 2000, p. 247).

In a study aiming to explain the degree of impact of individuals' physical health on subjective measures of satisfaction with health, life, happiness, and overall quality of life, Michalos and his colleagues (2000) surveyed 723 residents of Prince George, British Columbia. Defining perceived quality of life as "general happiness, satisfaction with life as a whole, and overall satisfaction with the quality of life" (p.279), the researchers determined that three indicators could explain 56 percent of the variance in participants' levels of satisfaction with their health. These indicators included general physical health, vitality, and body mass index, along with a single question on their frequency of physical health worries, and scores on a stress index. Specifically, a greater subjective rating of general physical health, vitality and a lower body mass index, along with less physical health worries and lower levels of stress accounted for participants' level of satisfaction with their health.

Moreover, regarding scores on a measure of happiness, it was determined that combining measures of physical health and domain satisfaction could explain 53 percent of

the variance in happiness scores (Michalos et al., 2000). Additionally, scores on a measure of depression showed the greatest impact on the participants' happiness scores. Thus, having lower levels of depression accounted for higher happiness ratings. Overall, seven health-related indicators accounted for the majority of the variance in happiness scores (60%). These seven indicators included depression, mental health, stress, emotional role functioning, vitality, physical role functioning, and chronic conditions. The remaining variance on happiness scores was attributed to four domain satisfaction scores including, self-esteem, present age, family relationships, and federal government (Michalos et al., 2000).

With regard to satisfaction with life as a whole, 68 percent of the explained variance was attributed to the combination of scores on health measures and domain satisfaction measures. Depression scores once again accounted for the largest variability, followed by satisfaction with self-esteem, health, and friendships (Michalos et al., 2000).

Lastly, the study found that the combination of health scores and domain satisfaction scores explained 63 percent of the variance in scores of satisfaction with overall quality of life. However, it was the degree of satisfaction with one's present age that influenced QoL satisfaction scores the most, followed by greater health satisfaction, greater self-esteem satisfaction, and lower depression scores (Michalos et al., 2000).

Overall, Michalos' et al. (2000) study provides evidence for how varying aspects of mental and physical health affect happiness, satisfaction with life, and quality of life. In particular, levels of happiness were influenced by the degree of mental health, stress levels, the impact emotional problems have on functioning, vitality, the degree to which physical health impacts daily functioning, and the number of chronic conditions. Having high levels of satisfaction with life as a whole was found attributable to low scores of depression, higher self-esteem, better physical health, and friendships.

Although the study results showed the influence that various aspects of health and well-being have on quality of life, it was conducted with individuals from a very specific geographic area (Prince George, BC) with different demographic characteristics than the national average. For example, the median earnings in Prince George were \$29,110 (Statistics Canada, 2007a), while the national median earnings were \$41,401 in the 2006 census (Statistics Canada, 2006). This difference between these populations warrants the study of influencing factors on life satisfaction beyond those in a small city with a population of just over 84,000 (Statistics Canada, 2007a) to a more metropolitan region, like the national capital. Moreover, special populations, such as the homeless, were neglected in Michalos' et al. (2001) study and this again raises the opportunity to study influencing factors of quality of life in special populations, like is done in the second study of the present dissertation, with the homeless and vulnerably housed. The gap in quality of life research among the homeless is discussed in the second half of this literature review, where the focus shifts to this specific population and its needs.

Quality of life and body weight. The way increased body mass can affect general physical health has been well known for some time; excessive body weight can increase the risk of a number of physical health problems, particularly cardiovascular problems. However, body weight as an indicator of quality of life is a newly examined area of study. American researchers found that individuals who report a body mass index (BMI) in either the underweight or obese categories also reported significantly reduced quality of life measures (Ford, Moriarty, Zack, Mokdad, & Chapman, 2001). Their results also revealed that physical functioning was affected more than mental functioning in participants who did not report a BMI within the normal range.

A similar study in the Netherlands showed sex differences in perceived weight and quality of life scores. Burns, Tijhuis, and Seidell (2001) found that both men and women who perceived themselves to be overweight also had lower scores for vitality and general physical health. Additionally, women indicated lower scores in physical functioning when they deemed themselves to be overweight.

Other European studies focusing on quality of life and weight have found that falling in the overweight category of the body mass index was associated with an increased risk of lower quality of life ratings (Lean, Hans, & Seidell, 1999). This risk increased when participants identified as obese, with individuals in this BMI category indicating even more negative impact in health-related quality of life ratings (Larsson, Karlsson, & Sullivan, 2002; Lean et al., 1999).

Moreover, the first study to measure pre and post quality of life ratings following a 12-week weight loss program showed participants in the intervention group reported significantly improved quality of life ratings following weight loss, compared to the control group who did not lose any weight (Rippe et al., 1998). This suggests that weight has a direct effect on quality of life. More recent studies have continued to find that self-reported BMI and perceived weight status (being underweight, normal weight, or overweight) are associated with negative health and well-being outcomes (Brunson, Overup, Nguyen, Novak, & Smith, 2014).

Lastly, American researchers Cash and Fleming (2002) developed and evaluated the Body Image Quality of Life Inventory (BIQLI), which was designed to quantify the effects of body image on various self-experiences and life contexts. Their results indicated that independent of their level of body satisfaction, individuals with higher body mass index reported poorer quality of life. Considering the relationship between perceived weight and

quality of life, opinion of one's weight was added as an indicator of quality of life in the first study of housed residents. This indicator was included as a measure of quality of life because of the research linking perceived weight with quality of life ratings (Brunson et al., 2014; Cash & Fleming, 2002; Ford et al., 2001; Larsson et al., 2002; Lean et al., 1999; Rippe et al., 1998).

Quality of life, depression, and mental health. In 2010, approximately one in four Canadian workers described their day-to-day lives as highly stressful (Crompton, 2011). Life stresses identified by Canadians include work demands, physical problems, financial situation, time pressures, the health of a family member, personal responsibilities, and employment status, among others (Statistics Canada, 2003). Stress is a term whose definition has been debated. The World Health Organization (2014) defines stress as the reaction people may have when presented with “demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope”(para. 3). Another popular definition of stress is “physical, mental, or emotional strain or tension” (The American Institute of Stress, 2014, para. 1). What is agreed upon is how the degree of stress experienced can highly influence mental health (Public Health Agency of Canada, 2006). One clear example is the Yerkes-Dodson law. Yerkes and Dobson (1908) identified the inverted U-shaped relationship between arousal (stress) and performance, stating that outside an optimal level of stress, performance decreased because of too little or too much stress. With regard to anxiety, too little stress results in a lack of motivation to perform; too much stress results in debilitating anxiety and avoidance. Chronic stress has also been linked to depression due to the sustained levels of elevated hormones in the body, which in turn affect the levels of other hormones known to impact depression (Miura, Ozaki, Sawada, Isobe, Ohta, & Nagatsu, 2008). It is clear that stress affects anxiety and depression in Canadians.

As a result of the link between stress and mental health, a measure of stress was used as an indicator of mental health in the housed sample.

In 2002, one in ten Canadians reported symptoms consistent with either an anxiety disorder or a mood disorder (Statistics Canada, 2003). Canadian population studies rank depression as being as common as other leading chronic health conditions like diabetes, and heart disease; with over one million individuals experiencing one major depressive episode annually (Statistics Canada, 2003). Estimates show that one in ten Canadians will experience at least one major depressive episode during their lifetime; one in twenty will experience depression during the course of one year; and at any given point in time, one in 50 Canadians will experience depression (Patten, Wang, Beck, & Maxwell, 2005). Likewise, mental illness has been identified as one of the factors contributing to the decline of quality of life, particularly severe mental disorders such as schizophrenia, schizoaffective, mood, and anxiety disorders (Ritsner, 2007). Individuals diagnosed with mood disorders or post-traumatic stress disorder (PTSD) are among those with more profound and global impairments in quality of life, according to a study by Rapaport and his colleagues (2005). Moreover, 85 percent of individuals with chronic and/or double major depressive disorder in their study showed severe¹ impairment in quality of life, and 63 percent of individuals with major depression demonstrated quality of life impairment to the same severe degree. Other studies have also found that increased severity of depressive symptoms in particular, is associated with gradual decrease of health-related quality of life ratings (Strine et al., 2009). Given these known links between mental health and quality of life, the subsequent two

¹ Severe impairment was defined as two standard deviations below the community norm (Rapaport et al., 2005).

studies use a number of indicators to make up a factor of mental health whose impact on quality of life will be examined.

One of the first studies examining the well being and functioning of depressed individuals was the Medical Outcomes Study (Wells et al., 1989) that compared patients with depressive disorders to patients with chronic physical illnesses such as diabetes, arthritis, hypertension, and coronary arterial disease. Results from the study showed that depression, in comparison to chronic physical diseases, was associated with fewer pain-free days, more social and physical deficits, poorer perception of physical health status, poorer quality of life, increased absenteeism, and increased treatment costs (Wells et al., 1989).

Likewise, Atkinson, Zibin, and Chuang (1997) found similar results in their study comparing quality of life between individuals with schizophrenia, bipolar disorder and major depression. On subjective measures of QoL, participants with mood disorders showed significantly lower measures of quality of life compared to those with schizophrenia. This appears to be attributable to the wide variety of domains affected by depressive disorders that contribute to the global assessment of quality of life (Berlim & Fleck, 2003), including social, physical, and psychological domains. More specifically, persons with clinical depression have been shown to exhibit similar health-related quality of life impairments in the areas of physical functioning (i.e., mobility), role functioning (i.e., self-care), and physical health problems (i.e., pain) as individuals with chronic conditions like arthritis, diabetes, and hypertension (Gaynes, Burns, Tweed, & Erickson, 2002). The study by Strine et al. (2009) also showed that individuals with depression report quality of life impairment attributable to physical injury, illness, pain, activity limitations, or anxiety.

Measuring the time perspective of depression and hopelessness, Moore, Hofer, McGee, and Ring (2005) studied a small group of clinically depressed psychiatric patients

and found that depression and hopelessness were associated with lower current quality of life measures. In addition, they found that patients who were more depressed had a larger gap between their current quality of life measure and their anticipated QoL measure in the future, when they envisioned themselves without depression. The authors concluded that both depression and hopelessness influenced current and future quality of life because of changes in cognitions about one's present and future quality of life.

What precisely causes depression and why some individuals experience it while others do not are questions that continue to be debated. What have been identified are factors that put different groups of people at risk. For example, prevalence rates show that single women, between the ages of 15 and 45 who are in the lowest income bracket have the greatest risk of developing a depressed mood (Patten & Juby, 2008). Other risk factors for depression include: having chronic health problems, increased body weight, single motherhood, lack of a high school diploma, receiving social assistance, smoking, drinking heavily, and living alone (Patten & Juby, 2008). Moreover, individuals who have already experienced one major depressive episode in their lives are at an increased risk for experiencing another episode (Patten & Juby, 2008). In view of the fact that depression is a highly prevalent mental disorder, a brief examination into its etiology and comorbidity is warranted.

Etiology of depression. The specific and precise etiology of most mental health disorders, including depression, is unknown. What are known however, are factors that contribute to depression; these include social and cultural factors, biological factors, and psychological factors (U.S. Department of Health and Human Services, 1999). This explanation of depression stems from the biopsychosocial model of disease. A second theory of the etiology of depression is Beck's (1967; 1983; Clark & Beck, 1999) cognitive model,

which posits that depressed individuals process cognitions differently than non-depressed individuals. Lastly, derived from Beck's model is the diathesis-stress model, which asserts that a biological predisposition in combination with environmental stressors and social and psychological factors are what lead some individuals to suffer from depression (Flett, Hewitt, Blankstein, & Mosher, 1995; Monroe & Simons, 1991). The diathesis-stress model may help explain the high prevalence rates of mood disorders among the homeless and vulnerably housed (Fischer & Breakey, 1991; Mental Health Policy Research Group, 1997; Susser, Moore, & Link, 1993), given that their housing status can be interpreted to be an environmental stressor, combined with the psychological and social hardships that are part with their housing situation.

Hopelessness and the diathesis-stress model. In addition to the cognitive model for understanding depression (Beck, 1967; Beck, 1983; Brown & Beck, 2002; Clark & Beck, 1999), a number of other researchers (Abramson, Metalsky, & Alloy, 1989; Abramson, Seligman, & Teasdale, 1978; Alloy, Hartlage, & Abramson, 1988; Metalsky & Joiner, 1992) have expanded the concept by examining depressed individuals' sense of inability to change the outcome or occurrence of negative events. Abramson and his colleagues (1989) explained that having expectations that negative events will occur, combined with a sense of powerlessness to change the likelihood of occurrence of said events, leads vulnerable individuals to a subtype of depression: hopelessness depression. Moreover, pessimistic inferences (regarding causes, consequences and the self) made by individuals facing negative stressful life events are speculated to be proximal contributory causes of hopelessness depression.

The theory of hopelessness depression (Abramson et al., 1989) consists of two components: the diathesis-stress aspect, and the causal mediational aspect. The diathesis-

stress component suggests, as Beck (1967; 1983) proposed, that people who possess a pessimistic inferential style (diathesis) are more likely to experience depression in the presence, but not the absence, of a negative life event (stress). The causal mediation component speculates that hopelessness is what mediates the relationship between the diathesis-stress component and symptoms of hopelessness depression (Abramson et al., 1989). In this regard, cognitive appraisal systems (that is, stable and global causal attributions) function as distal or predisposing cognitive diatheses which are manifested as individuals encounter proximal stressors in the environment, such as those outlined by Beck (1983). These stressors thus are said to ultimately lead to feelings of hopelessness or hopelessness depression (Abramson et al., 1989; Alloy, Hartlage, & Abramson, 1988; Metalsky & Joiner, 1992). Moreover, this component serves as an explanation for feelings of hopelessness in the face of unmet expectations that have been attributed great meaning. Given this understanding, individuals with unstable housing status can be expected to exhibit higher levels of hopelessness.

Depression comorbidity. Most often, individuals experience other physical or mental disorders in conjunction with depression. It is estimated that about one half of individuals diagnosed with major depressive disorder also meet criteria for an anxiety disorder (Barbee, 1998). Comorbidities also exist between major depression and personality disorders (U.S. Department of Health and Human Services, 1999), as defined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (American Psychiatric Association, 2000). A population survey in the United States regarding major depressive disorder and comorbid factors suggests that nearly three-quarters of Americans with depression also meet DSM-IV (APA, 2000) criteria for at least one other disorder, including an anxiety disorder, a substance use disorder, an impulse control disorder (Kessler, et al.,

2003), or an eating disorder (Patten & Juby, 2008). A second national survey in the United States found nearly 20 percent of individuals with a substance use disorder also experienced at least one mood disorder during a 12-month period (Grant, et al., 2004). The fifth and most recent version of the Diagnostic and Statistical Manual of Mental Disorders continues to link high comorbidity between depression and “substance-related disorders, panic disorder, obsessive-compulsive disorder, anorexia nervosa, bulimia nervosa, and borderline personality disorder” (APA, 2013, p. 168).

It is evident that mental illnesses, particularly depression, have a great influence on one’s quality of life. Moreover, with ten percent of the population expected to experience at least one major depressive episode in their lifetime, and the high comorbidity rate with other mental health disorders, including addiction, the need to examine the effect of depression on quality of life is warranted.

Quality of life and substance use. Hubley, Russell and Palepu (2005) argue that traditional measures of quality of life do not capture the specific physical and psychological health of injection drug users (their scores tend to cluster on the lower end of the distribution in traditional measures, and as such, are not sensitive enough to capture changes in this population). As such, they have devised the Injection-Drug Use Quality of Life (IDUQOL) scale to better reflect the true measure of quality of life among this population. The IDUQOL scale measures domains such as Being Useful, Drugs, Drug Treatment, Harm Reduction, and Neighbourhood Safety, which the researchers state are especially significant to the social, physical, and psychological realities of injection drug users. A more recent study by De Maeyer, Vanderplasschen and Broekaert (2009) held focus groups with drug users and confirmed the different aspects of life quality important to them. As with Hubley et al.’s (2005) argument, De Maeyer and his team (2009) found domains of personal relationships,

social inclusion, and self-determination to be more important to the measure of quality of life in drug users than their perceived health status.

Studies conducted by Hubley and her colleagues (Hubley et al., 2005; Hubley & Palepu, 2007) to date regarding quality of life and drug use have reviewed the validity of the IDUQOL and found no clear measure of the degree of QoL among this population. Moreover, at this time, no Canadian study has been found that provides a measure of quality of life among substance users. Although the proposed studies did not specifically target homeless and vulnerably housed individuals with substance abuse problems, identification of the level of quality of life of those who indicated having an addiction problem was possible. Determining the subjective quality of life of individuals with substance abuse problems could be a start in identifying the specific needs of this subgroup of individuals who are unstably housed. Moreover, similarly to how Hubley's development of the IDUQOL (Hubley et al., 2005) filled a gap in the knowledge base of quality of life and the specific population of substance users, so too does her development of the Quality of Life for Homeless and Hard-to-House Individuals (QOLHHI) inventory (Hubley, Russell, Gadermann, & Palepu, 2009). The QOLHHI is a population-specific measure of quality of life for homeless and vulnerably housed persons. The QOLHHI was used to assess the degree of quality of life in participants of the second study because it measures aspects of what Hubley has found to be relevant and important to quality of life in members of this population, such as employment and socio-economic stability.

Despite the high comorbidity rates of addiction with other mental health disorders like depression, one factor has been found to help counter the severity and even occurrence of some mental health disorders: social support.

Quality of life and social support. The benefits of social support and social networks have long been established and shown to reduce the risk of mortality (BerkmanL & Syme, 1979), increase physical functioning among the elderly (Prince, Harwood, Blizard, Thomas, & Mann, 1997), and decrease recovery time following surgery (Kopp, et al., 2003). Social support is defined as either the actual experience or the perception, that one is cared for and loved by others, and that one is esteemed and valued (Taylor, 2007). Moreover, social networks are defined as the means by which emotional and psychological support, as well as practical help, can be exchanged between people (Achat et al., 1998).

Although Natural Resources Canada (2009) and Zagon (2001) identify social engagement, which refers to participation in a social group, as an important indicator for quality of life, only the latter study recognizes the “degree of social interactions, intimate connections and social isolation” (Zagon, 2001, p. 17) as contributing indicators to overall life quality. Research studying the relationship between quality of life and social support has shown that in HIV patients, experiences of social support increased quality of life ratings (Nunes, Raymond, Kenneally Nicholas, D'Meza Leuner, & Webster, 1995). Moreover, research by Achat and his colleagues (1998) demonstrated that having social networks in which one receives pragmatic help, emotional and psychological support, is positively associated with women’s mental functioning, and even more strongly for women who are experiencing high levels of stress at work and at home.

With regard to mental illness, research by Mittal, Fortney, Pyne, Edlund, and Wetherell (2006) showed that social support, along with depression severity, and the number of chronic medical conditions, predicted scores on a measure of quality of life in American veterans. Moreover, interventions for a variety of problems, including depression, involve turning to family members, friends, self-help groups, religion, and social support networks

(U.S. Department of Health and Human Services, 1999). As such, social support plays an important role throughout the course of depression; often acting as a buffer between psychological distress and stress (Shields, 2004). In addition, Monroe, Bromet, Connell, Connell, and Steiner (1986) showed that increased social support is a prospective predictor of depressive symptomatology one year after a depressive episode. Moreover, a review of findings prior to 1994 by Paykel (1994), found support for the association between the lack of social support and the onset and relapse of depression. A study conducted with depressed Canadians living in the East Coast provinces further validates the mediating effect of social support on depressive symptomatology (Starkes, Poulin, & Kisely, 2005).

Among the elderly, studies have shown social support as a predictor of depressive symptom severity (George, Blazer, Hughes, & Fowler, 1989; Russell & Cutrona, 1991). In addition, research by Dean, Kolody, and Wood (1990) ranked the order of the magnitude of positive effects on depression, with support from a spouse at the top, followed by support from friends, and then from adult children. For senior citizens of Spain, having family members but seeing them seldom or never led to a decline in health-related quality of life (Garcia, Banegas, Perez-Regadera, Cabrera, & Rodriguez-Artalejo, 2005), implying that interaction from a social support network has to be active and accessible. Lastly, there appear to be sex differences in the effects of social support on depression. Cross-sectional time series data from a national survey found that women who lacked emotional support, but not men, showed a higher likelihood of a future depressive episode when compared to women receiving emotional support (Beaudet, 1999).

Overall, the number of studies relating social support and quality of life is large. A search in the PsycINFO database returned 514 studies after combining the terms ‘quality of life’ and ‘social support’. These many studies are evidence of the strong link between social

support and quality of life. Given that social support has also been found to influence depression and chronic illness, there is good reason to include social support in the second study with the homeless and vulnerably housed sample. Moreover, because of the strong link between depression and social support, both factors were investigated within the domain of mental health. Social support scores were not captured for the housed Ottawa sample and as such, were only analyzed in the homeless and vulnerably housed sample.

Quality of life and socio-economic factors. The number of Canadians experiencing quality of life impairment due to a mental illness is not only a very concerning social issue, but an economic issue as well. In Canada, lost work productivity and healthcare costs due to mental illness combined to a total economic burden of approximately \$51 billion in 2003 (Lim, Jacobs, Ohinmaa, Schopflocher, & Dewa, 2008). Moreover, differential use of medical services in Canada persists with respect to socioeconomic status (SES), as well as geographical location (e.g., urban versus rural). Despite a universal healthcare plan, Canadians with moderate to high income levels and higher education visit medical specialists more often than Canadians with lower income and lower education levels (Dunlop, Coyte, & McIsaac, 2000), an implication for both the general health and quality of life of homeless and vulnerably housed individuals.

Research in the area of socio-economic status and quality of life is limited. The majority of studies focus on one particular illness or condition when reporting associations between SES and quality of life. For example, among asthma sufferers, lower educational levels, unemployment and low household income are factors that have been found to influence health-related quality of life outcomes (Apter, Reisine, Affleck, Barrows, & ZuWallack, 1999). Among patients with epilepsy, a Mexican study found low socio-economic status to be associated with lower measures of quality of life (Alanis-Guevera,

Pena, Corona, Lopez-Ayala, Lopez-Meza, & Lopez-Gomez, 2005). Similar results have been found in people diagnosed with inflammatory bowel disease (Bernklev, et al., 2006), diabetes (Hassan, Loar, Anderson, & Heptulla, 2006), prostate cancer (Penson, Stoddard, Pasta, Lubeck, Flanders, & Litwin, 2001), end-stage renal disease (Sesso, Rodrigues-Neto, & Ferraz, 2003), and coronary heart disease (Barbareschi, Sanderman, Kempen, & Ranchor, 2009).

However, research has been emerging on the role of poverty on quality of life. Raphael (2011) points out that poverty affects many of the indicators of quality of life, including physical health, mental health, interpersonal relations, educational achievement, and social support. The second study in this dissertation focuses on individuals living in poverty and examines their level of quality of life, along with physical and mental health factors that affect it.

With regard to depression and mental health, Turner and Lloyd (1999) reviewed the social distribution of depression in a sample of 1393 Toronto residents and found a general linear pattern of increased socioeconomic status and decreased depressive symptoms. The researchers contend that certain socioeconomic factors such as socioeconomic status, typically determine life circumstances that can regulate exposure to stressors, as well as resources required to overcome said stressors. However, when such stressors do arise, Canadians in the low-income bracket are at a significantly higher risk of experiencing psychological distress, thereby increasing their risk of major depression (Orpana, Lemyre, & Gravel, 2009).

Research has also been carried out on job-related factors associated with depression. Although higher socio-economic status is predictive of lower rates of depression (Turner & Lloyd, 1999), Gilmour and Patten (2007) point out that white-collar workers, versus blue-

collar workers, are more likely to suffer from depression at some point in their lives. Moreover, individuals who perceive work-related stress to be high also have an increased risk for depression. Occupations that are predictive of low depression symptomatology include jobs in the areas of teaching for men, and physical, occupational and speech therapy for women (Zimmerman, Christakis, & Vander Stoep, 2004). Occupations predicting the highest depression ratings include sorters, graders, weighers, machine operators, cross-guards, checkers, and mail carriers; jobs that require meticulous attention to detail and good hand-eye coordination (Zimmerman et al., 2004). The amount of time spent working also plays a role in depression rates. Those who spend more than 40 hours of work per week are less likely to experience depression, whereas individuals working less than 30 hours a week are at a higher risk for depression, though this discrepancy is thought to be due to the impact of depression on work hours (Gilmour & Patten, 2007).

Such results are not surprising, given the established disparities between different degrees of socio-economic status and health (Andrulis, 1998; Dunlop et al., 2000; Williams, 1999). As such, socio-economic status was measured in both present studies by level of income, and education level. Lastly, among the lowest socio-economic bracket are individuals who are vulnerably housed or homeless. For this group, housing is presumably an important indicator of their quality of life. The relationship between housing and quality of life is explored next.

Quality of life and housing. Since the 1970s, shortly after the rise of quality of life research, measures have included subjective housing satisfaction as a factor for measuring overall quality of life. Major contributors to this connection between housing satisfaction and life satisfaction were Andrews and Whithey (1976), who established housing satisfaction as a primary contributor to life satisfaction. At the time, the notion of housing satisfaction was

measured by simply asking respondents to place their satisfaction level along a Likert-type scale ranging from complete satisfaction to complete dissatisfaction. The typical single question regarding housing asked respondents; “considering all things [...] how satisfied or how dissatisfied are you with this house or apartment?” (Peck & Stewart, 1985, p. 366). Further research expanded housing satisfaction surveys to include measures about person per-room ratio, ownership, type of structure, age of dwelling, quality of structure, and perceived housing costs (Peck & Stewart, 1985). Since the 1990s, measurement tools have included measures of the attractiveness and layout of the dwelling, the neighbourhood, and natural surroundings such as air, land, and water. Costs and quality of neighbourhood services such as fire and police protection, garbage collection, street maintenance, and recreational facilities also became important factors in measuring housing and life satisfaction (Frisch, Cornell, Villanueva, & Retzlaff, 1992). In this most recent decade, studies have also taken into account satisfaction with home use, satisfaction with community, satisfaction with neighbourhood (Grzeskowiak, Sirgy, Lee, & Claiborne, 2006), location, accessibility of services, personal security, environmental quality, and mobility (Canada Mortgage and Housing Corporation (CMHC), 2004; Natural Resources Canada, 2009).

As more and more research has emerged, several links have been found regarding the quality of life indicators and how they affect one another. For example, CMHC (2004) found that the location of housing can affect access to employment, education, transport, and health services. Moreover, the type of house individuals reside in and whether or not they own the dwelling have been found to affect public health, safety and crime risk, access to support networks, sense of family and community belonging, and empowerment and control over the surrounding environment. For individuals with a physical handicap, having an accessible home is not the only important factor contributing to their quality of life. They also take into

account having a sense of control over their environment, security, neighbourhood characteristics, access to amenities, and other social and community factors (Cooper & Rodman, 1994). In Britain, Smith, Easterlow, Munro and Turner (2003) demonstrated how poor health and housing problems could compound one another. They also revealed how exiting from home ownership can negatively impact quality of life by enhancing feelings of loss in self-confidence and esteem, perceiving a drop in social status, increasing feelings of isolation, sensing a threat to family life, and having an increased sense of loss of personal coherence. Given these negative outcomes for housed individuals with low housing satisfaction, the implications for individuals who are vulnerably housed or homeless are presumably greater and as such, housing satisfaction is examined in the second study. Utilizing items from the QOLHHI, the impact of neighbourhood and housing quality are examined in Study Two. Given that Study Two focuses solely on the homeless and vulnerably housed population, a review of relevant literature pertaining to this temporary community is subsequently examined.

Homelessness

Being homeless encompasses a broad range of people in a broad range of living situations. It includes men, women, youth, children, and families living in shelters, public places, or spaces not intended for human habitation (Springer, 2000). Being homeless also includes individuals who temporarily stay with family or friends because they cannot afford shelter for themselves. In addition to not having a place to live, some homeless individuals also experience drug addiction and mental illness (Knetch & Martinez, 2009; Tompsett, Toro, Guzicki, Marique, & Zatakia, 2006; Toro & McDonell, 1992). Moreover, it is important to note that homelessness is not typically a permanent state of living; for the majority of homeless individuals, it is a temporary experience (Aubry et al., 2003; Culhane,

et al., 1994; Shinn et al., 1998). Often homeless individuals move in and out of homelessness, some become stably housed, while others remain vulnerably housed. To be vulnerably housed means, according to the Canada Mortgage and Housing Corporation (2009), to spend more than 30 percent of the total household gross income on housing. This population is not necessarily the one you see on the street, but they do struggle. Someone who is vulnerably housed may receive a low income, work a low wage job, and live on a 'hand to mouth' basis.

Canadian researchers have become more interested in the homeless population since it began becoming more visible during the mid 1980s (Layton & Shapcott, 2008). In Ottawa, the number of individuals and families accessing an emergency shelter bed in 2013 was 6,705 people (Alliance to End Homelessness, 2014). Since 2004 when the Alliance to End Homelessness (ATEH) started collecting data on the number of people accessing shelter beds in Ottawa, the highest number was seen in 2012 with 7,308 individuals and families using shelter beds (ATEH, 2013). Although the most recent figures indicate a downward trend with fewer people using emergency shelters in 2013 than in 2012, (The Alliance to End Homelessness, 2014), the overall number of people requiring a shelter bed it is still nearly 1% of the city's population without a place to call home (Statistics Canada, 2012a). In addition, homelessness can occur for a number of different reasons that extend beyond the typically thought-of causes of substance addiction and mental illness. Some other reasons that individuals become homeless include losing a job, having an income too low to maintain suitable housing, or fleeing abuse (Alliance to End Homelessness, 2008), while others lack life skills to live on their own (Alliance to End Homelessness, 2011).

Pathways to homelessness. Being homeless is hardly ever attributable to one specific aspect or event, but rather a process of the interactions between a number of factors

at both the macro-level and the individual-level (Morrell-Bellai, Goering, & Boydell, 2000; Tyler & Schmitz, 2013; van Laer, de Wit, & Klazinga, 2009). Macro-level factors are those not in direct control of a person, but rather controlled by larger government bodies, policies, and the collective; individual-level factors on the other hand are factors at the control and manipulation of the individual person (Nelson & Prilleltensky, 2005). Neither of these factors typically function alone; rather, they are nested in one another, interconnecting and influencing each other. For homeless women, Buckner, Bassuk, and Zimma (1993) report that the impairment caused by mental illness may explain the social marginality they experience. Coupled with other macro-level variables like a low-income, a housing crisis, and functional impairment explains women's vulnerability to homelessness. Regarding women without a mental illness, Buckner et al. (1993) reviewed research that explains their homelessness as attributable to macro level factors such as a lack of adequate social and financial resources, as well as factors such as "domestic violence, substance abuse, responsibility for the care of dependent children, and lack of employment skills" (p. 393). Research by Levin, McKean, and Raphael (2004) found that, with regard to domestic violence, abusive partners prevented some women from obtaining work, leaving them dependent on the abuser and without financial means to escape the abuse. Sexual abuse and criminal activities carried out by the (usually male) head of household are also risk factors for homelessness that are specific to women (Evans & Forsyth, 2004).

Both men and women have identified the end of their marriage as a cause of homelessness, as well as their economic and emotional dependency on a relative or friend who passed away (Evans & Forsyth, 2004). Men in particular, seem to have other specific factors they attribute to their homelessness like criminal activities, release from prison, loss or renegeing of promised employment, accidents, and being born into homelessness (Evans &

Forsyth, 2004). Men are also more likely than women to report addiction as a reason for becoming homeless (Peressini, 2009).

Macro-level factors that have been identified as contributing to the likelihood of becoming or remaining homelessness include a lack of appropriate counselling, employment opportunities, wages sufficient to meet a minimum standard of living, and affordable and safe housing in drug-free neighbourhoods (Morrell-Bellai et al., 2000). Similarly, individual-level factors included a poor social network and chronic substance abuse problems.

Micro and macro-level factors are components of the ecological metaphor used to define how individuals interact with multiple social systems (Kelly, 1966, as cited in Nelson & Prilleltensky, 2005). One of the principles in the ecological metaphor is that of interdependence. The principle of interdependence between micro and macro-level factors asserts that different parts of these factors are interconnected and a change in any one component leads a ripple effect that impact other areas of the system (Nelson & Prilleltensky, 2005). As such, barriers to macro-level factors such as, proper counselling and guidance, have a heavy impact on the ability to change the micro-level factors. The following is a review of the literature of the homeless population. It focuses on the various factors that are explored in the two studies and their specific effect on homeless and vulnerably housed individuals. These factors include housing, quality of life, physical health, mental health, substance use, and social support.

Homelessness and housing. Access to supportive, subsidized, affordable housing is by far the single most important factor in preventing and ending homelessness (Aubry, Klodawsky, Nemiroff, Birnie, & Bonetta, 2007; Figueroa, 2008; Golden, Currie, Greaves, & Latimer, 1999; Layton & Shapcott, 2008; O'Connell, Kaspro, & Rosenheck, 2008; Shinn, et al., 1998). As such, the availability and access to affordable housing plays a large role in

the lives of homeless individuals. Engeland and Lewis (2004) state that having a place to call home is the foundation for obtaining employment, rearing children, building relationships within the community, and it contributes to individuals' overall health and well being. The percentage rate for affordable housing is set to 30 percent of gross household income to permit households to have enough financial resources remaining to cover other costs of living (CMHC, 2009). The challenge for homeless and low-income persons thus becomes evident; their financial resources are not sufficient to cover housing costs *and* other living expenses.

The annual report card on ending homelessness in Ottawa (Alliance to End Homelessness, 2012) outlined the cost of living in this city. A single individual working 40 hours a week, earning minimum wage, has an annual income of approximately \$21,320; the Low-Income Cut-off (LICO) for a single person in 2011 was \$23,298 (Statistics Canada, 2012b). This means that a single person earning minimum wage for 40 hours of work a week cannot afford basic necessities like food, shelter, and clothing because they have an annual deficit of \$1,978. Statistics Canada uses Low Income Cut-offs to distinguish between families or individuals who are "worse off than the average" (Statistics Canada, 1999, p. 6). Although Statistics Canada does not advocate the use of LICO scores as measures of poverty, the lack of other classification methods has left these cut-off measures as a research standard by which to compare those living in poverty to those above the poverty line. As such, an individual is considered at risk for homelessness given the disparity between his or her earnings and the national average cost of basic living requirements like shelter, food, and clothing. Moreover, the Alliance to End Homelessness (2012) points out that given the average monthly rental of a one-bedroom apartment in Ottawa in 2011, the annual household income would need to be \$35,960 for housing costs to equal 30 percent of household income.

It is clear that a single person living in Ottawa who is being paid minimum wage spends nearly fifty percent of their income on housing. Households who have such a high percentage of income dedicated to housing are considered to be in severe housing need (Alliance to End Homelessness, 2012).

Homelessness and quality of life. For the purposes of research with homeless persons, quality of life further includes measures of physical health, levels of distress (LaGory, Fitzpatrick, & Ritchey, 2001) mental health (Caslyn, Morse, Tempelhoff, Smith, & Allen, 1995; Narvaez, Twamley, McKibbin, Heaton, & Patterson, 2008), and housing satisfaction (O'Connell, et al., 2008; Wolf, Burnam, Koegel, Sullivan, & Morton, 2001). Although researchers in some cities and provinces compile reports on the quality of life indicators in their communities that lead to human and social development (see Shookner, 2000), only in the past decade has quality of life research emerged with a focus on homeless persons. Most of the studies that have been carried out involve assessing the quality of life of specific homeless samples. These include a narrow focus on formerly homeless veterans (O'Connell et al., 2008; O'Connell Kaspro, & Rosenheck, 2009; Rosenheck & Mares, 2007; Tsai et al., 2011), newly housed homeless persons (Caton et al., 2005; Wolf et al., 2001), or homeless persons with mental health or substance use problems (Gilmer, Stefanic, Ettner, Manning, & Tsemberis, 2010; Hwang, Gogosis, et al., 2011; Nelson, Sylvestre, Aubry, George, & Trainor, 2007).

One of the earlier studies comparing quality of life measures of homeless persons with severe mental illness to housed persons with severe mental illness found that those who were homeless had lower objective and subjective measures of quality of life (Lehman, Kernan, DeForge, & Dixon, 1995). Specifically, homeless individuals reported lower QoL

ratings for their living situation, their family and social relations, employment, daily activities, and their legal problems.

Similarly, a study identifying factors affecting quality of life in homeless persons found that with the exception of depressive symptoms, life chances such as race, sex, age, education, and crime victimization played a more significant role in quality of life than the choices homeless persons were given in their lives (Lagory et al., 2001). This implies that mental health issues are the primary factors affecting quality of life in homeless individuals. Moreover, although nothing can be done regarding a person's age, race, and sex, life chances regarding education and crime victimization are those that can be influenced by social policy and education programs.

Regarding the relationship between quality of life and housing for homeless individuals who obtain housing, research has found that higher housing satisfaction can be predicted by better self-assessed general health, more perceived skills, and experiencing a first versus later episode of homelessness (Wolf et al., 2001). Differences are noted between independent and subsidized housing. Overall, obtaining independent housing was significantly correlated with higher overall life satisfaction and quality of life (including greater satisfaction within the domains of leisure and money). Following their exit from homelessness, individuals who initially had reported poorer general health had higher satisfaction with overall quality of life, housing, food, and clothing. In addition, those who assessed themselves as having necessary skills to perform self-care tasks were also more satisfied overall (Wolf et al., 2001). Similar results have been shown in formerly homeless individuals identified with severe and persistent mental illness; being housed increases quality of life ratings (Kyle & Dunn, 2008)

Researchers focusing on recently housed homeless persons with mental health or substance use disorders found that quality of life was positively associated with the number of preferred housing features obtained once they were housed (O'Connell, Rosenheck, Krasprow, & Frisman, 2006). That is to say, when homeless individuals are housed and their housing more closely matches the housing and neighbourhood attributes they deemed to be personally important, the higher they rated their subjective quality of life. Similarly, Canadian researchers Nelson and his colleagues (2007) found that giving individuals choice or control over their housing and having higher housing quality ratings was related to greater levels of subjective quality of life among homeless persons.

Moreover, a Canadian study by Palepu, and her colleagues (2012) identified specific factors affecting the quality of life of homeless and hard-to-house individuals across five metropolitan cities. With the use of focus groups, participants identified basic needs like housing, food, clothing, personal hygiene, transportation, and money, as important factors to their quality of life. Additionally, the researchers found that both physical health and mental health were identified as important features affecting subjective QoL in their sample. The study also found less tangible influences on quality of life like privacy, housing stability, job choices, and personal growth. The broadest themes that Palepu and her colleagues (2012) identified as important factors contributing to the quality of life of homeless and hard-to-housed individuals included having choices, being recognized as a member of society, and stability across a number of life areas.

Study Two augments the research regarding factors that contribute to the quality of life in homeless individuals residing in the streets, in emergency shelters, and those that are marginally housed within the capital city.

Homelessness and physical health. Being homeless can bring about a variety of physical health-related issues. Some of the major physical health concerns facing homeless persons include “seizures, chronic obstructive pulmonary disease, musculoskeletal disorders, [and] tuberculosis” (Hwang, 2001, p. 229). Compared to the general population, homeless persons also have higher prevalence rates for infectious diseases, diseases of the blood, diabetes, epilepsy, heart disease, cerebrovascular diseases, respiratory problems, diseases of the liver and pancreas, skin diseases, problems of the musculoskeletal system, and injury or poisoning (Beijer & Andréasson, 2009; Beijer, Wolf, & Fazel, 2012; Khandor & Mason, 2007).

Moreover, higher levels of violence are also a reality for homeless persons (Layton & Shapcott, 2008), especially if they spend their nights on the streets rather than a shelter. However, research by Hwang (2002), showed that shelter use increased the risk of death nearly twice as much, though the increased risk may be attributable to viruses or infections that get more easily transmitted in the close quarters and shared ventilation of shelters. Nevertheless, mortality rates among homeless and vulnerably housed persons across Canada are considerably higher than those in the poorest income fifth, indicating that low income is not the sole contributing factor for increased mortality among this population (Hwang, Wilkins, Tjepkema, O’Campo, & Dunn, 2009). In addition, at 25 years old, homeless and vulnerably housed men have a remaining life expectancy of 42 years, while women’s is 52 years (Hwang et al., 2009). The probability of these individuals living to the age of 75 is calculated to be 32 percent for men and 60 percent for women (Hwang et al., 2009). In Britain, Morrison (2009) also found that homeless individuals have an increased mortality rate compared to their housed counterparts, including those residing in the poorest areas.

Additionally, being homeless increases the risk of death of persons who, in particular, have drug dependency, circulatory, and respiratory disorders (Morrison, 2009).

Wood (1992) suggests that the severity of diseases among homeless individuals is high due to their extreme poverty, which in turn can cause a delay seeking or accessing medical services. This delay in accessing medical services is attributable to higher-ranking competing priorities like finding shelter, food, clothing, and bathroom facilities (Gelberg, Gallagher, Andersen, Koegel, 1997) among this population. In what can be described as a perpetuating cycle, delaying medical services not only increases the severity of medical conditions but can in turn result in increased use of emergency treatment among the homeless. Indeed, in Canada, under a universal health care system, homeless individuals have considerably higher rates of emergency department and inpatient hospital use compared to their age and sex-matched low income counterparts (Hwang, et al., 2013). Moreover, Chambers et al. (2013a) identified that ten percent of homeless persons in their study made up the group of frequent emergency department users². This ten percent accounted for more than 60 percent of the total emergency department visits. On average, the homeless sample visited an emergency room two times per person, per year; however, the frequent users had an average rate of 12 visits per person per year. Factors predicting frequent emergency department use include being born in Canada, having a higher monthly income, perceived lower physical and mental health, and having a perceived external health locus of control from others (Chambers et al., 2013a).

In another study, Aubry, Klodawsky, and Coulombe (2012) found that their sample of single homeless individuals residing in Ottawa, Ontario could be categorized into groups

² Chambers et al. (2013a) define frequent emergency department users as participants who had at least 4.7 visits per person per year.

along a continuum, according to the severity of their overall health problems. This sample of Ottawa-based homeless individuals could be grouped into four distinct classes: 1) those who were “Higher Functioning” and had no substance use problems; 2) those who had “Substance Abuse Problems”; 3) those who had combined “Mental Health and Substance Abuse Problems”; and 4) those who experienced “Complex Physical and Mental Health Problems.” Sex differences were noted in the proportion of males and females in each of the groups. The highest proportion (38.8 percent of the sample) of adult males were found in the “Substance Abuse Problems” group, while the lowest proportion (8.8 percent of the sample) was found in the “Mental Health and Substance Abuse Problems” group. Conversely, nearly half (48.8 percent of the sample) of the female participants were found in the “Complex Physical and Mental Health Problems” group, while the lowest proportion (2.4 percent of the sample) was in the “Substance Abuse Problems” group. In comparing the physical health functioning of the four groups, Aubry and his colleagues (2012) found that those at the most severe end of the spectrum reported having a significantly lower level of physical health functioning compared to individuals in the other three groups. Interestingly, individuals in the “Substance Abuse Problems” group had the highest average score of physical health functioning, although it is unknown if the differences in scores were significant compared to the “Higher Functioning” group. The groups in Aubry’s and his colleagues’ (2012) study also showed significant differences in the number of chronic health conditions they reported. Once again, individuals in the “Complex Physical and Mental Health Problems” group indicated having the highest number of chronic health conditions, a significant difference compared to the other three groups. Additionally, Aubry and his team (2012) compared healthcare utilization between the four groups. They defined healthcare utilization by

positive responses to having spent time overnight in a medical setting in the previous 12 months or having visited an emergency room in the previous 3 months. Aubry and his colleagues (2012) found that individuals in the “Mental Health and Substance Abuse” group had the highest level of reported healthcare utilization, with individuals in the “Complex Physical and Mental Health Problems” group reporting the second highest level of healthcare utilization. Lastly, in tracking the housing trajectories of these four groups over a period of two years, Aubry and his colleagues (2012) found that persons in the “Substance Abuse Problems” group experienced the greatest difficulty in exiting homelessness and obtaining housing stability. As the researchers suggest, this result may be due to the recent increased number of social policies and programs addressing mental health problems, along with the assignment of services to triaged individuals with more severe and complex health problems (2012).

All that is required to obtain free medical care in Canada is a government issued health card. With this card, all Canadian citizens have access to medical services like hospitals, community health centres, and their choice of family doctor. Despite this universal health care system, Khandor, Mason, Chambers, Rossiter, Cowan and Hwang (2011) found that only 43 percent of homeless persons reported having a regular family doctor as a usual source of health care. Moreover, the likelihood of having a regular family doctor decreased with each subsequent year of homelessness and was associated with not having a health card and having a chronic medical condition (Khandor et al., 2011).

Other factors affecting increased severity of diseases among the homeless include not following the outlined treatment protocol and cognitive impairment (Wood, 1992). Chronic conditions such as hypertension, anaemia, and diabetes are often not controlled properly, if detected at all (Gelberg & Lin, 1989; Hwang & Bugeja, 2000; Hwang & Dunn, 2005). Often,

problems with feet and skin are observed in homeless persons. Those living on the street are likely to experience skin diseases such as body lice, scabies, and impetigo (Moy & Sanchez, 1992). Improper foot wear also leads to incidences of various foot disorders experienced by street-dwelling homeless persons (Wrenn, 1990; Wrenn, 1991). The incidence rate for tuberculosis is also higher among homeless individuals (Khan et al., 2011), particularly due to the crowding in shelters that have transient residents and often, poor ventilation (Nolan, Elarth, Barr, Saeed, & Risser, 1991).

Among youth living on the street, their high-risk health behaviours like survival sex (Greene, Ennett, & Ringwalt, 1999; Halcón & Lifson, 2004) and drug and alcohol use tend to lead them to poorer physical health status and an increased use of emergency room health care, as compared to their housed peers (Ensign & Bell, 2004; Klein et al., 2000). Moreover, the higher rates of prostitution, (Dematteo et al., 1999; Weber, Boivin, Blais, Haley, & Roy, 2002), multiple sexual partners, erratic use of condoms (Halcón & Lifson, 2004; MacDonald, Fisher, Wells, Doherty, & Bowie, 1994; Roy, Haley, Lemire, Boivin, Leclerc, & Vincelette, 1999), drug use, and incarceration (Dematteo et al., 1999), among homeless youth also put them at an increased risk of contracting HIV (Wang, King, Goldberg, Bock, Milner, & Read, 1991), and other sexually transmitted diseases and infections (Noell et al., 2001). Roy and her colleagues (2004) identified the standardized mortality ratio of street youth in Montreal to be 11.4³. Predictors of mortality among this group included being male, being homeless the previous six months, injection drug use in the previous six months, daily alcohol use in the last month, and HIV infection. Noell and his colleagues (2001) found that homeless youth have increased prevalence rates for hepatitis B and C, as well as sexually transmitted

³ Standardized mortality ratios higher than 1.0 indicate a higher number of deaths than expected.

infections like chlamydia and herpes. Additionally, the incidence rate of sexually transmitted infections was significantly higher among young women than men and related to inconsistent condom use, increased number of partners, and sex with older partners.

Being homeless is clearly connected to the lack of housing, and due to this, the majority of studies on homelessness have focused on factors that prevent the attainment or retention of housing. Physical health factors and health status have been identified as influencing the ability to attain and retain housing (Aubry et al., 2007; Klodawsky, Aubry, Nemiroff, Bonetta, & Willis, 2009). In a panel study of homeless persons in Ottawa, Canada, Aubry et al. (2007) found that in some cases, identifying a physical or mental impairment helped individuals attain housing. In other cases, their physical or mental impairment was the reason for not being able to attain or retain stable housing (Aubry et al., 2007; Klodawsky et al., 2009).

Given that homeless individuals are at an increased risk of illness and disease, and that physical health is highly related to quality of life, Study Two explores the relationship between physical health and quality of life in homeless and vulnerably housed individuals residing in the Ottawa area.

Homelessness and mental health. Prevalence rates of mental illness are difficult to estimate in the homeless population because they can vary depending on assessment method, sampling strategy, and how the study defines homelessness (Buckner et al., 1993). However, it has been determined that the prevalence for mental illness is higher among homeless individuals than among the general public (Boivin, Roy, Haley, & Galbaud du Fort, 2005; Canadian Institute for Health Information, 2007; Fazel, Khosla, Doll, & Geddes, 2008; Frankish, Hwang, & Quantz, 2009; Mental Health Policy Research Group, 1997) with some studies indicating that approximately one third of homeless persons have a mental disorder

(Canadian Institute for Health Information, 2007; Eberle, Kraus, Serge, & Hulchanski, 2001). Moreover, the lifetime prevalence rate of schizophrenia, although higher than the general population, was 5.7 percent in a Toronto sample, which is much lower than stereotypically assumed among the homeless (Mental Health Policy Research Group, 1997). What is much more prevalent among this population are mood and anxiety disorders with between 20 and 40 percent lifetime prevalence rates (Fischer & Breakey, 1991; Mental Health Policy Research Group, 1997; Susser et al., 1993). Point prevalence rates for mood disorders, schizoaffective disorder, and anxiety disorders were found to be slightly higher with rates of 41 percent, 23 percent, and 16 percent respectively, in a sample of homeless individuals in London, Ontario (Lapointe, Pennington, Vingilis, & Stitt, 2002).

In a systematic review of studies of homeless persons published between 1979 and 2005, Fazel and his colleagues (2008) identified alcohol dependence and drug dependence as the two most common major mental disorders, with pooled prevalence estimates of 37.9 percent and 24.4 percent, respectively. Moreover, when homeless individuals experience other mental health problems in addition to their substance dependency, they also report the lowest level of mental health functioning compared to those with solely substance abuse problems or complex physical and mental health problems (Aubry et al., 2012). Personality disorders were the third most prevalent type of mental disorders in Fazel and his colleague's (2008) review, with pooled prevalence estimates of 23.1 percent. Lastly, Fazel and his team (2008) found that psychotic disorders were just as prevalent as major depression (pooled prevalence estimates of 12.7 and 11.4 percent, respectively), which contrasts earlier findings that indicated mood disorders were more prevalent (Fischer & Breakey, 1991; Mental Health Policy Research Group, 1997).

In a recent Canadian study of homeless and vulnerably housed persons, Gadermann and her colleagues (2013) found that over fifty percent of individuals had been diagnosed with at least one mental health disorder. The most common conditions included depression, generalized anxiety disorder, and post-traumatic stress disorder. Among homeless women in Canada, Chambers and her colleagues (2013a) determined that poor mental health was related to low social support, experiencing a physical or sexual assault within the last year, having a chronic health condition, and drug use problems. Other factors affecting the prevalence of mental illness in homeless individuals include increased levels of stress, less effective coping styles, lower levels of social support, and lower self-esteem (CIHI, 2007).

Increased suicidal behaviours have also been associated with mental health features in homeless persons (CIHI, 2007; Cheung & Hwang, 2004; Christensen & Garces, 2006; Hwang, 2002). In the Toronto Street Report (Khandor & Mason, 2007), more than half of homeless persons indicated experiencing serious depression while one in ten persons indicated attempting suicide in the past year. American studies suggest that approximately three percent of the population report suicidal ideation every year, but the rates are ten times higher in the homeless population (Fitzpatrick, Irwin, Lagory, & Ritchey, 2007).

Internationally, Okamura, Ito, Morikawa, and Awata (2014) found that over twelve percent of homeless persons in Japan had a recurring wish to die and over seventeen percent had attempted suicide at some point in their life. Factors associated with recurrent thoughts of suicide among homeless Japanese included living on the street (compared to shelters), perceiving a lack of emotional support, perceived poor physical and mental health, being visually impaired, experiencing pain, and having insomnia. Not surprisingly, the greatest indicator of suicidal thoughts was a current experience of depression (Okamura et al. 2014).

Being homeless, living in poverty, and having economic insecurity are risk factors that can potentially influence the development of mental health problems and mental disorders in Canadians (Public Health Agency of Canada, 2006). Given the increased prevalence of mental illness among the homeless, Study Two examined emotional well-being within the context of mental health. Hopelessness was assessed as a component of mental health in the homeless and vulnerably housed sample, as explained below.

Homelessness, depression, and hopelessness. The most common mental illness affecting homeless individuals has been found to be major depression (Mental Health Policy Research Group (1997). The Public Health Agency of Canada (2006) estimates that Canadians between 15 to 24 years old have over 10 percent lifetime prevalence rate for depression, Canadians between 25 to 44 years have an almost 14 percent rate, and those between the ages of 45 to 64 have a lifetime prevalence rate of over 14 percent.

Among the homeless, one early study found that 59 percent of the homeless sample in Birmingham, Alabama showed “probable clinical caseness” (Lagory et al., 1990, p. 87) for depression. This study also found that risk factors for depression included a previous history of mental illness, being young, chronic homelessness, lack of education, having a physical illness and living on the street, as compared to an emergency shelter.

Another study found one third of homeless individuals in Ottawa self-identified mental health problems, with 20 percent of them stating depression as their main mental health concern (Farrell, Aubry, & Reising, 2002). In addition, research conducted with Canadian street youth found higher mean levels of depression than among their non-runaway peers (Ayerst, 1999). These young homeless individuals pointed to their lack of money, food, and shelter, as well as familial stress and separation from their friends as contributing to their depression.

Specific research on hopelessness in the homeless has seen a similar course as the quality of life research. A study by Vance (1995) is one of the few studies to outline the sources of hopelessness in a sample of older homeless men. These sources include the inability to find and secure employment, the ease of victimization, the lack of resources such as health care and police protection, the absence of ties to other family members, and the lack of support from the dominant culture. Miner (1991) demonstrated that hopelessness greatly influenced a very poor self-concept of homeless youth. In addition, the Canadian Population Health Initiative of the Canadian Institute for Health Information (2009) has identified self-esteem as a factor related to mental health and well-being that affects homeless individuals. In a qualitative study of homeless youth, Kidd (2004) found the participants' feelings of worthlessness, loneliness, hopelessness, and being trapped were linked to suicide. In a similar study, Kidd and Carroll (2007) found that a belief in a better future, or being hopeful of the future, was linked to lower risk of suicidality among homeless youth. Lastly, a study of Turkish street children examined the relationship between socio-demographic and family characteristics, family relations, street-life experiences, and hopelessness (Duyan, 2005). To date, nothing in the literature has been found relating hopelessness and quality of life in a homeless sample. To address this gap in the literature, Study Two included a measure of hopelessness within the mental health domain.

Hopelessness in current study. Abramson's et al. (1989) model of hopelessness posits that when individuals hold expectations that negative events will occur and they are incapable of changing the likelihood of occurrence of said events, they become more vulnerable to hopelessness depression. Moreover, pessimistic inferences (regarding causes, consequences and the self) made by individuals facing negative stressful life events are speculated to be proximal contributory causes of hopelessness depression.

The purpose of Study Two is not to determine whether homeless individuals experience hopelessness depression but rather to ascertain the degree to which they experience hopelessness and how this interacts with other measures, including perceived quality of life as measured by the Quality of Life for Hard-to-House-Individuals scale (QoLHHI), (Russell et al., 2008). Abramson et al.'s (1989) model provides a useful heuristic for assessing the nature of ambiguous behaviour outcomes possibly experienced by homeless individuals. It allows for the testing of this model of hopelessness within a new population, as few studies have focused on hopelessness in homeless persons.

Homelessness and substance use. Although Study Two does not investigate the link between substance use and housing or quality of life, it is important to discuss the effect of substance use on overall physical and mental health, particularly for a population with increased substance use such as the homeless and vulnerably housed.

Despite the challenge in determining which comes first, substance use or homelessness, it is widely known that higher than average levels of substance abuse (CIHI, 2007; Fischer & Breakey, 1991) further complicate the general health of homeless individuals. Research findings are incongruent in their understanding of the degree to which substance abuse contributes to the loss of housing and homelessness. Wasson & Hill (1998) found that among female-headed families, substance abuse was not a high predictor of entrance into the shelter system. Likewise, studies of homeless families did not find substance abuse to be a contributory factor of obtaining or retaining housing (Shinn, et al., 1998; Vostanis, Grattan, Cumela, & Winchester, 1997). However, research of homeless families by the Institute for Children and Poverty (1998) found substance abuse to be among the top factors contributing to the inability to obtain or retain employment at a wage level that would expedite access to affordable permanent housing. Similarly, substance abuse

problems were cited as precipitating factors of homelessness in studies conducted with homeless families in El Paso, Texas (Ryan & Hartman, 2000) and female-headed homeless families in Worcester, Massachusetts (Weinreb, Buckner, Williams, & Nicholson, 2006). Lastly, a literature review conducted by McChesney (1995) revealed that among the four risk factors associated with exiting permanent housing, substance abuse was among the highest.

Newer research shows that among other factors, substance use is to some degree a risk factor for homelessness (O'Connell et al., 2008). Several studies have found between 70 to 97 percent of homeless youth abuse either alcohol, illicit drugs, or a combination of both, and that the risk of using these substances increases with age and duration of homelessness (see Zerger, Strehlow, & Gundlapalli, 2008 for a review). Moreover, along with mental illness, abuse of substances account for the majority of hospitalizations of homeless persons (Chambers, 2013a).

Among Canadians, youth that experience either chronic or marginal homelessness have been found to consume more alcohol and use more illicit drugs than their housed peers (Public Health Agency of Canada, 2006). These youth also show a greater intent of becoming either inebriated or high, and have a higher likelihood of combining substances (Public Health Agency of Canada, 2006). In Toronto, lifetime diagnosis or substance abuse or dependence was reported by 68 percent of shelter dwellers (Goering, Tolomiczenko, Sheldon, Boydell, & Wasylenki, 2002). In Vancouver, British Columbia, Palepu and her colleagues (2012) found that 29 percent of study participants reported daily substance use and almost half reported less than daily substance use. Among the daily users, marijuana was the most common substance used, followed by crack cocaine, alcohol, heroin, and amphetamines (Palepu et al., 2012). In this study, daily substance use was further found to be independently related to increased symptoms of mental illness.

Parental alcoholism or drug abuse also appears to contribute as a risk factor for homelessness (Mental Health Policy Research Group, 1997). Moreover, predictive links have also been found between both childhood abuse and parental substance abuse and chronic homelessness (Stein, Burden Leslie & Nyamathi, 2002).

Overall, it seems that alcohol and drug use are factors often associated with being homeless. The use of substances appears to be less in homeless families headed by single mothers, and it seems to increase in single individuals without dependents who experience longer periods of homelessness. A recent comparison of drug use prevalence in homeless and vulnerably housed persons in three Canadian cities found that Vancouver has the highest rate of any drug use (82 percent), followed by Ottawa (74 percent), and Toronto (59 percent) (Palepu et al., 2013a). The types of drugs used also differed by city, with higher prevalence of amphetamines, cocaine/crack cocaine, and heroin in Vancouver, while Ottawa had higher prescription narcotic use. Among the three cities, the prevalence for self-described problematic drug use was found to be 29 percent and problematic alcohol use at 16 percent.

Hubley, Russell, and Palepu (2005; Hubley & Palepu, 2007) have argued that common measures of quality of life fail to capture the nuances and unique factors affecting drug users because they are not culturally sensitive to the lives of drug users. As such, the Injection Drug Users' Quality of Life Scale (IDUQOL) was created. Its early use in Montreal found that quality of life was negatively associated with both cocaine injection and emergency department use (Brogly, Mercier, Bruneau, Palepu, & Franco, 2003). Given the connection already discussed between mental health, depression, substance use, social support, and quality of life in housed individuals, attention now turns to social support as it is experienced in homeless and vulnerably housed persons.

Homelessness and social support. Social support has been found to be positively associated with mental functioning (Achat et al., 1998), and shown to act as a buffer between psychological distress and stress (Shields, 2004). Given the psychological distress already described as experienced by homeless individuals, it can be proposed that social support plays an important role in the lives of the homeless, and can be one way to cope with their housing situation (Canadian Population Health Initiative of the Canadian Institute for Health Information, 2009).

Research by Smart and Walsh, (1993) on predictors of depression in Toronto street youth found social support to have an inverse relationship with depression, meaning that youth who are perceived to have high levels of social support also showed lower ratings of depression compared to youth reporting medium or low levels of social support. Other studies have also found that increasing the availability of social support can reduce depressive symptomatology (Unger, Kipke, Simon, Johnson, Montgomery, & Iverson, 1998), and decrease the odds of using illicit drugs and engaging in high-risk sexual behaviours (Ennett, Bailey, & Federman, 1999) among homeless youth.

With regard to adults, Farrell et al. (2002) interviewed street-dwelling individuals and found 15 percent reported not having any social support. Often, when asked for the number of friends they had, respondents would point to the interviewer as their only friend (S. Farrell, personal communication, October 3, 2007). Moreover, social support was found to be an important influence for distress and suicidality among homeless individuals in Boston, Massachusetts, according to Schutt and his colleagues (1994). They found social support to interact with distress and explain suicidal thinking. Specifically, individuals with higher levels of distress who also had higher social support were less likely to experience suicidal ideation, as compared to individuals with less social support (Schutt et al., 1994). Higher

perceived social support is also related to the number of homeless episodes individuals experience. Zugazaga (2008) found that, despite homeless participants reporting less social support than is typical, those with the most perceived social support also indicated having fewer episodes of homelessness. Similarly, a study by Reitzes, Crimmins, Yarbrough, and Parker (2011) found that homeless adults in Atlanta, Georgia, who received tangible support, such as staying with friends or relatives, and who accessed formal social services more frequently, increased their odds of exiting from homelessness over a 15 month period. Additionally, although participants in this study did not typically access formal social services when they needed advice, they did report seeking out specific professional individuals at nearby agencies when they needed advice or counsel (Reitzes et al., 2011). This implies that although homeless persons may not feel socially connected to the social agencies that provide them services, they do make social connections with the professionals they encounter at these agencies.

One of the enabling factors associated with psychiatric hospitalization among homeless persons is a perceived lack of social support (Chambers et al., 2013a). In fact, perceived emotional support has been found to positively relate to subjective measures of mental health status (Hwang et al., 2009) among the homeless. Similarly for homeless women, low perceived social support is associated with poorer mental health (Chambers et al., 2013a). Given the important role social support plays in individuals' lives, and the added stress of being homeless or vulnerably housed, a measure of perceived social support was used in Study Two as part of the mental health domain.

To summarize the literature review, quality of life, as it is understood in its subjective terms, is the degree of general well-being of a person; well-being that involves a number of different elements, including those that are psychological, physical, social (Haas, 1999, as

cited in Poradzisz & Florczak, 2013), and economical. Physical elements affecting quality of life include physical health, which is the presence or absence of illness and disease, physical pain, mobility, and perceived or actual Body Mass Index outside of the normal range.

Psychological factors include a person's mental health, which involves the presence or absence of disorders like mood and anxiety disorders, psychotic disorders, and drug and alcohol dependency. Social factors affecting quality of life include the degree of social support that is perceived to be available, the number of social networks that a person has available to him or her, and the sense of connectedness or belonging. Lastly, economical factors affecting quality of life include socio-economic factors like income and education level. Poverty and housing status are also economic factors affecting quality of life, factors that are often central in the lives of homeless individuals.

Where the physical, psychological, social, and economical elements of quality of life can be understood as affecting an average person independent of the size or location of their residence, the same cannot be said of persons living in poverty or who are homeless. Being homeless or vulnerably housed affects the elements of quality of life in a much more interdependent fashion. For example, the average person with diabetes typically carries a health card that allows him or her access to a physician who can prescribe medication, which will likely be kept in a medicine cabinet somewhere in the home, and likely taken as prescribed, thereby managing his or her diabetes. A homeless person with diabetes on the other hand, is less likely to have a health card, which makes it more difficult to access a physician to get medication and increase the likelihood that the diabetes will not be well managed. If the homeless individual is able to fill his or her prescription, consideration needs to be given to where the medication will be kept. If the medication is lost or inaccessible when it is required, then the diabetes is not well managed. Unmanaged diabetes can lead to a

variety of other health complications like heart disease, kidney disease, circulatory problems, or eye problems (Campbell & Martin, 2009), to name a few. This person's deteriorated physical health may make it more difficult to socialize and receive the social support he or she requires, which in turn affects his or her mental health. As such, it is presupposed that for homelessness and vulnerably housed persons, their housing and poverty status affects their physical and mental health more negatively and therefore make it more difficult to attain the same level of quality of life as the average housed person.

The following two studies were undertaken as a means of studying the physical, psychological, and social dimensions of quality of life in both a housed and homeless group of individuals. The objective of the two studies is two-fold; first, to identify a model of the relationship between quality of life, physical health, and mental health in both a housed and homeless sample and indirectly compare them. Second, to use the model to determine if either physical health or mental health is a better predictor of quality of life in each of the groups. Identifying the best predictor of quality of life in housed versus homeless individuals may allow for better targeted strategies and social policy for helping individuals in need. The intent of the present two studies is to answer the following general comprehensive research questions:

1. Do housed individuals experience lower degrees of mental illness and perceived mental health status compared to homeless and vulnerably housed persons?
2. How do the predictive models between the housed sample and the homeless/vulnerably-housed sample differ? How are they the same?

The Current Studies

Two studies were undertaken as a means of identifying a predictive model of the relationship between quality of life, physical health, and mental health. Structural equation

modeling (SEM) was employed to accomplish this. SEM was chosen over multiple regression because it allows for simultaneous evaluation of model construct relationships (Alavifar, Karimimalayer, & Anuar, 2012). The first study focused on a model of housed residents in a metropolitan area, while the second study focused on a similar model of homeless and vulnerably housed individuals of the same location. The housed residents study used archival data from the Canadian Community Health Survey's (CCHS) 2007/2008 cycles and the homeless and vulnerably housed study used baseline data collected from the tri-city Health and Housing in Transition (HHiT) study.

Models in both studies used the three latent constructs of Physical Health, Mental Health, and Quality of Life to form the structural model. Where possible, variables were matched in both studies. For example, both the CCHS and HHiT study used the same measure to assess perceived physical health status (PCS) and perceived mental health status (MCS). As such, both models use PCS and MCS scores as variables for the Physical Health and Mental Health factors, respectively. Similarly, variables for chronic health conditions and pain and discomfort were also assessed with the same measure in both studies and as such, were matched to their respective Physical Health. Overall, the Physical Health factor in both studies used the same measured variables. However, this was not possible with the Quality of Life or Mental Health factors.

Although the MCS variable was the same for the Mental Health factor in both studies, the housed sample also used a measure of perceived stress. Stress was chosen as a variable because of its well-studied impact on mental health and mental functioning (CIHI, 2007; Gilmour & Patten, 2007; Michalos et al., 2000; Miura, 2008; Yerkes & Dobson, 1908). The homeless sample used a measure of perceived social support and a measure of hopelessness to assess the latent factor of Mental Health. Likewise, the variables measuring

the latent construct for Quality of Life differed in each model. In the housed sample, the latent QoL construct was measured by three variables: satisfaction with life, sense of belonging to the community, and satisfaction with one's weight. Through discussion groups in Zagon's (2001) study, Canadians identified that a sense of belonging to the community was among the top nine themes that depict quality of life in Canada. As a result, a measure of belonging to the community was used as an indicator of QoL in the housed sample model. Moreover, the rationale for including satisfaction with one's weight as a variable for quality of life stems from research findings linking lower quality of life ratings with both a body mass index (Cash & Fleming, 2002; Ford et al., 2001; Lean et al., 1999; Rippe et al., 1998) or perceived weight status (Burns et al., 2001; Larsson et al., 2002; Brunson et al., 2014) outside of the normal range. A measure of satisfaction with one's weight was not available for the homeless and vulnerably housed sample and thus, was not included.

In view of the fact that attempts were made to have both models measure similar variables, the homeless sample included a measure of the impact their neighbourhood had on them as an indicator for the QoL construct. This indicator was added to correspond to the sense of belonging indicator in the housed group. Lastly, the quality of life construct for the homeless and vulnerably housed model included a measure of housing quality as a variable. This variable was chosen because past researchers have recognized it as an integral measure of quality of life in the specialized population that is the homeless (O'Connell, et al., 2008; Wolf et al., 2001). Figures 1 and 2 provide the hypothesized model of the housed and homeless samples, respectively.

Contribution to the Literature

This study will add to the literature on the contributing factors to quality of life in a number of ways. First, it has a unique participant sample; these two studies will investigate

differences in the factors that contribute to quality of life between housed and homeless individuals. This comparison is lacking in current literature. Russell, Hubley, and Palepu (2005) conducted the only Canadian study currently available that focused solely on what the homeless and vulnerably housed consider important to their quality of life. They found that shelter, food, clothing, health care, personal identification, transportation, and money were tangible factors influencing the quality of life of homeless and vulnerably housed individuals. Less tangible influences included health, relationships, choices, stability, and recognition as members of the community. Although Russell and her colleagues (2005) captured first-hand experience of the influencing factors to the quality of life of homeless and vulnerably housed individuals, no comparisons have been made to date to those of a housed population. Given that homeless and vulnerably housed persons reside in a “unique social context that differs considerably from that of society in general” (Russell et al., 2005, para. 1), and seeing the results from her study, it is expected that the homeless and vulnerably housed will differ in what they consider is important to their quality of life, compared to the housed population. These expected outcomes will serve to clarify how quality of life differs between the general population and the homeless and vulnerably housed population in Ottawa.

Second, it is intended that the outcome of this research will provide support for social and policy change, particularly for the homeless population, and offer suggestions for the enhancement of life and life quality in currently homeless and vulnerably housed individuals. This may occur by identifying unique physical and mental health factors that contribute to the quality of life of homeless and vulnerably housed persons. With regard to the housed population, understanding of the interrelationships between the above factors and generalizable outcomes is also anticipated.

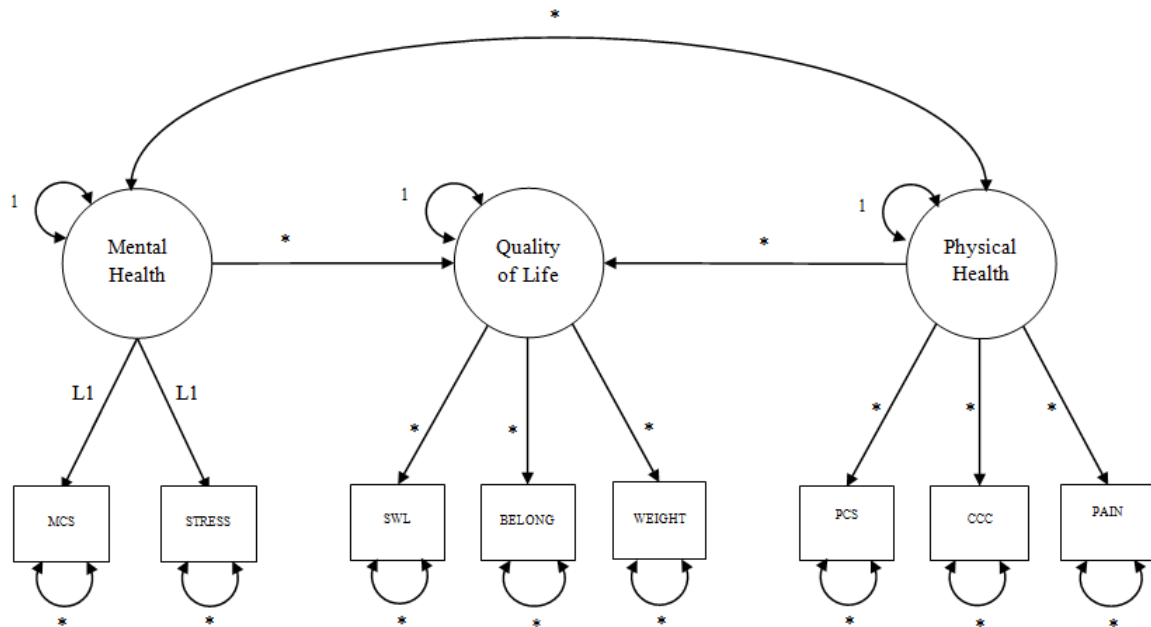


Figure 1. Hypothesized structural model of the relationship between mental health, quality of life, and physical health in a housed sample of Canadians residing in Ottawa. The limiting assumption of TAU-Equivalence was used on the estimated factor loadings to correct the under-identification of the local model of Mental Health. Three variables make up the Quality of Life construct, and three more variables make up the Physical Health construct. The model is hypothesized to show both Mental Health and Physical Health having a direct positive effect on Quality of Life. Mental Health and Physical Health are also expected to covary. Degrees of freedom are calculated by subtracting the number of unknown variables from the number of known variables ($df = k - uk$) In this model, the calculation is $k = [8(8 + 1)] / 2 = 36$; $uk = 18$; $df = 36 - 18$; $df = 18$.

MCS = Perceived mental health status; STRESS = perceived level of stress; SWL = satisfaction with life; BELONG = sense of belonging to community; WEIGHT = opinion of own weight; PCS = perceived physical health status; CCC = chronic health conditions; PAIN = degree of pain and discomfort.

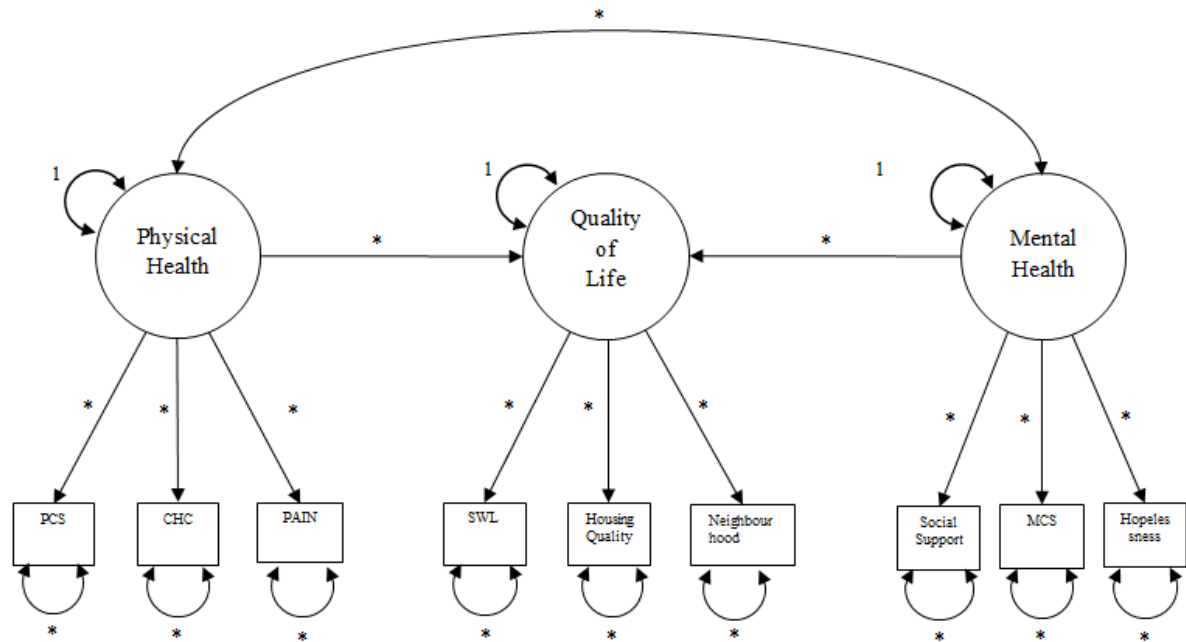


Figure 2. Hypothesized structural model of the relationship between mental health, quality of life, and physical health in a homeless and vulnerably housed sample of Canadians residing in Ottawa. Each of the three constructs are made up of three different variables. The model is hypothesized to show both Mental Health and Physical Health having a direct positive effect on Quality of Life. Mental Health and Physical Health are also expected to covary. Degrees of freedom are calculated by subtracting the number of unknown variables from the number of known variables ($df = k - uk$) In this model, the calculation is $k = [9(9 + 1)] / 2 = 45$; $uk = 21$; $df = 45 - 21$; $df = 24$.

PCS = perceived physical health status; CHC = chronic health conditions; PAIN = degree of pain and discomfort; SWL = satisfaction with life; Housing Quality = perceive quality of housing; Neighbourhood = impact of neighbourhood; Social Support = perceived social support; MCS = perceived mental health status; Hopelessness = perceived level of hopelessness.

Study One: The Relationship between Physical Health, Mental Health, and Quality of Life in a Housed Canadian Sample

The first study focused on identifying a predictive model of the relationship between quality of life, physical health, and mental health in a housed sample in the city of Ottawa. Despite the number of studies already reviewed that focus separately on the quality of life, physical and mental health of Canadians, there is little research on how these three factors interact in a unique sample like that found in city of Ottawa.

Ottawa is the capital city of Canada, and although it is considered a large population centre (i.e., has a population greater than 100,000 and a density of no fewer than 400 residents per kilometre squared), it only ranks as the sixth largest population centre in the country and fourth largest municipality by population count alone (Statistics Canada, 2012a). It has a unique demographic of residents in that they have the highest median total family income of all the census metropolitan areas (Statistics Canada, 2013). Ottawa also has the largest proportion of residents with a university degree and/or college diploma (Ferguson & Zhao, 2013), and per capita, has the largest number of scientists, engineers, and residents with doctoral degrees (City of Ottawa, 2014). Examining the relationship between physical health, mental health, and quality of life allowed for better understanding of how each of these areas affect persons with a unique demographic profile like Ottawa. Overall, the rationale for the first study is to explore the relationship between physical health, mental health, and quality of life in a sample of highly educated, higher earning, and housed residents of a large population centre in Canada.

Hypotheses and Research Questions

One research question that will be investigated in this study is the effect that physical and mental health factors have on quality of life for housed individuals. The general

hypothesis regarding the predictive model of quality of life, physical health, and mental health in a housed sample of residents is that physical health and mental health will be equal predictors of QoL. With a demographic sample of highly educated and higher earning individuals, there are no discernible reason to expect one factor to be of greater influence on quality of life.

An additional research question that will be investigated is whether or not predictors of quality of life differ between housed men and women. Other sex differences that will be explored include whether differences in perceived mental health status and perceived physical health status exist between housed men and women.

Method

Participants

The sample used in this study comprised of 1,339 participants who took part in the 2007-2008 Canadian Community Health Survey (CCHS, Statistics Canada, 2009a).

Inclusion criteria for this study required participants to be at least 18 years old, reside in a private dwelling within the city of Ottawa, to have responded to the survey themselves and not by proxy, and to have indicated that they were alone during the interview process.

Participants were excluded if they were "...institutional residents [or] full-time members of the Canadian Forces" (Statistics Canada, 2009a, p. 1).

In this sample, all respondents resided in private dwellings, most (68.6 %) in three or more bedroom homes. Over two-thirds (71.3%) of participants stated that a member of the household owned the dwelling. There were slightly more women (56.5 %) than men (43.5 %) who participated, and approximately half (51.4 %) of respondents indicated being either married or in a common-law relationship. The largest age group (19.4 %) was for individuals

between 40 and 49 years of age; however, more than half (54.2 %) of the respondents were between the ages of 30 and 59.

Measures

Developed by Statistics Canada, the Canadian Community Health Survey (CCHS) has historically collected data over 12 months and released results every two years. However, since 2007, data have been collected on a repeating two-month cycle and released on an annual basis. When the redesigned methodology was introduced in 2007, the sample changed from approximately 130,000 participants biennially, to 65,000 every year. The survey is comprised of two cross-sectional surveys carried out over a two-year repeating cycle. It collects population information from Canadians in relation to their health status, healthcare utilization, and health determinants (Statistics Canada, 2009a). The first survey, initially conducted throughout odd-numbered years (2001, 2003, 2005), gathers data from Canadian households on a variety of population health topics. Its objective is to generate reliable estimates at the level of the health region (St. Pierre & Béland, 2004; Statistics Canada, 2009a). The second survey, also initially conducted in a cyclical manner but throughout even-numbered years (2002, 2004, 2006), focuses on more specific topics that vary every cycle and strives to generate reliable estimates at the provincial level. Some of the specific topics surveyed include mental health, nutrition, and health examination measures (St. Pierre & Béland, 2004). Data used for the purpose of this study included the combined 2007 and 2008 sample. As such, the original 2007-2008 data contained over 130,000 national participants.

Four components form the Canadian Community Health Survey, including: 1) the core content, 2) the theme content, 3) the optional content, and 4) the rapid response content (Statistics Canada, 2009b). The core content includes questions that are asked of all survey

respondents in all provinces and that remain relatively stable in the questionnaire for approximately six years (Statistics Canada, 2009a). Conversely, the theme content consists of questions corresponding to a particular topic that are asked of only a sub-sample of participants. The theme content involves both a two-year theme and a one-year theme that change with each cycle (Statistics Canada, 2009a). The optional content is chosen from a list of available modules and gives health regions the opportunity to select content that focuses on specific provincial or regional public health priorities (Statistics Canada, 2009a). These selected modules are then only asked to participants of the region that requested the module. The content of these modules may vary annually based on the needs of health regions (Statistics Canada, 2009a). Lastly, the rapid response content is offered to organizations wanting national estimates on a specific topic of population health. These questions are only available for a single collection period (two months) and are asked of all respondents within that period (Statistics Canada, 2009a).

The CCHS began collecting data in 2001. Prior to that year, population health data were collected by the National Population Health Survey (NPHS). At that time, the NPHS was comprised of a series of cross-sectional measures, as well as a longitudinal component. The Canadian Community Health Survey has replaced the cross-sectional component of the NPHS, though the collection of longitudinal data on a sample of 170,000 Canadians every two years continues to be carried out by the NPHS (Katzmarzyk & Tremblay, 2007). The complete description of the aims, development, and methodology of the Canadian Community Health Survey are part of the documentation accompanying the publicly available survey data (Statistics Canada, 2009a; 2009b) and have also been outlined by St. Pierre and Béland (2004) and Gravel and Béland (2005).

Variables. For the purpose of the present study, data from the core content and optional content of the survey were used. Specifically, core content questions made up this study's observed measures of 1) perceived physical health status (PCS), 2) chronic health conditions (CCC), and 3) pain and discomfort (PAIN). These three measures were used to identify the latent variable Physical Health. Additionally, other core content questions used included observed variables for 1) perceived mental health status (MCS), and 2) stress (STRESS). These two measures were used to identify the latent variable Mental Health. The STRESS indicator was chosen because of its studies impact on mental health and functioning. Lastly, the latent variable Quality of Life was composed of items from both the core content and the optional content. Core content items included those for the observed variables of 1) sense of belonging to the community (BELONG), and 2) opinion of own weight (WEIGHT). The WEIGHT indicator was included as a measure of Quality of Life because of the research linking perceived weight with quality of life ratings (Brunson et al., 2014; Cash & Fleming, 2002; Ford et al., 2001; Larsson et al., 2002; Lean et al., 1999; Rippe et al., 1998).

The one item used from the optional content was regarding satisfaction with life (SWL) (see Appendix A for a complete list of variables and their abbreviations). The three latent variables were used to determine the relationships between Quality of Life, Physical Health, and Mental Health in a housed sample. Figure 1 outlines how these variables are hypothesized to relate to one another.

Procedure

The 2007-2008 Canadian Community Health Survey collected 131,959 interviews between January 2007 and December 2008. During that time, approximately fifty percent of interviews were conducted over the telephone using computer assisted telephone

interviewing, while the remaining fifty percent of interviews were conducted in person using computer assisted personal interviewing (Statistics Canada, 2009a). Both these types of computer assisted interviewing methods enable a custom interview for every participant that is based on survey responses and individual characteristics. Further procedural steps taken to carry out the CCHS are available from the Statistics Canada website (Statistics Canada, 2009b).

Sampling procedure. The Canadian Community Health Survey is a cross-sectional design population health survey. Original sampling took place across 121 health regions throughout the country. However, this study only analyzed responses from the City of Ottawa health unit to allow for indirect comparisons with the homeless population of Ottawa in Study Two. Since 2007, an annual stratified cluster sample has been attained from three sampling frames: an area frame, a list frame, and a random digit dialling frame (Statistics Canada, 2009b).

The area frame. Designed for the Canadian Labour Force Survey, this sampling plan is a multistage stratified cluster design wherein the household is the final sampling unit. Homogeneous strata are formed in the first stage and independent cluster samples are drawn from each stratum. Dwelling lists are then prepared for each cluster in the second stage and households are subsequently drawn from these lists (Statistics Canada, 2009a). For the purpose of this frame, the province of Ontario was divided into three regions; major urban centres, cities, and rural regions. Within each major urban centre, geographic or socio-economic strata were created, and then within each stratum, between 150 and 250 dwellings were grouped to create clusters. Six clusters were then chosen by random sampling in each stratum, with a probability proportional to size (Statistics Canada, 2009a). The cities and rural regions of Ontario were also stratified on geographical basis first and then based on

socio-economic characteristics. For the majority of strata, six clusters are selected using the proportional to size method. However, some geographically isolated urban centres in Ontario were covered using a three-stage sampling design (Statistics Canada, 2009a). Once new clusters were listed, the sample was obtained using a systematic sampling of dwelling.

The list frame. This frame was used in all health regions in Ontario as a means to complement the area frame. The list frame is comprised of listed telephone numbers in the Canada Telephone directory. This directory is an external database of names, addresses, and telephone numbers that is updated every six months. To create list frame strata, the database was linked to administrative conversion files to obtain postal codes that were then mapped to health regions (Statistics Canada, 2009a). Each health region had one list frame stratum, within which, the required number of telephone numbers were randomly selected. Additional telephone numbers were selected to account for those not in service in the random digit dialling frame.

The random digit dialling frame. This sampling frame used the Elimination of Non-Working Banks method to sample households. The first eight digits of a ten-digit telephone number are considered a bank, and they are considered non-working when a bank of one hundred numbers does not include any residential telephone numbers (Statistics Canada, 2009a). Initially, the frame consisted of all possible banks; however, as non-working banks were identified, they were removed from the frame. As a means of identifying non-working banks the Canada Telephone directory and telephone companies' billing address files were used, along with various administrative files. The remaining banks were regrouped, based on postal codes, to create random digit dialling strata that matched the health regions as closely as possible (Statistics Canada, 2009a). A bank was then randomly chosen and a number between zero and 99 was generated at random to create a complete telephone number within

each random digit dialling stratum. This was repeated until the required number of telephone numbers was reached. When the telephone number generated was not in service, additional numbers were often generated to achieve the targeted sample size. The success rate for in-service telephone numbers within this sampling frame ranged from 25 to 50 percent.

Overall, the area frame made up approximately 49 percent of the sample, the area frame made up about 50 percent of the sample, while the last one percent was drawn from the random digit dialling frame (Statistics Canada, 2009b). For a complete description of the Canadian Community Health Survey methodology, see Statistics Canada (2009b).

Analytical Strategy

Preliminary statistics and descriptive analyses were conducted using the IBM Statistics Package for the Social Sciences, version 20.0 (IBM Corp., 2011). Structural equation modeling (SEM) was performed using maximum likelihood estimation with RStudio software, version 0.97.449 (RStudio, 2012) using the Lavaan package (Rosseel, 2012), version 0.5-13 (Rosseel et al., 2012). SEM was chosen over multiple regression because it allows for simultaneous evaluation of model construct relationships (Alavifar, et al., 2012). Moreover, the assumptions for multiple regression such as specification of the model, interval data with limited range, and equal relationships between independent variables make it too constricting and impractical for applicable research (Alavifar, et al., 2012). Analyses were conducted in the typical SEM two-step procedure; first a confirmatory factor analysis (CFA) was performed to assess the suitability of the parameter estimates between the latent constructs and the observed indicators (known as the measurement model). This is achieved by having all the latent constructs in the model covary with one another. Second, a latent path analysis was conducted to assess the fit of the added regression paths between latent constructs; known as the structural model. Model fit was assessed using

the following fit indices: the Chi-square likelihood test (χ^2), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Standardized Root Mean Square Residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA). As suggested by Kline (2010), a close fit is identified by values above 0.95 for the CFI and TLI, below 0.05 for the SRMR, and below 0.06 for the RMSEA. Lastly, the Chi-square difference test ($\Delta\chi^2$) was used to identify the significantly better fitting model when comparing two nested models. A description of all these indices is available in Appendix B along with qualitative descriptions of cut-off fit values.

Results

The original sample of the Canadian Community Health Survey (CCHS) consisted of 131,061 participants across Canada. Inclusion criteria for the current model required participants who resided in a private dwelling within the city of Ottawa health unit, were at least 18 years old, responded to the survey themselves and not by proxy, and indicated that they were alone during the telephone interview process. These criteria reduced the total number of participants to 1,565. An additional 225 surveys were excluded for having more than ten percent data missing. Thus, the final sample consisted of 1,339 housed adults living in the Ottawa-Gatineau area.

Sample size

To reliably estimate correlation coefficients, Tabachnik and Fidell, (2007a) recommend a minimum of 300 cases for factor analysis. This requirement is met with the 1339 participants in this study's sample. For the structural equation model, Kline (2010) recommends a sample size exceeding 200. However, if an ideal 0.80 level of power (Cohen, 1988) is desired, sample size can be determined according to methods proposed by

MacCallum, Brown, and Sugawara (1996). This is accomplished using a procedure of interval-halving; whereby upper and lower bounds are determined to contain the minimum value of N being sought. This is carried out in a systematic fashion until a very close approximation of the minimum value of N is reached. Given $\alpha^4 = 0.05$, $\epsilon_p^5 = 0.05$, $\epsilon_a^6 = 0.08$, and a desired power of $\pi_d = 0.80$, the minimum value of N is dependent only on degrees of freedom ($df = \text{elements} - \text{parameters}$). Given that the hypothesized model in Figure 1 shows 36 known elements and 18 unknown parameters, the degrees of freedom for this model is 18. According to MacCallum and colleagues (1996) the minimum sample size required to achieve power of .80 for a test of close fit with 18 degrees of freedom is $N = 472$. This study's sample size of 1339 meets these criteria.

Preliminary Analyses

A missing values analysis was conducted and Little's MCAR test determined that the data were not missing completely at random, $\chi^2_{(268)} = 327.99$, $p = 0.007$. Not rejecting the hypothesis of Little's MCAR test means that the pattern of missing values depends on the data values. Despite this, using multiple imputations to correct for missing data is still possible because the amount of missing data is less than five percent (Tabachnick & Fidell, 2007b). Multiple imputations is a process that uses repeated random sampling of cases with complete data to identify the distribution of the variable with missing data. Repeated random samples (m) are taken from the distribution of the variable with missing data and an estimate of that variable is provided for each newly created and complete m data set (Tabachnick & Fidell, 2007b). Total and composite scores for a number of variables were computed.

⁴ α = alpha level

⁵ ϵ_p = the null value of the root mean square error of approximation (RMSEA)

⁶ ϵ_a = the alternative value of RMSEA

The study variables were assessed for spread and dispersion. The statistical value of the spread of the data was verified using Cramer and Howitt's (2004) method of dividing the skew measure of each variable by its standard error. Tabachnick and Fidell (2007b) recommend using a conventional alpha level of 0.01 ($z = 2.58$) to evaluate the significance of skewness in small to moderate samples. Given this study's large sample size of 1339 however, Tabachnick and Fidell (2007b) suggest examining the shape of the distribution, rather than relying on the statistical values. This is because with increased sample size both the standard error and skew decrease, resulting in a higher likelihood of rejecting the null hypothesis of no skew. Results from spread and dispersion analyses indicated four variables with a significant skew; the Chronic Health Condition variable ($z = 20.85$), the Pain variable ($z = 37.22$), the Perceived Mental Health variable ($z = 12.43$), and the Satisfaction with Life variable ($z = 16.84$). Examination of the shape of the distribution of these four variables confirmed the significant findings. As a result of the Pain, Mental Health, and Satisfaction with Life variables having a positive skew and no values of zero (Tabachnick & Fidell, 2007b), a logarithmic transformation was applied. Although the Chronic Health Conditions variable also showed a positive skew, it had values of zero among the scores. As such, a constant and arbitrary value of 5 was added before applying the logarithmic transformation. Following the transformations, none of the variables visually showed a significant skew and their statistical values decreased; Chronic Health Conditions ($z = 6.36$); Pain ($z = 30.60$); Mental Health ($z = 0.88$); and Satisfaction with Life ($z = 2.99$).

Dispersion was assessed in a similar manner of dividing the kurtosis measure of each variable by its standard error (Cramer & Howitt, 2004) and using an alpha level of 0.01 ($z = 2.58$) as well as visual examination of the shape of the distribution to assess significant kurtosis (Tabachnick & Fidell, 2007b). Following the transformations to correct skewness in

the four variables above, only the Weight variable showed a significant inference test for dispersion ($z = -14.34$). However, after visual inspection of the shape of the distribution with a normal curve imposed on each graph, none of the variables exhibited excess kurtosis. Since the sample size of this study is large, no transformations were applied to correct the significant kurtosis values because the visual examination of the distributions does not support the results of the formal inference tests. As Tabachnick and Fidell (2007b) explain, large samples reduce the impact of departure from zero kurtosis, and the underestimation of variance disappears with negative kurtosis in samples of at least 200 participants. As a result of the dispersion and spread measures of the data being transformed and accepted as normal, maximum likelihood (ML) estimation with robust standard errors was used to estimate the model.

Lastly, criteria for assessing multicollinearity between variables included a conditioning index above a value of 30 for a given dimension combined with variance proportions greater than 0.50 for a minimum of two variables (Tabachnick & Fidell, 2007b). Results revealed no conditioning index of 30 or greater and no variance proportions above 0.50 in two variables on more than one dimension (row). As such, criteria for multicollinearity were not met and it was concluded that no multicollinearity was evident among the variables. Table 1 shows the correlation matrix of the observable variables along with descriptive statistics. Table 2 provides the variance-covariance matrix of all eight variables used in the model.

Demographics. Just over half of the participants were women (56%), most were married (47.8%), and had an average age between 40 to 44 years. The great majority of participants identified themselves as white (84.8%), post-secondary graduates (71.9%), and had attended

Table 1

Descriptive Statistics and Correlations between Study Indicator Variables

Variables	Range	M	SD	1	2	3	4	5	6	7	8
1. PCS	1 - 5	2.23	.95	1							
2. Pain	1 - 5	1.39	.95	.39**	1						
3. CCC	0 - 7	1.05	1.25	.40**	.39**	1					
4. MCS	1 - 5	1.95	.91	.44**	.18**	.17**	1				
5. Stress	1 - 5	2.83	.98	.11**	.09**	.02	.25**	1			
6. SWL	1 - 5	1.71	.74	.39**	.18**	.13**	.49**	.25**	1		
7. Belong	1 - 4	2.29	.84	.15**	.06*	.01	.19**	.09**	.25**	1	
8. Weight	1 - 3	2.10	.98	-.23**	-.11**	-.16**	-.08**	-.03	-.07*	-.04	1

Note. The range of scores for each variable is provided along with descriptive statistics. PCS = Perceived physical health, CCC = Chronic health conditions, MCS = Perceived mental health, Stress = Perceived level of stress, SWL = Satisfaction with life, Belong = Sense of belonging, Weight = Opinion of own weight. * $p < 0.05$, ** $p < 0.01$.

Table 2

Variance / Covariance Matrix of Observed Variables

Variables	1	2	3	4	5	6	7	8
1. PCS	.903	.0906	-.089	.084	.100	.067	.121	-.210
2. CCC	.0906	.0570	-.024	.008	.005	.005	.003	-.038
3. Pain	-.089	-.0240	.065	-.010	-.021	-.008	-.011	.026
4. MCS	.084	.008	-.010	.041	.050	.018	.033	-.016
5. Stress	.100	.005	-.021	.050	.962	.044	.078	-.027
6. SWL	.067	.005	-.008	.018	.044	.032	.037	-.012
7. Belong	.121	.002	-.011	.033	.078	.037	.708	-.029
8. Weight	-.210	-.038	.026	-.016	-.027	-.012	-.029	.956

Note. PCS = Physical Composite Score of SF-12, CCC = chronic health conditions, MCS = Mental Health Composite Score of SF-12, Stress = perceived stress levels, Belong = Sense of belonging in community, Weight = subjective opinion of own weight.

a paid job the week previous to the survey (62.5%). Table 3 provides a complete list of demographic variables.

Analysis of Study Variables

The majority of respondents assessed their physical health to be either very good (40.4%) or excellent (23.7%). Similarly, 82.4 percent of respondents reported not having any pain that interfered with any aspect of their lives. In addition, 42.8 percent of respondents said they did not have any chronic health condition. Of the remaining participants who did indicate having at least one chronic health condition, 29.9 percent had one condition, 14.6 percent reported two conditions, and eight percent reported having three chronic health conditions. The remaining 4.9 percent of participants had between four and seven chronic health conditions.

With regard to mental health, over three-fourths of participants indicated perceiving their mental health as either very good (39.9%) or excellent (36.1%). Less than six percent of respondents indicated their mental health was fair or poor. Almost eleven percent indicated having one mental health diagnosis, and four percent reported living with two diagnoses. Regarding perceived life stress, nearly two-thirds of participants experienced either not very much stress (24%) or a bit of stress (41.9%). Approximately a quarter of respondents indicated experiencing quite a bit of stress (20.5%) or extreme stress (3.5%).

Lastly, nearly all participants (90.1%) reported feeling either satisfied or very satisfied with their life in general. Three percent of respondents reported feeling dissatisfied or very dissatisfied. Although it was expected that housed individuals in the national-capital region would report high satisfaction with life, the degree of skew in this distribution was not. Due to the already prepared and weighted nature of the Canadian Community Health Survey's data, no transformations could be applied and the data was left as such.

Table 3

Participant Characteristics and Demographics

Demographic	Percentage (%)
Sex	
Male	43.8
Female	56.2
Age	
18 – 19 yrs	3.1
20 – 29 yrs	14.5
30 – 39 yrs	18.9
40 – 49 yrs	19.4
50 – 59 yrs	15.9
60 – 69 yrs	15.5
70 – 79 yrs	8.7
80 or more	3.8
Marital status	
Married	47.8
Common-law	4.9
Widow / separated / divorced	19.9
Single / never married	27.5
Cultural Origin	
Visible minority	15.2
White	84.8
Education	
Less than secondary	6.6
Secondary graduate	13.1
Other post-secondary	8.3
Post-secondary graduate	71.9
Work Status	
At work	62.5
Absent	4.6
No job	23.4
Unable / Permanent	2.1
Retired	7.5

When asked about their sense of belonging to their local community, almost two-thirds of participants reported having a very strong (16.6%) or somewhat strong (46.6%) sense of belonging. The remaining third of respondents indicated feeling a somewhat weak (28.2%) or very weak (8.5%) sense of belonging to their local community. Participants were also asked about their weight and whether they thought they were overweight, underweight, or just about right. The majority (53.4%) felt they were at just the right weight, while 43.1% thought they were overweight.

Sex Comparisons of Indicator Variables

Sex comparisons were made for the indicator variables using a series of independent samples t-tests. The Bonferroni correction was applied and family-wise error rate for a series of eight t-tests was calculated to be $0.05/8 = 0.00625$. Among the eight study variables, significant sex differences were found for two of the variables. With equal variances not assumed, $F = 37.66$, $p < 0.05$, significant sex differences were found for activity limitations due to pain, $t_{(1329)} = 3.043$, $p = 0.002$. Women indicated significantly higher activity limitations due to pain ($M = 1.46$, $SD = 1.03$), than men ($M = 1.30$, $SD = 0.84$). Assuming equal variances, $F = 0.48$, $p = 0.49$, significant sex differences were also found for the number of chronic health conditions, $t_{(1337)} = -.6004$, $p < 0.0062$. Once again, women reported a higher number of diagnosed chronic health conditions ($M = 1.23$, $SD = 1.33$) compared to men ($M = 0.83$, $SD = 1.08$).

The Measurement Model

In structural equation modeling, the measurement model is initially analyzed for fit and modification indices are reviewed for suggested additional paths that would increase the fit of the model. These added modifications are based strictly on theory and are only added when a theoretical rationale exists (Kline, 2010). With each added parameter, a comparison

between the model without changes, known as the parent model, and the model with the changed parameter, known as the nested model, is conducted. A nested model is one that is exactly like the parent model, except that one or more paths have either 1) been removed (constrained to zero); 2) constrained to a fixed non-zero value; or 3) constrained to be equal to another parameter. This type of model is said to be nested within the original model. Given the more restrictive nested models, they have a higher Chi-square value and an added degree of freedom for every restriction. A nested comparison is carried out using a Chi-square difference test ($\Delta\chi^2_{(df)}$). A significant result indicates that the nested model is significantly worse than the parent model.

The measurement model was first examined as originally hypothesized, with indicators Perceived Physical Health, Chronic Health Conditions, and Pain loading on to the Physical Health factor, indicators Satisfaction with Life, Belonging, and Weight loading on to the Quality of Life factor, and indicators Mental Health and Stress loading on to the Mental Health factor (see Figure 1). The limiting assumption of TAU-Equivalence was used on the estimated factor loadings to correct the under-identification of the local model of Mental Health. The limiting assumption of Tau-Equivalence allows the parameters of a construct with only two indicators to be equally reliable (Kline, 2010), thus allowing the model to be mathematically solved. In calculating the fit of both measurement and structural models, the number of iterations is an indication of the number of subsequent cycles of calculations it took to improve the estimates of the initial solution (Kline, 2010). The fewer iterations it takes a model to converge, the better the fit of the model to the data. Generally, model convergence that takes over 500 iterations is indicative of an error in the data (Tabachnick & Fidell, 2007b).

The hypothesized model converged after 59 iterations using the maximum likelihood estimator and resulted in a significant Chi-square, $\chi^2_{(18)} = 199.03$, $p < 0.01$. This model showed a poor to mediocre fit among the relative fit indices, with CFI = 0.883 and TLI = 0.818. However, the absolute fit indices resulted in a mediocre to acceptable fit, with SRMR = 0.059 and RMSEA = 0.087. All parameter estimates loaded significantly on to the constructs.

Modification indices suggested a number of changes to the factor loadings that would increase the fit of the model. Based on theoretical information that suggests a relationship between pain and chronic health conditions, the residual (error) variances between indicators Chronic Health Conditions and Pain were cross-loaded. This added parameter (Model 2) increased the model fit, $\chi^2_{(17)} = 108.14$, $p < 0.01$, to an acceptable fit among the relative fit indices; CFI = 0.941, TLI = 0.903. The absolute fit indices also resulted in an acceptable fit, with SRMR = 0.048, and RMSEA = 0.063 (see Table 4 for all modifications made and changes in fit). A nested model comparison between the hypothesized model and Model 2 indicated that the original model was significantly worse than Model 2, $\Delta\chi^2_{(1)} = 90.90$, $p < 0.001$ and as such, the second model was retained.

The modification indices following the fit of Model 2 showed further possible modifications to increase the fit of this model. Grounded on past research of the relationship between high stress levels and low satisfaction with life in general, the residual variances between the indicators Stress and Satisfaction with Life were cross-loaded. This new model (Model 3) showed an enhanced fit, $\chi^2_{(16)} = 77.17$, $p < 0.01$. Both the relative fit indices and the absolute fit indices resulted in a fit within the close to acceptable range; CFI = 0.961, TLI = 0.931, SRMR = 0.040, and RMSEA = 0.053. A nested model comparison indicated that

Table 4

Fit Statistics of Measurement Model

Model	$\chi^2_{(df)}$	CFI	TLI	SRMR	RMSEA and 90% CI	$\Delta\chi^2_{(df)}$
Hypothesized model	199.03 (18)*	0.883	0.818	0.059	0.087 (0.076 – 0.098)	-
Model 2 – CCC Residual cross-loaded with PAIN residual	108.14 (17)*	0.941	0.903	0.048	0.063 (0.052 – 0.075)	90.90(1)*
Model 3 – STRESS residual cross-loaded with SWL residual	77.17 (16)*	0.961	0.931	0.040	0.053 (0.042 – 0.066)	31.00(1)*
Model 4 – WEIGHT cross-loaded with PHYSICAL HEALTH	23.70 (15)	0.994	0.990	0.021	0.021 (0.000 – 0.036)	53.50(1)*
Comparing hypothesized model and final model (Model 4)	-	-	-	-	-	175.00(3)*
Structural Model	23.70 (15)	0.994	0.990	0.021	0.021 (0.000 – 0.036)	-

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Fit Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; $\Delta\chi^2$ = Chi-Square Test of Difference.

* $p < .001$

Model 2 was significantly worse than Model 3, $\Delta\chi^2_{(1)} = 31.00$ $p < 0.001$, and as such, Model 3 was retained. The suggested modification indices following the fit of Model 3 were fewer, however, based on research that has found a relationship between individuals' physical health and the opinion they hold of their weight, a cross-loading between the Physical Health latent construct to the Weight indicator, was added and the fit assessed.

This fourth model resulted in the closest fit, $\chi^2_{(15)} = 23.70$, $p = 0.070$, with a non-significant Chi-square test indicating that the sample is statistically the same as the population.

Additionally, all the fit indices resulted in close fits; CFI = 0.994, TLI = 0.990, SRMR = 0.021, and RMSEA = 0.021. This model was compared to the previous model using a nested comparison and found to be significantly better than Model 3, $\Delta\chi^2_{(1)} = 53.50$ $p < 0.001$.

Examination of the parameter estimates in Model 4 revealed that the cross-loading of the Weight indicator to the Physical Health construct changed the original loading to the QoL construct to a non-significant loading, $z = 1.39$, $p = 0.164$. This degree of misfit was accepted and preferred instead of removing the Weight variable from the QoL construct and implementing a second limiting assumption on the model.

Given that no further modification indices were suggested, a nested comparison was carried out between the original measurement model and the final (fourth) model. As expected, the Chi-square test of difference resulted in a significant difference, $\Delta\chi^2_{(3)} = 175.00$, $p < 0.001$ and confirmed the fourth model as the best fitting and final measurement model. Figure 3 represents of the final measurement model with added standardized parameter estimates. Standardized and unstandardized values with standard errors are in Table 5. The SMC values in Table 5 are the squared multiple correlations and are an indicator of lower bound of reliability for that item. It is calculated by squaring the

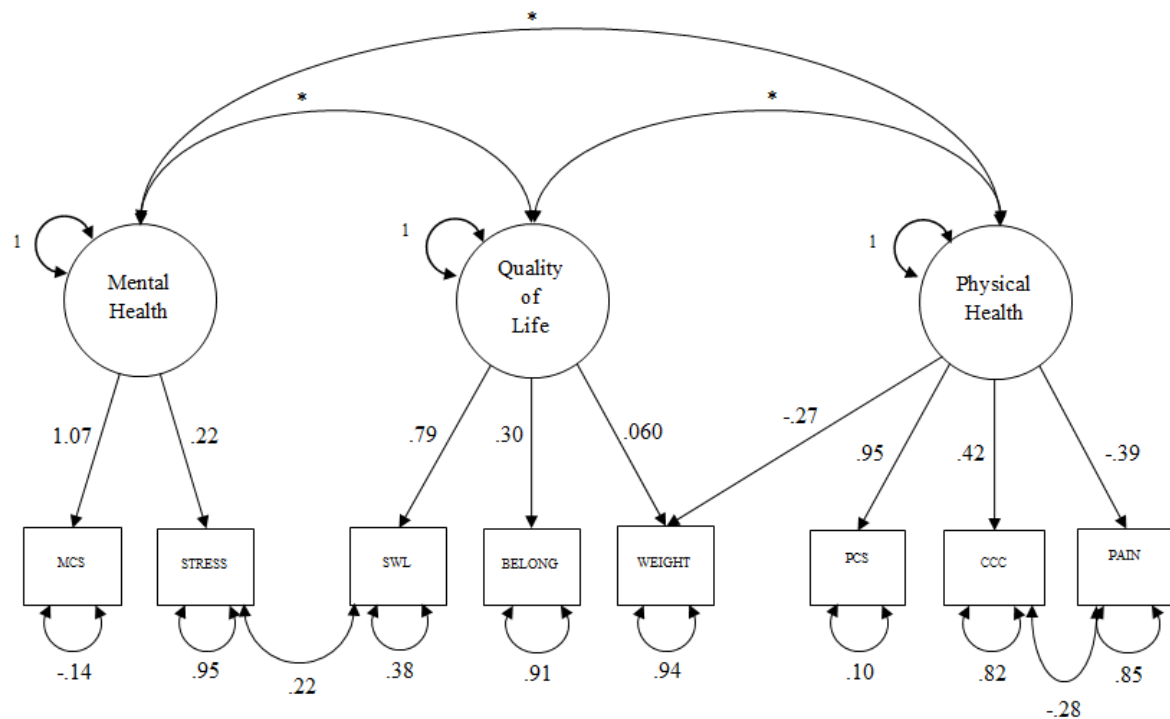


Figure 3. Final measurement model of the relationship between mental health, quality of life, and physical health in a housed sample. All fit indices indicate a close fit with, $\chi^2_{(15)} = 23.70$, $p = 0.070$, CFI = 0.994, TLI = 0.990, SRMR = 0.021, and RMSEA = 0.021 (90% Confidence Intervals = 0.000 – 0.036). All factor loadings are significant at alpha .001, except for Physical Health to Weight ($p = 0.164$).

MCS = Perceived mental health status; STRESS = perceived level of stress; SWL = satisfaction with life; BELONG = sense of belonging to community; WEIGHT = opinion of own weight; PCS = perceived physical health status; CCC = chronic health conditions; PAIN = degree of pain and discomfort.

Table 5

*Confirmatory Factor Analysis**Standardized & Unstandardized Regression Weights & Squared Multiple Correlations*

	Standardized			Unstandardized			SMC
	Physical Health	Mental Health	QOL	Physical Health	Mental Health	QOL	
PCS	0.95			0.90 (.04)			0.90
CCC	0.42			0.10 (.01)			0.18
Pain	-0.39			-0.10 (.01)			0.15
MCS		1.07			0.22 (.01)		1.14
Stress		0.22			0.22 (.01)		0.05
SWL			0.79			0.14 (.01)	0.62
Belong			0.30			0.26 (.03)	0.09
Weight	-0.27		0.06	-0.27 (.04)		0.06 (.04)	0.004 0.07

Note. Statistically significant $p < .05$ in **bold**. Standard errors (se) are in parentheses. QOL = Quality of Life, PCS = Perceived Physical Health; CCC = Chronic Health Conditions; Pain = Limitations Due to Pain; MCS = Perceived Mental Health; Stress = Perceived Stress; SWL = Satisfaction with Life; Belong = Sense of Belonging; Weight = Opinion of Own Weight; SMC = Squared Multiple Correlation – calculated by squaring the standardized values. The second value in the SMC results for Weight indicates the SMC value of the cross-loading construct of Physical Health.

standardized coefficient. The observed data appear to fit the final measurement model and there are large correlations among the latent variables.

The Structural Model

Covariances between the latent constructs of Physical Health and Quality of Life and between Mental Health and Quality of Life were removed and regressions were added to assess the question of whether physical health or mental health is a better predictor of quality of life in this housed sample. The covariance between Physical Health and Mental Health was left in place, as these two constructs are expected to covary, based on past research. Given that this is a mathematically equivalent model to the final measurement model⁷, preliminary fit analyses were also the same, $\chi^2_{(15)} = 23.70$, $p = 0.070$; CFI = 0.994; TLI = 0.990; SRMR = 0.021; and RMSEA = 0.021 (90% confidence intervals = 0.000 – 0.036). Additionally, both regression coefficients showed significant results and no pruning was required. As such, this resulted in the final structural model

Overall, the observed data appear to fit the model based on the fit indices. Standardized coefficient values are provided along with the final structural model in Figure 4. Unstandardized values along with standardized errors are provided in Table 6. The structural analysis showed that Mental Health has a significant direct positive effect on Quality of Life, $z = 6.87$, $p < 0.01$, indicating that better mental health of housed Ottawa residents results in better-perceived quality of life. Similarly, Physical Health showed a significant direct positive effect on Quality of Life, $z = 6.05$, $p < 0.01$, suggesting that the better physical health housed Ottawa residents are in, the better they perceive their quality of life.

⁷ The final measurement model and the hypothesized structural model are mathematically equivalent because all covariances between factors are unknown in the measurement model and none of them have been tested, thus remain unknown, in the initial structural model (see Figure 3).

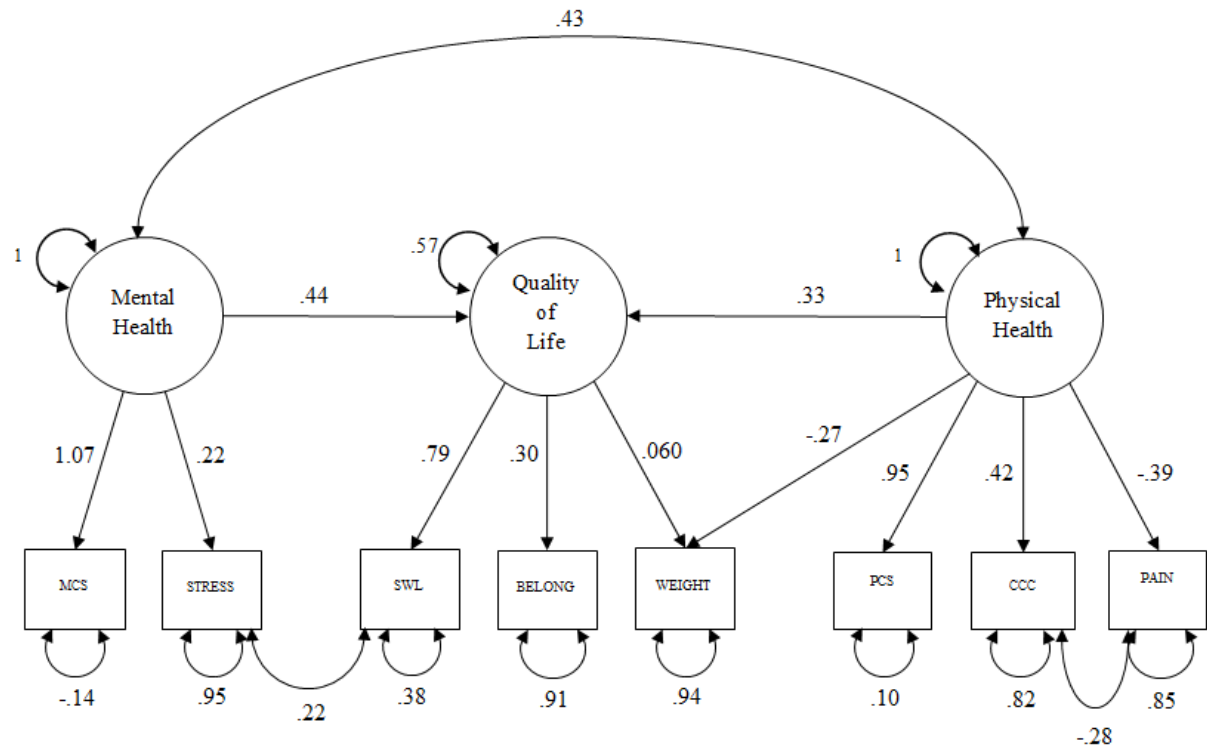


Figure 4. Final structural and measurement model of the relationship between Physical Health, Mental Health, and Quality of Life in a housed sample. All values displayed are standardized. The results represent a model with a close fit, $\chi^2_{(15)} = 23.70$, $p = 0.070$, CFI = 0.994, TLI = 0.990, SRMR = 0.021, and RMSEA = 0.021 (90% Confidence Intervals = 0.000 – 0.036). All factor loadings are significant at alpha .001, except for Physical Health to Weight ($p = 0.164$). Both regression coefficients were significant at the alpha 0.01 level. MCS = Perceived mental health status; STRESS = perceived level of stress; SWL = satisfaction with life; BELONG = sense of belonging to community; WEIGHT = opinion of own weight; PCS = perceived physical health status; CCC = chronic health conditions; PAIN = degree of pain and discomfort

Table 6

Standardized & Unstandardized Regression Weights & Squared Multiple Correlations (SMC) of the Structural Model

Constructs	Standardized		Unstandardized (se)		R ²
	Physical Health	QoL	Physical Health	QoL	
Physical Health		0.33		0.44 (.07)	0.11
Mental Health	0.43	0.44	0.43 (.03)	0.59 (.09)	0.20

Note. Statistically significant $p < .01$ in **bold**. Standard errors (se) are in parentheses.

R² = Squared Multiple Correlations of the standardized Structural Equations

Predicting quality of life. To determine the best predictor of quality of life, a comparison model was created in which the parameter estimate between Physical Health and Quality of Life was equal to the parameter estimate between Mental Health and Quality of Life (known as the TAU equivalence limitation), making Mental Health and Physical Health equal predictors of QoL. A nested model comparison was conducted between the equivalent model and the structural model. Non-significant results were achieved, $\Delta\chi^2_{(1)} = 2.34$, $p = 0.13$, indicating that neither Mental Health nor Physical Health is a significantly better predictor of Quality of Life in a housed sample of Ottawa residents. However, Mental Health accounted for 19.71% of the variance in Quality of Life, compared to Physical Health, which accounted for 10.82% of the variability.

Group Analyses

A group analysis was conducted to review sex differences within the structural equation model using RStudio 0.97.449. These analyses used a multi-step process, starting with the separation of the model based on sex, while retaining the same added paths as the final measurement model (see Figure 3). The male model consisted of 587 male participants and converged after 80 iterations. Fit analyses revealed a close fit, with $\chi^2_{(15)} = 20.64$, $p = 0.15$. The male model also showed close fit in both the relative and absolute fit indices, CFI = 0.991; TLI = 0.983; SRMS = 0.029; and RMSEA = 0.025. The female model consisted of 752 female participants and converged after 81 iterations. It also resulted in a close fit, with $\chi^2_{(15)} = 15.98$, $p = 0.38$. All fit indices indicated a close fit; CFI = 0.999; TLI = .998; SRMS = 0.024; and RMSEA = 0.009.

Given that SEM provides information regarding dispersion (variance and covariance) but no information about means, these were estimated by adding a mean structure to the

model's measurement model, also known as the covariance structure (see Figure 5). This includes the addition of a constant value of one that is applied to every variable in the model. The new means and covariance structure (MACS) used the Fixed Factor Equivalent method to set the scale and create a just identified MACS model by setting the path from the constant variable to the constructs to equal zero. This also isolated any misfit solely to the covariance model. Although the original model is split by sex, all of the analyses conducted in the group comparisons are carried out on both groups concurrently.

Prior to comparing the two groups, factorial invariance needed to be tested as a means of ensuring that the same constructs are being measured in both groups (Ployhart & Oswald, 2004). Factorial invariance testing is carried out at three different levels of invariance with increasing restrictions. Obtaining *configural invariance* ensures that the same pattern of fixed and free parameters is present in each group. Reaching *weak factorial invariance* ensures relative equality of factor loadings in each group, and *strong factorial invariance* ensures relative equality of corresponding indicator intercepts across groups. Configural invariance is tested similarly to an initial measurement model; if the model runs accurately with adequate fit and no theoretically convincing modification indices, then configural invariance is reached. Weak and strong invariance are both assessed using a reasonableness test that asks two questions; 1) do the RMSEA's of the current test fall within the RMSEA confidence interval of the previous test, and 2) is the change in CFI *less* than 0.01. If the answer is *yes* to both questions, then the reasonableness test is passed and that level of factorial invariance is reached.

As a way of verifying that the separate male and female models were well fitting, separate measurement models were created for each sex. Results of these are in Table 7. Overall, both males and females showed fit indices with a close fit.

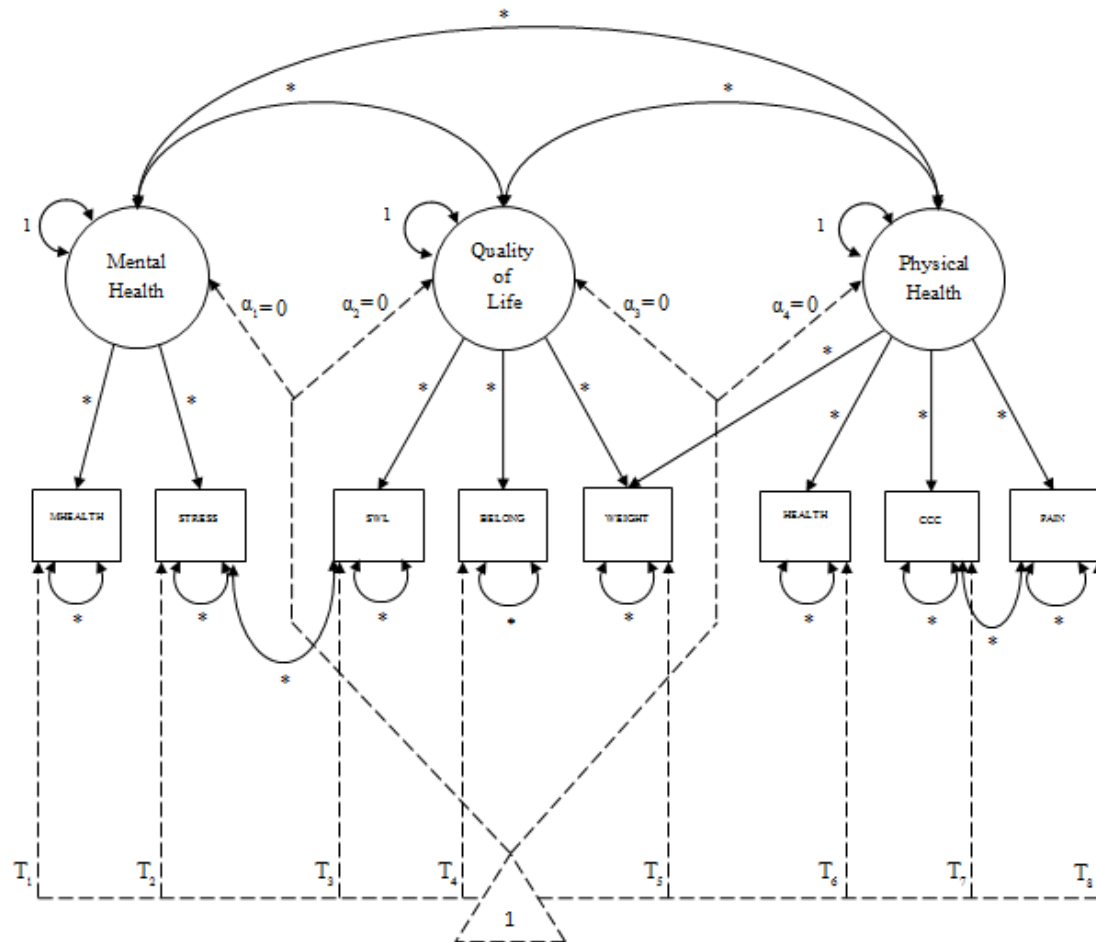


Figure 5. Mean and covariance structure (MACS) model of the relationship between Physical Health, Mental Health, and Quality of Life in a housed sample. Dotted lines represent the added mean structure; solid lines represent the covariance structure. The triangle is the constant that is added to every variable. T = TAU and is the name of paths from the constant to the indicators. α = Alpha and is the name of paths from the constant to the constructs, which are made to equal zero. MCS = Perceived mental health status; STRESS = perceived level of stress; SWL = satisfaction with life; BELONG = sense of belonging to community; WEIGHT = opinion of own weight; PCS = perceived physical health status; CCC = chronic health conditions; PAIN = degree of pain and discomfort.

Table 7

Fit Statistics of Sex Analyses

Model	$\chi^2_{(df)}$	CFI	TLI	SRMR	RMSEA and 90% CI	Pass/Fail
Male Model	20.64 (15)	0.991	0.983	0.029	0.021 (0.000 – 0.050)	-
Female Model	15.98 (15)	0.999	0.998	0.024	0.009 (0.000 – 0.036)	-
Added Mean Structure Males	20.64 (15)	0.991	0.983	0.026	0.025 (0.000 – 0.050)	-
Added Mean Structure Females	15.98 (15)	0.999	0.998	0.022	0.009 (0.000 – 0.036)	-
Configural Invariance	31.79 (29)	0.998	0.997	0.022	0.012 (0.000 – 0.033)	PASS
Weak Invariance	54.11 (35)	0.988	0.980	0.035	0.029 (0.011 – 0.043)	FAIL

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Fit Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval.

* Indicates significance at $p < 0.01$.

As expected, adding the mean structure to the model revealed very similar results as the separate CFA analyses. The only differences occurred in the Standardized Root Mean Square Residual, where results showed a slight decrease in index (better fit); however, numbers remained within the same category of close fit for both genders.

Configural invariance was tested to verify that the same pattern of fixed and free parameters exist in each group. Simultaneous confirmatory factor analyses of both the male and female groups revealed a non-significant Chi-square, $\chi^2_{(29)} = 31.79$, $p = 0.33$, and fit indices within the close fit range (see Table 7). Moreover, no theoretically relevant modification indices were present. As such, due to the acceptable fit indices, it is concluded that configural invariance has been reached and the same pattern of fixed and free parameters is seen in both the male and female models.

To assess weak invariance, factor loadings were made equal and latent variances were freed in the second (female) group. Table 7 shows results of a non-significant Chi-square at the alpha 0.01 level, $\chi^2_{(35)} = 54.11$, $p = 0.02$, with fit indices within the close range. The reasonableness test revealed that the RMSEA index of 0.029 is within the confidence interval of 0.000 and 0.033 of the RMSEA index for the configural invariance test. However, the difference between the Comparative Fit Index of 0.988 for the weak invariance test and the CFI of 0.998 for the configural invariance test is exactly 0.01. The requirement to pass the reasonableness test is a difference of *less* than 0.01. As a result, weak invariance is not reached. Unfortunately, having failed the weak invariance test, group comparisons of the model cannot continue because the relative equality of factor loadings in each group cannot be ensured.

Discussion

This study was designed to address the gap in the literature identifying a model of quality of life that included physical and mental health factors in a sample of housed individuals residing in the national capital region. The study also assessed whether physical health factors or mental health factors were a better predictor of quality of life in housed individuals.

Having a good quality of life is important because it allows individuals to feel good about themselves, thereby, allowing them to function and contribute in their lives and in society. In broad terms, having a good quality of life means that one is satisfied with the indicators that make life good (Michalos, 2004). Although indicators that make life good can vary (Sirgy et al., 2006) this study looked at subjective indicators of physical health, mental health, and quality of life. Subjective measures were chosen over objective measures as a means of studying how people understand their physical health, mental health, and quality of life and what they believe impacts QoL the most.

The Effect of Physical Health and Mental Health on Quality of Life

The present study found that physical health status has a significantly positive effect on quality of life. This indicates that the better physical health one is in, the higher the perceived quality of life is. These findings support the study's hypotheses and reinforce past research in this area. In their study, Michalos and his colleagues (2000) found that physical health status and life satisfaction domains explained more than half the variance in scores of happiness. The findings in the present study showed that physical health accounted for just over ten percent of the variability in quality of life. Additionally, past research has identified risk factors for low quality of life as being over age 45, being female, being unable to work, having no leisure activity time, and having asthma, diabetes, or other disability (Jiang & Earl

Hesser, 2008). Overall, the positive impact physical health has on quality of life is support for the continued health-promoting campaigns being seen across the country. The Heart and Stroke Foundation (2013) has released its latest report on Canadians' health and found a ten-year gap between how long citizens live and how long they live in good health. This suggests that the last ten years of Canadians' lives are spent in illness, with a decreased quality of life. A recent report by Manuel and his colleagues (2012) identified five risk factors for Ontarians that lead to illness in later life; they included a poor diet low in fruits and vegetables, physical inactivity, smoking, excessive alcohol consumption, and high levels of stress. Combined, these risk factors were found to lower life expectancy by more than seven years. However, changing health behaviours and eliminating all five risk factors was found to increase not only life expectancy, but also the number of years expected to live in good health, by nearly ten years (Manuel et al., 2012). The findings from the present study support the conclusion that individuals with higher health behaviours report better quality of life when compared to those with poor health behaviours (Manuel et al., 2012).

In addition to the positive effect on QoL from physical health, a positive effect was also found for mental health status. This suggests that the better mental health one is in, the better quality of life one is likely to report. The positive effect mental health was found to have on quality of life also corroborates past research that suggests individuals with lower mental health status (more dysfunction) also report lower quality of life (Berlim & Fleck, 2003; Rapaport et al., 2005; Ritsner, 2007; Strine et al., 2009; Wang, Chou, Yeh, Chen & Tzeng, 2013). These findings further support the research and campaign efforts of the Mental Health Commission of Canada (MHCC) and their first Mental Health Strategy for Canada (2012). The Mental Health Commission of Canada began in 2007 and has a ten-year mandate, provided by Health Canada, to create the first mental health strategy, to work on

reducing the stigma of mental illness, to advance knowledge exchange in mental health, and to research how to help those who are homeless and suffer from mental illness (MHCC, 2013). The mental health strategy focuses on six different directions: promotion and prevention; recovery and rights; access to services; disparities and diversity; First Nations, Inuit and Métis; and leadership and collaboration. Throughout their strategic plan the MHCC acknowledges the important role mental health plays on quality of life and emphasizes how being resilient to life challenges while mentally feeling and functioning well improves quality of life. The findings from the present study support the MHCC's call to action for greater investment in mental health and for more efficiency for the mental health system as a means to improve the quality of life for tens of thousands of Canadians (MHCC, 2013). Given that the impact mental health has on health-related quality of life has been calculated to have an economic value of \$28.2 billion (Lim et al., 2008), it is of great importance that research on mental health and quality of life continue.

Predicting Quality of Life

A subsequent goal of the current study was to determine which of the two factors, physical health or mental health, was the better predictor of quality of life. The model of quality of life in the present study indicated that neither physical health nor mental health was a better predictor, even though mental health accounted for a larger proportion of the variance in quality of life. This may be attributable primarily to the manner in which the variables were measured. All of the measures in the model were *perceived* measures, which may lead to inflated or understated scores due to the subjectivity of each participant. Research on perceived versus actual physical health has found that variability in mood is explained more by perception of disease rather than actual medical disease progression (Groarke, Curtis, Coughlan, & Gsel, 2004). Likewise, self-report measures are subject to

reporting errors related to socio-economic characteristics of the sample (Johnston, Propper, & Shields, 2009). Participants tend to be unaware of the severity of their health condition when it comes to such diseases as diabetes and hypertension, and as such give false-negative responses up to eighty-five percent of the time (Johnston et al., 2009).

Another possibility for not finding predictive differences between physical and mental health on QOL may be attributable to how both factors influence quality of life in a comparable manner. Studies have found similar impairment in a number of quality of life domains in both depressed individuals and those suffering from chronic health conditions (Hays, Wells, Sherbourne, Rogers, & Spritzer, 1995). More recent studies have also shown that the association between mental health dysfunction and quality of life is equal to the association between physical health impairment and QOL (Strine, Chapman, Kobau, Balluz, & Mokdad, 2004). Moreover, Strine and her colleagues (2009) found a dose-response relationship between depression severity and mean number of days an independent probability sample of U.S. citizens experienced pain, anxiety, poor general health, disability, and life dissatisfaction. This indicates that higher rates of depression and mental illness account for higher rates of physical disability like pain and poorer health, as well as greater life dissatisfaction. Given this dose-response relationship, it would be unlikely to find any differences between mental health and physical health in a general sample of the population.

Sex comparisons

The present study also analyzed sex differences among the core model variables and only two significant differences were found. Within this sample, women reported having greater limitations due to pain, as well as a higher number of chronic health conditions, when compared to men. These sex differences support the findings from the 2006 Participation and Activity Limitation Survey (PALS) conducted by Statistics Canada (2007b). Although

almost eleven percent of the population, or approximately three million Canadian adults, report problems related to pain, mobility, and agility, women were more likely to experience pain and have a disability related to pain or mobility, when compared to men (Statistics Canada, 2007b). Similarly, just as pain rates increase with age, the PAL Survey found that the gap between sexes also increased with age. For instance, of those surveyed who were aged 75 years or older, 38.5 percent of women reported limited activities due to pain, compared to 28.8 percent of men.

However, a more recent systematic review of the literature on pain and sex differences by Racine, Tousignant-Laflamme, Kloda, Dion, Dupuis, and Choinière (2012a) could not produce a consistent pattern of sex differences in pain sensitivity. Reviewing the previous ten years of research only established that women tend to have lower pain thresholds for pressure pain, but pain thresholds were equivalent between the sexes when it came to ischemic and cold pain (Racine et al., 2012a). When reviewing psychological and social factors, as well as past history, Racine and her colleagues (2012b) concluded that due to the contradictory results they found regarding anxiety, its role in sex differences in pain is ambiguous, while depression does not appear to play a mediating role in some of the differences that were found. However, catastrophic thinking was found to partially mediate sex differences in pain sensitivity, although, personality traits such as masculinity-femininity are also suspected to be involved. In addition, women were found to cope better with pain because of the different coping strategies they implement, compared to men (Racine et al., 2012b). Social factors such as sex expectations and perceived identification to usual male/female stereotypes were also found to possibly explain some of the difference in pain sensitivity. Lastly, Racine and her colleagues (2012b) found that women's pain sensitivity may be influenced by recent episodes of pain, a history of childhood sexual abuse, or a

familial model of pain. The present study could not show any of the relationships found in Racine's (2012a; 2012b) studies between pain and psychological and social factors, as no sex differences were found in these areas.

Despite the unclear sex differences found in a literature review by Racine and her colleagues (2012a; 2012b), pain continues to be a burden to approximately three million Canadians (Statistics Canada, 2006) and research needs to continue as a means of enhancing the lives and thereby the quality of life in our citizens.

Chronic health conditions were also found to be higher in women than men in the current study. This finding supports research with elderly Spaniards that found women reporting lower health-related quality of life scores due to a higher prevalence of chronic health conditions and lower physical health status (Orfila, Ferrer, Lamarca, Tebe, Domingo-Salvany, & Alonso, 2006). Denton, Prus, and Walter's (2004) findings of Canadian women also showed that they report more chronic health problems, as well as lower ratings of perceived overall health. Likewise, in linking the association between chronic illness, age, and both physical and mental health status, research showed that being female and having comorbid health conditions were associated with poorer health-related quality of life (Hopman, Harrison, Coe, Friedberg, Buchanan, & VanDenKerkhof, 2009). Current figures from the Public Health Agency of Canada (PHAC, 2013) show that women experience more problems with back pain, high blood pressure, arthritis, migraines, asthma, Crohn's disease or colitis, urinary incontinence, and COPD. The only chronic conditions that men had a higher incidence of were diabetes and heart disease. The incidences of ulcers, cancer, stroke, and Alzheimer's or dementia were relatively the same for both sexes (PHAC, 2013). Moreover, life expectancy for Canadian men and women has been steadily increasing since the 1920s where men lived to an average age of 59 and women lived to an average age of 61

(Statistics Canada, 2012c). As of 2009, men's life expectancy has increased by twenty years to an average of age 79, while women's life expectancy across Canada has increased to an average age of 83 years (Statistics Canada, 2012c). However, the gap in life expectancy between the sexes has increased from two years in the 1920s to four years in 2009.

Given that women continue to outlive men and have higher rates of chronic health conditions implies that women are living longer with chronic illness. This underscores the importance of continued research on physical health and its impact on quality of life, specifically in women, as they appear to experience a diminished quality of life for a longer time than men.

The Model

When attempts were made to separate the measurement model by sex as a means of analyzing sex differences, the models failed to demonstrate weak invariance. Failing weak invariance implies that the factors being measured are not being measured in the same way for both groups. For example, physical health may not be measured the same for men as for women. Given that all the factors were based on self-reported information, it may be possible that men and women perceive physical health or mental health differently. Rohlfen (2008) explains that a person's assessment of their health is influenced by more than the physical and mental conditions experienced daily; it is also influenced by health-promoting resources they have access to like medications, health care, and food. Rohlfen (2008) summarizes that sex differences in self-perceived health are unclear and research has shown varying results. Although earlier research has found that women tend to indicate poorer health compared to men, these differences cease to exist when socio-economic status is controlled (Gorman & Read 2006).

Recent research across 28 European countries further confirmed the variation of sex gaps in subjective health (Dahlin & Harkonen, 2013). In some countries, women reported markedly worse health than men, while in others, no such differences occurred. Similarly, socio-economic and demographic variables could account for sex gaps in some countries, but not in most (Dahlin & Harkonen, 2013). Future research must keep these disparities in sex differences in mind and perhaps use more objective measures to assess the physical and mental health of participants.

Similarly, sex differences in body image may have accounted for the non-significant loading of the Weight indicator onto the Physical Health structure. Western social norms dictate a common expectation that women should be more dissatisfied with their weight than men (Muennig, Jia, Lee, & Lubetkin, 2008), and for the most part, research has supported this (Mak, Pang, Lai, & Ho, 2013; Runfola et al., 2012). In an investigation of Swiss men and women, results indicated that although more men than women were actually overweight, women reported being more dissatisfied with their weight (Forrester-Krauss & Zemp Stutz, 2012).

Muennig and his colleagues (2008) posit that men's negative body image may be verified against social norms that regard social and intellectual accomplishments as higher on the hierarchy than physical form. For women however, social norms stress higher importance to body shape and size, thus, any woman not perceiving they have attained this 'ideal' self may show greater dissatisfaction with her weight. Moreover, research has shown the women report greater fear of becoming obese than do men (Lieberman, Tybur, & Latner, 2012).

Lastly, men with higher or perceived higher weight do not experience the negative health and well-being consequences like depression, anxiety, and poor self-esteem that overweight women do (Brunson et al., 2014). These sex differences in both self-

perceived physical health and weight satisfaction may have contributed to lack of weak invariance and the non-significant findings of cross-loading indicator variables.

Limitations and Future Research

Limitations of the current study include the archival nature of the data that prevented the use of more specific indicator variables in the model. Since the Canadian Community Health Survey is modular by nature, not all participants across regions were asked the same items. For example, social support was not assessed in Ontario and as a result, was not available for use in the model. Similarly, the CCHS did have a scale specifically about satisfaction with life, but it was only surveyed in the provinces of Quebec, Alberta, and Nunavut. A second (and related) limitation is the lack of a third indicator variable for the Mental Health construct because of the unavailability of a measure for social support for residents of Ottawa. As a result, the local model was under identified and a limiting assumption of tau equivalence was applied. This then forced the factor loadings for Perceived Mental Health and Stress to equal. Although this limiting assumption is required to make the model mathematically solvable, it is not as ideal a starting model as an over-identified or just-identified model would be. Another limitation of the study was the partially data-driven model that resulted. Although the covarying residual paths between Chronic Health Conditions and Pain, and Stress and Satisfaction with Life are theoretically justifiable, they are not ideal covariances because they are not from the same measurement. Moreover, the Stress and Satisfaction with Life indicators are linked to different constructs, suggesting that perhaps Stress is not only measuring Mental Health but also a degree of QoL, and Satisfaction with Life is similarly measuring a degree of Mental Health. A last limitation is the use of subjective measures of physical and mental health. Sex differences in perceived physical health may be what contributed to the failed weak invariance test and the lack of

relative equality of factor loadings in each sex. It is unknown whether the difference in group size was also a contributing factor to the failed group comparisons.

Future research would do well to consider the use of objective indicators of physical and mental health, such as the use of blood tests or diagnostic interviewing. Moreover, an equal number of male and female participants may reveal a less-data driven model in the future. Lastly, as much as this model of quality of life, physical health, and mental health serves as a starting point for the understanding of the relationship between these factors, further research with different sample groups is necessary to validate the final structural model and its added parameters.

Study Two: The Relationship between Physical Health, Mental Health, and Quality of Life in a Homeless and Vulnerably Housed Canadian Sample

Study Two explored the same relationships between physical health, mental health, and quality of life, but in a sub-sample of the Ottawa population: those who are homeless or vulnerably housed. Research with the homeless population has only recently begun to expand, and a greater understanding of their unique needs is starting to be reached. The importance of this understanding cannot be emphasized enough as key to implementing research-supported services and interventions that can make a difference in the already difficult lives of these individuals. The indirect comparison of the two study models provides this targeted understanding. Indirect comparisons were made between the two samples because although variables for both models were matched as closely as possible, under some circumstances, this was not possible.

The rationale for Study Two is to explore the same relationships as in the first study and build a model for the unique sub-sample of homeless and vulnerably housed individuals within the same large population centre. The exceptional needs of the homeless and vulnerably housed population have been largely ignored in research until recently. Gaining knowledge of how the relationship between quality of life, physical health, and mental health functions within this group of individuals can only help focus policy and social service efforts that will make a difference in the lives of this high-needs group of citizens.

Hypotheses and Research Questions

Research questions that were investigated in this study include the effect that physical and mental health factors have on quality of life for homeless and vulnerably housed individuals, and which of the two factors is a better predictor of QoL. The general hypothesis about the predictive model of QoL, physical health, and mental health in this sample is that

mental health will be a better predictor of quality of life. Although research has shown that homeless individuals have higher rates of physical health issues and comorbidities (Frankish, Hwang, & Quantz, 2005; Hwang, 2001; Hwang & Dunn, 2005), it is the constant and daily struggle of mental health challenges that is expected to have the greatest impact on quality of life.

Additional research questions will investigate what the current rate of mental illness is in this sample and if they differ between those who are homeless and those who are vulnerably housed. Another research question will examine whether homeless individuals experience a greater level of hopelessness than vulnerably housed persons. Other group differences that will be explored include whether differences in perceived mental health status and perceived physical health status exist between those who are homeless and those who are vulnerably housed. Lastly, group differences will be attempted to identify contrasts in predictors of quality of life between individuals who are homeless and those who are vulnerably housed.

Method

Participants

This study used data collected from the baseline measure of the Health and Housing in Transition (HHiT) study (Hwang, Aubry, et al., 2011). The Health and Housing in Transition study is a three-city longitudinal cohort study aimed at further identifying the connections between housing and health. Specifically, the HHiT study's goal is to determine the association between changes in housing status and corresponding changes in physical and mental health. The sample used in the reported analyses was composed of only City of Ottawa data and included 395 homeless or vulnerably housed adults (70.3% male, 29.7 % female) with a mean age of 41.03 years (SD = 11.42).

Inclusion criteria involved: 1) adults 18 years of age or older; and 2) not living with a dependent partner or dependent child. Individuals were defined as homeless if they either lived in a shelter, a public space, a vehicle, an abandoned building, or someone else's home, and they did not have their own house, apartment, or room. Vulnerably housed individuals were defined as persons who have housing costs greater than 30% of their monthly income and are therefore identified by the Canadian Mortgage Housing Corporation as meeting criteria for core housing need. These individuals live in socially marginalized types of housing such as rooming houses. Persons recruited from meal programs were included if they met the above criteria in addition to reporting being homeless and not having stayed at a homeless shelter in the previous seven days. The rationale for these last criteria was to capture the small sample of homeless individuals residing primarily on the street.

Measures

The HHiT survey instrument was composed of previously validated measures that were chosen based on their relevance and past success with homeless and vulnerably housed participants. All the measures have demonstrated validity and reliability, and very good to excellent psychometric properties. A complete list of measures used in the HHiT study can be found in Appendix C. The following is a description of the measures used in this current study.

12 Item Short-Form Health Survey (SF-12). An abbreviated version of the Short Form 36-Item Health Survey (SF-36), the Short Form 12-Item Health Survey (SF-12) (Ware, Kosinski, & Keller, 1996), was used to assess physical health status. The original SF-36 is made up of 36 questions that combine to make an eight-scale profile of functional health and well-being scores. In addition, the measure provides two psychometrically-based summary scales; the Physical Component Summary Scale (PCS) and the Mental Component Summary

Scale (MCS) (Ware et al., 1996). These two summary scales were found to capture 85% of the reliable variance in the eight-scale SF-36. As a result, the 36-item questionnaire was reduced to 12 items, which reproduced 90% of the variance in the PCS and MCS of the original SF-36. These results were seen in both general and patient population studies (Ware et al., 1996). Moreover, the new reduced survey reproduced the eight-scale profile well enough for large sample studies.

Specifically, the SF-12 asks respondents to rate various aspects of their physical and mental health. Some of the questions require the respondent to choose a response among a Likert-type scale, while others ask yes/no questions. For example, the first question asks: “*In general, would you say your health is...*” with responses ranging from *excellent (1)*, *very good (2)*, *good (3)*, *fair (4)*, *poor (5)*. Yes/no questions ask respondents to consider either their physical or mental health over the previous four weeks and ask things like: “*During the past four weeks, have you accomplished less than you would like as a result of your physical health?*” For a complete list of SF-12 items, see Appendix D. Improved efficiency and lower costs are benefits of the new SF-12, although there are some limitations, mainly in relation to single-item and two-item scales. Although the SF-12 produces the eight-scale profile, it does so with fewer levels than the SF-36. As such, it yields less precise scores. However, for large group studies such as this one, this difference is not as important given that confidence intervals for group averages in health scores are largely determined by sample size (Ware et al., 1996).

Total raw scores for both the PCS and MCS summary scores are transformed to standardized scores based on the general U.S. population and have a mean of 50 and a standard deviation of 10 (Ware et al., 1996). Higher scores indicate better overall physical and mental health, respectively (Hwang et al., 2011). The SF-12 has been widely shown to

have acceptable reliability and validity (Marosszeky & Sansoni, 2005; Ware et al., 1996). A study on the use of the SF-12 with a homeless sample found internal consistency estimates using Cronbach's alpha to be 0.82 for PCS and 0.79 for MCS (Larson, 2002). For the present study, the items making up the PCS and MCS were found to have a Cronbach's alpha of .79 for both scales.

National Survey of Homeless Assistance Providers and Clients. Items adapted from the National Survey of Homeless Assistance Providers and Clients (NSHAPC; Interagency Council on the Homeless, 1999) were used to assess chronic health conditions and some demographic characteristics. NSHAPC items ask participants to provide yes or no responses to a list of medical conditions like high blood pressure, back problems, and diabetes. Demographic items adapted from the NSHAPC include date of birth and level of education. See Appendix E for a complete list of adapted items.

The NSHAPC was designed to give information regarding the providers of homeless assistance as well as the characteristics of homeless persons who use homeless assistance services. This two-phase study collected provider data based on a statistical sample of 76 metropolitan and nonmetropolitan areas in the United States (Interagency Council on the Homeless, 1999). Data from all programs that met the NSHAPC's definition of homeless assistance program were collected by either 1) telephone interviews with representatives from 6,307 services locations, and 2) mail surveys from 5,694 programs (Interagency Council on the Homeless, 1999). The Census Bureau collected data for the first phase of the survey between October 1995 and October 1996. The second phase of the study consisted of the client survey and was conducted over a four-week period in late October to November 1996 (Interagency Council on the Homeless, 1999). Data from program clients were collected by means of interviews with 4,207 program clients. For a complete outline of the

NSHAPC's methodology and technical report, see the U.S. Department of Housing and Urban Development website at

http://www.huduser.org/portal/publications/homeless/homeless_tech.html.

Canadian Community Health Survey. Assessment of other health conditions such as smoking habits, were adapted from the Canadian Community Health Survey (Statistics Canada, 2009b). See Study One for further information about this survey.

The Housing Quality Score. This six-item measure of housing quality asks about comfort, safety, spaciousness, privacy, friendliness, and overall quality of current housing situation (Toro, et al., 1997). Each item is rated on a seven-point scale ranging from “very bad” (1) to “very good” (7). A total score is calculated by averaging across the six items and can range from 6 to 42. Higher scores represent higher levels of housing quality.

Quality of Life in Homeless and Hard to House Individuals Scale. Hubley and her colleagues (2009) developed the Quality of Life in Homeless and Hard to House Individuals Scale (QoLHHI) as a measure of subjective quality of life in persons who are vulnerably housed or homeless. The interview-guided survey measures up to 12 life areas⁸ and is comprised of two components: the Multiple Discrepancies Theory (MDT) Scale, and the Impact Survey (Hubley et. al., 2009). The MDT Scale is based on Michalos' (1985, as cited in Hubley et al., 2009) Multiple Discrepancies Theory, which states that overall satisfaction is a function of perceived discrepancies between one's current situation compared to a number of other expectations and beliefs. The Impact Survey asks descriptive information about the respondent's circumstances and then measures the impact that different aspects of a life area have on the respondent.

⁸ Life areas covered by the QoLHHI include: health, health care system, place where you live or stay, living conditions, financial situation, employment situation, social and support services, recreational and leisure activities, spiritual life, romantic situation, family, and friends.

The QoLHHI was constructed as a modular instrument and as such, only relevant life areas can be administered, rather than the entire survey. This is possible because quality of life is presumably influenced by a range of experiences and circumstances across different life areas (Hubley et al., 2009). Since the QoLHHI takes a domain-based approach with the 12 separate life areas, it is possible to attain a measure of quality of life for a specific life area without administering the entire survey.

Analyses for this sample used one adapted subscale from the MDT Scales of the QoLHHI Survey; the QoLHHI Overall Satisfaction Scale: Short Version. This scale asked respondents to rate their level of satisfaction with regard to each of the 12 life areas, as well as general life satisfaction. It also provided an overall net satisfaction rating. All 13 items on this subscale are rated on a 7-point Likert-type scale ranging from 1 (*very dissatisfied*), 2 (*quite dissatisfied*), 3 (*slightly dissatisfied*), 4 (*neither dissatisfied nor satisfied*), 5 (*slightly satisfied*), 6 (*quite satisfied*), to 7 (*very satisfied*). An overall score for quality of life can thus range from 13 to 91.

Additionally, this study used one subscale from the Impact Survey; The QoLHHI Impact: Living Conditions module. This scale asked respondents to rate the degree of impact their neighbourhood has on them. This item was rated on a 7-point Likert-type scale ranging from 1 (*large negative impact*), 2 (*moderate negative impact*), 3 (*small negative impact*), 4 (*no impact*), 5 (*small positive impact*), 6 (*moderate positive impact*), to 7 (*large positive impact*). See Appendix F for a complete list of QoLHHI items used in this study.

Social Provisions Scale. The Social Provisions Scale (SPS) examines the degree to which respondents feel their relationships provide them with different dimensions of social support (Cutrona & Russell, 1987). The original SPS consists of 24 items rated on a 4-point Likert-type scale ranging from 1 (*strongly disagree*), 2 (*disagree*), 3 (*agree*), to 4 (*strongly*

agree). Half of the items describe the presence of a type of support, while the other half describes the absence of a type of support. There are four questions for each of the six types of support, which include: Attachment, Social Integration, Reassurance of Worth, Reliable Alliance, Guidance, and Opportunity for Nurturance. The modified version used in this study includes six items from the original measure (two from Attachment, two from Guidance, and two from Reliable Alliance), and an additional two questions. The two additional items are: 1) *I provide support to my friends and / or my family*; and 2) *I have lots of serious disagreements and arguments with my family*. Similar to the 24-item measure, half of the items (4) are negatively worded. To score, the negatively worded items are reverse-scored and all the items are summed. A higher score indicates a greater degree of perceived support.

Norms and comparative data have been established using a variety of populations, although normative data for low income and minority populations has not yet been established. However, as a whole, the total internal consistency reliability for the 24-item measure is excellent, ($\alpha = .93$). Specifically, the alpha coefficient for the Attachment scale is also very good ($\alpha = .75$), as is the alpha coefficient for Reliable Alliance ($\alpha = .74$), and Guidance ($\alpha = .78$). Moreover, Russell, Altwater, and van Velzen (1984, as cited in Cutrona & Russell, 1987) found internal consistency of the measure to be acceptable following administration of a 12-item version to 505 college students. Correlations between two items for each support type ranged from $r = -.33$ (Reassurance of Worth) to $r = -.56$ (Reliable Alliance) (Cutrona & Russell, 1987). Additional studies with elderly participants yielded internal consistency figures above .70 for all support types (Cutrona & Russell, 1987), while studies with schoolteachers revealed internal consistency figures above .60 (Russell et al.,

1984, as cited in Cutrona & Russell, 1987). For the present study, items making up the Social Provision Scale were found to have a Cronbach's alpha of .80.

Beck Hopelessness Scale. The Beck Hopelessness Scale (BHS) is a 20-item self-report inventory used to measure the degree of negative attitudes, pessimism, or hopelessness about one's immediate and long-term future. It also has a particular utility as an indirect indicator of suicidal risk of depressed individuals who have already attempted suicide (Beck, Weissman, Lester, & Trexler, 1974). This scale was added to the Health and Housing in Transition survey solely for the use of the Ottawa sample.

During the five to ten minutes necessary to complete, respondents are asked to indicate whether each statement is true or false regarding their attitudes during the past week. There are nine out of the 20 items that are keyed false (e.g., "*I look forward to the future with hope and enthusiasm*") and 11 items that are keyed true (e.g., "*I can't imagine what my life would be like in ten years*"). Each item is scored either 0 or 1, producing a total score ranging from 0 (no hopelessness) to 20 (severe hopelessness). Higher scores indicate higher levels of pessimism and hopelessness.

Regarding the interpretation of the BHS, scores of nine or greater have been shown to indicate high enough levels of hopelessness to be predictive of eventual suicide in depressed suicide ideators (Nezu, Ronan, Meadows & McClure, 2000). However, the BHS authors caution test users to examine other aspects of the test-takers' functioning; including levels of depression and suicidal ideation within the global realm of a comprehensive assessment.

Norms for the BHS have been calculated using seven patient samples from the United States: suicide ideators (N = 165), suicide attempters (N = 437), alcoholics (N = 105), heroin addicts (N = 211), patients diagnosed with major depression – single episode (N = 72), patients diagnosed with major depression – recurrent episodes (N = 134), and patients

diagnosed with dysthymic disorder ($N = 177$), for a total normative group sample size of 1301 individuals (Nezu et al., 2000). Internal reliability estimates using Kuder-Richardson scores for the above seven samples were calculated to be .92 for suicide ideators, .93 for suicide attempters, .91 alcoholics, .82 heroin addicts, .92 for patients diagnosed with major depression – single episode, .92 for patients diagnosed with recurrent episodes of major depression, and .87 for patients diagnosed with dysthymic disorder. Test-retest reliability of a group of 22 outpatients who took the BHS twice within seven days was .69. A second sample of 99 outpatients obtained a correlation of .66 with the BHS taken 6 weeks apart. For the present study, items making up the Beck Hopelessness Scale were found to have a Cronbach's alpha of .81.

The BHS manual (see Beck & Steer, 1993) provides information on six aspects of validity. Concurrent validity with clinician's ratings of hopelessness is correlated at .74. Topol and Reznikoff (1982) found the BHS to have discriminate validity, as it could discriminate between a group of adolescent suicide attempters and a group of adolescent psychiatric inpatients as well as a group of suburban high school students. The adolescent suicide attempters indicated higher scores on the BHS than the other two groups. Concerning its predictive validity, the BHS has been found to generally predict an estimated 90% of suicide completers for individuals with scores above nine. However, the false alarm rate is estimated to be around six percent (Nezu et al., 2000). Factor analytic studies have uncovered between one and five factors in the scale, however of these, the affective factor regarding feelings about the future is what accounts for the majority of the variance in BHS scores (Fernandez, 1998). According to Beck et al. (1974), the three main factors in the BHS are affective, motivational, and cognitive, all of which provide the BHS with relatively appropriate content validity. In addition, construct validity has been established through a

number of studies that tested and confirmed the construct of hopelessness or pessimism (Beck et al., 1974). Lastly, the Beck Hopelessness Scale has been determined to have both high clinical utility and high research applicability (Nezu et al., 2000).

Lastly, in addition to the demographic information gathered using items from the NSHAPC (Interagency Council on the Homeless, 1999) Statistics Canada, and Census Canada, family history and critical life events were captured using items from the Montreal Street Youth Cohort Study (Roy, et al., 2003).

Variables. The latent variable Physical Health comprised three observed measures: 1) perceived physical health status (PCS), 2) chronic health conditions (CHC), and 3) pain and discomfort (PAIN). The latent variable of Mental Health is composed of three observed variables including 1) perceived mental health status (MCS), 2) hopelessness (Hopelessness), and 3) perceived social support (Social Support). The third latent variable, Quality of Life is comprise observed measures of 1) overall quality of life (SWL), 2) Housing Quality (House Qual.), and 3) impact of their neighbourhood (Neighbourhood). These three latent variables were used to determine the relationships between Quality of Life, Physical Health, and Mental Health, in a homeless and vulnerable housed sample. Figure 2 shows how these variables are hypothesized to relate.

Procedure

A pilot study was conducted during September and October 2008 to demonstrate the feasibility of recruitment methods and ease of administration of the survey. As the pilot study proved successful, baseline interviews began taking place February 2009 and were completed by October 2009.

Recruitment took place at city shelters, meal programs, and rooming houses. Initially, a two-stage cluster sampling strategy was used to recruit participants. The primary sampling

units at the first stage were shelters, meal programs, and rooming houses. The second stage was random selection of individuals within each primary sampling unit. At shelters, participants were selected using a random number list based on their bed number. At meal programs, participants were invited to an interview following screening by program staff or interviewers. Screening took place while participants stood in line for a meal or were known to staff and easily locatable in the area. Persons recruited from meal programs were included if they met the above criteria in addition to reporting being homeless and not having stayed at a homeless shelter in the previous seven days. The rationale for these last criteria was to capture the small sample of homeless individuals residing primarily on the street. Originally, the recruitment strategy was the same for locating participants residing in rooming houses. However, difficulties were encountered in obtaining complete listings of rooming houses from the municipality and inaccurate tenant lists. As such, a secondary recruitment strategy was put in place to recruit participants who were vulnerably housed. This consisted of screening possible participants at drop-in centers, meal programs, and shelters.

Once identified, trained interviewers met with participants for a 60 to 90 minute interview. Interviews were conducted at a number of different locations, including available areas of shelters, meal programs, rooming houses, and at the Centre for Research on Education and Community Services at the University of Ottawa. At the time of the interview, participants were provided with information regarding the nature of the study, consent forms, and a \$20 honorarium following survey completion or termination.

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Analytical Strategy

Similar to the first study, preliminary statistics and descriptive analyses were conducted using the IBM Statistics Package for the Social Sciences, version 20.0 (IBM Corp., 2011). Structural equation modeling (SEM) was performed using maximum likelihood estimation with RStudio software, version 0.97.449 (RStudio, 2012) using the Lavaan package (Rosseel, 2012), version 0.5-13 (Rosseel et al., 2012). Analyses were conducted in the typical SEM two-step procedure; first a confirmatory factor analysis (CFA) was performed to assess the suitability of the parameter estimates between the latent construct and the observed indicators (known as the measurement model). Second, a latent path analysis was conducted to assess the fit of the regression paths between latent constructs; known as the structural model. Model fit was assessed using the following fit indices: the Chi-square likelihood test (χ^2), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Standardized Root Mean Square Residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA). As suggested by Kline (2010), a close fit is identified by values above 0.95 for the CFI and TLI, below 0.05 for the SRMR, and below 0.06 for the RMSEA. Lastly, the Chi-square difference test ($\Delta\chi^2$) was used to identify the significantly better fitting model when comparing two nested models. A description of these indices is available in Appendix B along with qualitative descriptions of cut-off fit values.

Results

The original sample consisted of 400 adults identified as homeless or vulnerably housed. Four surveys were excluded due to duplication and a fifth survey was excluded because it had more than 50 percent of responses missing. Thus, the final sample consisted of 395 homeless or vulnerably housed adults living in the Ottawa area.

Sample size

Tabachnik and Fidell (2007b) recommend a minimum of 300 cases when conducting factor analysis to reliably estimate correlation coefficients. This requirement is met with the 395 participants in this study's sample. For the structural equation model, Kline (2005) recommends a sample size exceeding 200. However, if an ideal 0.80 level of power (Cohen, 1988) is desired, sample size can be determined according to methods proposed by (MacCallum, Brown, & Sugawara, 1996). This is accomplished using a procedure of interval-halving; whereby upper and lower bounds are determined to contain the minimum value of N being sought. Given $\alpha^9 = 0.05$, $\epsilon_p^{10} = 0.05$, $\epsilon_a^{11} = 0.08$, and a desired power of $\pi_d = 0.80$, the minimum value of N is dependent only on degrees of freedom ($df = \text{elements} - \text{parameters}$). Given that the hypothesized model in Figure 2 shows 45 known elements and 21 unknown parameters, the degrees of freedom for this model is 24. According to MacCallum and colleagues (1996) the minimum sample size required to achieve power of .80 for a test of close fit with 25 degrees of freedom is approximately $N = 363$. This study's sample size of 395 meets these criteria.

Preliminary Analyses

A missing values analysis was conducted and a statistically significant result of Little's MCAR test determined that the data were not missing completely at random, $\chi^2_{(7599)} = 8452.61$, $p < 0.01$. Missing data are ideally missing completely at random (MCAR) because it implies that such a pattern of missing data cannot be predicted from other variables in the data set (Tabachnik & Fidell, 2007a). The pattern in these data suggests that

⁹ α = alpha level

¹⁰ ϵ_p = the null value of the root mean square error of approximation (RMSEA)

¹¹ ϵ_a = the alternative value of RMSEA

data are missing at random (MAR) and therefore the pattern is related to other variables. However, given that only approximately one percent (1.39%) of the total values were determined to be missing, a regression equation generated using cases with complete data was used to predict the missing values for incomplete cases. This method is preferred to the mean substitution method because it is more objective (Tabachnick & Fidell, 2007a). A new data set was created with the predicted missing values and total scores were then computed for the following variables: Social Support and Hopelessness. Lastly, composite scores were created to determine the total number of Chronic Health Conditions.

The variables were then assessed for spread and dispersion. The statistical value of the spread of the data was verified using Cramer and Howitt's (2004) method of dividing the skew measure of each variable by its standard error. Tabachnick and Fidell (2007b) recommend using a conventional alpha level of 0.01 ($z = 2.58$) to evaluate the significance of skewness in small to moderate samples. Given this study's large sample size of 395, Tabachnick and Fidell (2007b) suggest examining the shape of the distribution because with increased sample size, both the standard error and skew decrease resulting in a higher likelihood of rejecting the null hypothesis of no skew. Results indicated that both the Chronic Health Condition variable ($z = 8.71$) and the Hopelessness variable ($z = 6.64$) have a significant skew ($z > \pm 2.58$). Examination of the shape of the distribution of these two variables confirmed the significant findings. As a result of the Hopelessness variable having a positive skew and no values of zero (Tabachnick & Fidell, 2007b), a logarithmic transformation was applied. Although the Chronic Health Conditions variable also showed a positive skew, it had values of zero among the scores. As such, a constant and arbitrary value of two was added before applying the logarithmic transformation. Following the

transformations, neither the Chronic Health Conditions variable ($z = -0.79$) nor the Hopelessness variable ($z = 0.05$) showed a significant skew.

Dispersion was assessed in a similar manner of dividing the kurtosis measure of each variable by its standard error (Cramer & Howitt, 2004) and using an alpha level of 0.01 ($z = 2.58$) as well as visual examination of the shape of the distribution to assess significant kurtosis (Tabachnick & Fidell, 2007b). Calculations revealed five of the variables with significant kurtosis: Physical Health ($z = -3.10$), Pain ($z = -3.64$), Satisfaction with Life ($z = -4.87$), Mental Health ($z = -4.38$), and Hopelessness after the logarithmic transformation ($z = -3.67$). However, after visual inspection of the shape of the distribution with a normal curve imposed on each graph, none of the variables exhibited excess kurtosis. Since the sample size of this study is large, no transformations were applied to correct the significant kurtosis values because the visual examination of the distributions does not support the results of the formal inference tests. As Tabachnick and Fidell (2007b) explain, large samples reduce the impact of departure from zero kurtosis, and the underestimation of variance disappears with negative kurtosis in samples of at least 200 participants. As a result of the dispersion and spread measures of the data being transformed and accepted as normal, maximum likelihood (ML) estimation with robust standard errors was used to estimate the model.

Criteria for assessing multicollinearity between variables included a conditioning index above a value of 30 for a given dimension combined with variance proportions greater than 0.50 for a minimum of two variables (Tabachnick & Fidell, 2007b). Although results revealed the last root to have a conditioning index of 39.59, it only showed one variance proportion above 0.50 in the dimension (row). As such, criteria for multicollinearity were not met and it was concluded that no multicollinearity was evident among the variables. The correlation matrix of the observable variables is seen in Table 8 along with descriptive

Table 8

Descriptive Statistics and Correlations Between Observed Variables

Variables	Range	M	SD	1	2	3	4	5	6	7	8	9
1. PCS	0-100	44.67	11.73	1								
2. CHC	0-28	3.89	3.20	-.54**	1							
3. Pain	1-3	1.77	0.69	-.60**	.53**	1						
4. MCS	1-100	38.21	13.53	.004	-.24**	-.25**	1					
5. Social Support	8-32	17.79	4.29	.08	-.08	-.10*	.39**	1				
6. Hopelessness	0-20	7.33	4.03	.05	-.09	-.13*	.05	.01	1			
7. House Qual.	1-7	4.63	1.77	.04	-.09	-.12*	.23**	.14**	.04	1		
8. Neighbourhood	1-7	4.17	1.72	.04	.02	-.16*	.25**	.22**	.04	.29**	1	
9. SWL	1-7	3.87	1.90	.13**	-.14**	-.26**	.54**	.45**	.000	.16**	.38**	1

Note. * $p < .05$; ** $p < .01$.

PCS = Physical Composite Score of SF-12, CHC = Chronic Health Conditions, MCS = Mental Health Composite Score of SF-12,

House Qual. = Housing Quality, Neighbourhood = Impact of current neighbourhood, SWL = Overall satisfaction with life.

statistics of the observed variables. Table 9 provides the variance-covariance matrix of all nine variables used in the model.

Demographics. Of the 395 participants who completed the survey, approximately two thirds were men (70.3%), mostly single (59.7%), Caucasian (77.1%) and had had children (53.5%). Their ages ranged from 18 to 70 years, with an average age of 41.3 years ($SD = 11.42$). The length of time participants reported being homeless ranged from one week to 36 years, with an average of just over five years ($M = 5.15$, $SD = 6.12$). However, this varied greatly, and most often participants reported being homeless for two months. Lastly, almost half of the participants were identified as being in a vulnerable housing situation (49.8%), while others were homeless/living in a shelter (44.8 %) or homeless but not in a shelter (5.3%). No sex differences were found for age ($t_{(379)} = -1.41$, $p = 0.16$) or the number of years being homeless ($t_{(392)} = -1.78$, $p = 0.08$). See Table 10 for a complete list of demographic and observed variables with means and frequencies

Analysis of study variables. Physical health was assessed using the Physical Health Composite Scale (PCS) of the SF-12. Both the PCS and Mental Health Composite Scale (MCS) subscales were transformed to a zero to 100 scale and are represented as t-scores with a mean of 50 and a standard deviation of ten. Overall, participants gauged their physical health to be within the average range ($M = 44.67$, $SD = 11.73$) (see Table 11 for descriptive statistics of all observed variables). Physical health was also assessed using a measure of pain and discomfort (PAIN). The measure for pain level is a score with a range from one (no pain) to three (extreme pain). The average pain score was within the *no pain* range ($M = 1.77$, $SD = 0.69$). On the whole, thirty-eight percent of participants indicated having no pain or discomfort, while almost half (47.1%) rated their pain as moderate. The remaining fifteen percent (14.9%) of participants reported being in extreme pain or discomfort. Overall, the

Table 9

Variance-Covariance Matrix of the Observed Variables

Variables	1	2	3	4	5	6	7	8	9
1. PCS	137.60	-1.52	-4.83	2.89	0.74	0.76	0.63	3.75	0.13
2. CHC	-1.52	0.06	0.09	-0.06	0.01	-0.04	-0.78	-0.08	0.00
3. Pain	-4.83	0.09	0.48	-0.34	-0.19	-0.15	-2.36	-0.30	-0.02
4. SWL	2.89	-0.06	-0.34	3.62	1.26	0.55	13.99	3.63	0.00
5. Neighbourhood	0.74	0.01	-0.19	1.26	2.97	0.89	5.75	1.60	0.01
6. House Qual.	0.76	-0.04	-0.15	0.55	0.89	3.16	5.50	1.06	0.02
7. MCS	0.63	-0.78	-2.36	13.99	5.75	5.50	183.13	22.39	0.17
8. Social Support	3.75	-0.08	-0.30	3.63	1.60	1.06	22.39	18.36	0.01
9. Hopelessness	0.13	0.00	-0.02	0.00	0.01	0.02	0.17	0.01	0.06

Note. PCS = Physical Composite Score of SF-12, CHC = Chronic Health Conditions, MCS = Mental Health Composite Score of SF-12, House Qual. = Housing Quality, Neighbourhood = Impact of current neighbourhood, SWL = Overall satisfaction with life.

Table 10

Descriptive Statistics of Demographic Variables

Demographic Variables	Frequency (%)	Range	Mean	SD
Years Homeless		0.01 – 36	5.13	6.12
Participant Type				
Homeless (in Shelter)	44.8			
Homeless (Not in Shelter)	5.3			
Vulnerably Housed	49.8			
Ethnicity				
Caucasian	77.1			
Black, African-Canadian	5.3			
First-Nations / Aboriginal	12.0			
South Asian (East Indian. etc.)	0.5			
West Asian (Afghan, Arab, etc.)	1.8			
Hispanic, Latin-American	1.0			
Other	2.3			
Marital Status				
Single / Never Married	59.7			
Divorced / Separated	24.8			
Widowed	1.5			
Married / Common-Law	5.6			
Partnered, Not Married	8.4			
Has Children	53.5			
No Children	46.5			
Smoking Status				
Not at All	13.9			
Occasionally	5.1			
Daily	81.0			
Mental Health Diagnoses		0-2	1.16	0.83
Alcohol Use		0-40	8.85	9.92
Drug Use		0-10	3.68	2.86

Table 11

Descriptive Statistics of Observed Variables

Observed Variables	Range	Mean	SD
Physical Health			
PCS	0-100	44.67	11.73
CHC	0-18	3.89	3.20
Pain	0-3	1.77	0.69
Mental Health			
MCS	1-100	38.11	13.53
Social Support	8-32	17.79	4.29
Hopelessness	0-20	7.33	4.03
Quality of Life			
Housing Quality	1-7	4.63	1.78
Overall Quality of Life	1-7	3.87	1.90
Neighbourhood	1-7	4.17	1.72

most frequently reported level of pain was within the *moderate pain or discomfort* category. Lastly, the number of possible chronic health conditions ranged from zero to 18. Participants reported an average of nearly four chronic health conditions ($M = 3.89$, $SD = 3.20$), although the most frequently appearing number of conditions was two. Combined, the observed measures of physical health (PCS), PAIN, and chronic health conditions (CHC) were used to create the Physical Status construct within the model.

Regarding mental health, the MCS subscale of the SF-12 indicated participants have more dysfunction than average ($M = 38.11$, $SD = 13.53$). However, 44.1 percent of respondents reported not having a mental health diagnosis at all. Of those who did report a mental health diagnosis, 28.1 percent indicated having at least one diagnosis and 27.8 percent reported more than one diagnosis. Despite higher than average mental health problems, respondents perceived their social support to be on the lower end of the average level ($M = 17.79$, $SD = 4.29$). Additionally, participants experienced, on average, mild levels of hopelessness, ($M = 7.34$, $SD = 4.07$), with less than one third (28.1 %) indicating hopelessness levels in the moderate or severe range. Most frequently, participants indicated feelings of hopelessness within the mild range. Combined, perceived measures of mental health functioning (MCS), social support (SUPPORT), and HOPELESSNESS make up the latent construct of Mental Health in the model.

Averaged scores from items of the Quality of Life for Homeless and Hard-to-House Individuals (QOLHHI) Inventory revealed that participants were generally slightly dissatisfied with their overall quality of life ($M = 3.87$, $SD = 1.90$). Approximately nine percent of respondents indicated feeling very satisfied with their life, while 15 percent reported being quite satisfied and almost 18 percent indicated being slightly satisfied with their life currently. Individuals who indicated feeling neither satisfied nor dissatisfied

accounted for 12 percent of all participants. Participants reporting dissatisfaction with their life included nearly 14 percent who felt very dissatisfied, 15 percent who reported feeling quite dissatisfied, and almost 17 percent who felt slightly dissatisfied with their current life.

Overall, the most frequently occurring rating was within the *Slightly Satisfied* category.

Scores from The Housing Quality Score indicate that, on average, participants find the overall quality of their current housing to be neither good nor bad ($M = 4.63$, $SD = 1.78$).

Nearly 13 percent rated the quality of their housing as very good, while almost half of participants rated it good (26.6%) or somewhat good (21%). Of those who rated the quality of their housing poorly, over seven percent said it was very bad, almost nine percent said it was bad, and nearly eight percent reported their housing to be somewhat bad. However, the most frequently occurring score was within the *somewhat good* category. The last variable to form the Quality of Life construct is a measure of the impact their neighbourhood has on participants. Scores ranged from *large negative impact* (1) to *large positive impact* (7). On average, participants reported their neighbourhood had no impact on them ($M = 4.17$, $SD = 1.72$). Approximately 40 percent of individuals indicated that their neighbourhood had a positive impact on them; with 9.4 percent saying it had a large positive impact, 15.9 percent reporting a moderate positive impact, and 15.2 rating it as having a small positive impact. Of those participants who indicated their neighbourhood had a negative impact on them, 10.6 said it had a large negative impact, 7.1 percent reported a moderate negative impact, and 11.9 percent indicated it had a small negative impact. The most frequent rating (29.9%) was within the *no impact* category. Overall, the measures for satisfaction with life (SWL), quality of housing (HOUSING_QUAL), and the impact of their neighbourhood

(NEIGHBOURHOOD) combine to create the Quality of Life construct in the model. The three constructs, Physical Health, Mental Health, and Quality of Life, along with their

indicator variables, form the measurement and structural models that are analyzed in structural equation modeling.

Group Comparisons

Comparisons were made between those who identified as homeless, whether living in a shelter or not, and those who identified as vulnerably housed. Multiple independent sample t-tests were conducted to determine differences in the study variables between the two groups. To account for the family-wise error rate, the Bonferroni correction was applied and the alpha of 0.05 was divided by the number of t-tests conducted; nine. As such, the corrected alpha level was determined to be 0.0056.

Significant differences were found in four of the nine observed variables. Vulnerably housed individuals ($M = 4.48$, $SD = 3.28$) indicated having a significantly higher number of chronic health conditions, $t_{(393)} = -4.20$, $p < 0.0056$, than homeless individuals ($M = 3.29$, $SD = 3.01$). However, despite having fewer chronic health conditions, homeless individuals ($M = 3.58$, $SD = 1.88$) showed significantly lower levels of satisfaction with life, $t_{(393)} = -3.15$, $p = 0.002$, compared to vulnerably housed individuals ($M = 4.14$, $SD = 1.89$). Additionally, even though homeless participants ($M = 4.93$, $SD = 1.51$) called either a shelter or the streets their home, they rated the overall quality of where they live significantly better, $t_{(393)} = 3.39$, $p = 0.001$, than those who were vulnerably housed ($M = 4.33$, $SD = 1.97$). Despite rating their housing quality higher, homeless participants ($M = 3.80$, $SD = 1.73$) rated the impact of their neighbourhood as significantly more negative, $t_{(393)} = -4.43$, $p < 0.0056$, than their vulnerably housed counterparts ($M = 4.55$, $SD = 1.63$).

In sum, differences were found among the observed variables between those who are vulnerably housed and those who are homeless, either in a shelter or on the streets. Results showed that homeless individuals have less chronic health conditions than those who are

vulnerably housed. Additionally, homeless participants also rated the shelter or street where they reside as better quality than the rooming houses the vulnerably housed group reside in. However, the impact of the neighbourhood where the homeless group reside was more negatively rated than the impact of the neighbourhood for the vulnerably housed group. Lastly, the homeless group showed significantly lower satisfaction with life ratings than did the vulnerably housed group.

The Measurement Model

In structural equation modeling, the measurement model is initially analyzed for fit and modification indices are reviewed for suggested additional paths that would increase the fit of the model. These added modifications are based strictly on theory and are only added when a theoretical rationale exists (Kline, 2010). With each added parameter, a comparison between the model without changes, known as the parent model, and the model with the changed parameter, known as the nested model, is conducted. A nested model is one that is exactly like the parent model, except that one or more paths have either 1) been removed (constrained to zero); 2) constrained to a fixed non-zero value; or 3) constrained to be equal to another parameter. This type of model is said to be nested within the original model. Given the more restrictive nested models, they have a higher Chi-square value and an added degree of freedom for every restriction. A nested comparison is carried out using a Chi-square difference test ($\Delta\chi^2_{(df)}$). A significant result indicates that the nested model is significantly worse than the parent model.

Similar to the first study, the measurement model was first examined as originally hypothesized. Indicators for Perceived Physical Health, Chronic Health Conditions, and Pain loaded on to the Physical Health factor, indicators for Satisfaction with Life, Housing

Quality, and Neighbourhood loaded on to the Quality of Life factor, and indicators for Mental Health, Social Support and Hopelessness loaded on to the Mental Health factor (see Figure 2). The hypothesized model converged after 92 iterations using the maximum likelihood estimator. The number of iterations is an indication of the number of subsequent cycles of calculations it takes to improve the estimates of the initial solution (Kline, 2010). The less iterations it takes a model to converge, the better the fit of the model to the data. Generally, model convergence that takes over 500 iterations is indicative of an error in the data (Tabachnick & Fidell, 2007b).

The hypothesized model showed a mediocre to poor fit, $\chi^2_{(24)} = 103.37$, $p < .001$, with relative fit indices resulting in CFI = 0.896 and TLI = 0.844. The absolute fit indices resulted in an acceptable to mediocre fit, with SRMR = 0.056 and RMSEA = 0.092. All parameter estimates loaded significantly on to the constructs, except for the Hopelessness indicator on Mental Health Status ($z = 0.68$, $p = 0.499$). The Hopelessness variable was left in the model and a degree of misfit was accepted because this is preferable to adding a subsequent TAU-Equivalence limitation to the model. Modification indices suggested a number of changes to the residual indicator variances and factor loadings that would increase the fit of the model. Table 12 shows a list of modifications made along with the changes in fit. Given that the Physical Component Summary (PCS) indicator and the Mental Component Summary (MCS) indicator are both subscales of the SF-12 Health Survey, it is reasonable to add a relationship between their residual variances. As such, the residual variance for these indicators was cross-loaded, implying that a path was added between the PCS and MCS indicators.

A nested comparison was carried out between the initial model and the model with the newly added parameter as a means of identifying the significantly better fitting model. The Chi-square difference test produced a significant result, $\Delta\chi^2_{(1)} = 10.52$, $p < .001$, which suggested the second model be retained. The second measurement model (Model 2, see Table 12) converged after 104 iterations and showed modest improvement, with $\chi^2_{(23)} = 66.74$, $p < .001$. The relative fit indices indicated an acceptable fit with CFI = 0.943 and TLI = 0.910. The absolute fit indices also revealed an acceptable fit with SRMR = 0.052 and RMSEA = 0.069. Subsequent modification indices suggested further changes to increase the fit of the model. The most theoretically sound modification with the greatest impact was the added path between the residual variances of the Satisfaction with Life (SWL) and the Housing Quality indicators. Given the quality of life research that uses housing quality as a measure, it is reasonable to add a relationship between the residual variance of these variables. The path was applied and a nested model comparison resulted in a significant chi-square, $\Delta\chi^2_{(1)} = 18.67$, $p < .001$ and as such, the third model was retained over the second.

This third model converged after 121 iterations and showed an increase in fit, $\chi^2_{(22)} = 48.07$, $p = .001$. The relative fit indices showed a close to acceptable fit with CFI = 0.966 and TLI = 0.944. The absolute fit indices also showed an increase in fit with indices in the acceptable to close range; SRMR = 0.045 and RMSEA = 0.055. Additional modification indices suggested the cross-loading of the Social Support indicator with the Physical Health construct would attain the highest increase in fit. Theory regarding the relationship between how social support affects subjective measures of health is abundant and as such, a path was added between the social support indicator and the Physical Health construct.

A nested model comparison between Model 3 and Model 4 revealed a significant

Table 12

Fit Statistics of Measurement and Structural Models

Model	Iterations	$\chi^2_{(df)}$	CFI	TLI	SRMR	RMSEA and 90% CI	$\Delta\chi^2_{(df)}$
Hypothesized model	92	103.37 ₍₂₄₎ **	0.896	0.844	0.056	0.092 (0.074 – 0.110)	-
Model 2 - Cross-loading Residuals PCS and MCS	104	66.74 ₍₂₃₎ **	0.943	0.910	0.052	0.069 (0.050 – 0.089)	36.63 ₍₁₎ **
Model 3 - Cross-loading Residuals SWL and Housing_Qual	121	48.07 ₍₂₂₎ **	0.966	0.944	0.045	0.055 (0.034 – 0.076)	18.67 ₍₁₎ **
Model 4 - Cross-loading Support to Physical Health	122	41.11 ₍₂₁₎ **	0.974	0.955	0.039	0.049 (0.026 – 0.071)	6.97 ₍₁₎ **
Model 5 - Cross-loading Pain to Mental Health	115	35.26 ₍₂₀₎ *	0.980	0.964	0.034	0.044 (0.018 – 0.067)	5.85 ₍₁₎ *
Comparison between hypothesized model and final model (Model 5)		-	-	-	-	-	68.11 ₍₄₎ **
Structural Model	140	35.26 ₍₂₀₎ *	0.980	0.964	0.034	0.044 (0.018 – 0.067)	-

Note. * Significant at alpha 0.05. **Significant at alpha 0.01.

CFI = Comparative Fit Index; TLI = Tucker-Lewis Fit Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; $\Delta\chi^2$ = Chi-Square Test of Difference; PCS = Physical Composite Scale of the SF-12; CHC = Chronic Health Conditions; MCS = Mental Health Composite Scale of the SF-12; Housing_Qual = Housing Quality.

difference, $\Delta\chi^2_{(1)} = 6.97$, $p < .001$, indicating that the fourth model is a better fit than the third. After 122 iterations, the fourth model's fit improved even more, $\chi^2_{(21)} = 41.11$, $p < 0.01$. Relative fit indices showed a close fit, with CFI = 0.974 and TLI = 0.955. Similarly, absolute fit indices suggest this last model is also a close fit, with SRMR = 0.039 and RMSEA = 0.049. Modification indices were verified once more and the cross-loading between the Pain indicator and the Mental Health construct suggested the greatest increase in fit. Given the research on how pain can affect mental health measures, a path was added between the Pain indicator and the Mental Health construct.

A nested model comparison between Model 4 and Model 5 resulted in a significant chi-square, $\Delta\chi^2_{(1)} = 5.85$, $p < 0.01$ and as such, the fifth model was retained. This fifth model converged after 115 iterations and showed an increase in fit with a non-significant Chi-Square at the alpha 0.01 level, $\chi^2_{(20)} = 35.26$, $p = 0.019$. All fit indices showed a close fit with CFI = 0.980; TLI = 0.964; SRMR = 0.034; and RMSEA = 0.044. No further theoretically sound modifications were suggested and as such, this fifth model was retained as the final measurement model.

A nested comparison was carried out between the original measurement model and the final (fifth) model. As expected, the Chi-square test of difference resulted in a significant difference, with $\Delta\chi^2_{(4)} = 68.11$, $p < 0.001$ and confirmed the fifth model as the best fitting and final measurement model. Figure 6 is a representation of the final measurement model with standardized¹² parameter estimates. Factor covariances are displayed with the lower

¹² Unstandardized parameter estimates are coefficients measured in the units used to measure the independent variable in terms of unit of change. Given that most variables use different units of measurement, this does not allow for comparison between variables. Standardizing the parameters using a mathematical calculation allows comparisons to be made.

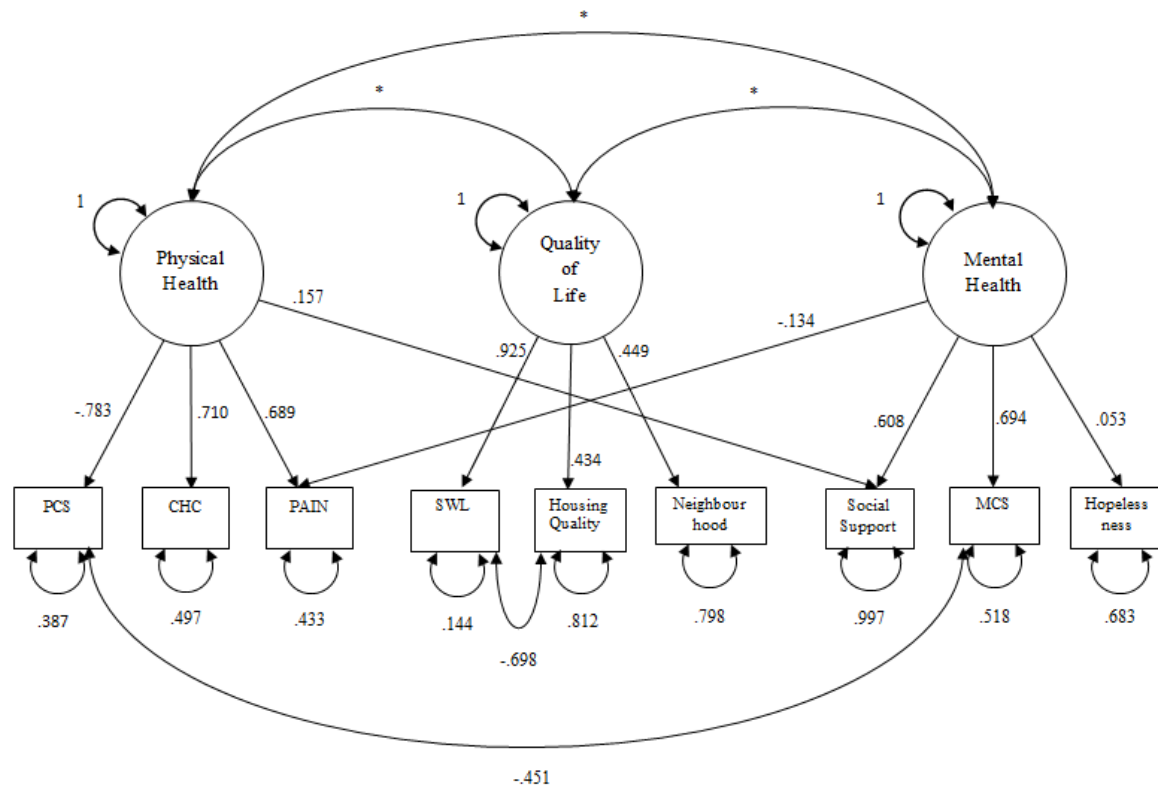


Figure 6. Final measurement model of the relationship between quality of life, mental health, and physical health in a homeless and vulnerably housed sample. Includes standardized parameter values of the factor loadings. Results represent a model with a close fit, $\chi^2_{(20)} = 35.26$, $p = 0.019$; CFI = 0.980; TLI = 0.964; SRMR = 0.034; and RMSEA = 0.044 (90% CI = 0.018 – 0.067). All factor loadings are significant at $p = 0.05$, with the exception of Hopelessness. This degree of misfit is accepted as such to avoid a limiting assumption. PCS = perceived physical health status; CHC = chronic health conditions; PAIN = degree of pain and discomfort; SWL = satisfaction with life; Housing Quality = perceive quality of housing; Neighbourhood = impact of neighbourhood; Social Support = perceived social support; MCS = perceived mental health status; Hopelessness = perceived level of hopelessness.

Table 13

*Confirmatory Factor Analysis**Standardized & Unstandardized Regression Weights & Squared Multiple Correlations (SMC)*

	Standardized			Unstandardized (Standard Error)			SMC
	PH	MH	QOL	PH	MH	QOL	
PCS	-0.78			-9.17 (0.59)			0.61
CHC	0.71			0.17 (0.01)			0.50
Pain	0.69	-0.13		0.48 (0.04)			0.47 0.02
MCS		0.69			9.33 (0.71)		0.48
Hopelessness		0.05			0.01 (0.01)		0.003
Social Support	0.16	0.61		0.67 (0.30)	2.60 (0.28)		0.37 0.02
SWL			0.93			1.76 (0.13)	0.86
House Qual.			0.43			0.77 (0.13)	0.19
Neighbourhood			0.45			0.77 (0.10)	0.20

Note: Statistically significant $p < .05$ in **bold**. Standard errors (se) are in parentheses.

PH = Physical Health, MH = Mental Health, QOL = Quality of Life, PCS = Physical

Composite Score of SF-12, CHC = Chronic Health Conditions, MCS = Mental Health

Composite Score of SF-12, SWL = Satisfaction with Life, House Qual. = Housing Quality,

SMC = squared multiple correlation – was calculated by squaring the standardized values.

The second value in some of the SMC results indicates the SMC value of the cross-loading variable.

bound of reliability for that item. It is calculated by squaring the standardized coefficient (i.e., $0.85^2 = 0.72$). The observed data appear to fit the model and there are large correlations among the latent variables.

The Structural Model

Covariances between the Physical Health and QOL factors, and between the Mental Health and QOL factors, were removed and replaced with regressions. These regression paths were added to assess the question of whether physical health or mental health is a better predictor of quality of life. The covariance between Physical Health and Mental Health was left in place, as it is theorized that those two factors covary.

Preliminary fit analyses resulted in the same fit as the final measurement model. This is expected, as both models are mathematically equivalent. Like the measurement model, the initial structural model resulted in a non-significant Chi-square, $\chi^2_{(20)} = 35.26$, $p = 0.019$. Among the relative fit indices, this initial structural model indicated a close fit, with CFI = 0.980 and TLI = 0.964. Similarly, the absolute fit indices revealed a close fit, with SRMR = 0.034 and RMSEA = 0.044 (90% confidence intervals = 0.019 to 0.067, $p = 0.63$). The regression coefficient between QOL and Mental Health showed significant results, $z = 3.71$, $p < 0.01$, while the coefficient between QOL and Physical Health was not significant, $z = 1.52$, $p = 0.13$. The Physical Health coefficient was not pruned as it would change the stability of the model. As such, a level of misfit from this loading was accepted and this model was deemed the final structural model (see Figure 7).

Overall, the observed data seem to fit the structural model well, based on fit indices. Standardized coefficient values are provided along with the final structural model in Figure 7. Unstandardized values along with standardized errors of the constructs are provided in

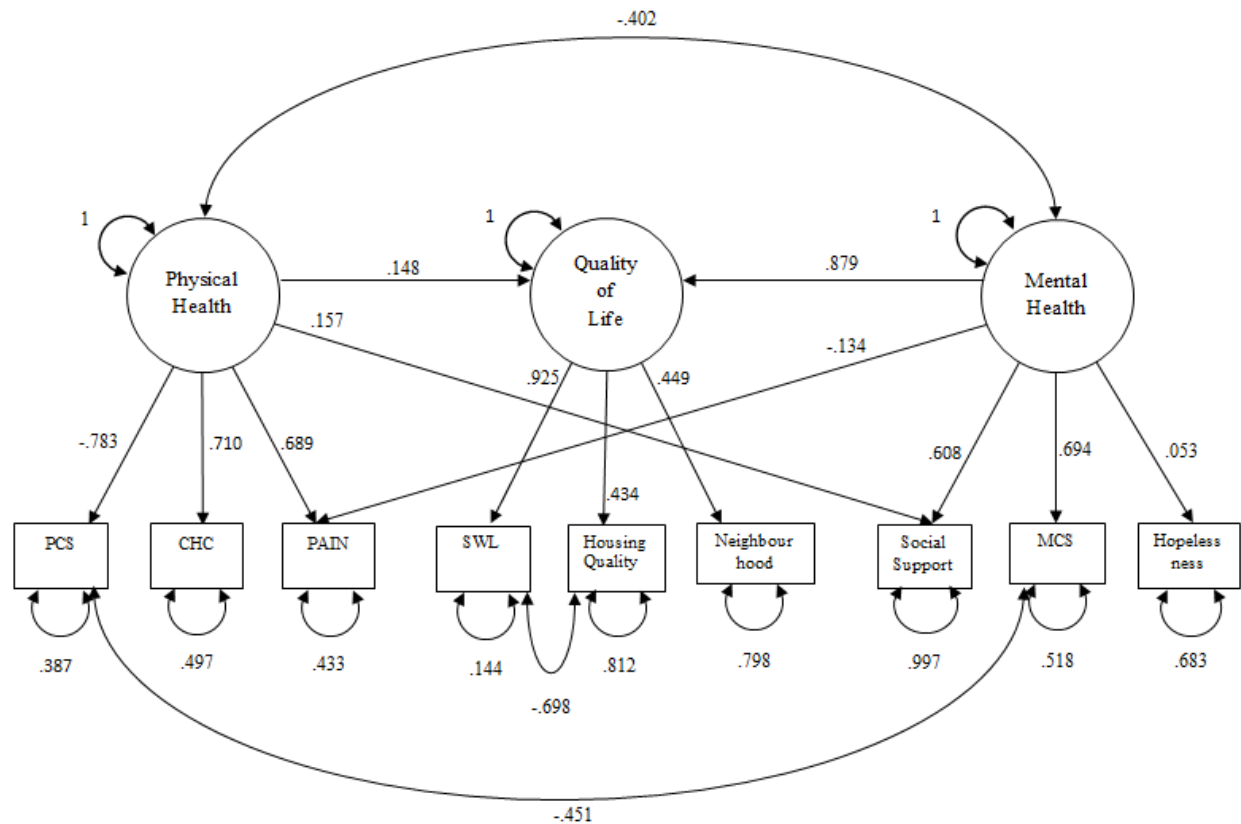


Figure 7. Final structural model of the relationship between quality of life, mental health, and physical health in a homeless and vulnerably housed sample. All values displayed are standardized. Results represent a model with a close fit, $\chi^2_{(20)} = 35.26$, $p = 0.019$; CFI = 0.980; TLI = 0.964; SRMR = 0.034; and RMSEA = 0.044 (90% CI = 0.018 – 0.067). The regression coefficient between Quality of Life and Mental Health was significant at the alpha 0.01 level, while the regression between Quality of Life and Physical Health showed non-significance with $z = 1.523$, $p = 0.128$. PCS = perceived physical health status; CHC = chronic health conditions; PAIN = degree of pain and discomfort; SWL = satisfaction with life; Housing Quality = perceive quality of housing; Neighbourhood = impact of neighbourhood; Social Support = perceived social support; MCS = perceived mental health status; Hopelessness = perceived level of hopelessness.

Table 14. The structural analysis showed that Mental Health has a significant direct positive effect on Quality of Life, suggesting that the better mental health homeless and vulnerably housed Ottawa residents perceive, the better they perceive their quality of life. Physical Health showed a non-significant direct negative effect on Quality of Life.

Predicting quality of life. To determine the best predictor of quality of life, a comparison model was created in which the parameter estimate between Physical Health and Quality of Life was equal to the parameter estimate between Mental Health and Quality of Life (known as the TAU equivalence limitation), making Mental Health and Physical Health equal predictors of QoL. A nested model comparison was conducted between the equivalent model and the structural model and significant results were achieved, $\Delta\chi^2_{(1)} = 138.0$, $p < 0.01$. These results indicate that Mental Health is a significantly better predictor of Quality of Life than is Physical Health in homeless and vulnerably housed residents of Ottawa. As such, Mental Health accounted for 30.47 % of the variance in Quality of Life, and Physical Health accounted for only 4.33% of the variability.

As with study one, a group model analysis between homeless and vulnerably housed individuals was intended. However, by dividing the total sample into these two groups, the sample size per group (198 and 197, respectively) becomes too small to achieve adequate power for meaningful results. As such, a group model analysis was not possible.

Discussion

Study Two was designed to address the gap in the literature identifying a model of quality of life that included physical and mental health factors in a sample of homeless and vulnerably housed adults residing in the national capital region. The study also assessed

Table 14

*Results of the Structural Model**Standardized & Unstandardized Regression Weights & Squared Multiple Correlations (R^2)*

Constructs	Standardized		Unstandardized (SE)		R^2
	Physical Health	QoL	Physical Health	QoL	
Physical Health		0.15		0.27 (0.18)	0.02
Mental Health	-0.40*	0.88	-0.40 (0.09)	1.58 (0.43)	0.77

Note. * A correlation. Statistically significant $p < .01$ in **bold**. Standard errors (SE) are in parentheses. R^2 = Squared Multiple Correlations of the Structural Equations – calculated by squaring the standardized regression values.

whether physical health factors or mental health factors were a better predictor of quality of life in homeless or vulnerably housed individuals.

In this study, homelessness was defined as living in shelters, public places, living in spaces not intended for human habitation, or temporarily staying with family or friends due to unaffordable housing (Springer, 2000). Those who were identified as being vulnerably housed were defined as individuals who spend more than 30 percent of the total household gross income on housing (Canada Mortgage and Housing Corporation, 2009). This population is not necessarily the one you see on the street, but they do struggle. Someone who is vulnerably housed may receive a low income, work a low wage job, and live on a 'hand to mouth' basis.

Factors Affecting Quality of Life

As previously mentioned, research of quality of life in homeless and vulnerably housed individuals has been minimal and has typically involved a very specific sub-sample of this population, like newly housed homeless individuals (Wolf et al., 2001) or formerly homeless veterans (O'Connell et al., 2008). In the current study, no subsamples of the homelessness or vulnerably housed sample were made, and data reflect persons residing on the street, in shelters, or in rooming houses. The structural model found that mental health status has a significantly positive effect on quality of life. This indicates that the better mental health homeless or vulnerably housed individuals are in, the higher their perceived quality of life is. These findings support the study's hypotheses and advocate for the many mental health campaigns and services for this specific sector. Given that the prevalence of mental illness has been found to be higher among homeless individuals than among the general public (Boivin, et al., 2005; Mental Health Policy Research Group, 1997; Frankish et al., 2009), this finding adds support for the mental health services available to this

population. Although there exists a number of reasons why homeless individuals have difficulty accessing mental health services (Power, 2008), the positive findings in this study advocate for continued funding for services that can deliver these services to the homeless and vulnerably housed. Some of these services, like the Housing First program, are discussed below.

The present study also looked at the impact of physical health status on quality of life. Although individuals reported perceived physical health within the average range, generally experiencing no pain, and having an average of nearly four chronic health conditions, no significant effect on quality of life was found. This could be due to how physical health status was measured. For example, other health factors may be contributing to the quality of life in this population that were not captured in the analysis. These alternate factors may include alcohol and drug use, as well as smoking status. In this sample, the great majority of people smoked, had an increased risk of alcohol dependence, and a moderate level of drug use. These addictive behaviours could affect participants' health in a way that was not caught in this model. Similarly, the non-significant effect of physical health on QOL may be attributable to existing barriers this particular population experiences when trying to access healthcare. For example, homeless individuals have identified barriers to chronic pain management to include difficulty getting to medical appointments, physicians not providing prescription due to addiction problems, the high stress of life in a shelter, inability to bear the expense of prescribed medication, and inadequate sleeping conditions (Hwang, Wilkins, Chambers, Estrabillo, Berends, & MacDonald, 2011). Other barriers to healthcare include low socio-economic status (Olah, Gaisano, & Hwang, 2013) and having at least three chronic health conditions (Argintaru, et al., 2013). As a result of these barriers, homeless persons

turn to other means to manage their pain; namely, more affordable over-the-counter medications, illicit drugs, and alcohol (Hwang, Wilkins et al., 2011).

Another possible explanation for the non-significant effect of physical health on quality of life may be the way in which quality of life was measured in this study. Three individual items made up the QoL factor and they asked about participants' general satisfaction with life, the quality of their housing, and the impact their neighbourhood had on them. It is plausible that ratings for quality of life were affected by other factors that were not accounted for in this model. For example, exploratory research on the quality of life in drug users has found that QoL involves many more areas than those usually represented in health-related QoL measures and that for this specific population, may not be primarily related to physical health (De Maeyer et al., 2009). For example, drug users reported personal relationships and social inclusion as the most important factors related to their quality of life, while they rarely brought up physical health (De Maeyer et al., 2009). Given the possibility that addictive health behaviours like drug use influenced responses in the current study, it is reasonable to consider that participants' drug use affected how they prioritized factors that impact their quality of life in a way that was not captured in this model, thus leading to the non-significant impact of physical health on QoL. This is more plausible when one considers that all 395 participants in the current study indicated some form of drug use, with more than half of them scoring within the *moderate* to *severe* problem range.

The most surprising result was the significant negative relationship between physical health and mental health factors. This result contradicts years of research indicating the positive relationship between these two factors. Further analysis of the data was taken and verified the same results. Upon closer inspection, it was noted that the correlation between perceived mental health status (MCS) and perceived physical health status (PCS) in this

sample was close to non-existent ($r = .004$, $p = 0.94$). However, research by Ware et al. (1996), indicates that within the general American population, MCS and PCS are only very weakly correlated in the SF-12 ($r = .06$). One explanation for this surprising result in this study may be the uniqueness of the homeless sample. Despite years of research indicating the positive relationship between physical health and mental health, it has excluded the homeless population. Just like Hubley and her colleagues (2005) identified the unique and culturally specific factors important to the quality of life of injection drug users, it is possible that the homeless population has culturally specific health and mental health factors that have not been identified or captured in these measures. Consideration for future research would do well to focus on identifying physical and mental health factors that are important to individuals inhabiting the distinctive culture that is homelessness.

Predicting Quality of Life

An additional goal of this study was to determine if physical health status or mental health was a better predictor of quality of life among the homeless and vulnerably housed. Given the non-significant impact of physical health on quality of life, it is no surprise that mental health was clearly the best predictor of QoL in this sample. This is an important finding, as it reaffirms the importance of mental health services available to the homeless and vulnerably housed population. One of these important services is the Housing First program, which offers stable housing to homeless individuals and families who experience mental health and/or substance abuse problems. The Housing First programs operate according to five core principles (Gaetz, Scott, & Gulliver, 2013; Tsemberis, 1999). These five core principles include: not having to receive treatment first, which is in contrast to standard care where for example those who suffer from alcoholism are required to be sober in order to qualify for housing. Another principle includes giving clients the choice of where they want

to live and the type of housing they prefer, as well as providing them with individualized support services, if they so choose. The last two principles involve the provision of harm reduction services instead of abstinence, and helping clients become socially integrated in their community. Research regarding the effectiveness of this program shows that it does help significantly decrease rates of substance use (Padgett, Stanhope, Henwood & Stefancic, 2011) as well as the utilization of substance abuse treatment (Padgett, Gulcur & Tsemberis, 2006; Tsemberis, Gulcur & Nakae, 2004) for homeless persons with concurrent mental health and substance problems when compared to those under a treatment first regimen. Moreover, after four years of following both treatment groups, no significant differences were found in substance use, indicating individuals with concurrent mental health and substance abuse problems can retain their stable housing without increased drug or alcohol use (Padgett et al., 2006; Tsemberis et al., 2004). Long-term research of Housing First program participants showed that the vast majority succeeded in retaining their stable housing after one year (Pearson, Montgomery & Locke, 2009) and after four years (Stefanic & Tsemberis, 2007).

In Canada, the At Home/Chez Soi project is a randomized control trial of the Housing First program across five Canadian cities (Goering et al., 2011; Goering et al., 2014; Hwang, Stergiopoulos, O'Campo & Gozdzik, 2012). Within each of the five study sites, a specific subsample or service was more closely examined, including the Ethno-Racial Intensive Case Management project (Stergiopoulos et al., 2012). This project focused on the needs of diverse ethno-racial groups of homeless people with mental illness and used both Housing First and anti-racism/anti-oppression principles. Early findings of the At Home/Chez Soi project suggest receiving housing allows previously homeless clients to envision a different and better future for themselves (Polvere, Macnaughton & Piat, 2013), which is important

for decreasing hopelessness among this population. Attaining housing allowed clients to focus on other aspects of their lives, like addressing their mental health problems, reconnecting with family, and taking the necessary steps to better their lives so as to retain their housing. As of August 2012, over eighty-five percent of the nearly one thousand participants of the At Home/Chez Soi project remain in their first or second home (Goering, et al., 2012). Additionally, clients of the program spent much more time in stable housing and less time in shelters, the streets, temporary or unstable housing, and institutions, than did a group of homeless individuals who received treatment as usual (Goering et al., 2012). At the conclusion of the 24-month At Home/Chez Soi project, a highly significant number of individuals receiving housing first remained stably housed (73 percent), compared to their treatment as usual counterparts (32 percent) (Goering et al., 2014).

Moreover, the At Home/Chez Soi project also found an increase in self-reported ratings of quality of life for individuals receiving housing first compared to those receiving treatment as usual (Goering et al., 2014). Not only were quality of life ratings higher for those in the housing first group but they also increased more quickly as well. Specifically, housing first participants indicated increased satisfaction with their homes and neighbourhoods, their perceived safety, and their finances (Goering et al., 2014).

Overall, the Housing First program shows effectiveness in increasing housing stability (Goering et al., 2014; Pearson et al., 2009; Stefanic & Tsemberis, 2007), reducing treatment and hospital visits (Padgett et al., 2006; Tsemberis et al., 2004), improving physical health, mental health (City of Toronto, 2007), and addiction symptomatology (Padgett et al., 2009), and improving quality of life (City of Toronto, 2007; Gilmer et al., 2010; Goering et al., 2014; Hwang, Gogosis, et al., 2011; Mares & Rosenbeck, 2009). The findings in the current study reflecting the important role mental health plays on quality of

life in homeless and vulnerably housed individuals supports the continued research and services provided by Housing First and the At Home/Chez Soi programs in Canada.

Group Comparisons

The present study made group comparisons between those identified as homeless and those who were vulnerably housed. Findings revealed that as a group, homeless persons report fewer chronic health conditions than those who were vulnerably housed. This supports the baseline findings of the tri-city Health and Housing in Transition study (Hwang, Aubry, et al., 2011) which showed that although homeless and vulnerably housed individuals have the same elevated risk of having serious physical or mental illness (Holton, Gogosis & Hwang, 2010), those who were vulnerably housed indicated a greater number of chronic health conditions. This finding cannot be attributed to differences in the number of barriers to health care between homeless and vulnerably housed persons, as Argintaru and his team (2013) have shown that no statistically significant differences exist. However, one possibility for the vulnerably housed group to indicate more chronic health conditions may be the fact that they are vulnerably housed instead of homeless. Qualitative data from the At Home/Chez Soi project (Goering et al., 2014) showed a shift in participants' view of their lives and priorities; from being in survival mode while they were homeless to having "more meaningful activities (e.g., *establishing a nice routine* and *doing things that matter*)" (Goering et al., 2014, pg. 28) once they were housed. Being vulnerably housed versus being homeless may allow individuals to put their health higher on their priorities. This in turn may lead to more regular medical visits, which can uncover previously undiagnosed health conditions. Nevertheless, having a higher number of chronic health conditions does increase the possibility of having unmet health needs, regardless if individuals are homeless or vulnerably housed. Moreover, individuals living in shelters show a shortened life expectancy

by 13 years for men and eight years for women, compared to men and women in rooming houses whose life expectancy is shortened by 11 and nine years, respectively (Hwang, et al., 2009). As such, it is important to ensure health services are readily available and accessible to those residing in marginalized housing and those living on the streets and in shelters, equally.

The present study also found that compared to the vulnerably housed group, those who were homeless indicated lower satisfaction with life but higher ratings for housing quality. The lower satisfaction with life scores provided by the homeless group were intuitively expected, however, it contradicts some past research that finds no differences in general life satisfaction between those homeless individuals who have attained housing and those who have not (Schutt, Goldfinger & Penk, 1997; Wolf et al., 2001). Still, research on general life satisfaction within the homeless population is mixed. For example, Gilmer and colleagues (2010) did find higher life satisfaction scores for individuals who were placed in a housing program compared to those who were not. Additionally, in a comprehensive review of current research of the quality of life of those who are homeless, Hubley and her colleagues (2012) concluded that in general, homeless individuals experience lower levels of life satisfaction compared to those who are newly housed. These mixed findings suggest that housing status is one of several important domains that contribute to general life satisfaction in a homeless or vulnerably housed population, and that perhaps an interaction of several domains is at play.

Nonetheless, the higher rating of housing quality among the homeless group in this study is somewhat puzzling. Past research indicated that housing satisfaction increases after attaining housing (Hwang, Gogosis, et al., 2011; Schutt et al., 1997; Toro et al., 1997; Wolf et al., 2001), which does not support the current contradictory result. Some plausible reasons

for the vulnerably housed group reporting lower housing quality ratings than the homeless group may be because of the difference in quality of the two groups' housing locations. The majority of the homeless group in this study resided mostly in local shelters while those deemed to be vulnerably housed resided in rooming houses. Emergency shelters in Ottawa are funded and governed by the city, which provides a set of standards with which all city shelters are to be managed (City of Ottawa, 2005). By contrast, most rooming houses are privately owned and only require a license from the city to operate. As a result, rooming houses have anecdotally been known to have substandard levels of cleanliness.

A 2009 report (Conestoga-Roves & Associates) prepared for the Ottawa Community Housing Corporation, which manages 14,783 social housing units in the city of Ottawa, provided the results of a building condition assessment carried out on a large number of their units. The assessors used The Facility Condition Index (FCI) as a marker to represent the condition of the buildings, both internally and externally. Rooming houses in particular were assessed to have FCIs within the fair to poor range, while the overall FCI for the entire building portfolio was within the poor range. These poor ratings indicate that, as a whole, the 14,783 social housing units managed by the Ottawa Community Housing Corporation are in urgent need of remedial work. In Winnipeg, a study of the city's rooming house tenants (Distasio, Dudley, & Maunder, 2002) revealed themes of poor building conditions and poor management. Tenants described the cramped bedrooms, regular rodent problems, unsanitary shared bathrooms and kitchens, and the smell of bodily fluids from past tenants that remain in the units, as being the most unpleasant to live with. Should similar conditions exist in Ottawa rooming houses, it is understandable why the vulnerably housed group in this study rated their housing quality lower than those residing in shelters.

The impact their neighbourhood had on the study participants was the last significant finding between the two study groups. The homeless group indicated that their neighbourhood had a significantly more negative impact than the vulnerably housed group, whose average rating was between *none* to a *small positive* impact. This is in accordance with the study hypothesis, as it was expected that those residing in neighborhoods with more of a community feel, where rooming houses are usually found, would find it more of a positive experience compared to those residing in more commercial areas, where shelters are typically found.

In the city of Ottawa, emergency shelters available for single men are all located within a 1.2-kilometer radius in the downtown core. So is the women's shelter. By contrast, rooming houses, where the vulnerably housed in this study resided, are more dispersed throughout the city. Although a number of them border the downtown area, they are much more integrated within their respective communities. Where those identified as homeless resided in a neighbourhood of mostly government and commercial buildings, vulnerably housed participants in rooming houses lived in structures better integrated within their community. Additionally, shelters in the city are very large, with clear signage identifying the buildings, compared to the much smaller rooming houses, most of which have no signs identifying them and look like residential homes or apartments.

For some time, anecdotal evidence has linked a high number of illicit activities and drug use in neighbourhoods where homeless persons reside. Given the strong established link between illicit drug use and homelessness (Johnson & Fendrich, 2007; Fountain, Howes, Marsden, Taylor & Strang, 2003; Kemp, Neale & Robertson, 2006), and given that over half of the participants in the current study reported at least moderate drug use, it is feasible to consider that this sample has some knowledge of the drug subculture that exists in and

around these emergency shelters. Research has shown that identifying with communities, peer groups, or cultures, can be either a protective factor or a risk factor for delinquent behaviour, including the onset of illicit drug use (see Moshier et al., 2012). For those who do develop a sense of belonging to the drug subculture, four clusters of cultural elements appear to be present: detachment from mainstream society, a strong sense of kinship with other drug users, feelings of excitement and pleasure, and a sense of mastery stemming from drug use and other related behaviors (Moshier et al., 2012). For individuals trying to better themselves and move out of homelessness, it can be challenging when immersed in a subculture that isolates itself from mainstream society.

In a research report of the housing needs of homeless substance users, Kraus, Serge and Goldberg (2005) identified housing stability as not only a measure of success over substance use, but also as a way out of “survival mode” and towards having more control of their lives, gaining a sense of belonging to their neighbourhood, and gaining confidence in themselves.

Additionally, when homeless individuals are asked what they considered to be the most important housing features, they reported wanting to have an affordable home that was in a safe and drug-free neighbourhood with easy access to amenities and public transportation (O’Connell et al., 2006). Overall, it would appear that homeless individuals want what everyone else wants in a home: somewhere we feel good about hanging our hat.

The Model

The final model, although partially data-driven, showed a close fit and mostly significant paths between the latent and indicator variables. One exception however, was the regression coefficient between the mental health construct and the hopelessness indicator. This path was non-significant in the hypothesized model and remained so throughout the

model modifications. One explanation for this may be the level of hopelessness reported among this homeless sample. This study hypothesized that participants would indicate elevated levels of hopelessness, given this population's known increased levels of depression. However, only mild levels of hopelessness were reported for both vulnerably housed and homeless persons, with no significant difference between each group. Although this result does not support the study hypothesis, it does allow for the consideration of three possibilities.

First, this sample of homeless and vulnerably housed persons may have higher levels of resiliency than expected. Although research with homeless youth has shown hopelessness levels at the moderate range (Rew, Taylor-Seehafer, Thomas, & Yockey; 2001) and above the predictive level of eventual suicide (Nezu et al., 2009), it is possible that protective factors of resiliency were in place in this study's sample that were not assessed. Resiliency is an important protective factor (Zerger et al., 2008); to the degree that *perceived* resiliency has been shown to have a negative effect on loneliness, hopelessness, and life-threatening behaviours in homeless youth who were disconnected from others (Rew et al., 2001).

Second, it is possible that hopelessness is not an ideal indicator of mental health, or that on a hierarchy of factors that influence mental health in this population, other indicators rank higher than hopelessness. For example, the number or severity of mental health disorders may be a better indicator of mental health status compared to hopelessness. In addition, substance use was not assessed in this model, although it has been shown to be associated with mental health status in a homeless sample (Chambers et al., 2013a).

Lastly, the measure used to rate hopelessness may not be sensitive enough to the unique needs and opinions of such a distinct sample of individuals. It is important to keep in mind that the Beck Hopelessness Scale has a normative sample of psychiatric inpatients with

recent suicide attempts. The BHS has also been validated with non-clinical college students (Steed, 2001), both of these groups are quite different from the study sample and as such, the BHS may not adequately discriminate the nuances in hopelessness of this group.

Limitations and Future Research

Given that the original hypothesized model of quality of life in homeless and vulnerably housed individuals showed an initial mediocre fit, modifications had to be made and as such, the final model is a partially data-driven model. Although the modifications made were theoretically sound, the observed covariance of the error terms between Satisfaction with Life and Housing Quality was unexpected, but necessary to improve the fit of the overall model. Although the relationship between life satisfaction and housing quality has been established (O'Connell et al., 2006; Nelson et al., 2007), the covariance between these two indicators suggests a shared error that remains unidentified. Further exploration of this possible confound may prove beneficial in the future. Also, further research is required with other homeless and vulnerably housed samples to validate the final structural model and its added parameters.

Moreover, despite having a large enough sample size to conduct structural equation modeling with adequate power, future research would do well to consider increasing the overall sample size to conduct model comparison between the vulnerably housed and homeless groups. Having the complete baseline sample of the Health and Housing in Transition study (Hwang, Aubry et al., 2011), including Toronto and Vancouver, would have made it possible to conduct these group comparisons.

In addition, sex comparisons were not available in this study due to the disproportionate number of male participants, which is reflective of the homeless population of single adults. However, challenging as it may be to increase the number of female

participants, doing so can lead to more direct comparisons and identification of the unique needs of each sex.

Lastly, despite the usefulness of subjective measures of physical and mental health, they limit results to the perception of participants. Given the elevated mental health issues and substance abuse found in the homeless population, is it reasonable to rely on subjective accounts of physical health and mental well being? Future research may consider using more objective measures of physical and mental health. These can include medical chart reviews or tracking objective disease/health indicators with blood tests.

Those who are homeless or vulnerably housed experience a precarious day-to-day existence. Continued research and understanding of their struggles, the barriers they face, the resilience they hold, and the importance they give to varying factors of their lives can only help to further provide effective resources much needed by this group.

Overall Discussion

With respect to demographic variables, there were some differences and similarities between the two studies. Some similarities included the average age of respondents ranging between 40 and 44 years. There was also little multicultural representation in both studies, as the majority identified as either Caucasian or White.

In addition to the differences in housing status, the two studies varied on some demographic variables. The second study was made up of approximately two-thirds male respondents, which is representative of the homeless population. By contrast, just over half of the housed sample was female. Marital status also varied greatly between the two studies. Just over half of the housed sample indicated being married or in a common-law relationship, compared to the under six percent of the homeless and vulnerably housed sample. Moreover, just over a quarter of the housed sample indicated they were single or had never been

married, while nearly 60 percent of the homeless and vulnerably housed said the same. These vast discrepancies in marital status are likely due to a number of reasons: first, the sampling method of the homeless and vulnerably housed study exclusively targeted single individuals without dependents. Second, the unequal distribution of the sexes also affected the lower number of married homeless or vulnerably housed persons. The two samples further differed in education levels. The great majority of the housed sample (71.9 percent) indicated having graduated with a post-secondary degree or diploma. By contrast, only 16.7 percent of the homeless and vulnerably housed sample had completed a post-secondary degree or diploma. The most frequent level of education the homeless sample reached was some high school credits, but no diploma (36.5 percent). Lastly, one quarter of the housed sample reported they were unemployed or were unable to work, whereas 58 percent of the homeless sample indicated no having worked in the last year.

Although samples for both studies were chosen from the same city, their differences are quite stark. The housed sample is one of equally proportioned males and females who are largely educated, employed, and married. They represent the more privileged proportion of society who, because of their education and demographic status, not only reside at a permanent address, but also experience a different level of daily stress. Comparatively, the homeless and vulnerably housed sample represent a very disenfranchised group of mostly unattached males with a high school diploma or some high school credits, who have spent an average of five years homelessness. Their socio-demographic status has not afforded them the choices and options of the housed sample.

The purpose of each of the studies was to better understand the relationship between quality of life, physical health, and mental health using two models for residents of Ottawa, Ontario who are housed or homeless, respectively. The housed model showed that both

physical health and mental health have a significant positive effect on quality of life, although neither factor was a better predictor of QoL. Despite that, there was a significantly positive covariance between physical health and mental health, with physical health accounting for almost 11 percent of the variance in quality of life and mental health accounting for nearly 20 percent of the variance. For the homeless and vulnerably housed model, only mental health had a significantly positive effect on QoL; although physical health also showed a positive effect on QoL, it did not reach significance level. This may be contributing to the result indicating mental health is a significantly better predictor of QoL in this model. Results indicate that mental health accounted for approximately 30 percent of the variance in QoL, while physical health accounted for just over four percent of the variance. What is surprising in this model is the significant negative relationship between physical health and mental health. A negative relationship between these two factors indicates that a higher level of one factor corresponds to lower values of the second factor. This result is contradictory to all the research identifying the positive relationship between physical and mental health. However, in addition to the lack of cultural differences between the homeless sample and the general population in which the SF-12 is normed, another possibility for this contradictory result may be the way in which the composite summary scores of the SF-12 are derived. The scoring algorithm of the SF-12 uses a factor analytic technique that forces PCS and MCS scores to be orthogonal (Farivar, Cunningham, & Hays, 2007; Ware et al., 1996). In addition, the negatively weighted scales used in the PCS and MCS scoring algorithm make it so that higher scores in one composite score drive down scores in the other composite score (Farivar et al., 2007). In other words, just as the results of the homeless and vulnerably housed group showed that as physical health increases mental health decreases, and vice versa, the orthogonality of the PCS and MCS summary scores were designed to do

the same. Consideration to not covary the Physical and Mental Health factors in future model testing may lead to different and more representative results.

Comparing the Two Studies

Indirect comparison of the degree of life satisfaction / quality of life between the two studies shows that the great majority of the housed sample reported having a satisfied or very satisfied life. By contrast, the homeless and vulnerably housed sample indicated being slightly dissatisfied with their life, on average. This difference was expected, as it is not difficult to imagine a less satisfying life or lower quality of life when one (if not more) of life's basic needs is not being met.

Comparisons of perceived physical health between the two studies indicate that although the homeless study showed average levels of physical health, the housed study showed that over two-thirds of respondents identified their physical health as either very good or excellent. Once again, these differences are not surprising given the identified barriers to health care seen in homeless and vulnerably housed populations. Similarly, although measures of pain showed average scores in the *no pain* range for both studies, the housed group had over 82 percent of participants in the *no pain* range while the homeless and vulnerably housed sample had only 38 percent of participants in that range. In addition, participants in the housed study had a range of zero to seven chronic health conditions, with a group average of one chronic health condition. Comparatively, the number of chronic health conditions in the homeless and vulnerably housed study ranged from one to 18 conditions. Every single one of the 395 participants in this study reported *at least* one chronic health condition; with the study average being nearly four. This is a stark and unfortunate difference between the housed and homeless studies. This comparison, although indirect, points to the continued high need for health resources for this vulnerable population.

Moreover, this difference reinforces the need to not only continue identifying barriers to health care for the homeless population, but also finding solutions and establishing effective programs and resources to overcome these barriers. It has been established that unmanaged illness and disease, in any population, increase taxpayer costs by means of increased hospital and emergency room visits. If one considers the impact one chronic health condition has on each additional condition, creating a cascade effect on deteriorating health, the need for cost-effective preventative strategies becomes exceedingly clear.

Lastly, indirect comparison of the perceived degree of mental health status between the two studies shows that over three quarters of participants in the housed study rated their mental health as either very good or excellent. By contrast, participants in the homeless study indicated that they perceived themselves as having higher than average mental dysfunction. Moreover, the housed study reported just under 11 percent of its participants identified having one mental health diagnosis, whereas the homeless group reported over 28 percent with one mental health diagnosis. Once again, these differences between housed and homeless persons are a sad reminder of how far there is still left to go before a solution to the challenges of homeless and vulnerably housed citizens is found.

Considering the barriers faced daily by our homeless citizens in meeting their basic needs of food and shelter, and in attaining health care, it is not surprising that they experience generally lower levels of physical health, higher levels of pain, more chronic health conditions and mental health diagnoses, and greater mental health dysfunction. This in turn impacts quality of life, as demonstrated by the lower rating of QoL, compared to the housed sample.

Some implications of the findings in these studies regarding policy and services include the need for more mental health services for homeless individuals. Despite Housing

First research supporting the provision of stable housing above all else to help this population, the majority of homeless individuals have to wait for housing. These waitlisted people are still struggling with physical and mental health issues and require services. Policy makers would do well to consider providing clinicians, therapists, or psychiatrists to local shelters or even mobile services for those few individuals prefer to be street-dwellers. Such a service may increase compliance for those who must take prescription medication. It may also increase perceived social support in addition to mental health and well being. For those individuals who are vulnerably or recently housed (through a Housing First-type programme), community outreach of mental health services can help monitor and treat mental health issues before they reach crisis levels. Moreover, preventative services would have implications for both housed and homeless individuals; possible saving government expenditure on emergency services.

Limitations and Future Research

It is important to recognize that the main limitation is the lack of directly comparable measures between the two studies. Although it would be easy to suggest that future research carry out model comparisons using matched measures, this suggestion would overlook the unique needs of the homeless population, including the fact that being homeless is often a temporary state and that most homeless people are at times part of the housed population as well. A better recommendation would be to match indicators. For example, although both models consisted of three matched structures, the indicators that made up those structures were not matched; the housed study only had two indicator variables measuring mental health (perceived mental health and stress), while the homeless study had three indicators making up the mental health factor (perceived mental health, social support, and hopelessness). Future research would do well to consider using indicators measuring the

same observable variable for both the housed and homeless groups, even if those variables are attained from different measures (i.e., both the housed and homeless model have indicators for perceived mental health, stress, and depression that make up the mental health factor).

Another limitation is the possibility of unidentified factors that may be affecting the surprising relationship between physical health and mental health in the homeless and vulnerably housed study. It is possible that given the unique needs of this population, such a negative relationship does indeed exist, and future research would do well to consider exploration of the possibility of this contrasting result within the context of such a distinct group. Lastly, further research is required with other housed and homeless samples to validate the final structural model and its added parameters in both studies.

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Appendix A

List of Study Variables and Abbreviations

Study One: Housed Model

PHYSICAL HEALTH

1. **Perceived Health (PCS):** In general, would you say your health is: (1) Excellent, (2) Very good, (3) Good, (4) Fair, or (5) Poor?
2. **PAIN:** How much does pain & discomfort limit your activity? (1) No pain or discomfort, (2) pain does not prevent activity, (3) Pain prevents a few activities, (4) pain prevents some activities, or (5) Pain prevents most activities.
3. **Chronic Health Conditions (CCC):** Number of chronic health conditions

MENTAL HEALTH

1. **Perceived Mental Health (MCS):** In general, would you say your mental health is: (1) Excellent, (2) Very good, (3) Good, (4) Fair, or (5) Poor?
2. **STRESS:** Would you say that most days are: (1) Not at all stressful, (2) Not very stressful, (3) A bit stressful, (4) Quite a bit stressful, or (5) Extremely stressful?

QUALITY OF LIFE

1. **Satisfaction with Life (SWL):** How satisfied are you with your life in general? (1) Very satisfied, (2) Satisfied, (3) Neither nor, (4) Dissatisfied, or (5) Very Dissatisfied?
2. **BELONG:** How would you describe your sense of belonging to your local community? Would you say it is: (1) Very strong, (2) Somewhat strong, (3) Somewhat weak, or (4) Very weak?
3. **WEIGHT:** Do you consider yourself (1) Overweight, (2) Underweight, or (3) Just about right?

Study Two: Homeless and Vulnerably Housed Model

PHYSICAL HEALTH

1. **Perceived Health (PCS):** In general, would you say your health is: (1) Excellent, (2) Very good, (3) Good, (4) Fair, or (5) Poor?
2. **PAIN:** How much does pain & discomfort limit your activity? (1) No pain or discomfort, (2) pain does not prevent activity, (3) Pain prevents a few activities, (4) pain prevents some activities, or (5) Pain prevents most activities.
3. **Chronic Health Conditions (CCC):** Number of chronic health conditions

MENTAL HEALTH

1. **Perceived Mental Health (MCS):** In general, would you say your mental health is: (1) Excellent, (2) Very good, (3) Good, (4) Fair, or (5) Poor?
2. **Hopelessness:** Total score out of 20 to questions measuring the degree of negative attitudes, pessimism, or hopelessness about one's immediate and long-term future.
3. **Social Support:** Total score out of 32, based on eight questions asking about the degree to which respondents feel their relationships provide them with different dimensions of social support.

QUALITY OF LIFE

1. **Satisfaction with Life (SWL):** How satisfied are you with your life in general? (1) Very satisfied, (2) Satisfied, (3) Neither nor, (4) Dissatisfied, or (5) Very Dissatisfied?
2. **Housing Quality:** Total score out of 42, based on six questions asking about comfort, safety, spaciousness, privacy, friendliness, and overall quality of current housing situation.
3. **Neighbourhood:** Rate the impact your neighbourhood has on you: (1) Large negative impact, (2) Moderate negative impact, (3) Small negative impact, (4) No impact, (5) Small positive impact, (6) Moderate positive impact, or (7) Large positive impact.

Appendix B

Description of Fit Indices

Table B1

Description of Fit Indices

Index	Abbreviation	Continuous Data	Categorical Data
Chi-square	χ^2	Ratio of χ^2 to $df \leq 2$ or 3, useful for nested models / model trimming	
Relative Fit Indices			
Comparative Fit index	CFI	≥ 0.95 for acceptance	0.95
Tucker-Lewis Index	TLI	≥ 0.95 for acceptance	0.96
Absolute Fit Indices			
Standardized Root Mean Square Residual	SRMR	≤ 0.08	< 0.07
Root Mean Square Error of Approximation	RMSEA	$< 0.06 - 0.08$ with confidence interval	< 0.06

Note. Table is partially replicated from Schreiber (2008). Some fit indices are based on the model Chi-Square value and degrees of freedom. As such, these results are reported even though it is not used to justify the fit of the model due to its dependence on sample size (Schreiber, 2008). However, the Chi-square difference test, or nested comparison, ($\Delta\chi^2$) is used to verify the statistical significance in the reduction of overall fit when free parameters are removed (trimming) or the improvement in overall fit when free parameters are added (building) (Kline, 2010). The Chi-square difference test evaluates the equal-fit hypothesis of two hierarchical models. In model trimming, an oversimplified model would lead to a rejection of the equal-fit hypothesis. However, a similar result in model building would support retaining the added path (Cheung & Rensvold, 2002).

Table B2

Qualitative Description of Fit Indices

Absolute Fit Index RMSEA & SRMR	Qualitative Description	Relative Fit Index CFI & TLI
.00	Exact Fit	1.00
.01 - .05	Close Fit	.95 - .99
.05 - .08	Acceptable Fit	.90 - .95
.08 - .10	Mediocre Fit	.85 - .90
> .10	Poor Fit	< .85

Note. Absolute fit indices compare the hypothesized model to the perfect (saturated) model and provide a measure of how much worse the hypothesized model is to the perfect model. The Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR) are two absolute fit indices used throughout this study. The RMSEA is scaled as a badness-of-fit index where a zero value is indicative of a perfect fit. The value of RMSEA decreases as degrees of freedom increases, suggesting greater parsimony (Kline, 2010). The RMSEA is also a parsimony-corrected index, as it provides a 90% confidence interval. The SRMR is a measure of the mean absolute correlation residual (Kline, 2010) and has a zero-value that indicates a perfect fit. Conversely, relative fit indices compare the hypothesized model to the worst (null) model. The null model assumes zero population covariance among the indicator variables even though this assumption is most likely false (Kline, 2010). As such, relative fit indices do not measure model adequacy in a true sense, but rather the relative improvement from the worst fitting model. This study reports two relative fit indices: the Comparative Fit index (CFI) and the Tucker-Lewis Index (TLI).

Appendix C

Measures used by the Health and Housing in Transition Study.

1. Alcohol Use Disorders Identification Test – Primary Care (AUDIT – PC)
2. Canadian Community Health Survey (2004; 2009) (CCHS)

Chronic health conditions

Health care utilization

Oral health conditions

Smoking

Source of healthcare

3. Census Canada

Demographics

4. Dartmouth Residential Follow-back Calendar
5. Drug Abuse Screening Test (DAST-10)
6. EuroQol Group 5-Dimension Self-Report Questionnaire (EQ5D)
7. Montreal Cohort Study
8. National Survey of Homeless Assistance Providers and Clients (NSHAPC)
9. Quality of Life for Homeless and Hard-to-House Individuals (QoLHHI)

Impact: Living Conditions

Impact: Health

Overall Satisfaction Scale Short Version 1

10. Short Form 12-Item Survey (SF-12)
11. Street Health Survey (1992)
12. Social Provisions Scale
13. Social Support Network Instrument

14. Social Service Utilization

15. Statistics Canada

Demographics

16. Toro's Housing Quality Instrument

17. Vas Scale

Appendix D

List of Items Adapted from the Short Form 12-Item Health Survey (SF - 12)

1. In general, would you say your health is...

1	2	3	4	5
Excellent	Very good	Good	Fair	Poor

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

2. ...moderate activities such as moving a table. Does your health now limit you a lot, limit you a little, or not limit you at all? (If participant says s/he does not do activity, probe: Is that because of your health?)

1	2	3
Yes, limited a lot	Yes, limited a little	No, not limited at all

3. ...climbing several flights of stairs. Does your health now limit you a lot, limit you a little, or not limit you at all? (If participant says s/he does not do activity, probe: Is that because of your health?)

1	2	3
Yes, limited a lot	Yes, limited a little	No, not limited at all

The following questions that I will ask you are about your physical health and your daily activities during the past 4 weeks.

4. During the past 4 weeks, have you accomplished less than you would like as a result of your physical health?

☐ Yes ☐ No

5. During the past 4 weeks, were you limited in the kind of work or other regular daily activities you do as a result of your physical health?

☐ Yes ☐ No

The following questions that I ask you are about your emotions and your daily activities during the past 4 weeks.

6. During the past 4 weeks, have you accomplished less than you would like as a result of any emotional problems, such as feeling depressed or anxious?

☐ Yes ☐ No

7. During the past 4 weeks, did you not do work or other regular daily activities as carefully as usual as a result of any emotional problems, such as feeling depressed or anxious?

☐ Yes ☐ No

The next questions are also about your physical and emotional health during the past 4 weeks. (Refer to scale)

8. During the past 4 weeks, how much did pain interfere with your normal work, including both outside and inside the home? Did it interfere. . (CLARIFY TYPE OF PAIN).

1	2	3	4	5
Not at all	Slightly	Moderately	Quite a bit	Extremely

The next questions are about how you feel and how things have been with you during the past 4 weeks. As I read each statement, please give me the answer that comes closest to the way you have been feeling: Is it all of the time, most of the time, a good bit of the time, some of the time, a little of the time, or none of the time? (Refer to scale)

9. How much of the time during the past 4 weeks...have you felt calm and peaceful?

1	2	3	4	5	6
All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time

10. How much of the time during the past 4 weeks...did you have a lot of energy?

1	2	3	4	5	6
All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time

11. How much of the time during the past 4 weeks...have you felt down?

1	2	3	4	5	6
All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time

12. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities like visiting with friends or relatives?
(Refer to scale)

1	2	3	4	5
All of the time	Most of the time	Some of the time	A little of the time	None of the time

Appendix E

Items Adapted from the National Survey of Homeless Assistance Providers and Clients

1. Demographics

4.3. What is your date of birth?

Month		Day		Year	

97 ☐ Don't know98 ☐ Refused**4.4. How much school have you completed?** *(Read categories if person is unsure. Mark (X) for the highest level completed or degree received. If currently enrolled, mark the level of previous grade attended or highest degree received.)*

- 1 ☐ No school completed
- 2 ☐ Preschool
- 3 ☐ Kindergarten
- 4 ☐ 1st, 2nd, 3rd, 4th grade
- 5 ☐ 5th, 6th, 7th, or 8th grade
- 6 ☐ 9th grade
- 7 ☐ 10th grade
- 8 ☐ 11th grade
- 9 ☐ 12th grade, NO DIPLOMA
- 10 ☐ HIGH SCHOOL GRADUATE – high school DIPLOMA
- 11 ☐ G.E.D.
- 12 ☐ Vocational training certificate
- 13 ☐ Some college but no degree
- 14 ☐ Associate degree in college – Occupational program
- 15 ☐ Associate degree in college – Academic program
- 16 ☐ Bachelor's degree (e.g., BA, AB, BS)
- 17 ☐ Master's degree (e.g., MA, MEng, MEd, MSW, MBA)
- 18 ☐ Professional school degree (e.g., MD, DDS, DVM, LLB, JD)
- 19 ☐ Doctorate degree (e.g., PhD, EdD)
- 97 ☐ Don't know
- 98 ☐ Refused

2. Chronic Health Conditions

10.1. Do you have any of the following medical conditions? (Read categories and mark (X) one box on each line.)	Yes	No	Don't know	Refused
a. Sugar in your blood (diabetes)	1 ☐	2 ☐	97 ☐	98 ☐
b. Anemia (poor blood)	1 ☐	2 ☐	97 ☐	98 ☐
c. High blood pressure	1 ☐	2 ☐	97 ☐	98 ☐
d. Heart disease/stroke	1 ☐	2 ☐	97 ☐	98 ☐
e. Problems with your liver	1 ☐	2 ☐	97 ☐	98 ☐
f. Arthritis, rheumatism, joint problems	1 ☐	2 ☐	97 ☐	98 ☐
g. Chest infection, cold, cough, bronchitis	1 ☐	2 ☐	97 ☐	98 ☐
h. Pneumonia	1 ☐	2 ☐	97 ☐	98 ☐
i. Tuberculosis	1 ☐	2 ☐	97 ☐	98 ☐
j. Skin disease, skin infection, skin sores, skin ulcers	1 ☐	2 ☐	97 ☐	98 ☐
k. Lice, scabies, other similar infestations	1 ☐	2 ☐	97 ☐	98 ☐
l. Cancer	1 ☐	2 ☐	97 ☐	98 ☐
m. Problem walking, lost limb, other handicap	1 ☐	2 ☐	97 ☐	98 ☐
n. Gonorrhea, syphilis, herpes, chlamydia, other STDs (NOT AIDS)	1 ☐	2 ☐	97 ☐	98 ☐
o. HIV positive	1 ☐	2 ☐	97 ☐	98 ☐
p. Have AIDS	1 ☐	2 ☐	97 ☐	98 ☐
q. Use drugs intravenously (shoot up)	1 ☐	2 ☐	97 ☐	98 ☐
r. Other - Specify ☐	1 ☐	2 ☐	97 ☐	98 ☐
s. None	90 ☐			

Appendix F

The Quality of Life in Homeless and Hard-to-House Individuals (QoLHHI) Scale

Overall Satisfaction Scale: Short Version 1

“Now I am going to ask you some questions about how satisfied or dissatisfied you feel about different areas of your life right now. This is the response scale we will be using.”

On the whole, how do you feel about your life currently?

1	2	3	4	5	6	7	X
Very dissatisfied	Quite dissatisfied	Slightly dissatisfied	Neither dissatisfied nor satisfied	Slightly satisfied	Quite satisfied	Very satisfied	No answer

The QoLHHI Impact: Living Conditions Module

“You’ve talked about some things that describe your neighbourhood. Now I’d like you to rate the impact that your neighbourhood has on you.” (Refer to scale)

1	2	3	4	5	6	7
Large negative impact	Moderate negative impact	Small negative impact	No impact	Small positive impact	Moderate positive impact	Large positive impact