THE RELATIONSHIP BETWEEN COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) USE AND QUALITY OF LIFE AMONG INDIVIDUALS LIVING WITH CHRONIC PAIN:

RESULTS FROM A NATIONALLY REPRESENTATIVE SAMPLE

by

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Abstract

Background:

Chronic pain is a major public health concern in Canada, with an estimated annual cost of $6 billion in direct health care expenses as well as associated deficits in quality of life, depression, social isolation, disability and reduced income potential. At the same time, Canadians are participating in a broader range of health care services, including an increased use of complementary and alternative medicine (CAM) therapies. Research studies internationally demonstrate that CAM use has a positive effect on health-related quality of life (HRQOL) but comparisons are constrained because of differences in definitions, types of CAM included, as well as research methodologies. Few studies have been found on the relationship between CAM and HRQOL for those living with chronic pain.

Purpose:

The purpose of this quantitative research study was to examine the relationship between the use of CAM and HRQOL for individuals living with chronic pain using results from a Canadian population health data set.

Method:

This study was a secondary data analysis of the nationally representative Canadian Community Health Survey (CCHS) Cycle 3.1 Subsample 1, a cross-sectional population health data set collected by Statistics Canada in 2005 (n=32,133). A representative sample of respondents aged 12 and older with self-reported chronic pain (n=5,164) was examined to describe CAM use and HRQOL for those with chronic pain. Chi-squared tests, t-tests and multiple logistic regression models were analyzed to examine and better understand the relationships between the groups being discussed.

Results:

A weighted estimate of 15.5% of Canadians aged 12 and older lived with chronic pain in 2005. The past 12-month prevalence of CAM use for the total Canadian population was 20.9% whereas for the chronic pain subset of the population, CAM use prevalence was 30.8%. CAM use was associated with lower age, being female, being married / common-law, having a higher education, and having a higher income. High HRQOL was associated with lower age, higher education, higher income and a stronger sense of belonging to the local community. Using a single-item approach for measurement of HRQOL, 89.8% of Canadians rated their HRQOL as “high” compared to 65.6% for the chronic pain subset. Using the Health Utilities Index Mark 3 (HUI3) (a multi-item assessment tool for HRQOL measurement), the mean HUI3 score for Canadians was 0.88 (on a scale of -0.36 to 1.00) compared to 0.64 for the chronic pain subset. CAM use had a statistically significant positive association with high HRQOL, with CAM users having 1.48 times increased odds of reporting a high HRQOL than non-CAM users (CI=1.16-1.88).

Conclusion:

These results highlight the significant characteristics of CAM users and of those with a high HRQOL for Canadians living with chronic pain. Furthermore, they demonstrate that a modest but significant positive association exists between CAM use and a high HRQOL. It is importance to monitor trends in chronic pain prevalence as well as in treatment options, not only in terms of the impact on individuals and society, but also to better understand effective treatment strategies to improve HRQOL. Research studies on effective therapies for chronic pain could provide valuable information for health care practitioners and policy-makers seeking an integrated approach to chronic pain prevention and management.

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1.0 Introduction

According to the World Health Organization (WHO), chronic pain is one of the most underestimated health care problems in the world today, having a significant impact on the quality of life (QOL) of individuals and a major burden on health care systems [1]. Chronic pain is estimated to cost $6 billion annually in direct health care costs in Canada [2] and is associated with depression, social isolation, dysfunctional relationships within the family, absenteeism from work, poor productivity, reduced income potential, disability and increased use of health care services [3,4].

Estimates of the prevalence of chronic pain in Canada range from 14% to 30% of the population [3,5-11] and similar prevalence statistics are documented internationally [12-18]. Furthermore, research suggests that the prevalence of chronic pain is increasing as life expectancy increases [5]. The difference in the estimated prevalence statistics may well be related to different measurement techniques and varying definitions on what exactly constitutes chronic pain. Chronic pain is commonly defined simply as pain that lasts three months or more [3,5,7-10,15-17], though some would argue that chronic pain is a complex biopsychosocial phenomenon with distinct physical, psychological and behavioral patterns [18]. The International Association of Chronic Pain (IASP) has set the international standard definition for chronic pain as “pain without apparent biological value that has persisted beyond the normal tissues healing time (usually taken to be three months)” [19**]**.

Chronic pain, also known as persistent pain or intractable pain, is associated with a host of chronic health conditions. The Canadian Chronic Pain Study of 2004 reported that the most common causes of chronic non-cancer pain (in descending order of prevalence) were: arthritis and other inflammatory conditions (31%), low back or spinal conditions

(21%), injury and postoperative conditions (13%), migraine / headache (11%), neuropathic or neurological problems (11%), and soft tissue pain (8%) [9]. A report using Canadian Community Health Survey (CCHS) data of 2007/2008 found that the most common chronic conditions associated with chronic pain as reported by survey participants aged 12 to 44 (in descending order) were: back problems, migraine headaches, arthritis, mood disorders, anxiety, stomach/intestinal ulcers, bowel disorders (Crohn's disease or colitis) and diabetes [6].

In most North American medical clinics, chronic pain treatments tend to focus on a variety of medications and procedures, often resulting in cycles of poor pain management and serious adverse side effects [20]. In an effort to manage chronic pain more effectively, Canadians are increasingly exploring complementary and alternative medicine (CAM) therapies (21-24], a trend that is also found internationally [25-32]. Research studies have consistently shown that the most common reason for seeking CAM therapy is for the treatment of chronic pain [23,28,33]. In 2008, Canadians spent $7.8 billion on CAM therapies, of which approximately 30% was reimbursed by medical plans [34]. Factors involved in the trend toward using CAM therapies to treat chronic pain include: inadequate pain control with conventional modalities such as pharmaceuticals, reluctance to use daily analgesics, fear of narcotic dependence, strong motivation to get well, increased ethno-cultural diversity and a general societal trend to becoming more actively involved in maintaining health [33,35].

The primary goal in the treatment of chronic pain, regardless of its aetiology, is to improve the patient's QOL by decreasing the level of pain [36]. Research consistently demonstrates that chronic pain has a negative impact on QOL [37-44]. Interest in QOL research has been developing globally in recent years, with an awareness that population health needs to be measured not only with objective data such as morbidity and mortality rates but also with analyses of subjective data regarding the perceived health status of individuals within populations, which also serve as powerful predictors of health outcomes [45-47].

QOL research literature sometimes differentiates between global QOL (GQOL) and health-related QOL (HRQOL) [48] and at times studies use terms such as QOL and HRQOL interchangeably [49,50]. According to one set of researchers, GQOL refers to individuals' perceptions of their position in life in the context of their culture and value systems and in the context of their goals, expectations, standards and concerns [51]. HRQOL refers specifically to the physical, social and mental domains that have a direct influence on individuals' perceptions of health and well-being, most often in the context of a specific disease or disorder [45]. Another way to describe HRQOL is that it is an assessment of QOL within the context of clinical research and clinical medicine [52]. The term HRQOL will be used for this study because: (1) the focus is on a health issue (i.e., chronic pain) as well as on a health care treatment modality (i.e., CAM therapies), and (2) the data to be analyzed is a population health data set (i.e., the CCHS Cycle 3.1 Subsample 1) that includes data from several HRQOL assessment tools.

The causes of chronic pain are diverse and complex and a broad spectrum of treatment strategies need to be available to address the biological, psychological, social and spiritual factors that affect health status. CAM therapies add a valuable set of treatment options to improve the HRQOL for a culturally diverse population with unique and distinct health care needs. Current research on the effectiveness of CAM for chronic pain report a variety of results, with consistent evidence that massage therapy, acupuncture, biofeedback, hypnosis, meditation, yoga, and chiropractic may assist in relieving chronic pain [53].

Currently, most CAM therapies are not covered by provincial health care plans, despite the knowledge that certain therapies have proven effective, with little risk [20,23,36]. The financial cost makes these treatment options less accessible for the **very population cohorts** that experience the highest levels of chronic pain, such as those with low income and the elderly.

This study accesses data from the CCHS Cycle 3.1 Subsample 1 to create a study population of respondents who report that they live with chronic pain and also that have been diagnosed with a chronic health condition. Within this subset, data is analyzed regarding the participants' responses to questions on CAM use as well as questions about their perceived HRQOL, in order to better understand the relationship between CAM use and HRQOL. The results of this research could assist to: (1) serve as a baseline for future monitoring of characteristics related to the health status of Canadians living with chronic pain; (2) provide benchmarks with which more detailed research studies on the topic could be developed; and (3) justify allocation of limited social and health care resources [50]. Furthermore, it builds an evidence base to inform the discussion on the need for a paradigm shift to a more holistic treatment strategy for chronic pain that acknowledges the connection between mind and body in the amelioration of chronic pain. The results of this research could provide evidence to support the development of integrative pain clinics within Canada, following the example of American and European pain clinics that offer CAM therapies.

Research studies within Canada and internationally have explored strategies for managing chronic pain, including the effectiveness of specific CAM therapies for specific health issues. Furthermore, a number of studies have been published that examine the effect of CAM on HRQOL for those living with chronic pain, usually in the context of a specific diagnosis or a set of chronic conditions [38,54-59]. However, comparisons are constrained because of differences in definitions of chronic pain and CAM, the types of CAM included, as well as differences in research methodology [20,28,25]. No studies have been found that analyze a large population health data set to explore the relationship of CAM therapies on the HRQOL of those living with chronic pain.

2.0 Purpose Statement

The purpose of this quantitative research study is to examine the independent effect of CAM use on HRQOL for Canadians 12 years and older living with chronic pain. This research study is a secondary data analysis using master data files of a nationally representative subsample of the CCHS Cycle 3.1. The CCHS is a cross-sectional population health survey conducted using telephone interviews and personal visits completed annually by Statistics Canada [60].

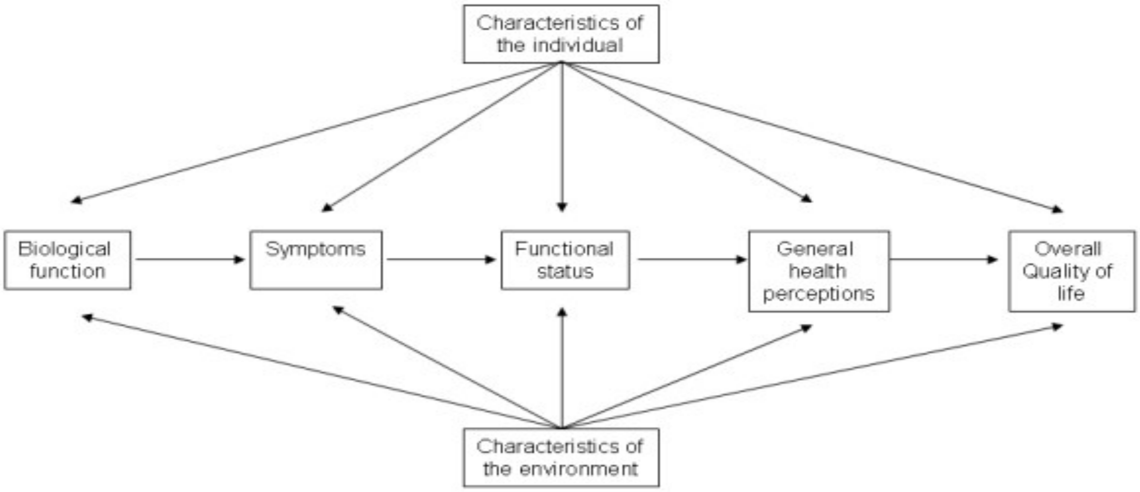
3.0 Theoretical Framework

The theoretical framework for this research study is based on the *Revised Wilson and Cleary Model for HRQOL,* a quality of life conceptual model that facilitates the examination of the complex factors affecting health outcomes for individuals [61,62]. This model attempts to identify relationships among the individual and societal variables affecting individual or population health and to facilitate the development of optimally effective clinical interventions [61,62] (see Figure 1 below). The authors' stated objectives are to integrate two paradigms of health: the *clinical paradigm* (also called the "biomedical" model), with its focus on etiology and pathology as a means to guide treatment and outcomes, and the *social sciences paradigm* (alternatively called the "quality-of-life" model), which focuses more on the impact of social structures and institutions on individual functioning and well-being [61,63]. This conceptual model has been empirically validated in various populations and for numerous health conditions, including studies that include health conditions causing chronic pain [64,65].

The original *Wilson and Cleary Model* (1995) provides a classification system consisting of five types of patient outcome measurements: biological variables, symptom status, functional health, general health perceptions, and overall quality of life [62,66]. These five categories of measurement are arranged horizontally to represent the continuum of increasing biological, social and psychological complexity, moving from the cellular level at the left of the schematic to the individual or person and finally to the individual interacting with society at the far right [62]. These categories range from very specific measurements of cellular and organ functions that are relatively easy to monitor to more complex concepts that are more difficult to measure accurately and consistently, such as satisfaction with life and the value attached to one's functional abilities. The authors note that the schematic is intended to demonstrate visually that there are dominant causal associations among conceptually distinct measures of HRQOL and is not intended to imply that there are not reciprocal relationships between the various categories or that there might not be relationships between non-adjacent levels [61].

The *Revised Wilson and Cleary Model* builds on the original concepts and also develops two new categories: (1) characteristics of the individual and (2) characteristics of the environment, as distinct entities that influence each of the five outcome measurement categories. Characteristics of the individual refer to intra-personal factors, such as demographic, developmental, psychological and biological factors whereas characteristics of the environment encompass all other levels of influence (i.e., inter-personal), including social support, community, institutional, and public policy factors [62].

Figure 1. ***Revised Wilson and Cleary Model of HRQOL*** **[62]**
(Ferrans CE, Zerwic J J, Wilbur JE, Larson JL. (2005). Conceptual model of health-related quality of life. *Journal of Nursing Scholarship, 37*, 336–342. © John Wiley and Sons**.** Used with permission.)



The *Revised Wilson and Cleary Model* is appropriate for this study because it provides a framework that can be used to select variables from the population health data set (i.e., CCHS Cycle 3.1) that are relevant in exploring the relationship between CAM use and HRQOL. The use of a framework also assists in the identification of potential links between variables within the complex construct of QOL [64]. This model is particularly appropriate to the study of chronic pain because it identifies not only how the characteristics of an individual (e.g., psychological variables, personality, values, and preferences) affect the pain experience, it also takes into account the impact of social structures and institutions (e.g., social / family support, socio-economic status, area of residence, community resources) on a person's ability to cope with chronic pain [40]. Furthermore, proponents of the use of this model identify the importance of self-report as an integral component in determining patient outcomes, making it an appropriate model for use in a research project designed to use the subjective data from a population health survey [66]. A more detailed explanation of the concepts of QOL, HRQOL, and perceived heath status is provided in the current research study in Sections 4.2.6 and 4.2.7.

4.0 Review of Literature

In order to analyze these selected data effectively, it is necessary to examine the current state of knowledge on the topics of chronic pain, CAM use and HRQOL, particularly studies that combine several of these areas of focus, and to identify inconsistencies that may exist. This section begins with an exploration of literature regarding CAM use and effectiveness, followed by a discussion of relevant health research studies, formatted within the context of the categories of the *Revised Wilson & Cleary Model of HRQOL*. For each section, the underlying health concepts, as identified by the authors of this model, will be discussed.

4.1 Complementary and Alternative Medicine (CAM)

In an effort to manage chronic pain more effectively, individuals living with chronic pain are increasingly exploring complementary and alternative medicine (CAM) therapies [23,28]. Though several definitions for CAM exist, it is commonly defined as “a group of diverse medical and healthcare systems, therapies, and products that are not currently considered part of conventional medicine” [32,53]. Non-pharmaceutical therapies that come under the umbrella of CAM are listed in Table 1 below.

Table 1. Categories of CAM Therapies

Type of CAM	**Examples** [32,53,67,68]
Biologically Based Medicine	- Herbal remedies (Chinese and Western) - Dietary supplementation (multivitamins and minerals) - Diet-based therapies (Atkins, macrobiotic, etc.) - Aromatherapy
Energy Medicine	- Ayurveda - Pulsed electromagnetic fields - Therapeutic touch - Reiki - Qigong - Cranial electrotherapy stimulation
Mind-Body Medicine	- Meditation - Hypnosis - Yoga - Biofeedback - Guided imagery
Manipulative Body-Based Medicine	- Chiropractic - Massage therapy (Chinese and Western) - Osteopathy - Reflexology
Movement Therapies	- Alexander technique - Feldenkrais - Pilates - Trager psychophysical integration
Traditional Healers	- Spiritista - Native American healer / medicine man - Shaman
Professionalized CAM	- Homeopathy - Acupuncture - Naturopathy

Though psychotherapy and counseling are non-pharmaceutical therapies that have proven effective in the management of chronic pain [58,69,54], these are generally not included in the list of CAM therapies as they are considered mainstream health care. For that reason, they will not be included as CAM in the current research study.

In Canadian reports using National Population Health Survey (NPHS) data, manipulative therapies (chiropractic and massage therapy) are listed as the most common

CAM therapies [22,23]. American authors cite varying trends, some reporting biologically based CAM as the most popular, followed by manipulative therapies [67], another reporting acupuncture as the most often used specifically for chronic pain [20] and others that concur with the Canadian results [28,24]. European, Australian and Mexican reports cite biologically based, manipulative, and mind-body therapies as the most commonly used [31,55,68].

There has been a dramatic growth in the uses of CAM therapies in North America and Europe in the past several decades [22-24,28]. Surveys conducted in Canada, USA and Australia report that the most frequently cited health problem cited by CAM users is chronic pain [20,22-24,28,35,53,67,70]. Research studies of CAM use for chronic pain frequently report on the causes of chronic pain for which individuals have sought treatment. An analysis of Statistics Canada NPHS data reports that the most common diagnoses associated with chronic pain for which people received CAM therapies include: chronic back pain (39%), gastrointestinal disorders (21%), migraine headaches (18%) and arthritis or other musculoskeletal disorders (18%) [23].

A report based using an Ipsos Reid survey of Canadian adults aged 18 years and older requested by the Fraser Institute (Canada) in 2006 states that 74% of the survey respondents tried alternative therapies at least once in their lives, and 54% had done so in the previous 12 months, representing a 4% increase in the past decade [34]. A report based on NPHS data states that, for the cohort of Canadian adults with chronic low back pain, 39% reported CAM use [23]. Other research studies state that CAM use is higher in those with chronic pain compared to those with no pain, those who believe in self-care compared to those who rely on medical doctors, those with self-reported unmet health needs, and those with chronic health conditions and/or with low functional status [22,23,71]. In a number of studies nationally and internationally, CAM utilization is associated with being: female, middle-aged (30 to 59 years), married, as well as having a higher level of income, higher level of education and a more holistic orientation to health than non-CAM users [22,23,24,28,53, 67,72]. In most of these studies, it is articulated that people use CAM in conjunction with, rather than instead of, conventional medical care.

Until recently, many research trials on the use and effectiveness of CAM have used relatively weak research methods, often with small sample sizes and various types of bias. Conducting rigorous clinical trials to in specific types of CAM therapies have been hampered because those selecting these therapies are often unwilling to participate in being randomized and there are also issues of the ethics of appropriate control or sham procedures [73]. Researchers are now publishing studies of higher quality, including systematic reviews and meta-analyses regarding the effectiveness of CAM therapies. A meta-analysis of research trials completed by the American Pain Society/American College of Physicians on low back pain determines that there is evidence that exercise, spinal manipulation (chiropractic), inter-disciplinary rehabilitation, acupuncture, massage, yoga and functional restoration all have positive effects to alleviate chronic pain [54]. Another study reports that patients with chronic back pain who use CAM are more active, more involved in social life, and healthier after participating in CAM [23]. Another meta-analysis completed at the University of Ottawa on the effectiveness and harms of acupuncture, spinal manipulation, mobilization, and massage techniques in management of back, neck, and/or thoracic pain conclude that there are short-term benefits of these CAM therapies but identified the need for more rigorous and robust research methods in primary studies of CAM [74].

4.2 Literature Review using *Revised Wilson & Cleary Model of HRQOL*

4.2.1 Characteristics of the individual. In the *Revised Wilson and Cleary Model of HRQOL,* the authors describe the characteristics of the individual in terms of the demographic, developmental, psychological, and biological factors that influence the health outcomes [62]. These sub-categories include both modifiable and non-modifiable factors, which have an interactive influence on shaping the individual's perception of quality of life [62]. Non-modifiable factors include *demographic factors* such as age, sex and cultural origin and *biological factors*, such as genetically linked characteristics that may lead to disease (e.g., sickle cell anemia). D*evelopmental status* and *psychological variables*, such as cognitive processes that alter perception, motivation, beliefs, and attitude towards illness are modifiable in varying degrees and are valuable in the analyses of effective health care interventions [62,75].

Two significant demographic factors linked to the development of chronic pain are age and gender. National and international reports consistently state that the likelihood of experiencing chronic pain increases with age and that more females report living with chronic pain than men [5-9,12-16]. Several recent Canadian studies involving population health data sets from the CCHS and the NPHS provide a detailed description of the scope of the problem [3,5-9]. A Statistics Canada report in 2008 indicates that, on average, 18% of adult Canadian women suffer from chronic pain compared to 14% of men [5]. However, upon closer examination of the statistics in this report, several trends are evident. In a comparison between survey respondents residing in households and those living in institutions, males of all age groups report less pain than females but the number of men reporting chronic pain increases as age increases. Furthermore, the highest chronic pain levels is reported by residents in institutions, with 34% of males aged 65 and older and 39%

of females in this age group living with chronic pain. This report is consistent with previously published Canadian research reports [3,8,9] as well as with American and other international sources [12-16]. One American study finds that the frail elderly in institutions carry the highest risk of all, with reports that 40% to 68% of nursing home residents live with chronic pain [76]. Interestingly, several studies report that the very elderly who live independently report lower levels of chronic pain than adults between 50 to 65 years of age [16,77].

Individuals of all cultural groups may experience chronic pain; however, there are cultural groups that tend to face specific challenges more than others and this has an impact on health trends. In Canada, it has been reported that aboriginal and First Nations individuals experience a higher prevalence of chronic diseases such as diabetes than Caucasian individuals [78]. Since it is known that chronic pain is associated with chronic disease prevalence, it is likely then that aboriginals and First Nations people may experience higher levels of chronic pain. An analysis of CCHS data in 2010 reports that, though ethnicity was not strongly associated with chronic pain prevalence, Asian Canadians had the highest chronic pain prevalence in the over-65 age group and the First Nations population had the highest prevalence in the under-65 age group [6].

Child development is a *developmental factor* linked to the onset of chronic pain. A British research team conducted a prospective study of the relationship between childhood physical and psychological adversity and chronic widespread pain in adulthood (n=7,571) [79]. These authors assert that childhood trauma is a risk factor for migraines, arthritis/rheumatism, back pain, and pain/discomfort of any origin. In this study, those who reported two or more adverse experiences in childhood and adolescence had a 40% greater risk of developing pain than those who did not report adverse experiences. Level of education is also associated with chronic pain prevalence, with several recent Canadian and American studies reporting that those with high school or less education are twice as likely to report experiencing chronic pain compared to those with a university education [5,6,17,80].

Psychological factors associated with chronic pain identified in the literature include: high levels of stress, higher levels of dependence on others, poor self-assessed health, and poor psychological status [3,81], though it is worth noting that association does not imply causation It is well known that psychological factors can contribute to the intensity of pain or perhaps be the cause of the pain itself and, conversely, that the experience of chronic pain itself is a significant psychological stressor, creating a rather vicious cycle of chronic pain and stress [82]. This cycle can be problematic for the health care practitioner who is assessing a patient with chronic pain and trying to determine whether the source of the problem is somatic or psychological or both and, most importantly, how to prepare the most effective treatment plan.

Modern brain-imaging techniques have provided valuable information regarding the connection between mind and body and demonstrate that there is not just one pain center for pain, but rather there exists a neuronal matrix made up of all areas that are activated by sensory, affective, and cognitive data processing [82]. Studies using fMRI (functional MRI of the brain) have demonstrated that painful negative feelings such as rejection and loss also create neuronal stimulation patterns similar to those created by noxious stimulation [83]. This study demonstrates that high levels of pain could persist even after the body has healed of the traumatic event [83]. A less technology-based research study regarding people's beliefs about pain and the effect of these beliefs concludes that families with beliefs that pain was controllable have less symptom distress, caregiver burden and pain control outcomes than families that believed that pain was not controllable [84].

The fourth factor identified by Ferrans *et al* that influences health outcomes in the realm of the characteristics of the individual is *biological factors,* which in this model include factors such as body mass index, skin color, and family history related to genetically linked disease and disease risk [62]. An example cited by these authors is a health report from the USA that states that more African American women have high rates of obesity and low levels of physical activity than white American women, and that this places them at an increased risk for diabetes and cardiovascular disease.

4.2.2 Characteristics of the environment. Ferrans *et al* describe this category as the social or physical characteristics than have a potential impact on health outcomes [62]. A number of researchers state that, when surveyed, those with chronic pain who have strong social supports, such as a compassionate mate / partner / caregiver, as well as broader supportive social networks that involve trustworthy relationships and mutual reciprocity, are less disabled by their pain than those who experience a lack of social cohesion [3,5-7,12,13,15,16]. A research study using CCHS data from 2003 states that those who acknowledged that they had social supports ‘all of the time’ reported the least chronic pain (13% males, 15% females) and those who stated they had social support ‘none of the time’ demonstrated the highest prevalence (25% males, 39% females) [3]. However, it cannot be assumed that marriage provides the necessary social support. In at least two studies, it was found that, in both sexes and for all ages, chronic pain prevalence was lowest among those who declared themselves single and highest in those who were divorced or separated [3,17]. Increased prevalence of lifelong victimization, emotional neglect and physical or emotional abuse by the family of origin have been reported to be significantly more frequent in chronic pain sufferers than in other patient groups and control groups [85,86].

A risk factor for chronic pain most consistently reported in research literature is socio-economic status (SES), with the trend being that, as SES increases, prevalence of chronic pain decreases. A research study using the CCHS of 2000/2001 states that those living in low household income report more than twice the prevalence of chronic pain (approximately 27% for women and 22% for males) compared to the highest level of household income levels (11% and 14% respectively) [3]. Similar trends are reported by Finnish researchers [18], as well as British [17], American [16] and Australian [15] authors. The Public Health Agency of Canada (PHAC) reports that health status improves at each step up the income and social hierarchy and that the degree of control people have over life circumstances, especially stressful situations, and their discretion to act are the key influences affecting this trend [78].

Chronic pain has also been reported to be more prevalent in certain geographical regions within Canada. One recent Statistics Canada report of CCHS data (2010) states that, for males aged 12 to 44, self-reported chronic pain was more prevalent in rural areas than in urban areas [6]. Another research study of chronic pain in Canada reports that the lowest pain prevalence was in Quebec at 16% and the highest in the Atlantic provinces at 36% [9].

4.2.3 Biological function. Biological function refers to the functioning of cells, organs and organ systems and is the most fundamental determinant of health status, according to Wilson and Cleary (1995). These processes can generally be measured objectively and are utilized in routine clinical practice through lab tests, physical assessment, and medical diagnosis. This domain can be seen to represent a continuum, with ideal biological functioning at one end of the spectrum and severe life-threatening pathological functioning at the opposite end. The focus of medical intervention is often to improve outcomes in this domain [75].

Research in recent years has focused on the biochemical and structural plasticity of the nervous system following tissue and nerve injury [87]. From a physiological perspective, the transition from acute to chronic pain is commonly categorized as either inflammatory (resulting from tissue injury or damage) or neuropathic (damage or disease of nerve fibers) [88]. The mechanisms of chronic pain are still not completely understood but are believed to involve changes in the expression of neuro-receptors (nociceptive plasticity), central spinal hyperexcitability (central sensitization) and alterations in descending control from the midbrain [89]. Long-term biological consequences of increased pain include increases in excitability and regulatory changes, called “hyperalgesic priming” [90]. Clinical investigators examining chronic pain patients have also found that they often have lower-than-normal levels of endorphins in their spinal fluid; however whether this is the cause of, or the result of, the chronic pain experience is not made clear [91].

Though chronic pain itself is difficult to measure using objective measurement tools, chronic pain is associated with a variety of diseases that are objectively diagnosed based on biological functioning. Causes of chronic pain can be divided into categories by tissue of origin, such as myofascial, mechanical or joint, and neuropathic [92]. Some of the more common causes of chronic pain include cancer, migraine or tension headaches, chest pain, pain from diabetes with neuropathy, arthritis, fibromyalgia, neuralgia or neuropathic pain, neck and back disorders, facial pain disorders, functional or organic bowel disorders, and pelvic disorders [92].

4.2.4 Symptoms. In this category of the model, the focus shifts from physiological functioning to the perception a person has of their physical, psychological or psychophysical state [62]. An individual's response to an abnormal sensation is affected by previous somatic experiences and is influenced by their environment. These abnormal symptoms are interpreted and evaluated in the context of the perceived cause, consequences, progression and cure of whatever health issue is causing the symptom. In clinical practice, clinicians see patients who demonstrate alterations in biological function but are asymptomatic as well as patients who complain of symptoms where no biological cause can be found.

The symptom of chronic pain, for example, has been shown to vary greatly from one individual with the same disease process to another, linked with a number of factors. Psychosocial factors including illness behavior and psychological distress have been reported to be particularly important predictors of persistence of pain, making this a significant determinant in chronic pain prevalence [17,69,93]. Canadian Pain Society survey data analysis (2009) shows that almost 30% of chronic pain sufferers report being diagnosed with depression, more than 20% have been diagnosed with an anxiety disorder and almost 12% of chronic pain sufferers report having both diagnoses [94]. This same study compared QOL indicators for people with depression, emphysema, kidney failure and heart disease against people suffering from chronic pain and found that chronic pain sufferers reported the lowest quality of life.

The WHO has reported that between one-half and two-thirds of people with chronic pain are less able or unable to exercise, enjoy normal sleep, perform household chores, attend social activities, drive a car, walk or have sexual relations [17]. The Chronic Pain Association of Canada states that one of the most common reasons that people buy books on suicide and physician-assisted suicide is the fear of living in severe intractable pain [11]. Indeed, it has been reported that the rate of suicide is double for those living with chronic pain when compared to those living with no chronic pain [4].

Individuals with chronic pain who have an internal locus of control orientation report less pain, less depression, and increased use of active coping strategies and compliance with their prescribed treatment protocol than those with an external locus of control [95]. Active coping skills (e.g., deep breathing, biofeedback, yoga) have been associated with reports of less pain, less depression, less functional impairment, and higher general self-efficacy [96]. Passive coping, on the other hand, have been associated with reports of greater depression, greater pain and flare-up activity, greater functional impairment, and lower general self-efficacy. [86].

4.2.5 Functional status. The third level in the *Revised Wilson and Cleary Mode*l refers to the assessment of the person’s ability to perform certain tasks, which is commonly influenced by biological functions and symptoms [61,62]. The functional status variable includes physical functioning, social functioning, emotional functioning and role functioning and has been measured as both a predictor variable and outcome measurement in the population experiencing chronic pain [62]. Several HRQOL assessment tools exist that contain specific questions related to functional status, such as the SF36 and HUI3, both of which are found in cross-sectional and longitudinal population health surveys conducted by Statistics Canada [97]. Functional performance is a complex phenomenon in that it is influenced not only by biological function and symptoms, but also by characteristics of individuals and of their environment, and includes factors such as personal choice, values, motivation and expectations [62].

There is a growing body of literature on chronic pain and its impact on the functional status of the individual, the family, the workplace and on society. Recent Canadian reports provide evidence of the activity limitation resulting from chronic pain. Two measures commonly used to determine functional status are the ability to complete *activities of daily living (ADLs)* as well as *instrumental activities of daily* living (IADLs) [6]. ADLs include personal care tasks such as bathing, dressing, eating and taking medications, whereas IADLs refer to the ability to cook, shop for necessities, perform everyday housework and run errands such as banking. In a report on chronic pain in the 12 to 44 year old age group, Canadians without pain rarely reported needing assistance but, in those reporting pain, 3% of males and 5% of females required assistance with ADLs and 13% of males and 23% of females required assistance with IADLs [6]. 60% of those in this age group reported activity limitations "sometimes" or "often" and the majority stated that chronic pain not only limited but also prevented at least a few activities. In Canadian seniors, the findings are similar and, interestingly, even for those living in institutions where many basic needs are met by others, seniors with chronic pain report greater interference with activity restrictions than their peers residing at home [5].

Chronic pain frequently leads to social alterations in function. Disability resulting from poorly managed chronic pain often leads to retreat from social activity, creating isolation and loneliness as well as functional interference with work and other activities, higher levels of dependence on others, and higher levels of health care utilization [3,81]. Further negative effects of chronic pain can be: loss of work with subsequent loss of medical and disability insurance, significant financial constraints on family activities and living circumstances, and strained and dysfunctional relationships with significant others [95]. According to a study of 600 participants with moderate to severe chronic pain, almost

60% had lost their job, suffered loss of income or had a reduction in responsibilities as a result of their pain [10].

4.2.6 General health perceptions. This component of the model considers an individual's perception of their own overall health, taking into account the physiological processes, symptoms and functional ability identified in the previously discussed aspects of this model but also accounting for other factors that are not explicitly explored, such as mental health and other life factors [62]. Evaluation of general health perception is usually measured with a single global question, allowing persons to summarize the importance of various facets of their uniquely personal health experience, that asks them to rate overall health on a Likert scale, ranging from poor to excellent [62]. Such a measurement tool, called a single-item HRQOL assessment tool, has been found to be a strong predictor for both the use of health care services as well as for mortality, even after controlling for clinical factors [61].

Both the NPHS and the CCHS contain global questions on general health perceptions. A report based on CCHS data on 12-44 year old respondents suggests that those with chronic pain are less likely than their generally pain-free counterparts to: (1) assess their well-being positively, (2) rate their general health as good, very good or excellent, (3) report good, very good or excellent mental health, and (4) report being satisfied with their lives [6]. Similar results are documented in a study of Canadian seniors, which reports that the odds of reporting negatively on their general health increases as reports of levels of pain increase for both institutionalized seniors and those residing in households [5]. These correlations are true for both females and males, with those who rate their health as excellent having the lower prevalence of chronic pain compared to those who rate their health as poor [3].

4.2.7 Overall quality of life. An individual's sense of well-being is a subjective and individualized perception of life, stemming from satisfaction or dissatisfaction with the areas of life that are important to a person [62,75]. The World Health Organization (WHO) defines QOL as "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" [51]. A review of literature on the topic of QOL reveals a lack of clarity and consistency in terminology, with phrases such as "quality of life" (QOL), "health-related quality of life" (HRQOL) and "global quality of life" (GQOL) used interchangeably by various authors. In general, the terms QOL or GQOL refer to the broader multi-dimensional concepts surrounding an individual's perception of his or her overall satisfaction with life and may not necessarily be related to specific disease characteristics [43]. HRQOL refers specifically to the physical, social, and mental domains that have a direct influence on an individual's perception of health and well-being, most often in the context of a specific disease or disorder [43,45]. Health and QOL are inherently interrelated and HRQOL can be seen as an assessment of QOL within the context of clinical research and clinical medicine [52].

For the purposes of this study, the term HRQOL will be consistently used, since the focus of the study meets the criteria for HRQOL as described above. The source of the data for the current study is the CCHS Cycle 3.1, which in this specific year (2005) included two internationally recognized HRQOL assessment tools, the Health Utilities Index Mark 3 (HUI3) and the Short-Form Health Survey (SF-36), both of which are known as 'multi-item HRQOL assessment tools', as well as a general global question regarding one's perception of overall health status, known as a 'single-item HRQOL assessment tool' [98].

The HUI3 is a generic, preference-based HRQOL assessment tool, developed by McMaster University's Centre for Health Economics and Policy Analysis, that is commonly applied to patients with chronic pain [99]. The HUI3 has been widely used in clinical studies worldwide, in population health surveys, in the estimation of quality-adjusted life years, and in economic evaluations [99,100]. The HUI3 is comprised of eight health dimensions: vision, hearing, speech, ambulation/mobility, pain, dexterity, self-care, emotion and cognition, with each dimension consisting of three to six levels [99]. HUI scores can be calculated on each dimension or as a summary health value, with a range from -0.36 (reflecting a health status considered worse than death) to 0.00 (indicating a HRQOL similar to death) to 1.00 (indicating perfect health) [100]. A generic HRQOL measure such as the HUI3 can strengthen a research study by providing outcomes data on the beneficial and adverse effects of a health care treatment from the study subjects' perspectives [52].

The assessment tool most widely used throughout the world to measure generic HRQOL is the Short-Form Health Survey (SF-36), a patient-reported survey developed by an independent, nonprofit research institution in the United States called RAND, which conducts research on a broad range of topics [101]. This health assessment tool has been validated and tested for reliability and validity in research studies internationally [58] and in fact is the most commonly used generic HRQOL instrument used in the world [52]. This survey consists of eight scales, which measure: physical functioning, physical role (refers to limitations in daily activities), bodily pain, general health, vitality, social functioning, emotional role (refers to limitations in daily activities) and mental health [101]. Two global scores, physical health (PCS) and mental health (MCS) can be calculated, with higher scores indicating better HRQOL. Responses are coded, summed and converted into a scale that is similar to the HUI3, with ratings from zero (maximum disability) to 100 (equivalent to no disability). The SF-36 has been criticized as being a poor assessment tool for measuring the effect of pain on HRQOL because of its poor responsiveness to both improvement and deterioration in pain when compared to the HUI3 as well as other assessment tools [52].

The majority of research on chronic pain and HRQOL has found evidence of the negative impact of chronic pain on HRQOL using a variety of measurement tools that have been tested for reliability and validity [8,36,37,40-44,52,58,63-73,75,84,102-3]. A recent Statistics Canada report using longitudinal population health data sets reports that, for Canadian seniors, the odds of reporting negatively on their general health or of feeling "unhappy" increased significantly as their pain levels increased, with the odds 6.9 times higher of reporting negatively on their general health when pain intensity was described as increasing to a severe level [5]. A similar report on Canadians aged 12 to 44 found that the relationship between chronic pain and measures of well-being remained even when the researchers took into account socio-demographic characteristics and specific painful chronic conditions [6]. As previously discussed, comparisons within the various research studies are complicated by the conceptual ambiguity around the usage of terms such as QOL, GQOL and HRQOL. However, regardless of the term used, chronic pain is most often a profoundly unpleasant experience and it is not surprising then that it would have a negative impact on QOL.

In the document *What makes Canadians Healthy or Unhealthy* by the Public Health Agency of Canada (PHAC), the author asserts that health status improves at each step up the income and social hierarchy and that the degree of control people have over life circumstances, especially stressful situations, and their discretion to act are the key influences affecting this trend [78]. The PHAC website also states that evidence indicates that key determinants of health are: income and social status; social support networks; education; employment / working conditions; social environments; physical environments; personal health practices and coping skills; healthy child development; biology and genetic endowment; health services; gender; and culture [78]

One notable exception in the review of the literature on HRQOL and chronic pain is a Norwegian study (n=1,893) that found no significant relationship between chronic pain and GQOL [48] and hypothesized that there was a complex relationship between GQOL and chronic pain, concluding that chronic pain may be more closely linked with perception of health and stress rather than with QOL [48].

4.3 Gaps in Literature

Though there are numerous research studies about the prevalence, etiology and treatments for chronic pain as well as on the changing trends in CAM usage, there is little research examining the potential relationship between CAM use and HRQOL for individuals with chronic pain. Comparisons of the few research studies that do examine these issues are constrained because of differences in the types of CAM therapies included for their analyses as well as in their definitions of both chronic pain and quality of life [37,38,39,48,55,56]. Three relatively small studies that address all three components (chronic pain, HRQOL and CAM) include one from Sweden, where researchers assert that women with breast cancer receiving care at a hospital offering CAM therapies reported a higher QOL than those receiving conventional care (n=60) [38], one from the United States, where researchers concluded that certain CAM therapies both reduced pain and improved QOL (n=200) [37] and one from Mexico, which examined the role of CAM in improving QOL for patients with chronic rheumatic diseases (n=445), and concluded that

CAM use was not associated with a better QOL [55]. None of these studies involve large population health data sets or have comparable lists for CAM therapies.

Given that chronic pain is a subjective experience known to have a negative impact on quality of life and that researchers claim that CAM is used most by those experiencing chronic pain, an analysis of this Canadian survey-based population health data could assist policy planners as well as health care providers in understanding these complex issues from the perspective of those who are living with chronic pain. A gap in literature on this topic, particularly in the Canadian context, is evident. An understanding of the experiences of those living with chronic pain regarding their perception of factors that enhance quality of life may help to identify opportunities in Canada for the development of a broad spectrum of health care interventions for both prevention and management of chronic pain available to all who need it.

5.0 Research Objectives / Questions / Hypotheses

The overall goal of this research project is to examine the relationship between the use of CAM and HRQOL for people living with chronic pain. The *Wilson and Cleary Model of HRQOL* categories will be used to assist in the identification and analysis of important variables affecting CAM use and HRQOL (see Table 2 below) for the study population. The strength of the relationship between CAM use and HRQOL for those living with chronic pain will be explored using a sequence of regression models.

The specific objectives and their corresponding research questions and hypotheses are as follows:

Objective #1: To compare the socio-demographic and health-related characteristics of Canadians with chronic pain, between: (1) those who use CAM and those who do not use CAM (independent variable), and (2) those reporting a high HRQOL with

those reporting a low HRQOL (dependent variable).

Question #1: *Are there differences in the socio-demographic and health-related characteristics of Canadians with chronic pain, including differences between: (1) those who use CAM and those who do not use CAM, and (2) those reporting a high HRQOL with those reporting a low HRQOL?*

It is hypothesized that there will be differences in the socio-demographic and health related characteristics for individuals with chronic pain for both those who use CAM compared to those who do not use CAM and for those who report a high HRQOL compared to those who report a low HRQOL.

Objective #2: To determine the socio-demographic and health-related characteristics that are associated with: (1) CAM use, and (2) HRQOL among Canadians with chronic pain.

Question #2: Which socio-demographic and/or health-related characteristics have a statistically significant association (i.e., an odds ratio significantly higher or significantly lower than 1.0) for CAM use (yes/no) and for HRQOL (high/low) for individuals with chronic pain?

It is hypothesized that the results of this study will be consistent with published literature using Statistics Canada population health data, which report that CAM use is positively associated with younger age, being female, being married, being Caucasian, having a higher level of education, having a higher income, and having a chronic condition compared to non-CAM use [22,23,24]. It is also hypothesized that high HRQOL is positively associated with younger age, having a higher level of education, higher income and stronger sense of belonging to the local community [78] as well as lower pain intensity and less restriction of activities due to pain [5-7[.

Objective #3: To determine if CAM use has a statistically significant independent effect on HRQOL for Canadians with chronic pain, controlling for the socio-demographic and health-related variables found to be statistically significant.

<u>Question #3</u>: *Does* ***CAM use have a statistically significant independent effect on HRQOL for Canadians with chronic pain, controlling for the socio-demographic and health-related variables found to be statistically significant?***

It is <u>hypothesized</u> that **CAM use has a statistically significant independent effect on HRQOL for Canadians with chronic pain, controlling for the socio-demographic and health-related variables found to be statistically significant**

Table 2. Classification of the study variables using *Revised Wilson & Cleary Model* Categories

CATEGORIES sdv = socio-demographic predictor variable hrv = health-related predictor variable dv=dependent variable	**VARIABLES AVAILABLE IN CCHS 3.1**
Characteristic of individual (sdv)	Age, Sex, Marital status, Education, Ethnicity
Characteristic of environment (sdv)	Province of residence, Urban or rural residence area, Household income, Sense of belonging to local community
Biological Function (hrv)	Diagnosis for chronic condition(s)
Symptoms (hrv)	Pain intensity
Functional Status (hrv)	Restriction of activities due to pain
General Health perception (dv)	General perception of health

A summary of the analytic strategy for understanding the relationship of CAM use on the HRQOL of individuals living with chronic pain is presented below in Figure 2.

Figure 2. Analytic plan for examining relationship of CAM use with HRQOL

<table>
<tr><th colspan="3">Phase One: Descriptive statistics (Research Objective 1 and Hypothesis 1)</th></tr>
<tr><td><i>Descriptive Statistics</i></td><td colspan="2">Calculate prevalence and SE of socio-demographic and health-related variables (predictor variables) for:
(A) chronic pain subset,
(B) CAM use versus non-CAM use (IV),
<i>(C)</i> High HRQOL versus low HRQOL (DV)</td></tr>
<tr><td colspan="3">Phase Two: Logistic regression analyses to examine CAM use and HRQOL levels (Research Objective 2 and Hypothesis 2)</td></tr>
<tr><td><i>(a) Adjusted Models</i></td><td><i>Independent Variables</i></td><td><i>Dependent Variables</i></td></tr>
<tr><td>Regression Model One:</td><td>Socio-Demographic:
Age, marital status, sex, education, ethnicity, province of residence, urban/rural residence, income, sense of belonging
Health-Related:
Diagnoses, pain intensity, restriction of activities</td><td>CAM Use (Yes or No)</td></tr>
<tr><td>Regression Model Two:</td><td>Socio-Demographic:
Age, marital status, sex, education, ethnicity, province of residence, urban/rural residence, income, sense of belonging
Health-Related:
Diagnoses, pain intensity, restriction of activities</td><td>HRQOL (High or Low)</td></tr>
<tr><td colspan="3"><i>(b) Calculate likelihood ratios for the full models and partial models to identify the most concise models</i></td></tr>
<tr><td colspan="3">Phase Three: Logistic regression analyses to examine relationship of CAM use to HRQOL levels (Research Objective 3 and hypothesis 3)</td></tr>
<tr><td><i>(a) Adjusted Models</i></td><td><i>Independent Variables</i></td><td><i>Dependent Variable</i></td></tr>
<tr><td></td><td>All significant IVs from Phase 2 plus CAM Use</td><td>HRQOL
(High or Low)</td></tr>
<tr><td colspan="3"><i>(b) Calculate likelihood ratios to determine whether there is a significant relationship between CAM use and HRQOL</i></td></tr>
</table>

6.0 Methods

6.1 Data Source

The data set for this study was the master data files of a nationally representative subsample of the Canadian Community Health Survey (CCHS) Cycle 3.1 (2005), a cross-sectional health survey that was created as a joint initiative of the Canadian Institute for Health Information (CIHI), Statistics Canada and Health Canada [104]. The CCHS Cycle 3.1 collected responses from persons aged 12 or older, living in private occupied dwellings in 122 health regions covering all provinces and territories. The contents of Subsample 1 consisted of an additional set of questions within Cycle 3.1 that was asked only of a subset of respondents when the Cycle 3.1 survey was completed, with the stated goal to permit calculation of provincial and national estimates while minimizing response burden [104]. Cycle 3.1 Subsample 1 (2005) was selected for this research study because it contained an internationally validated and reliable HRQOL assessment tool called the HUI3 and also because it was the most recent year in which the CCHS asked a series of questions about specific types of CAM therapists.

The CCHS survey collects data annually on the health status, health care resource utilization and health determinants for a representative sample of the Canadian population aged 12 and older [23]. The CCHS study design uses a multi-stage stratified cluster design to sample dwellings across Canada, using the area frame designed for the Canadian Labour Force Survey as its primary frame as well as a list frame from household telephone lists and a random digit dialing list frame [59]. Data are collected in a systematic, standardized computer-assisted method that programs the flow of questions as well as the type of answers required using computer assisted in-person (CAPI) and telephone (CATI) interviews [105].

The target population of the CCHS is randomly selected from the sampled households. The target population covers household residents in the provinces and territories but excludes members of the Canadian Forces, residents of institutions, those living on Indian reserves and other aboriginal settlements, and residents of some remote areas [36].

Data collection for Cycle 3.1 began in January 2005 and continued over 12 months, with a sample size of 131,959 [59]. The sample size for Subsample 1 was 32,133. The response rate for Cycle 3.1 was 78.9% and represented a total Canadian population of 27,131,965 [106]. Data for the current research study were accessed at the Statistics Canada Research Data Centres at the University of Manitoba and at the University of Victoria, BC.

6.2 Methodological Considerations

Access to the master data files (as opposed to the public use files) allows the investigator to have uncensored access to the complete set of variables, providing the opportunity for a more robust analysis of data. The CCHS master data files contain a “weight” variable, which may be used to produce weighted population estimates. In order to account for the complex survey design described above, the application of survey weights is necessary to obtain meaningful estimates from the sample and to ensure that the results represent the entire population, not only the study sample selected [107]. Applying statistical weights refers to the process of adjusting response rates from survey respondents to represent the population from which the sample has been drawn. Statistics Canada uses a “bootstrap” re-sampling method to determine variance estimates, a multi-stage process that involves a repeated process of selecting random samples, then calculating and post-stratifying weights for each sample group [107]. A variance estimating technique called bootstrapping is endorsed by Statistics Canada to take into account the CCHS sampling design features and weight adjustments. It also prevents generating inaccurate results such as: incorrect inferences, underestimation of standard errors of estimators, inflated Type 1 error rates and erroneous model diagnostics [107]. The CCHS Subsample 1 has its own set of bootstrap weights that must be used to make accurate weighted estimates.

6.3 Strengths of the CCHS Cycle 3.1 for the Current Research

There were specific strengths of the CCHS Cycle 3.1 Subsample 1 that made it an appropriate data set to study CAM use and HRQOL for Canadians living with chronic pain. One of the main strengths was that it provided data from a large representative sample of Canadians (n=32,133), allowing the data analyst to draw conclusions about the population of interest. The CCHS contains reliable, comprehensive data on the health and well-being of Canadians that has been collected independently of health care providers [23,108]. This is particularly relevant for this study because it has been reported that CAM users frequently do not disclose their CAM therapy use to their medical doctors [109]. Cycle 3.1 specifically was chosen because it was the most recent Statistics Canada survey that had both a validated and reliable HRQOL assessment tool (HUI3) as well the inclusion of important variables that were specifically relevant to the study of CAM, such as the detailed list of CAM therapists.

6.4 Limitations of the CCHS Cycle 3.1 for the Current Research

There were several limitations of using CCHS data for the current research study. One of the limitations was that it is a survey of Canadians aged 12 and older living in private dwellings and therefore those living in institutions at the time of t he study were excluded. Also, the CCHS specifically excludes full-time members of the Canadian Forces, those living on Indian reserves and on Crown lands, and residents of certain remote areas [59]. As a result, the prevalence of chronic pain may be under-represented, as there is evidence of a higher prevalence of chronic pain in some of these population groups [5-7,56,83].

Another limitation was that this research study analyzed previously determined survey questions as well as previously collected data, which eliminated the possibility of tailoring the survey format to more precisely address the research objectives. This lack of flexibility is of particular significance when one examines the question regarding chronic pain. The question in the CCHS questionnaire is rather non-specific in that it simply asks respondents whether they are "usually free of pain or discomfort" and no specific time period for living with chronic pain is solicited. Respondents also were not asked specific information about the frequency, duration or site of their pain nor whether the pain is cancer or non-cancer pain [6,22]. Data collection was also limited to the types of CAM therapies listed in the CCHS questionnaire, when the actual selection of CAM therapies available to Canadians is much more comprehensive. The CCHS does not collect data linking specific health conditions with specific CAM therapies or data that links specific pain medication with the severity of chronic pain or type of disease so no analysis can be done in these areas.

Other limitations included that there may have been a "recall bias" in that the data was collected using respondents' self-reported answers to the survey questions. Furthermore, telephone interview surveys (which comprise 58.5% of the data collection interviews) [104] have a fundamental bias in that the oldest, the sickest, those living in institutions, and those in the lower socio-economic status are often not able to be interviewed because of lack of access to a telephone [9].

6.5 Study Population

The study population for the current research study included all survey participants aged 12 and older who reported chronic pain, based on their responses to three questions from the CCHS Cycle.3.1 Subsample 1. The first criterion was to select those cases where individuals responded negatively to the question: “Are you usually free of pain or discomfort?” The second criterion was then applied, which was to select all positive responses to the question of being diagnosed by a health professional with a long-term chronic condition that had lasted, or was expected to last, at least six months. The inclusion of this second question as a criterion was meant to substantiate the respondents’ answer to the rather vague question regarding pain and discomfort. Less than 2% of cases were removed based on a negative response to this question. Thirdly, survey respondents who responded by proxy (i.e., on behalf of another person) were excluded from the study because quality of life is a subjective phenomenon that may or may not be answered accurately by one person representing another. Less than 1% of cases were removed due to “by proxy” responses.

Numerous Canadian reports have been published that do rely on the CCHS question regarding the respondent being “usually free of pain and discomfort” as being indicative of the respondent living with chronic pain [3,5-7,22,23]. The current research study builds on recent research literature using CCHS and / or NPHS data to provide new information on chronic pain in relation to patterns of use of alternative health care practitioners as well as HRQOL [3,5-9,22,23,39].

6.6 Study Measures

The selection and organization of variables for this study is informed by the *Revised Wilson and Cleary Model* and is limited to the questions asked in the CCHS. The primary areas of focus are HRQOL (as the dependent variable) and CAM use (as the independent variable) and the factors (predictor variables) that influence both HRQOL and CAM use for individuals with chronic pain. A summary of the variables to be examined in this research project can be found in Table 3 below.

In this analysis, the levels of measurement of the CCHS were maintained whenever possible. For variables with more than two predetermined categories, the categories were retained unless the expected frequencies were deemed to be too small, in which case the categories were collapsed, which is considered to be an appropriate statistical method for low expected frequencies [111]. These re-named categories were identified and rationale provided in the definitions provided below. Guidelines for minimum cell counts (i.e., greater than n=5) for the CCHS as determined by Statistics Canada were strictly followed Data were assessed for missing values by running frequencies on all variables and cases with missing data were omitted from the analyses (list-wise deletion).

CAM Use

CAM use was measured by evaluating three CCHS questions. Respondents were first selected based on their response to the question as to whether they had, in the past 12 months, seen or talked to an alternative health care provider such as an acupuncturist, homeopath or massage therapist about their physical, mental or emotional health. Those who answered in the affirmative were then asked whom they had consulted from a list of 12 categories, including: massage therapist, acupuncturist, homeopath or naturopath, Feldenkrais or Alexander technique, relaxation therapist, biofeedback teacher, Rolfer, herbalist, reflexologist, spiritual healer, religious healer, or “other – specify”. All “Yes” responses were categorized as CAM users. A third question that was included in this variable was the respondents’ reports of the number of consultations with a chiropractor in the past 12 months. All responses with a number higher than zero were categorized as CAM users. Respondents who answered yes to either or both of the questions regarding having seen or talked to an alternative health care provider or visited a chiropractor were categorized as (1) CAM user. Respondents who stated no to all listed CAM therapists as well as "zero" visits to a chiropractor were categorized as non-CAM users.

Age

Age was measured in the CCHS in several different ways; first, it was collected as age based on yearly units, then several derived variables were also calculated and made available for analysis. In order to have these study results be comparable with other published reports on chronic pain using CCHS data and also because of low cell counts, the categories were collapsed into the following categories: (1) less than 18 years old, (2) 18 to 24, (3) 25 to 44, (4) 45 to 64, and (5) 65 or older.

Sex

Sex was measured as a dichotomous variable, with male as (1) and female as (2).

Marital status

Marital status was measured using the CCHS categories, listed as: (1) married, (2) common-law, (3) widowed, (4) separated, (5) divorced, and (6) single.

Education

Level of education completed was taken from a CCHS derived measure, with the following categories developed based on the highest level of education the respondents had completed. The categories are: (1) less than secondary school graduation, (2) secondary graduation, (3) some postsecondary, and (4) post-secondary graduation.

Ethnicity

Respondents were asked to select from a list of 13 ethnic / racial categories after hearing the statement "People living in Canada come from many different cultural and racial backgrounds. Are you..." CCHS created several derived variables from this data. Due to small cell counts, the CCHS derived variable that was selected consisted of only two categories: (1) White and (2) Visible Minority.

Province / Territory of Residence

Residence was categorized in the CCHS as (10) Newfoundland and Labrador, (11) Prince Edward Island, (12) Nova Scotia, (13) New Brunswick, (24) Quebec, (35) Ontario, (46) Manitoba, (47) Saskatchewan, (48) Alberta, (59) British Columbia, and (60) Yukon / Northwest/Nunavut Territories. The last category was collapsed due to small cell counts.

Household income

Household income was taken from a CCHS derived measure for annual household income that divided respondents' incomes into categories based on increments of approximately $10,000 These categories will be further collapsed because of small cell counts into five categories of income groups: (1) $0 to $14,999, (2) $15,000 to $29,999, (3) $30,000 to $49,999, (4) $50,000 to $79,999, and (5) $80,000 and higher, which is consistent with other published Statistics Canada reports [5,6].

Sense of belonging to the community

This variable was measured using the CCHS question asking respondents to describe their sense of belonging to the community by selecting one of four options: (1) very strong, (2) somewhat strong, (3) somewhat weak, and (4) very weak.

Diagnosis of chronic condition

For this variable, respondents were first asked whether they had a long-term chronic condition(s) that they expected would last or already had lasted six months or more and that had been diagnosed by a health professional. If the respondent answered "yes" to that question, the interviewer read a list of 31 chronic diseases, soliciting a yes or no response for each one. This list included: allergies, asthma, arthritis, fibromyalgia, back problems (excluding fibromyalgia and arthritis), high blood pressure, migraine, chronic bronchitis, emphysema, chronic obstructive pulmonary disease (COPD), diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, effects of stroke, urinary incontinence, bowel disorder, Alzheimer’s disease or other dementia, cataracts, glaucoma, thyroid condition, chronic fatigue syndrome, chemical sensitivities, schizophrenia, mood disorder, anxiety disorder, developmental disorder, learning disability, eating disorder, or other long-term physical or mental health condition.

Only those chronic conditions that were statistically significant for chronic pain using chi-squared tests ($p<0.05$) were selected. This list included: allergies, asthma, arthritis, fibromyalgia, back problems (excluding fibromyalgia and arthritis), high blood pressure, migraine, chronic bronchitis, emphysema, COPD, diabetes, heart disease, cancer, stomach or intestinal ulcers, effects of stroke, urinary incontinence, bowel disorder, thyroid condition, chronic fatigue syndrome, chemical sensitivities, mood disorder, anxiety disorder, or other long-term physical or mental health condition.

Pain Intensity

Pain intensity was measured by asking respondents who stated they were not usually free of pain or discomfort to describe the usual intensity of their pain or discomfort, using the following CCHS categories: (1) Mild, (2) Moderate, and (3) Severe.

Restriction of Activities

Restriction of activities was measured by asking respondents who stated they were not usually free of pain or discomfort to describe to what extent their pain or discomfort restricted their activities. The available responses were: (1) pain does not prevent activity, (2) pain prevents a few activities, (3) pain prevents some activities, and (4) pain prevents most activities.

HRQOL (dependent variable)

HRQOL was measured using two different variables. The first involved the single-item question regarding the respondents' perception of their overall health, including mental and physical health. The CCHS provided a 5-point Likert scale ranging from: (1) Excellent, (2) Very good, (3) Good, (4) Fair, and (5) Poor. In order to ensure these study results could be compared to other similar reports, these categories were collapsed into a dichotomous variable, with (1) High HRQOL including all "excellent", "very good", and "good" responses, and (2) Low HRQOL including all "fair" and "poor" responses.

As a supplementary analysis, HRQOL was also measured using the Health Utilities Index 3 (HUI3). The CCHS provides a Total HUI3 score for each respondent. HUI scores are calculated as a summary health value, with a range from -0.36 (reflecting a health status considered worse than death) to 0.00 (indicating a HRQOL similar to death) to 1.00 (indicating perfect health) [100]. Mean HUI3 scores were used in order to compare the single-item measurement tool with the multi-item measurement tool.

Table 3. Table of Independent Variables by Wilson & Cleary Categories

Categories in W & C Model	CCHS Survey Variables	CCHS Code (page)	Recoded?[1]	Derived Variable?	Measure
Socio-demographic Variables:					
Characteristics of individual					
	Age	DHHE_AGE (p1)	yes	✓	categorical
	Sex	DHHE_SEX (p8)	no	-	binomial
	Marital status	DHHE_MS (p8)	no	-	categorical
	Education	EDU_Q01-Q06 (p275-6)	no	✓	categorical
	Ethnicity	SDC_Q7 (p272)	no	✓	binomial
Characteristics of environment					
	Province	ADM_Q03B (p293)	yes	-	categorical
	Urban/Rural	ADM_Q04	no	-	categorical
	Total income	INC_Q3 (p281)	yes	✓	categorical
	Sense of belonging	GEN_Q10	no	-	categorical
Health-related Variables:					
Biological Function					
	Diagnosis	CCC _Q011-901	no	-	categorical
Symptoms					
	Pain Intensity	HUI_Q29 (p206)	no	-	categorical
Functional Status					
	Restriction of activities	HUI_Q230 (p206)	no	-	categorical

Table 4. CAM Therapist Categories (CCHS)

CAM Therapist Categories	CCHS Code (page)	Recoded?	Derived Variable?	Measure
Biologically Based Medicine				
Herbalist	HCU_Q04/5 (43)	no	-	binomial
Mind-Body Medicine				
Biofeedback	“	no	-	binomial
Manipulative Body-Based Medicine				
Chiropractor	HCU_Q02E (40)	no	-	binomial
Massage Therapist	HCU_Q04/5 (43)	no	-	binomial
Rolfer	“	no	-	binomial
Reflexologist	“	no	-	binomial
Movement Therapies				
Feldenkrais	“	no	-	binomial
Traditional Healers				
Spiritual Healer	“	no	-	binomial
Religious Healer	“	no	-	binomial
Professionalized CAM				
Acupuncture	“	no	-	binomial
Homeopath or Naturopath	“	no	-	binomial

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[1] Recoding by principal investigator in order to be consistent with similar recent research literature using CCHS data and to make sure cell counts were adequate [23,39]

6.7 Analytic Plan

The statistical analysis was conducted in several steps. First, prevalence rates and standard errors (SE) were calculated, with results available as both weighted and un-weighted frequencies. To ensure the protection of personal health information, only weighted estimates were reported in the current research study. Second, cross-tabulations were statistically tested using chi-squared tests. Third, multiple logistic regression analyses were conducted to address research objectives #2 and #3 (see Figure 2 on Page 38 above). Logistic regression models were selected because the dependent variables in the current research study were dichotomous.

Two statistical software packages were used for data analysis: SPSS software version 20.0 (SPSS, Chicago, IL) for the organization of data variables and WesVar 4.3 (WeStat, Rockville, MD) for the prevalence estimates, bootstrap weights and regressions. Data analysis for each specific phase was consistently organized to match each research question and is outlined below.

Phase One Procedure (Research Objective #1):

In Phase One, descriptive statistics were calculated to describe the socio-demographic and health-related characteristics of Canadians living with chronic pain. The prevalence rates and standard errors (SE) were calculated for each characteristic of each variable of interest, and chi-squared tests were calculated to determine the statistical significance for each cross-tabulation. Proportions were determined for each nominal-level variable. Assumptions of chi-squared tests are that: (1) The sample must be randomly selected from the population, and (2) the sample size “n”, must be large enough so that the expected count in each cell is greater than or equal to 5 [112]. T-tests were used for continuous measures such as the HUI3 scores. Assumptions of t-tests include: (1) The data must be sampled from a normally distributed population, (2) each score (or difference score for the paired t-test) must be independent of all others [113]. All interval-level data that were not normally distributed were transformed to meet assumptions before applying statistical tests.

Phase Two Procedure (Research Objective #2):

Phase Two of the current study used multiple logistic regression to test the relationships between the socio-demographic and health-related variables for Canadians living with chronic pain. This phase was divided into two parts: (1) Phase 2A explored the relationships between the socio-demographic and health-related variables as predictor variables and CAM use (yes/no) as the dependent variable, and (2) Phase 2B explored the relationships between the socio-demographic and health-related variables and HRQOL (high/low) as the dependent variable. Logistic regression models were selected because both CAM use and HRQOL were dichotomous variables. Regression models are used in research in which there is a variety of possible explanations for the variation or when there are relationships in which one variable influences another one, or when both of these situations are combined [112]. The independent variables for this analysis included: age, sex, marital status, education, ethnicity, province of residence, rural/urban area of residence, household income, sense of belonging to the local community, diagnosis, pain intensity, and restriction of activities due to pain.

The goal of logistic regression is to estimate the regression coefficients, β_A and β_1, given a sample of (X,Y) pairs. Stated in a different way, the goal is to find the best fitting model that will describe the relationship between the predictor variables in the model and the outcome variable, which must be binary (e.g., yes/no). The logistic regression model may be written in terms of p, which is the possibility or probability of the presence of the characteristic of interest, as follows [113]:

$$p = \frac{e^{\beta A+\beta 1X1+\beta 2X2+\ldots\ldots.+\beta kXk}}{1+e^{\beta A+\beta 1X1+\beta 2X2+\ldots\ldots.+\beta kXk}}$$

where:
Y is binary and represents the event of interest (response), coded as 0/1 for failure/success,
X is the independent variable,
A is the Y-intercept,
β_1 is the slope, and
e is the exponent function.

All assumptions of logistic regression were verified before proceeding with the analysis. Assumptions of logistic regression include: (1) independence of errors (i.e., no duplicate responses), (2) linearity of the continuous IVs and their logit-transformed outcomes, (3) multi-collinearity (i.e., redundancy among the IVs), and (4) lack of strongly influential outliers [114]. Examination of residuals scatterplots for patterns, trends or clumping may indicate a failure of independence [113]. Linearity can be verified by creating a statistical term representing the interaction between each continuous IV and its natural logarithm [114]. IVs were correlated with each other and checked for multicollinearity by running a correlation matrix on all of the IVs [115]. Tolerance levels and variance inflation factors of all IVs were calculated to further determine multicollinearity when all variables were examined together. A tolerance value less than 0.10 and a variance inflation factor greater than 0.10 was used to identify multicollinearity for possible elimination of variables [111,113]. Outliers can be identified with scatterplots or by creating histograms to assess frequency distributions [115]. No duplicate responses or outliers were found in the current research study and no problems with multi-collinearity existed so there were no variables needing to be removed.

Initially, all IVs were entered simultaneously into a logistic regression model to determine which IVs were significantly related to CAM use, after adjusting for the effects of the other IVs. Adjusted odds ratios (AORs) and 95% confidence intervals (95% CIs) were calculated. Odds ratios provide a measure of the likelihood that an outcome will occur given a particular activity, compared to the odds of the outcome occurring in the absence of that activity [116]. Partial models were created by removing IVs that were not significantly related to the DV. These partial models were compared to the full model using likelihood ratio Cox-Snell ^{pseudo}-R^2 values and F-values to determine which model had the "best fit" i.e., whether there existed a partial model that represented a statistical improvement over the full model in describing the relationship between the predictor variables and the outcome [112,113].

Phase Three Procedure (Research Objective #3):

Phase Three of this analysis used multiple logistic regression to examine the relationship between CAM use (yes/no) and HRQOL (high/low) for Canadians living with chronic pain, controlling for the effects of significant predictor variables. This procedure involved taking the results of Phase 2B, where the most informative and concise model to describe the relationships between the statistically significant socio-demographic and health-related variables (as IVs) and HRQOL (high/low) (as DV) had been determined. In Phase 3, CAM use was added to the list of statistically significant predictor variables from the partial model of Phase 2B and all of these variables were entered simultaneously into a multiple logistic regression model. Adjusted odds ratios (AORs) and 95% confidence intervals (95% CIs) were calculated. This new model was then compared to the partial model determined from Phase 2B by using likelihood ratio Cox-Snell pseudo-R^2 values and F-values to better understand the relationships between CAM use and HRQOL. In this way, it was possible to control for these other predictor variables and evaluate the independent relationship between CAM use and HRQOL.

7.0 Ethics

Approval to access the CCHS survey data has been obtained from Statistics Canada via the Manitoba Research Data Centre and ethical approval was obtained through the University of Manitoba Research Ethics Board (see Appendix A).

8.0 Results

8.1 Phase One Results: Descriptive Statistics

The total number of survey respondents for the CCHS Cycle 3.1 Subsample 1 was 32,133, which represented the population of Canadians 12 years and older in 2005. A total of 5,164 (15.5%, SE=0.32) respondents, representing 4,201,685 Canadians (weighted estimate), reported living with chronic pain. A total of 26,989 (84.5%, SE=0.32) respondents, representing 22,268,440 Canadians (weighted estimate), reported living with no chronic pain.

The purpose of Phase One was to describe the study sample. The stated hypothesis was that there would be differences in the socio-demographic and health related characteristics for: (1) those with chronic pain compared to those with no chronic pain, (2) those who use CAM versus those who do not use CAM, and (3) those with a high HRQOL versus hose with a low HRQOL. The findings of this study support the hypothesis.

Phase One A: Descriptive statistics for study population. The set of descriptive statistics begins with a comparison of the chronic pain subset (i.e., those with chronic pain) to the rest of the CCHS Cycle 3.1 Subsample 1 (i.e., those with no chronic pain). The first table below (Table 5) provides an overview of the differences in the characteristics of the individual and the environment (i.e., socio-demographic variables) between the study population (those with chronic pain) and the larger group of Canadians with no chronic pain.

Those with chronic pain were older on average than those who have no chronic pain, with approximately 66.0% of those with chronic pain aged 45 and older compared to approximately 41.1% of those with no chronic pain of the same age. Furthermore, the prevalence of chronic pain increased progressively until the age group category of 45 to 64, with 42.1% (SE=1.00) of those with chronic pain compared to 28.7% (SE=0.21) of those with no chronic pain in the age category of 45-64 (X^2=1235.71, p<0.000). More females than males reported chronic pain; 57.1% (SE=0.96) of those with chronic pain were female compared to 49.7% (SE=0.20) of those with no chronic pain (X^2=92.56, p<0.000*)*.

Those with chronic pain were more likely to be in a cohabiting relationship than to be living alone. They were also less likely to report being single than their counterparts with no chronic pain (16.9%, SE=0.74 versus 32.6%, SE=0.29, X^2=715.42, p<0.000). Education attainment was lower for those with chronic pain, with 27.2% (SE=0.91) stating that they had less than secondary school graduation compared to 22.8% (SE=0.31) of those with no chronic pain (X^2=63.87, p<0.000). The majority of survey respondents stated they were “white” as compared to “visible minority”. However, the visible minority rate was lower for those with chronic pain than for those with no chronic pain, at 15.2% (SE=0.91) for those with chronic pain and 16.8% (SE=0.40) for those with no chronic pain (X^2=18.71, p<0.000).

Table 5 also presents data for characteristics of the environment. The results showed that the population distribution by province for those with chronic pain was only slightly different between the two groups but the overall difference was statistically significant (X^2=32.46, p<0.001). The proportion of those living with chronic pain was lower in Ontario, Quebec, and Alberta than the proportion of those living with chronic pain in the rest of the provinces and the territories. In terms of residence by urban or rural area, there was no significant difference between the two groups, with approximately 81.5% living in urban areas compared to 18.5% in rural areas (X^2=0.05. p<0.819).

However, significant differences were evident in the categories of household income and in the sense of belonging to the local community. On average, those with chronic pain had a lower household income than those with no chronic pain, with approximately 24.1% of those with chronic pain indicating a total annual household income below $30,000 compared to approximately 14.1% of those with no chronic pain. More than 30.9% (SE=0.46) of those with no chronic pain compared to 20.4% (SE=0.93) of those with chronic pain had an income of $80,000 and higher ($X^2$=513.64, p<0.001). A lower proportion of Canadians with chronic pain reported a sense of belonging to the local community, with approximately 58.2% reporting a "somewhat strong" or "very strong" sense of belonging to the local community compared to approximately 63.5% of those with no chronic pain.

Table 5: Socio-demographic characteristics of the Canadian population by chronic pain

VARIABLES		**Chronic pain (n=5,164)**		**No chronic pain (n=26,989)**		**X^2**	***p-value***
Weighted percentage of population		**15.5%**		**84.5%**			
Characteristics of the Individual		%	SE	%	SE		
Age	Less than 18 years old	2.46	0.30	10.87	0.15	1235.71	0.000
	18 to 24 years old	5.35	0.50	12.50	0.26		
	25 to 44 years old	26.24	0.84	35.51	0.26		
	45 to 64 years old	42.11	1.00	28.69	0.22		
	65 years and older	23.85	0.71	12.42	0.14		
Sex	Male	42.91	0.96	57.09	0.96	92.56	0.000
	Female	57.09	0.96	49.67	0.96		

Table 5 (continued from previous page)							
Marital Status	Married	55.67	1.05	47.39	0.37	715.42	0.000
	Common-law	8.74	0.53	10.04	0.26		
	Widowed	9.00	0.48	4.14	0.13		
	Separated	2.69	0.31	2.05	0.12		
	Divorced	6.90	0.44	3.73	0.16		
	Single	16.93	0.74	32.58	0.29		
Education	Less than secondary grad	27.20	0.92	22.82	0.31	63.87	0.000
	Secondary graduation	14.90	0.72	14.93	0.34		
	Some post-secondary	7.67	0.54	9.03	0.27		
	Post-secondary grad.	49.11	1.05	52.30	0.42		
Ethnicity	White	83.98	0.91	82.57	0.40	18.71	0.00
	Visible minority	15.21	0.91	16.82	0.40		
Characteristics of the Environment							
Province of Residence	Newfoundland & Lab.	1.86	0.13	1.66	0.03	32.46	0.001
	PEI	0.49	0.04	0.43	0.01		
	Nova Scotia	3.65	0.25	2.86	0.05		
	New Brunswick	2.80	0.18	2.31	0.04		
	Quebec	22.47	0.82	24.11	0.16		
	Ontario	37.94	1.00	39.04	0.21		
	Manitoba	3.88	0.25	3.39	0.05		
	Saskatchewan	**3.35**	**0.22**	2.81	0.04		
	Alberta	9.31	0.53	10.01	0.10		
	British Columbia	14.07	0.59	13.10	0.12		
	NWT, Yukon, Nunavut	0.29	0.01	0.26	0.01		
Residence Area	Urban	81.45	0.79	81.56	0.36	0.05	0.819
	Rural	18.55	0.79	18.44	0.36		
Household Income	$0 to $14,999	8.17	0.41	4.15	0.16	513.64	0.000
	$15,000-$29,999	15.89	0.68	9.99	0.25		
	$30,000-$49,999	20.98	0.81	16.67	0.33		
	$50,000-$79,999	21.04	0.87	23.99	0.42		
	$80,000 and higher	20.44	0.93	30.88	0.46		
Sense of Belonging	Very strong	16.56	0.76	16.51	0.32	99.54	0.000
	Somewhat strong	41.65	1.07	46.94	0.45		
	Somewhat weak	24.38	0.89	25.29	0.40		
	Very weak	12.57	0.74	8.58	0.28		

Percentages are based on weighted data
$p<0.05$ for all cross-tabulations except for residence area (p=0.86)
Note: Missing values for all variables were ≤5%, except for household income (16%)

Descriptive statistics regarding the health-related variables for those with chronic pain compared to those with no chronic pain are presented in Table 6. The ten chronic conditions that had the highest number (in %) of respondents reporting living with chronic pain as well as the chronic condition were, in descending order: fibromyalgia (72.2%, SE=3.16), chronic fatigue syndrome (63.7%, SE=3.96), arthritis/rheumatism (42.7%, SE=0.97), urinary incontinence (42.1%, SE=2.14), cancer (41.6%, SE=3.29), multiple chemical sensitivities (41.2%, SE=2.81), emphysema (40.5%, SE=4.70), COPD (40.5%, SE=4.34) and back problems (40.0%, SE=0.94).

In a supplementary analysis, data were analyzed to determine the ten most prevalent chronic conditions for the total Canadian population (n=32,133). They were, in descending order of prevalence: allergy – other than food (26.5%, SE=0.38), back problems (18.2%, SE=0.34), arthritis / rheumatism (16.6%, SE=0.28), high blood pressure (14.6%, SE=0.26), other chronic conditions (12.5%, SE=0.27), migraines (10.6%, SE=0.26), asthma (8.5%, SE=0.23), allergy – food (7.3%, SE=0.221), thyroid condition (5.75, SE=0.19), and mood disorder (5.6%, SE=0.19).

Level of pain intensity and restriction of activities because of pain are also presented in Table 6. Within the chronic pain subset, the majority described their pain as “moderate” (51.6%, SE=1.06), followed by those who described it as “mild” (32.4%, SE=1.05) and 16.0% (SE=0.72) who described it as “severe”. The majority of those with chronic pain stated that their pain restricted their activities, with only 27.6% (SE=0.94) reporting that they had chronic pain but that it did not restrict their activities. These statistics do not exist for the non-chronic pain group because the respondents had to declare that they were not free of pain or discomfort before the questions of pain intensity and activity restriction due to pain were asked.

Table 6: Health-related characteristics of the Canadian population by chronic pain

VARIABLES			**Chronic pain (n=5,164)**		**No chronic pain (n=26,989)**		X^2	***p*-value**
Weighted percentage of population			**15.5%**		**84.5%**			
Biological Function			%	SE	%	SE		
Diagnosis	Fibromyalgia	yes	72.22	3.17	27.78	3.17	1138.59	0.000
	Chronic fatigue syndrome	yes	63.68	3.96	36.32	3.96	630.95	0.000
	Effects of a stroke	yes	44.63	3.75	55.37	3.75	228.30	0.000
	Arthritis / rheumatism	yes	42.67	0.97	57.33	0.97	3381.83	0.000
	Urinary incontinence	yes	42.11	2.14	57.89	2.14	494.73	0.000
	Cancer	yes	41.60	3.29	58.40	3.29	201.44	0.000
	Multiple chemical sensitivities	yes	41.17	2.80	58.83	2.80	328.57	0.000
	Emphysema	yes	40.51	4.70	59.49	4.70	59.00	0.000
	COPD	yes	40.46	4.34	59.54	4.34	66.48	0.000
	Back problem	yes	40.01	0.94	59.99	0.94	3070.30	0.000
	Stomach/intestinal ulcer	yes	38.62	2.45	61.38	2.45	394.11	0.000
	Bowel disorder	yes	37.91	1.91	62.09	1.91	477.06	0.000
	Mood disorder	yes	36.04	1.59	63.96	1.59	564.25	0.000
	Chronic bronchitis	yes	35.26	2.24	64.74	2.24	229.93	0.000
	Anxiety disorder	yes	34.46	1.81	65.54	1.81	376.91	0.000
	Other chronic conditions	yes	32.40	1.09	67.60	1.09	923.79	0.000
	Diabetes	yes	30.98	1.53	69.02	1.53	268.84	0.000
	High blood pressure	yes	28.75	0.91	71.25	0.91	671.78	0.000
	Thyroid condition	yes	28.23	1.50	71.77	1.50	216.33	0.000
	Migraine headache	yes	28.19	1.17	71.81	1.17	423.70	0.000
	Allergy - food	yes	24.94	1.23	75.06	1.23	153.68	0.000
	Asthma	yes	22.89	1.15	77.11	1.15	107.47	0.000
	Allergy - other	yes	19.86	0.38	70.14	0.38	134.84	0.000
Symptoms								
Pain Intensity	Mild		32.44	1.05	n/a	n/a	n/a	n/a
	Moderate		51.56	1.06	n/a	n/a	n/a	n/a
	Severe		16.01	0.72	n/a	n/a	n/a	n/a
Functional Status								
Restriction of Activities	Pain - does not prevent activity		27.64	0.94	n/a	n/a	n/a	n/a
	Pain - prevents a few activities		32.46	1.02	n/a	n/a	n/a	n/a
	Pain - prevents some activities		21.79	0.86	n/a	n/a	n/a	n/a
	Pain - prevents most activities		18.12	0.78	n/a	n/a	n/a	n/a

Percentages are based on weighted data

$p<0.05$ for all cross-tabulations

Note: Missing values for all variables were ≤1%, except for pain intensity and restriction of activities (2%)

Table 7: Statistics comparing study population to total Canadian population (including those with chronic pain)

VARIABLES		**Chronic pain subset** (i.e., study population) **n = 5,164**		**TOTAL Canadian population** (includes chronic pain subset) **n=32,133**	
Weighted percentage of population		**15.5%**		**100%**	
		%	SE	%	SE
Free of pain or discomfort	Yes	0.00	n/a	84.51	0.32
	No	100.00	n/a	15.49	0.32
Has a chronic condition	Yes	100.00	n/a	68.48	0.39
	No	0.00	n/a	31.52	0.39
CAM Use	Yes	30.83	0.96	20.90	0.35
	No	69.17	0.96	79.10	0.35
HRQOL (single item approach)	High	65.64	1.06	89.58	0.40
	Low	34.36	1.06	10.42	0.18
HUI3 (multi-item approach)	Mean score (score computed as %)	63.00	0.01	88.00	0.01

Percentages are based on weighted estimates.
Note: Missing values for all variables were ≤5%

Table 7 provides a brief synopsis of the general statistics regarding both the chronic pain subset and the total Canadian population (including the chronic pain subset). The purpose of this table is to provide an overview of the most important variables of interest for the current research study to determine the scope of the differences between groups. The rates of chronic pain and chronic condition for the chronic pain subset will necessarily be 100%, as these were the criteria for creating this study population.

CAM use was higher for those with chronic pain, with 30.8% (SE=0.96) stating that they had used some form of CAM compared to 20.9% (SE= 0.35) of the total Canadian population. Self-rated HRQOL (using a single question for perceived general health) was lower for those with chronic pain compared to that of the total Canadian population (65.6%, SE=1.07 versus 89.8%, SE=0.40).

A supplementary analysis of HRQOL was completed using the total scores obtained from the HUI3 (a multi-item HRQOL assessment tool). Similar results were obtained in the multi-item assessment tool as what was obtained from the single-item HRQOL question in that, in both cases, the chronic pain subset perceived their HRQOL as being lower than the total Canadian population. The mean HUI3 score for those with chronic pain was 0.63 (SE=0.01) compared to 0.88 (SE=0.002), on a scale of -0.36 for a health status worse than death to 1.00 for best possible health. Chi-squared tests cannot be calculated because the chronic pain subset is included in the total Canadian population so the two groups are not distinct from each other.

Phase One B: Descriptive statistics for CAM users versus non-CAM users

Socio-demographic variables of the study population by CAM use are presented in Table 8. Overall, 30.8% (SE=0.96) of the chronic pain population reported CAM use and 69.2% (SE=0.96) reported non-CAM use (X^2=89.25, p<0.000). CAM users tended to be younger than non-CAM users; among CAM users; approximately 41.4% were aged 44 years and younger compared to approximately 28.4% of non-CAM users. Females were more likely than males to use CAM, with 62.7% (SE=1.84) of females and 57.0% (SE=1.27) of males indicating that they used CAM (X^2=14.49, p<0.000). CAM users were more likely to be married or in a common-law relationship than non-CAM users (approximately 70% vs. 64%). The percentage of CAM users who were widowed was about half that of non-CAM users who were widowed (4.5%, SE=0.66 vs. 10.8%, SE=0.64; p<0.000). The level of education attainment was higher for CAM users than non-CAM users in all categories. Only 15.1% (SE=1.33) of CAM users had not completed high school compared to 32.5% (SE=1.21) of the non-CAM users. Regarding university education, 62.5% (SE=1.91) of CAM users had completed post-secondary graduation compared to 45.0% (SE=1.28) of non-CAM users (χ^2=189.50, $p<0.000$). The majority (approximately 87%) of both CAM users and non-CAM users reported their ethnicity as "white" rather than "visible minority", with no statistically significant difference between the two groups (χ^2=0.26, $p=0.61$).

The results from Table 8 also demonstrated that CAM users were more likely to be from western Canada (Manitoba, Saskatchewan, Alberta and BC), with 38.4% of all CAM users from these four provinces compared to 26.9% of non-CAM users from these same provinces. These four provinces were the only ones where the ratio of respondents with chronic pain who used CAM was higher than the ratio of respondents with chronic pain who did not use CAM. CAM users were wealthier than non-CAM users, with only approximately 17.6% of CAM users reporting a household income of less than $30,000 compared to approximately 33.7% of non-CAM users. There was no statistically significant difference (χ^2=0.31, $p=0.860$) between CAM-users and non-CAM users regarding residence in an urban or rural area.

Table 8: Socio-demographic characteristics of the study population by CAM use

VARIABLES		**CAM Users**		**Non-CAM Users**		X^2	***p-value***
Weighted percentage of population		**30.8%**		**69.2%**			
Characteristics of the Individual		%	SE	%	SE		
Age	Less than 18 years old	1.14	0.32	1.60	0.29	189.20	0.000
	18 to 24 years old	3.49	0.55	4.76	0.56		
	25 to 44 years old	36.72	1.69	22.06	1.07		
	45 to 64 years old	44.29	1.79	42.72	1.23		
	65 years and older	14.35	1.13	28.87	1.01		
Sex	Male	37.31	1.84	42.96	1.27	14.49	0.000
	Female	62.69	1.84	57.04	1.27		
Marital Status	Married	59.60	1.69	55.08	1.32	60.02	0.000
	Common-law	10.49	1.09	8.59	0.72		
	Widowed	4.47	0.66	10.84	0.64		
	Separated	2.63	0.66	2.69	0.38		
	Divorced	7.94	0.85	7.07	0.58		
	Single	14.87	1.18	15.73	0.89		
Education	Less than secondary graduation	15.11	1.33	32.45	1.21	189.50	0.000
	Secondary graduation	14.23	1.26	15.22	0.91		
	Some post-secondary	8.16	0.96	7.31	0.64		
	Post-secondary grad	62.50	1.81	45.00	1.28		
Ethnicity	White	87.12	1.52	86.59	1.01	0.26	0.610
	Visible minority	12.88	1.52	11.41	1.01		
Characteristics of the Environment							
Province of Residence	Newfoundland & Labrador	0.54	0.15	2.53	0.22	97.56	0.000
	PEI	0.28	0.06	0.63	0.07		
	Nova Scotia	3.44	0.59	3.82	0.30		
	New Brunswick	2.05	0.31	3.39	0.27		
	Quebec	21.04	0.65	23.12	1.12		
	Ontario	33.96	1.87	39.32	1.30		
	Manitoba	5.43	0.65	3.19	0.29		
	Saskatchewan	4.32	0.45	2.91	0.26		
	Alberta	12.28	1.21	7.64	0.59		
	British Columbia	16.37	1.27	13.17	0.76		
	NWT/Yukon/Nunavut	0.29	0.04	0.29	0.03		

Table 8 (continued from previous page)							
Residence Area	Urban	80.81	1.62	81.02	0.95	0.03	0.860
	Rural	19.19	1.62	18.98	0.95		
Household Income	$0 to $14,999	4.91	0.58	11.93	0.68	207.10	0.000
	$15,000-$29,999	12.74	1.06	21.78	1.14		
	$30,000-$49,999	22.47	1.65	26.50	1.24		
	$50,000-$79,999	26.35	1.77	21.74	1.22		
	$80,000 and higher	33.53	1.96	18.04	1.29		
Sense of Belonging	Very strong	17.06	1.30	17.99	0.97	5.03	0.169
	Somewhat strong	45.52	1.95	43.06	1.36		
	Somewhat weak	25.87	1.69	25.53	1.20		
	Very weak	11.55	1.19	13.42	0.88		

Percentages are based on weighted data. SE= Standard Error.
$p<0.001$ for all cross-tabulations except for ethnicity ($p=0.610$), residence area ($p=0.860$) and sense of belonging to local community ($p=0.169$)
Note: Missing values for all variables were ≤5%, except for household income (15%)

Health-related variables of the study population by CAM use are presented in Table 9. There were nine chronic conditions that were statistically significant for CAM use ($p<0.05$), including (in descending order of prevalence): back problems, allergies – other, “other chronic conditions”, migraine headaches, allergy – food, mood disorder, fibromyalgia, multiple chemical sensitivities, and chronic fatigue syndrome. There were six chronic conditions that were statistically significant for non-CAM use ($p<0.05$), including (in descending order of prevalence): arthritis, high blood pressure, diabetes, stroke, cancer, and COPD. There were eight chronic conditions where CAM use was not statistically significant ($p>0.05$), including: asthma, anxiety disorder, bowel disorder, thyroid condition, urinary incontinence, stomach/intestinal ulcer, chronic bronchitis, and emphysema.

Regarding level of pain intensity, CAM users reported a lower prevalence of severe pain compared to non-CAM users (approximately 13% vs. 17% respectively). However, the opposite was true for those with moderate pain, with more CAM users than non-CAM users reporting moderate pain (approximately 54% vs. 50% respectively). Mild levels of pain were comparable between the two groups (approximately 32% for each group).

CAM users were more likely to state that pain restricted "few" or "some" of their activities than the non-CAM users. However, an analysis of the two extremes of activity restriction due to pain (i.e., does not prevent any activities or prevents most activities) revealed that CAM user rates were significantly lower than non-CAM user rates in each of these categories. Only 23.8% (SE=1.59) of CAM users reported that pain does not prevent any activities compared to 29.3% (SE=1.18) of non-CAM users (X^2=43.3, p<0.000). Similarly, only 15.1% (SE=1.34) of CAM users stated that pain prevented most of their activities compared to 19.5% (SE=0.95) of non-CAM users (X^2=43.3, p<0.000).

More respondents with chronic pain who used CAM reported a high HRQOL than respondents with chronic pain who did not use CAM, with 75.0% (SE=1.55) of CAM users reporting a high HRQOL compared to 61.5% (SE=1.31) of non-CAM users (X^2=9.89, p<0.000).

Table 9: Health-related characteristics of the study population by CAM use

VARIABLES			CAM Users		Non-CAM Users		X^2	*p-value*
Weighted percentage of population			**30.8%**		**69.2%**			
Biological Function			%	SE	%	SE		
Diagnosis	Back problem	yes	64.68	0.83	43.35	0.95	195.22	0.000
	Allergy - other than food	yes	43.22	0.73	33.39	0.85	44.64	0.000
	Arthritis/rheumatism	yes	43.09	0.71	50.73	1.01	25.54	0.000
	Other chronic condition	yes	29.59	0.58	26.51	0.84	4.83	0.028
	Migraine headache	yes	23.90	0.60	19.02	0.71	16.04	0.000
	High blood pressure	yes	20.13	0.52	31.83	0.80	76.43	0.000
	Allergy - food	yes	16.75	0.49	10.46	10.40	40.00	0.000
	Mood Disorder	yes	15.41	0.47	12.88	0.56	5.71	0.017
	Asthma	yes	14.48	0.46	12.94	0.54	2.23	0.135
	Anxiety disorder	yes	10.78	0.35	10.30	0.96	0.28	0.594
	Bowel disorder	yes	10.19	0.36	10.32	0.51	0.05	0.822
	Fibromyalgia	yes	10.06	0.36	6.46	0.47	20.32	0.000
	Thyroid condition	yes	9.60	0.36	11.30	0.51	2.39	0.122
	Multiple chemical sensitivities	yes	8.80	0.39	4.64	0.35	33.87	0.000
	Stomach/intestinal ulcer	yes	7.52	0.32	8.50	0.53	1.35	0.250
	Urinary incontinence	yes	7.16	0.28	8.72	0.46	3.60	0.058
	Chronic fatigue syndrome	yes	6.32	0.29	4.35	3.33	9.09	0.003
	Diabetes	yes	6.19	0.29	11.40	0.50	33.82	0.000
	Chronic bronchitis	yes	6.10	0.26	6.19	0.40	0.01	0.913
	Cancer	yes	2.20	0.16	4.22	0.38	12.88	0.000
	Effects of a stroke	yes	1.94	0.16	3.48	0.33	8.86	0.003
	COPD	yes	1.20	0.09	2.50	0.31	8.10	0.004
	Emphysema	yes	1.53	0.15	2.06	0.26	1.59	0.207
Symptoms								
Pain Intensity	Mild		32.79	1.84	32.24	1.30	13.90	0.001
	Moderate		54.01	1.97	50.50	1.32		
	Severe		13.20	1.28	17.26	0.92		
Functional Status								
Restriction of Activities	Pain - does not prevent activity		23.81	1.59	29.30	1.18	43.30	0.000
	Pain - prevents a few activities		36.02	1.91	30.87	1.21		
	Pain - prevents some activities		25.05	1.63	20.36	1.04		
	Pain - prevents most activities		15.12	1.34	19.47	0.95		
HRQOL	High		75.00	1.55	61.45	1.31	9.89	0.000
	Low		25.00	1.55	38.55	1.31		

Percentages are based on weighted data. SE = Standard Error

P<.001 for all cross-tabulations except for asthma (p=0.135), other chronic conditions (p=0.028) and mood disorder (p=0.017)

Note: Missing values for all variables were ≤1%, except for pain intensity and restriction of activities (2%)

Phase One C: Descriptive statistics for high HRQOL versus low HRQOL.

Socio-demographic variables of the study population by HRQOL are presented in Table 10. Overall, 65.6% (SE=1.06) of the chronic pain population reported a high HRQOL and 34.4% (SE=1.06) reported a low HRQOL (X^2 =89.25, $p<0.000$).

The results indicated that older adults were more likely than younger adults to report a low HRQOL. Of those reporting a low HRQOL, 29.2% (SE=1.42) were age 65 or older compared to 20.7% (SE=1.51) of those reporting high HRQOL (X^{22}=47.10, $p<0.000$). There was no statistical difference between males and females for HRQOL (X^2=0.23, $p=0.630$). Those with a high HRQOL were more likely to report being married or living common-law; approximately 68% of those with a high HRQOL reported cohabitation compared to approximately 62% of those with a low HRQOL. Those with a high HRQOL were less likely to be widowed or divorced than those with a low HRQOL. Those with a high HRQOL were more likely to have attained a high education completion level, with 54.7% (SE=1.36) of them completing a post-secondary degree compared to 42.2% (SE=1.72) of those reporting a low HRQOL (X^2=168.0, $p<0.000$). Also, those with a high HRQOL were less likely to report having an education attainment of less than high school completion (21.3%, SE=1.08 vs. 38.1%, SE=1.78, X^2=168.00, $p<0.000$). Regarding the question of ethnicity, there was no statistically significant difference found between those who reported being white compared to those who were part of a visible minority (X^2=0.04, $p=0.844$).

Table 10 also presents data regarding the socio-demographic variables relating to characteristics of the environment. The results demonstrated that there is no statistically significant difference between the HRQOL from province to province (X^2=16.63, *p*=0.083) or between rural and urban residence area (X^2=3.46, *p*=0.063). Differences were evident in the variables of household income and in the sense of belonging to the local community. The percentage of those reporting a high HRQOL increased as income level increased, with 28.2% of those with a high HRQOL reporting an income of $80,000 or more compared to 12.4% of those with a low HRQOL reporting this income level (X^2=326.66, *p*<0.000). Those with a high HRQOL were more likely to report a “very strong” or “somewhat strong” sense of belonging to the local community compared to those with a low HRQOL (approximately 65% vs. approximately 55%).

Table 10: Socio-demographic characteristics of the study population by HRQOL

VARIABLES		**HRQOL High**		**HRQOL Low**		X^2	***p-value***
Weighted percentage of population		**65.6%**		**34.4%**			
Characteristics of the Individual		%	SE	%	SE		
Age	Less than 18 years old	1.77	0.31	1.03	0.33	47.12	0.000
	18 to 24 years old	4.56	0.55	4.38	0.76		
	25 to 44 years old	28.22	1.17	25.17	1.63		
	45 to 64 years old	44.80	1.41	40.23	1.84		
	65 years and older	20.66	1.51	29.19	1.42		
Sex	Male	40.96	1.28	41.65	1.71	0.23	0.630
	Female	59.04	1.28	58.35	1.71		
Marital Status	Married	58.03	1.35	53.45	1.77	74.50	0.000
	Common-law	10.16	0.79	7.34	0.87		
	Widowed	6.91	0.52	12.52	0.94		
	Separated	2.52	0.44	2.94	0.44		
	Divorced	6.28	0.62	9.44	0.82		
	Single	16.10	0.85	14.32	1.27		
Education	Less than secondary graduation	21.34	1.08	38.13	1.78	167.99	0.000
	Secondary graduation	16.29	1.02	12.28	1.07		
	Some post-secondary	7.67	0.65	7.36	0.87		
	Post-secondary grad	54.69	1.36	42.23	1.72		

Table 10 (continued from previous page)							
Ethnicity	White	86.85	1.08	86.78	0.86	0.05	0.844
	Visible minority	13.15	1.08	13.22	0.86		
Characteristics of the Environment							
Province of Residence	Newfoundland & Labrador	1.74	0.18	2.25	0.30	16.63	0.083
	PEI	0.44	0.05	0.69	0.10		
	Nova Scotia	3.58	0.35	3.95	0.38		
	New Brunswick	2.60	0.25	3.62	0.40		
	Quebec	23.05	1.07	21.31	1.54		
	Ontario	36.69	1.34	39.47	1.69		
	Manitoba	4.19	0.37	3.51	0.43		
	Saskatchewan	3.33	0.30	3.37	0.39		
	Alberta	9.58	0.71	8.09	0.92		
	British Columbia	14.49	0.82	13.47	1.03		
	NWT/Yukon/Nunavut	0.30	0.03	0.26	0.04		
Residence Area	Urban	80.25	1.03	82.39	1.29	3.47	0.063
	Rural	19.75	1.03	17.61	1.29		
Household Income	$0 to $14,999	6.25	0.48	16.60	1.15	326.66	0.000
	$15,000-$29,999	14.85	0.90	27.21	1.70		
	$30,000-$49,999	24.82	1.23	26.04	1.75		
	$50,000-$79,999	25.88	1.27	17.73	1.53		
	$80,000 or higher	28.20	1.41	12.41	1.37		
Sense of Belonging	Very strong	18.09	1.08	16.98	1.17	82.92	0.000
	Somewhat strong	46.84	1.38	37.85	1.80		
	Somewhat weak	24.99	1.19	26.92	1.67		
	Very weak	10.07	0.78	18.24	1.37		

Percentages are based on weighted data. SE= Standard Error.
p<0.001 for all cross-tabulations except for sex (*p*=0.630), ethnicity (*p*=0.844), province of residence (*p*=0.083) and residence area (*p*=0.063)
Note: Missing values for all variables were <5%, except for household income (15%)

Health-related characteristic of the study population by HRQOL are presented in Table 11. Of the 23 chronic conditions included in the current research study, 20 chronic conditions were statistically significant (*p*<0.05) for having a greater proportion of respondents who reported having a low HRQOL rather than a high HRQOL. For the three remaining chronic conditions, including allergy – other than food, migraine headaches, and allergy - food, there was no significant difference ($p>0.05$) between a high HRQOL and a low HRQOL.

Low HRQOL was associated with increased pain intensity; as the level of pain intensity increased, the percentage of respondents reporting a high HRQOL decreased. Although the majority of respondents described their pain as moderate in both groups (50% for high vs. 54% for low HRQOL), the differences polarized for “mild” and “severe” pain. In the low HRQOL group, 28.6% (SE=1.63) stated they had severe pain compared to only 9.4% of the high HRQOL group ($X^2=461.44$, $p<0.000$). Similarly, in the low HRQOL group, only 17.3% (SE=1.43) rated their chronic pain as mild compared to 40.4% (SE=1.33) of those in the high HRQOL ($X^2=461.4$, $p<0.000$)

Similar results were found for the restriction of activities due to pain; reports of high HRQOL decreased as the level of restriction of activities due to pain increased. Fully 71% of those reporting high HRQOL said that pain restricted either none or just a few activities whereas only 39% of those reporting low HRQOL reported the same results. In the category of “pain prevents most activities”, 9.1% (SE=0.71) of those with a high HRQOL reported this extreme level of restriction compared to 35.4% (SE=1.72) of those with a low HRQOL ($X^2=714.60$, $p<0.000$). Finally, those with high HRQOL were more likely to have used CAM than those with low HRQOL (35.2%, SE=1.21 compared to 22.4%, SE=1.44, $X^2=89.25$, $p<0.000$).

Table 11: Health-related characteristics of the study population by HRQOL

VARIABLES			**HRQOL High**		**HRQOL Low**		X^2	***p-value***
Weighted percentage of population			**65.6%**		**34.4%**			
Biological Function			%	SE	%	SE		
Diagnosis	Back problem	yes	48.73	1.35	52.12	1.75	5.33	0.021
	Arthritis / rheumatism	yes	42.17	1.28	62.17	1.28	151.13	0.000
	Allergy - other	yes	36.51	1.21	36.23	1.67	0.39	0.781
	Other chronic conditions	yes	24.59	1.24	32.74	1.73	38.82	0.000
	High blood pressure	yes	21.23	0.99	41.57	1.73	236.53	0.000
	Migraine headache	yes	20.32	1.12	20.91	1.34	0.25	0.618
	Allergy - food	yes	12.61	0.86	11.92	1.16	0.52	0.472
	Asthma	yes	11.59	0.85	16.83	1.28	27.50	0.000
	Thyroid condition	yes	9.77	0.76	12.90	1.19	11.76	0.001
	Mood disorder	yes	9.48	0.74	21.69	1.38	146.55	0.000
	Bowel disorder	yes	7.95	0.68	15.04	1.16	62.64	0.000
	Diabetes	yes	5.86	0.54	17.33	1.27	172.9	0.000
	Fibromyalgia	yes	5.29	0.63	11.94	1.16	73.27	0.000
	Urinary incontinence	yes	5.44	0.57	13.66	1.15	103.35	0.000
	Stomach/intestinal ulcer	yes	5.43	0.61	13.57	1.29	101.8	0.000
	Chronic bronchitis	yes	4.91	0.52	8.56	0.90	26.87	0.000
	Heart Disease	yes	5.39	0.60	19.10	1.34	239.94	0.000
	Multiple chemical sensitivities	yes	4.93	0.53	7.97	0.95	19.08	0.000
	Chronic fatigue syndrome	yes	3.00	0.48	8.74	0.94	81.01	.000
	Cancer	yes	1.68	0.43	7.25	0.80	103.74	0.000
	Effects of a stroke	yes	1.27	0.23	6.30	0.89	101.06	0.000
	COPD	yes	0.66	0.26	4.65	0.78	83.40	0.000
	Emphysema	yes	0.69	0.19	4.02	0.77	63.86	0.000
Pain Intensity	Mild		40.38	1.33	17.26	1.43	461.44	0.000
	Moderate		50.24	1.35	54.12	1.76		
	Severe		9.38	0.71	28.62	1.63		
Restriction of Activities	Pain - does not prevent activity		35.49	1.24	12.55	1.17	714.60	0.000
	Pain - prevents a few activities		35.68	1.24	26.32	1.71		
	Pain - prevents some activities		19.77	1.03	25.69	1.57		
	Pain - prevents most activities		9.06	0.71	35.43	1.72		
CAM Use	Yes		35.24	1.20	22.43	1.44	89.25	0.000
	No		64.76	1.20	77.57	1.44		

Percentages are based on weighted data. SE= Standard Error.

Note: Missing values for all variables were ≤1%, except for pain intensity and restriction of activities (2%)

8.2 Phase Two Results: Logistic Regression Models

The purpose of Phase Two was to examine the relationship between the socio-demographic variables and health-related variables of individuals with chronic pain: (1) who use CAM and those who do not use CAM, and (2) who report a high HRQOL and those who report a low HRQOL**.** It was hypothesized that CAM use would be positively associated with younger age, being female, being married, being Caucasian, having a higher level of education, and having a higher income compared to non-CAM use. It was also hypothesized that a high HRQOL would be positively associated with younger age, having a higher level of education and a higher income than low HRQOL. Results from the logistic regression models supported the hypothesis with a few exceptions, which will be described below.

Phase Two of this study used regression models to determine which variables were significantly associated with CAM use and HRQOL. This phase began by examining the data to ensure that the assumptions of logistic regression were met. The CCHS survey is formatted and organized in a manner that ensures that there would be no duplicate responses, therefore satisfying the assumption of independence of errors. Lack of multi-collinearity (i.e., redundancy among the IVs) was determined by creating a correlation matrix of all of the IVs. No bivariate correlations were found that were higher than 0.700, thus satisfying the assumption of lack of multi-collinearity. To assess for outliers, scatterplots box and whiskers plots were examined and no outliers were found. A second analysis using standardized residuals was conducted and again no extreme observations were found. Phase Two is divided into two parts: Phase 2A examines which predictor variables were significant for CAM use and Phase 2B examines which predictor variables were significant for HRQOL.

Phase 2A: Logistic regression models for CAM use versus non-CAM use.

For the full model, all socio-demographic variables and all health-related variables were entered simultaneously to determine which IVs were significantly associated with CAM use. The adjusted odds ratios (AOR) and 95% confidence intervals (CI) of the full model are presented in Table 12. WesVar provides the Cox-Snell pseudo R^2 values to evaluate the "goodness-of-fit" of logistic models, using maximum likelihood estimates through an iterative process, with higher values indicating better model fit. F-values are also useful to determine if the variances between the means of two populations are significantly different. This combination of all socio-demographic and health related variables (i.e., Full Model) was found to be statistically significant: $F(47,454) = 6.221$, $p<0.000$.

Several IVs were found to be not statistically significant for CAM use. Of the socio-demographic variables, marital status, ethnicity, residence area (urban/rural), and sense of belonging to the community were found to be not significant ($p>0.05$). Of the health-related variables, neither pain intensity or restriction of activities was found to be statistically significant at $p<0.05$ and only two chronic conditions were found to be statistically significant: back problems and allergy – other than food.

The interpretation of multiple regression models is complicated by the influence that variables have with one another, and therefore building a parsimonious model (i.e., one with the fewest predictor variables but with the most theoretically or practically important ones retained) is advised [113]. To meet this requirement, partial models were created by removing IVs that were not statistically significant ($p>0.05$). The difference between the models was examined by comparing the Cox-Snell R^2 values, F-values and regression coefficients. The most parsimonious model is described in Table 13, with the difference between the full model being F(35,468)=5.105, *p*<0.000 and the partial model being F(22,479)=9.9, *p*<0.000.

The socio-demographic variables that were found to be statistically significant for CAM use included: younger age, being female, having a higher level of education, and having a higher income. Relative to the oldest age category (65 years and older), the odds of using CAM was significant for two age groups: 25-44 years old had more than twice the odds of CAM use (AOR=2.05, CI=1.51-2.76) and 45-64 years old had 1.35 times the odds of CAM use (CI=1.02-1.78). Males were less likely than females to use CAM (AOR=0.64, 95% CI=0.506-0801). Relative to the highest education level, the odds of using CAM decreased as level of education decreased, with the lowest odds of CAM use found among those with less than secondary school graduation (AOR=0.46, CI=0.34-0.63). Compared to northern Canada as the reference category, residents of Newfoundland & Labrador were least likely to use CAM (AOR=0.31, CI=0.13-0.68) whereas residents of Manitoba and Saskatchewan both had more than twice the odds of CAM use. Relative to the highest income category, the odds of using CAM decreased as the level of income decreased, with the lowest odds of using CAM (AOR=0.28, CI=0.19-0.41) found among those with an income of $14,999 or less. Two chronic conditions were statistically significant for CAM use: those with back problems had 1.48 times increased odds of CAM use than those with no back problems (CI=1.20-1.82) and those with non-food allergies had 2.34 times increased odds of CAM use than those with no non-food allergies (CI=1.90-2.88).

Table 12: Predictors of CAM use for the study population – FULL MODEL

$F=6.221$ (47,454) $p<0.000$		**Dependent Variable - CAM Use**		
		AOR	**Lower 95% CI**	**Upper 96% CI**
Age	Less than 18 years old	1.46 NS	0.46	4.6
	18 to 24 years old	1.13 NS	0.59	2.19
	25 to 44 years old	1.75	1.18	2.60
	45 to 64 years old	1.15 NS	0.83	1.59
	65 years and older	1.00	Reference category	
Sex	Male	0.65	0.51	0.83
	Female	1.00	Reference category	
Marital Status	Married	0.88 NS	0.63	1.24
	Common-law	0.92 NS	0.59	1.44
	Widowed	0.82 NS	0.48	1.39
	Separated	0.88 NS	0.44	1.78
	Divorced	1.30 NS	0.83	2.05
	Single	1.00	Reference category	
Education	Less than secondary graduation	0.49	0.35	0.67
	Secondary graduation	0.75 NS	0.55	1.02
	Some post-secondary	0.75 NS	0.54	1.06
	Post-secondary graduation	1.00	Reference category	
Sense of Belonging	Very strong	0.96 NS	0.64	1.44
	Somewhat strong	0.98 NS	0.69	1.38
	Somewhat weak	0.97 NS	0.68	1.39
	Very weak	1.00	Reference category	
Province of Residence	Newfoundland & Labrador	0.33	0.14	0.76
	PEI	0.61 NS	0.30	1.23
	Nova Scotia	1.04 NS	0.56	1.93
	New Brunswick	0.86 NS	0.46	1.60
	Quebec	1.26 NS	0.73	2.17
	Ontario	0.96 NS	0.58	1.60
	Manitoba	2.22	1.22	4.02
	Saskatchewan	2.24	1.31	3.84
	Alberta	1.91	1.10	3.31
	British Columbia	1.35 NS	0.80	2.28
	NWT, Yukon, Nunavut	1.00	Reference category	
Residence Area	Urban	0.79 NS	0.59	1.05
	Rural	1.00 NS	Reference category	

Table 12 (continued from previous page)					
Household Income	$0 to $14,999		0.25	0.15	0.40
	$15,000-$29,999		0.41	0.28	0.61
	$30,000-$49,999		0.54	0.39	0.76
	$50,000-$79,999		0.67	0.48	0.94
	$80,000 or higher		1.00	Reference category	
Ethnicity	White		1.01 NS	0.70	1.44
	Visible minority		1.00	Reference category	
Pain Intensity	Mild		0.96 NS	0.65	1.41
	Moderate		1.08 NS	0.76	1.53
	Severe		1.00	Reference category	
Restriction of Activities	Pain - does not prevent activity		0.81 NS	0.55	1.18
	Pain - prevents a few activities		1.05 NS	0.74	1.48
	Pain - prevents some activities		1.13 NS	0.806	1.59
	Pain - prevents most activities		1.00 NS	Reference category	
Diagnosis	Back problems	yes	2.31	1.85	2.86
		no	1.00	Reference category	
	Arthritis	yes	1.01 NS	0.79	1.28
		no	1.00	Reference category	
	Allergy - food	yes	1.51 NS	1.10	2.07
		no	1.00	Reference category	
	Allergy – non-food	yes	1.43	1.14	1.79
		no	1.00	Reference category	
	Asthma	yes	0.77 NS	0.56	1.04
		no	1.00	Reference category	
	High Blood Pressure	yes	0.78 NS	0.59	1.02
		no	1.00	Reference category	
	Migraine Headache	yes	1.14 NS	0.85	1.52
		no	1.00	Reference category	
	Bowel Disorder	yes	0.8 NS	0.55	1.15
		no	1.00	Reference category	
	Mood Disorder	yes	0.95 NS	0.69	1.30
		no	1.00	Reference category	
	Other chronic condition	yes	1.2 NS	0.94	1.52
		no	1.00	Reference category	

AOR = Adjusted Odds Ratio. CI = Confidence Intervals NS = Not Significant

Table 13: Predictors of CAM use for the study population – PARTIAL MODEL

F=12.063 (24,477) *p*<0.000		**Dependent Variable – CAM Use**		
		AOR	**Lower 95% CI**	**Upper 95% CI**
Age	Less than 18 years old	1.89 NS	0.67	5.27
	18 to 24 years old	1.33 NS	0.77	2.27
	25 to 44 years old	2.05	1.51	2.76
	45 to 64 years old	1.35	1.02	1.78
	65 years and older	1.00	Reference Category	
Sex	Male	0.64	0.50	0.80
	Female	1.00	Reference Category	
Education	Less than secondary graduation	0.46	0.34	0.63
	Secondary graduation	0.73	0.54	0.98
	Some post-secondary	0.8 NS	0.56	1.12
	Post-secondary graduation	1.00	Reference Category	
Province of Residence	Newfoundland & Labrador	0.31	0.136	0.68
	PEI	0.63 NS	0.32	1.20
	Nova Scotia	1.00 NS	0.54	1.83
	New Brunswick	0.81 NS	0.456	1.44
	Quebec	1.15 NS	0.68	1.90
	Ontario	0.90 NS	0.55	1.45
	Manitoba	2.06	1.16	3.61
	Saskatchewan	2.07	1.24	3.44
	Alberta	1.69 NS	0.99	2.86
	British Columbia	1.31NS	0.79	2.1
	Northern Canada (NWT, Yukon, Nunavut)	1.00	Reference Category	
Household Income	$0 to $14,999	0.28	0.19	0.41
	$15,000-$29,999	0.44	0.31	0.62
	$30,000-$49,999	0.56	0.40	0.77
	$50,000-$79,999	0.69	0.50	0.95
	$80,000 or higher	1.00	Reference Category	
Diagnosis	Allergy – non-food	1.48	1.20	1.82
		1.00	Reference Category	
	Back problems	2.34	1.90	2.88
		1.00	Reference Category	

AOR = Adjusted Odds Ratio. CI = Confidence Intervals NS = Not Significant

Phase 2A: Logistic regression models for high HRQOL versus low HRQOL.

For the full model, all socio-demographic variables and all health-related variables were entered simultaneously to determine which IVs were significantly associated with HRQOL. The adjusted odds ratios and confidence intervals of the full model can be found in Table 14. WesVar provides the Cox-Snell pseudo R^2 values to evaluate the "goodness-of-fit" of logistic models, using maximum likelihood estimates through an iterative process, with higher values indicating better model fit. *F*-values are also useful to determine if the variances between the means of two populations are significantly different. This combination of all socio-demographic and health related variables (i.e., Full Model) was found to be statistically significant: F=7.903 (51,450) p<0.000. The Cox-Snell likelihood ratio was 0.139.

In the analysis of the logistic regression, several IVs were found to be statistically significant for HRQOL. Of the socio-demographic variables, sex, marital status, ethnicity, province of residence, and residence area (urban/rural) were found to be not significant (p>0.05). Of the health-related variables, only three chronic conditions were found to be statistically significant for HRQOL: high blood pressure, mood disorder, and other chronic conditions.

The interpretation of multiple logistic regression models is complicated by the influence that variables have with one another and, therefore, building a parsimonious model (i.e., one with the fewest predictor variables but with the most theoretically or practically important ones retained) is advised [113]. To meet this requirement, variables not achieving statistical significance at the p<0.05 level were removed until all variables remaining in the model were significant. The difference between the models was examined by comparing the Cox and Snell R^2 value, *F*-values and regression coefficients. The most parsimonious model is described in Table 15, with the difference between the full model being *F*=7.903 (51,450) *p*<0.000 and the partial model being *F*=20.072 (22,479), *p<0.000*.

The socio-demographic variables that were found to be statistically significant for HRQOL were: younger age, having a higher level of education, and having a higher income. The odds of having a high HRQOL was significant for two age groups, 18-24 years old and 25-44 years old, relative to the oldest age category. Relative to the highest education level, the odds of having a high HRQOL was lower for those with an education less than secondary graduation (AOR=0.61, CI=0.47-0.78). The more a person felt a sense of belonging to the local community, the more likely they were to rate their HRQOL as high. Those who reported their sense of belonging as “somewhat strong” or “very strong” had 1.6 to 1.8 times increased odds of rating their HRQOL as high compared to the reference category of “very weak”. Relative to the highest income category, the odds of having a high HRQOL decreased as the level of income decreased, with the lowest odds of having a high HRQOL found among those with an income of $14,999 or less (AOR=0.35, CI=0.23-0.53). Two chronic conditions were statistically significant for HRQOL: those with mood disorders were less than half as likely to rate their HRQOL as high when compared to those with no mood disorder (AOR=0.42, CI=0.31-0.55) and those with high blood pressure were half as likely to rate their HRQOL as high than those with no high blood pressure (CI=0.39-0.62). The category of “other chronic conditions” was also statistically significant; those in this category were 0.75 as likely to have high HRQOL compared to those who did not have “other chronic conditions” (CI=1.90-2.88).

Those with mild or moderate pain intensity had significantly increased odds of reporting their HRQOL as high when compared to the reference category of severe pain intensity (AOR=2.77, CI=1.94-3.94 and AOR=1.47, CI=1.06-2.04 respectively). The likelihood of reporting a high HRQOL increased as the level of restriction of activities due to pain decreased; those whose pain did not prevent activity had 7.1 times increased odds of reporting a high HRQOL compared to the reference category of those whose pain prevented most activities (CI=4.89-10.19).

Table 14: Predictors of HRQOL for the study population – FULL MODEL

F=7.903 (51,450) *p*<0.000		**Dependent Variable - HRQOL**		
		AOR	**Lower 95% CI**	**Upper 95% CI**
Age	Less than 18 years old	2.94 NS	0.60	4.40
	18 to 24 years old	3.30	1.53	7.08
	25 to 44 years old	1.49 NS	0.97	2.26
	45 to 64 years old	1.11 NS	0.81	1.50
	65 years and older	1.00	Reference Category	
Sex	Male	0.77	0.59	0.98
	Female	1.00	Reference Category	
Marital Status	Now married	1.29 NS	0.83	1.99
	Common-law	1.44 NS	0.86	2.40
	Widowed	1.56 NS	0.94	2.58
	Separated	1.62 NS	0.78	3.35
	Divorced	1.29 NS	0.81	2.06
	Single	1.00	Reference Category	
Education	Less than secondary graduation	0.62	0.46	0.8
	Secondary graduation	1.21 NS	0.87	1.66
	Some post-secondary	0.87 NS	0.56	1.33
	Post-secondary graduation	1.00	Reference Category	
Sense of Belonging	Very strong	1.51 NS	0.98	2.30
	Somewhat strong	1.63	1.11	2.38
	Somewhat weak	1.07 NS	0.71	1.58
	Very weak	1.00	Reference Category	
Province of Residence	Newfoundland & Labrador	1.14 NS	0.59	2.19
	PEI	0.84 NS	0.41	1.70
	Nova Scotia	0.96 NS	0.52	1.75
	New Brunswick	1.16 NS	0.61	2.16
	Quebec	1.36 NS	0.7	2.33
	Ontario	1.25 NS	0.74	2.10

	Table 14 (continued from previous page)				
	Manitoba		1.67 NS	0.94	2.93
	Saskatchewan		1.24 NS	0.70	2.1
	Alberta		1.35 NS	0.74	2.45
	British Columbia		1.34 NS	0.79	2.28
	NWT, Yukon, Nunavut		1.00	Reference Category	
Residence Area	Urban		0.89 NS	0.65	1.19
	Rural		1.00	Reference Category	
Characteristics of the Environment					
Household Income	$0 to $14,999		0.34	0.20	0.55
	$15,000-$29,999		0.37	0.23	0.57
	$30,000-$49,999		0.60	0.39	0.90
	$50,000-$79,999		0.8 NS	0.53	1.19
	$80,000 or higher		1.00	Reference Category	
Ethnicity	White		1.16 NS	0.76	1.76
	Visible minority		1.00	Reference Category	
Pain Intensity	Mild		2.64	1.78	3.90
	Moderate		1.40 NS	0.97	1.99
	Severe		1.00	Reference Category	
Restriction of Activities	Pain - does not prevent activity		6.70	4.53	9.89
	Pain - prevents a few activities		3.26	2.28	4.64
	Pain - prevents some activities		2.36	1.65	3.35
	Pain - prevents most activities		1.00	Reference Category	
Diagnosis	Allergy - food	yes	1.10 NS	0.77	1.57
		no	1.00	Reference Category	
	Allergy – non-food	yes	1.15 NS	0.91	1.45
		no	1.00	Reference Category	
	Asthma	yes	0.55	0.39	0.77
		no	1.00	Reference Category	
	Fibromyalgia	yes	0.51	0.32	0.796
		no	1.00	Reference Category	
	Arthritis	yes	1.02 NS	0.80	1.29
		no	1.00	Reference Category	
	Back problems	yes	1.02 NS	0.80	1.29
		no	1.00	Reference Category	
	High Blood Pressure	yes	0.50	0.39	0.63
		no	1.00	Reference Category	
	Migraine Headache	yes	0.94 NS	0.70	1.25
		no	1.00	Reference Category	

Table 14 (continued from previous page

	Mood Disorder	yes	0.43	0.31	0.60
		no	1.00	Reference Category	
	Other chronic condition	yes	0.71	0.54	0.93
		no	1.00	Reference Category	
	Thyroid condition	yes	0.94 NS	0.70	1.25
		no	1.00	Reference Category	
	Urinary incontinence	yes	0.82 NS	0.54	1.23
		no	1.00	Reference Category	
	Chronic fatigue syndrome	yes	0.95 NS	0.47	1.87
		no	1.00	Reference Category	
	Cancer	yes	0.25	0.29	0.49
		no	1.00	Reference Category	

AOR = Adjusted Odds Ratio CI = Confidence Intervals NS = Not Significant

Table 15: Predictors of HRQOL for the study population – PARTIAL MODEL (MODEL 1)

F = 20.072 (df=22,479), p<0.000			Dependent Variable - HRQOL		
			AOR	**Lower 95% CI**	**Upper 95% CI**
Age	Less than 18 years old		2.33 NS	0.54	9.90
	18 to 24 years old		2.72	1.41	5.24
	25 to 44 years old		1.41	1.00	1.99
	45 to 64 years old		1.09 NS	0.84	1.40
	65 years and older		1.00	Reference Category	
Education	Less than secondary graduation		0.61	0.47	0.78
	Secondary graduation		1.23 NS	0.91	1.66
	Some post-secondary		0.85 NS	0.56	1.27
	Post-secondary graduation		1.00	Reference Category	
Sense of Belonging	Very strong		1.62	1.08	2.40
	Somewhat strong		1.77	1.23	2.53
	Somewhat weak		1.16 NS	0.79	1.70
	Very weak		1.00	Reference Category	
Household Income	$0 to $14,999		0.35	0.23	0.53
	$15,000-$29,999		0.39	0.20	0.59
	$30,000-$49,999		0.59	0.40	0.88
	$50,000-$79,999		0.82 NS	0.56	1.20
	$80,000 or higher		1.00	Reference Category	
Restriction of Activities	Pain - does not prevent activity		7.06	4.89	10.19
	Pain - prevents a few activities		3.35	2.37	4.71
	Pain - prevents some activities		2.35	1.69	3.25
	Pain - prevents most activities		1.00	Reference Category	
Pain Intensity	Mild		2.77	1.94	3.94
	Moderate		1.47	1.06	2.04
	Severe		1.00	Reference Category	
Diagnosis	High Blood Pressure	yes	0.50	0.39	0.62
		no	1.00	Reference Category	
	Mood disorder	yes	0.42	0.31	0.55
		no	1.00	Reference Category	
	Chronic condition - other	yes	0.75	0.57	0.96
		no	1.00	Reference Category	

AOR = Adjusted Odds Ratio. 95% CI = 95% Confidence Intervals. NS = Not Significant

8.3 Phase Three: Logistic Regression for CAM Use and HRQOL

The main objective of the current research study was to examine the relationship between CAM use and HRQOL for individuals living with chronic pain. The purpose of Phase Three was to compare the HRQOL of individuals with chronic pain who use CAM to those with chronic pain who do not use CAM, controlling for the socio-demographic and health-related variables found to be statistically significant. It was hypothesized that individuals with chronic pain who use CAM therapies would perceive their HRQOL to be better than those with chronic pain who do not use CAM therapies. Results from the logistic regression models supported the hypothesis.

A series of regression analyses have already been run to examine the relationships between the socio-demographic variables and health-related variables with either CAM use as the DV (Tables 12 and 13) or HRQOL as DV (Tables 14 and 15). The process for evaluating the association of CAM use with HRQOL involved analyzing two models that were nested, i.e., all terms of a Model 1 occurred in the larger Model 2. In this way, it was possible to control for all of the predictor variables and examine the independent effect of CAM use on HRQOL. The first nested model included the socio-demographic variables (age, education, sense of belonging to local community, household income) and health-related variables (pain intensity, restriction of activities due to pain, high blood pressure, mood disorder, and 'other chronic conditions') that were found to be statistically significant in Phase Two B (as described in Table 15). The second nested model included all of the variables listed above plus CAM use, presented in Table 16 below.

The univariate statistics, the associations of each variable with HRQOL and the regression weights for the two models are provided in Table 16. Model 1 (Table 15) had a Cox-Snell $R^2=0.253$, $F=20.072$ (df=22,479), $p<0.000$, with all predictor variables having significant regression weights. Model 2 (with CAM use added) had a Cox-Snell $R^2 = 0.256$, *F*=19.641 (df=23,478), *p<0.000*. Verification that the relationship between CAM use and HRQOl is statistically significant was obtained by examining the parameter estimates within Model 2. Regression coefficients are used to estimate the significance of individual parameters of various models and, in Model 2, CAM use has a parameter estimate of 0.39 (SE=0.12) with a *p*-value=0.002, confirming its statistical significance. Table 16 demonstrated that CAM users had 1.48 increased odds of reporting a high HRQOL than non-CAM users (AOR=1.48, 95% CI: 1.16, 1.88).

Table 16. Logistic Regression: Association of CAM Use with high HRQOL CAM added to MODEL 1 (MODEL 2)

F=19.641 (df=23,478), *p<0.000*			**AOR**	**Lower 95% CI**	**Upper 95% CI**
Age	Less than 18 years old		2.27 NS	0.53	9.65
	18 to 24 years old		2.74	1.41	5.30
	25 to 44 years old		1.36 NS	0.95	1.92
	45 to 64 years old		2.27 NS	0.53	9.65
	65 years and older		1.00	Reference Category	
Education	Less than secondary graduation		0.64	0.49	0.82
	Secondary graduation		1.27 NS	0.93	1.72
	Some post-secondary		0.86 NS	0.57	1.29
	Post-secondary graduation		1.00	Reference Category	
Sense of Belonging	Very strong		1.62	1.08	2.42
	Somewhat strong		1.77	1.23	2.54
	Somewhat weak		1.16 NS	0.79	1.69
	Very weak		1.00	Reference Category	
Household Income	$0 to $14,999		0.38	0.24	0.58
	$15,000-$29,999		0.42	0.2	0.63
	$30,000-$49,999		0.62	0.41	0.92
	$50,000-$79,999		0.85 NS	0.57	1.25
	$80,000 or higher		1.00	Reference Category	
Restriction of Activities	Pain - does not prevent activity		7.26	5.04	10.46
	Pain - prevents a few activities		3.36	2.38	4.72
	Pain - prevents some activities		2.33	1.68	3.23
	Pain - prevents most activities		1.00	Reference Category	
Pain Intensity	Mild		2.77	1.94	3.94
	Moderate		1.45	1.05	2.01
	Severe		1.00	Reference Category	
Diagnosis	High Blood Pressure	yes	0.50	0.39	0.63
		no	1.00	Reference Category	
	Mood disorder	yes	0.41	0.30	0.55
		no	1.00	Reference Category	
	Chronic condition - other	yes	0.73	0.56	0.94
		no	1.00	Reference Category	
CAM Use		yes	1.48	1.16	1.88
		no	1.00	Reference Category	

AOR = Adjusted Odds Ratio. 95% CI = 95% Confidence Intervals. NS = Not Significant

9.0 Discussion

Until now, there have been relatively few research studies published on the topic of the relationship between CAM use and HRQOL for those living with chronic pain. This is the first research study using a Canadian population health data set to examine this topic. The CCHS Cycle 3.1 (2005) is the most recent Statistics Canada survey that asks detailed questions regarding both HRQOL and CAM use, using several different HRQOL measurement tools, including both single-item and multi-item assessment tools. The conceptual framework on HRQOL created by Wilson and Cleary and further developed by Ferrans *et al* provides a useful basis with which to organize the pursuit of knowledge on this topic. This current research has contributed to the body of knowledge of CAM use and HRQOl for individuals living with chronic pain and has made it possible to provide population-based estimates of the factors associated with CAM use and with HRQOL for Canadians living with chronic pain. Identification of these trends could assist in targeting effective interventions for chronic pain in order to improve HRQOL.

The *Revised Wilson and Cleary HRQOL Model* strives to clarify the components of HRQOL and the relationships among these components. This discussion section explores the factors associated with chronic pain as well as the variables associated with CAM use and HRQOL within the constructs of these regression models. The discussion is formatted using the three research objectives of this thesis and the key findings are presented in Table 17 below.

Table 17. Key Findings using conceptual framework: *Revised Wilson & Cleary Model*

Key Findings using *Revised Wilson & Cleary Model*	
Characteristics of the Individual and the Environment	
Chronic Pain:	The prevalence of living with chronic pain for Canadians aged 12 and older in this study was 15.49% (SE=0.32).
CAM Use:	The past 12-month prevalence of CAM use for the Canadian population was 20.90% (SE=0.35) whereas for the chronic pain subset of the population, CAM use was 30.83% (SE=0.96). CAM use was significantly associated with lower age, being female,, higher education, higher income, and western province of residence were all significantly associated with increased odds of CAM use.
HRQOL:	High HRQOL was associated with a significantly lower age and a higher education, income and sense of belonging to the local community.
Biological Function	
Chronic Pain	The prevalence of living with a chronic condition among individuals aged 12 or older in Canada was 68.4% (SE=0.40). The ten chronic conditions that had the highest number (in %) of respondents reporting living with chronic pain as well as the chronic condition were, in descending order: fibromyalgia, chronic fatigue syndrome, arthritis/rheumatism, urinary incontinence, cancer, multiple chemical sensitivities, emphysema, COPD and back problems. In a supplementary analysis, data was analyzed to determine the ten most prevalent chronic conditions for the total Canadian population from the CCHS Cycle 3.1 Subsample 1 (n=32,133). They were, in descending order of prevalence: allergy – other than food, back problems, arthritis / rheumatism, high blood pressure, other chronic conditions, migraine, asthma, allergy – food, thyroid condition, and mood disorder.
CAM Use	There were nine chronic conditions that were statistically significant for CAM use ($p<0.05$). They were, in descending order of prevalence: back problems, allergy – other than food, "other chronic conditions", migraine headaches, allergy – food, mood disorder, fibromyalgia, multiple chemical sensitivities, and chronic fatigue syndrome. There were six chronic conditions that were statistically significant for non-CAM use ($p<0.05$). They were, in descending order of prevalence: arthritis, high blood pressure, diabetes, stroke, cancer, and COPD.

Table 17 (continued from previous page)	
HRQOL	When the HRQOL of respondents were compared by chronic condition, data analysis demonstrated that, for 20 of the 23 chronic conditions in this study, a significantly greater proportion of respondents (p<0.05) reported a low HRQOL rather than a high HRQOL. The only chronic conditions that had no significant difference (p>0.05) between reporting a high HRQOL and low HRQOL were: allergy -– other than food, migraine, and allergy – food. In the multiple logistic regression, two chronic conditions that were significantly associated with low HRQOL were high blood pressure and mood disorder. “Other chronic conditions” was also significantly associated with increased odds of high HRQOL.
Symptoms	
Chronic Pain Subset	For the chronic pain subset, 32.4% (SE=1.05) of respondents rated their pain as mild, 51.6% (SE=1.06) rated their pain as moderate, and 16.01% rated their pain as severe.
CAM Use	No significant association between CAM use and pain intensity was found.
HRQOL	Those with mild pain intensity had 2.77 (CI=1.95-3.94) times increased odds of rating their HRQOL as high compared to those with severe pain, Those with moderate pain had 1.45 (CI=1.05-2.01) times increased odds of reporting their HRQOL as high compared to those with chronic pain.
Functional Status	
Chronic Pain Subset	For the chronic pain subset, 27.64% (SE=0.94) reported that pain did not restrict activities, 32.46% (SE=1.02) stated that pain prevented a few activities, 21.79% (SE=0.86) reported that pain prevented some activities, and 18.12% (SE=0.78) reported that pain prevented most activities.
CAM Use	In the multiple logistic regression, those with severe pain were less likely to use CAM than those with mild pain but no significant association between CAM use and pain intensity was found.
HRQOL	Those whose pain restricted no activities had 6.70 (CI=4.54-9.89) times increased odds of reporting high HRQOL compared to those whose pain restricted most of their activities.

Table 17 (continued from previous page)	
General Health Perception	
Chronic Pain Subset	The prevalence of high HRQOL rating using the single question regarding perceived general health was 89.76% (SE=0.40) compared to the prevalence in the chronic pain subset of 65.64% (SE=1.06).
CAM Use	Of those with chronic pain who reported a high HRQOL, 35.24% (SE=1.20) stated they were CAM users. Of those who reported a low HRQOL, only 22.43% (SE=1.44) were CAM users. Of those with chronic pain who reported CAM use, 75.00% (SE=1.55) rated their HRQOL as high. Of those who reported that they did not use CAM, 61.45% (SE=1.31) rated their HRQOL as high.
Overall Quality of Life	
	Using the HUI3 (a multi-item questionnaire for HRQOL measurement), the mean HUI3 score for Canadians was 0.88 (on a scale of -0.36 to 1.00) compared to 0.64 for the chronic pain subset.
CAM Use and HRQOL	
Association of CAM use with HRQOL	CAM use was positively associated with high HRQOL, with CAM users having 1.48 (CI=1.16-1.88) times increased odds of reporting high HRQOl compared to non-CAM users.

9.1 Research Objective #1 and Research Objective #2

The first two research objectives will be combined for discussion purposes because, in both objectives, chronic pain, CAM use and HRQOL are described and examined using the sane data analysis processes. For Research Objective #1, prevalence rates, cross-tabulations and chi-squared tests are completed for each of the three groups. For Research Objective #2, multiple logistic regression models are completed to assess significant relationships between groups of variables. The first research objective was to describe the socio-demographic and health-related characteristics of individuals with chronic pain, including (1) a comparison of those who use CAM compared to those who do not use CAM, and (2) a comparison of those having a high HRQOL compared to those who have a low HRQOL. It was hypothesized that, for those with chronic pain, there would be differences in the variables selected between: (1) those with chronic pain compared to the general Canadian population, (2) those who use CAM compared to those who do not use CAM, and (3) those who report high HRQOL compared to those who report low HRQOL. The findings of this research study largely supported the hypotheses.

The second research objective was to examine these same variables for CAM use and HRQOL and explore significant relationships among groups of variables. It was hypothesized that the results of this study would be consistent with published literature using Statistics Canada populations health data, which reported that CAM use was positively associated with younger age, being married, being Caucasian, having a high level of education and having a higher income compared to those who do not use CAM. It was also hypothesized that high HRQOL would be positively associated with younger age, having a high level of education, having a high income and possessing a stronger sense of belonging to the community than those with low HRQOL. Again the findings of the current research study largely supported the hypotheses.

9.1.1 Chronic pain: characteristics of the individual. Using the conceptual framework, socio-demographic variables can be divided into non-modifiable and modifiable factors that work interactively to shape an individual's perception of HRQOL [62]. The characteristics of the individual available for this research study included age, sex, marital status, education and ethnicity, with all but education considered non-modifiable by the authors of this model. The data analysis in this research study demonstrated that those with chronic pain were more likely to be older, female, married, less educated and more likely to be Caucasian than the Canadian population in general.

Age. In the current study, the overall prevalence of living with chronic pain among individuals aged 12 or older in Canada was 15.5% (SE=0.32). In this study, the prevalence of chronic pain increased progressively in each age group category until the age category of 45 to 64 years, with more than 43% of those with chronic pain being in this age group. This is an interesting finding in that a lot of the research literature speaks of the general rates of increased pain with increased age but this middle-aged "bubble" needs to be examined more closely. An American study did concur with these specific results by reporting that the odds of chronic pain increased with age within each age group up to age 55 to 64 years, with more than a 3-fold increase in the odds of chronic pain observed in the three oldest age groups [16]. A large-scale European report also reported that those below 40 years of age appeared to have less chronic pain, whereas the 41 to 60 age group appeared to be more likely than others to suffer from chronic pain [12]. Several studies report that the very elderly who live independently report lower levels of chronic pain than adults between 50 to 65 years of age [5]. On the other hand, it is also a reality that pain levels may be highest for elderly people in institutions [5,117]. This is a significant issue that urgently needs some focused, standardized policy planning for more effective implementation of chronic pain assessment, prevention and management strategies in long term care facilities. The CCHS excludes residents who are not in privately occupied dwellings so no analysis could be completed on this topic in the current research study.

A possible explanation for these trends in chronic pain prevalence may have to do with the stresses that are typical of the middle-aged cohort, including working to develop their professional experience while raising children and caring for aging parents, to name just a few. For those whose life experience during those productive and challenging years involves an injury or a diagnosis of a disease, the development of chronic pain could have a much greater negative impact than for those who are older and more likely retired, with fewer demands on their resources, whether they be financial, physical or emotional. It is also possible that chronic pain is reported less in the older (i.e., great than 65) adult population cohort because older adults may believe that a certain degree of chronic pain is expected as the human body ages. [5]. As to the trend that the elderly in institutions suffer the most from chronic pain, a knowledge deficit exists regarding the care of the elderly in institutions, many of whom have issues with altered cognition and subsequent decreased ability to communicate effectively. More research is definitely required to determine appropriate treatments to ameliorate the suffering of this group of Canadians.

As to the overall trend of chronic pain increasing as people age, an American author suggests that the sedentary lifestyles of Americans may be a contributing factor to chronic pain development with increased age [118]. As people get older, they experience more chronic joint problems such as osteoarthritis, rheumatoid arthritis, and osteoporosis as well as other age-related chronic health conditions such as cancer, Parkinson's disease, diabetes, poor circulation, and inflammatory disease, all of which can lead to and worsen pain symptoms [119]. An evaluation of the factors affecting these trends in chronic pain prevalence by age group could be useful in planning chronic pain prevention and management strategies.

Sex. In the current research study, females were more likely to report chronic pain than males. Again, these results matched published literature on the topic. For example, one Canadian study of individuals aged 12 to 44 reported that the odds of chronic pain were about 20% higher in females than males [6] and another study found that chronic pain, whether listed as mild, moderate or severe, had a prevalence of 18% in females and 14% of males [3]. An Australian study reported some similar trends but also reported a finding not reported by others. These researchers stated that, for males, prevalence of chronic pain peaked at 27.0% in the 65 to 69 year age group and, for females, prevalence peaked at 31.0% in the oldest age group (80 to 84 years) [15].

Determining a rationale for these trends is a complex issue because of physical, behavioral and social contexts that differ between males and females [120]. It has been proposed that there are biological factors that have a significant impact, such as: (a) gender differences in how pain is “learned” or how different stimuli are interpreted, (b) gender differences in the transmission and modulation of pain signals and neuro-active agents, and (c) the vaginal canal as a route for invasion of agents that may cause hyper-analgesia in many body regions [121]. Psychological differences between females and males, such as the cognitive and emotional processing of pain as well as acceptable behaviors when in pain are also cited as significant factors [122]. Another factor may be the difference in the societal, family and occupational roles typically held by females (e.g., multiple primary-role responsibilities) and males, which may contribute to sex differences in pain [3].

Marital Status. This research study found that the marital rates for individuals with chronic pain were higher than the marital rates for those with no chronic pain (55.7%, SE=1.05) compared to 47.4%, SE=0.37). A recent study using CCHS data reported similar results and stated that, in both sexes and for all ages, chronic pain prevalence was lowest among those who were declared themselves single and highest in those who were divorced or separated [3]. An American study reported similar results, stating that single respondents (never married) were less likely to have chronic pain and divorced / separated respondents were somewhat more likely to have chronic pain than married respondents [123]. Some attempts have been made to explain any association between marital status and chronic pain, including a study that hypothesized that being married would provide a buffer to ameliorate the pain experience [124] but in fact the evidence in that study did not support their hypothesis.

Education. Regarding level of education (considered a modifiable factor), this research study found those with chronic pain had a lower level of education attainment, with 27.2% (SE=0.92) stating that they had less than secondary school graduation compared to 22.8% (SE=0.31) of those in the general population. Literature on chronic pain reports conflicting findings about the prevalence of chronic pain based on education levels. Some surveys provide data that support the hypothesis that those with lower education have an increased prevalence of chronic pain, such as the Statistics Canada (2008) report of older adults, which found that 41% of institutional residents and 30% of elderly households with chronic pain had less than high school completion, compared to 33% of institutional residents and 23% of household populations with chronic pain having completed high school education [5]. Another Canadian study using 2007/08 CCHS data (n=57,000) of respondents between the ages of 12 to 44 found that residents in households where no one had graduated from secondary school were almost twice as likely to report chronic pain, as those in households with at least one postsecondary graduate [6]. This report is consistent with a publication on Canadian waitlists for chronic pain, which states that 19.3% of university educated experience chronic pain compared to 46% of those with high school or less education [80]. In contrast to the above data, Meana *et al* reported that, based on their analysis of CCHS data from 2000-2001, a bivariate analysis showed that level of education was not associated with chronic pain for either of the sexes or age groups [3].

It is unclear what the rationale could be for these differing results. It is possible that there has been a change in the patterns of education attainment in recent decades such that education levels have become a more significant social determinant related to chronic pain prevalence than it was in previous decades. Alternatively, these differing results may simply reflect different research methodologies, either in the data collection or in data analysis and how data is categorized.

Ethnicity. The fourth non-modifiable variable in this model is ethnicity. The current study reports that, when comparing those with chronic pain to those with no chronic pain, there was a small but significant difference in ethnicity rates for respondents who are "white" compared to "visible minorities"; 84.0% (SE=0.91) vs. 82.6% (SE=0.40) respectively. The current research study did not analyze ethnicity in the same detail as some other publications using CCHS data. For example, a Statistics Canada report (2003) stated that, though ethnicity was not strongly associated with chronic pain prevalence, Asians had the highest chronic pain prevalence and Chinese males and females had the lowest rates in the over-65 age group for this age group and aboriginal Canadians had the highest prevalence in the under-65 age group [3]. This same report also stated that the CCHS data consistently showed that aboriginal persons were more likely to report chronic pain than those whose racial/cultural background was white. One explanation for this trend could be that aboriginal / first nations people have a higher prevalence of pain-related chronic conditions (back problems, migraine, arthritis, stomach / intestinal ulcers, anxiety disorders and mood disorders) than the general population in Canada [6,125].

9.1.2 Chronic pain: characteristics of the environment. The socio-demographic variables for this component that were available for analysis in the current research study included province of residence, area of residence (urban/rural), annual household income and sense of belonging to the community. The data analysis in this research study demonstrated that the two variables that had significant differences in the results were: (1) that those with chronic pain were more likely to have a lower income and (2) that those with chronic pain had a reduced sense of belonging to the community compared to the Canadian population in general. In this study, no significant difference was found between the prevalence of chronic pain from one Canadian province or territory to the other or between rural and urban areas. Because these results are different from some other research studies, a brief discussion of these two variables is warranted.

Province of residence. The data analysis in the current research study found a small but significant difference between provinces but these findings are slightly different than results found in other research studies. A study completed by Boulanger et al (2007) involved conducting two comprehensive surveys on the prevalence and treatment of chronic pain in Canada reported that the minimal pain prevalence was in Quebec (16% in 2004) and the maximum prevalence was found in the Atlantic provinces (36% in 2004).[9]. The current research study did concur, in general with another study that compared USA and Canadian CAM use that found that CAM use was higher in the west than the east [24]. One possible reason for the differences in these studies is that, by grouping provinces and territories together in the process of preparing data for analysis in different ways for the various studies, different results may be achieved.

Residence area. In the current research study, no significant difference was found in the prevalence of chronic pain between residents of urban areas compared to rural areas. However, a study of chronic pain prevalence in Ontario reported that chronic pain rates were associated with living in a rural area [126]. However, when depression was factored into the pain analysis, residence area no longer was significant. Likewise, a report using CCHS data found that, among males, chronic pain was more prevalent in rural areas [6]. More investigation would be required to analyze what factors would influence the change in chronic pain rates based on urban or rural residence.

Income. The results of the current research study demonstrate that the prevalence of chronic pain decreases as the level of income increases, which is consistent with Canadian studies that used the CCHS data set [5,6,22]. A very common risk factors for chronic pain reported in research literature is a low annual household income. In the document *What makes Canadians Healthy or Unhealthy,* published by the Public Health Agency of Canada, the author asserts that health status improves at each step up the income and social hierarchy and that the degree of control people have over life circumstances, especially stressful situations, and their discretion to act are the key influences affecting this trend [78]. Numerous studies demonstrate that the prevalence of chronic pain has an inverse relationship to income; that is, the higher the income, the lower the incidence of chronic pain [12-16]. A British study of chronic widespread pain and socio-economic status sheds further light on the topic by examining the inverse relationship between socio-economic status (SES) and the incidence of chronic widespread pain, suggesting that this relationship was connected with psychosocial factors [17].

The current research study does not have the capacity to discern whether annual income level is a result of or a cause of chronic pain. However, one can speculate as to reasons for this association. For example, lower paying jobs are often jobs that involve manual labour, which as often associated with increased risk of injury or repetitive stress disorder. Furthermore, those in the lower income bracket tend to have fewer financial resources and may be limited as to how best to treat their health issues. In some parts of Canada where poverty is particularly high, such as in the far north, there may be fewer health care providers, whether conventional or alternative therapists, and acute pain issues may lead to chronic pain issues because of inadequate access to health care services.

Sense of belonging to the local community. Studies have also been published as to the prevalence of chronic pain based on the presence of lack of social supports. In this current research study, a lower percentage of people with chronic pain reported feeling connected to the local community than those with no chronic pain. These results correspond with other published literature on the topic. The Canadian Women's Health Surveillance report (2004) provided further support for these results in its review of the data on 'tangible social supports', reporting that those who stated they had social supports 'all of the time' reporting the least chronic pain (13% males, 15% females) and those who stated they had social support 'none of the time' reporting the highest prevalence of chronic pain. (25% males, 39% females) [3]. Increased prevalence of lifelong victimization, emotional neglect and physical or emotional abuse by the family of origin have been reported to be significantly more frequent in those with chronic pain than in other patient groups and control groups [83,84].

9.1.3 CAM use: characteristics of the individual.

Age. Regarding CAM use and age, the current research study found that CAM users tended to be younger than non-CAM users. The odds of using CAM was significant for two age groups: 25 to 44 year-olds, who were more than twice as likely to use CAM (AOR 2.05, CI 1.51-2.76) and 45 to 64 year-olds, who were 1.35 times more likely (CI 1.02-1.78) to use CAM than those aged 65 or older (see Table 13). These results are similar to research studies in the USA, Britain as well as in Canada [22,23,127,128]. A report using CCHS data to analyze CAM use and chronic back pain stated that the mean age of CAM users was 45.2 years, which was 4.7 years lower than non-CAM users [23]. Possible explanations for this trend could be that younger individuals may be more likely to use Internet resources to explore treatment options and obtain information regarding CAM use for their specific source of chronic pain [129]. Furthermore, younger people may be more willing to explore alternative and unconventional approaches compared to older individuals.

Sex. Regarding CAM use and sex, the majority of published health literature on CAM use supported the results of the current research study, which reports that females are more like to use CAM than males. One American study stated that 24% of female patients with chronic pain used CAM compared to 10% of males [71] and another stating that 78.6% of CAM users for chronic pain were female [28]. An interesting study in Britain found that there were no gender differences in usage of general practitioners (MDs) for chronic pain but that females were significantly more likely to use CAM therapies than males (21.7% to 14.2%) [127]. Though the statistics regarding this trend are quite consistent from one report to the next, investigation of reports for CAM use within specific cohorts such as a particular chronic disease reveal that this trend is not necessarily found in each case. One example is a study of CAM use on individual with inflammatory bowel disease (n=380), which found no statistically significant difference between females and males for CAM use [129].

Reasons given for this trend of increased CAM use by females are varied. Females, in general, tend to be more health conscious than males, which may lead them to invest more time and resources into preventive healthcare [128]. It has also been suggested that females still tend to serve as the health care managers at home and thereby influence which services will be utilized by the family [128]. Further research into this observed trend is required to clarify the factors affecting these data results.

Marital status. In the current research study, the data showed that CAM users were more likely to be married or in a common-law relationship than non-CAM users *(p*<0.000). These results concur with one Statistics Canada report [23] but most of the reports on CAM use are silent on the topic of marital status when discussing CAM use for chronic pain. When a multiple logistic regression of CAM use was completed in the current research study, marital status was found to be not statistically significant.

One explanation for the finding of increased CAM use in married / common-law respondents could be that this group of respondents may have had partners with health insurance that covered CAM therapies as a workplace benefit and this may have increased their likelihood of CAM use compared to respondents who were single. One could speculate that the relationship between CAM use and being married / common-law became non-significant in the multiple logistic regression analysis because income was added to the model, reducing the potential effect of workplace health benefits.

Education. There is a great deal of unanimity regarding the level of education and prevalence of CAM use for chronic pain in the research literature. In the current research study, the odds of using CAM increased as the level of education increased throughout all categories and these results match other published literature on the topic [23,24,33,130]. In these publications, higher income and higher education were consistently associated with increased CAM use. It could be argued that CAM therapies are more commonly used in the more educated population because people with higher education levels tend to: (a) have improved access to information and knowledge of resources, (b) have higher salary jobs which in turn lead to more employment benefits such as health insurance for CAM, and (c) have improved knowledge and skills needed to problem-solve and cope with change, thus providing a sense of control over their circumstances [131].

Ethnicity. This current research study found no significant association between CAM use and ethnicity. Only a small number of studies on this topic were located, including one research study on this topic that reported results indicating that there was no significant association between CAM use and type of ethnic origin [132]. Another study compared CAM usage between USA and Canada and reported that, in the USA, members of certain racial or ethnic groups were less likely to use CAM but no comment was made regarding significant findings on this topic for Canadians [24].

9.1.4 CAM use: characteristics of the environment.

Province of residence. The results of the current research study indicated that CAM users were more likely to be from western Canada (Manitoba, Saskatchewan, Alberta and BC). However, when analyzed using multiple logistic regression, the relationship was only significant for Newfoundland & Labrador, which had about a third (AOR=0.31, CI= 0.13-0.68) the likelihood of using CAM as compared to northern Canada (as reference category) whereas both Manitoba (AOR=2.06, CI=1.16-3.61) and Saskatchewan (AOR=2.07, CI=1.24-3.44) had about twice the likelihood of using CAM (see Table 13). These results are similar to the results published both nationally and internationally.

A Canadian study of chronic back pain using NPHS data collapsed the data on CAM usage by province into three categories, Atlantic, Prairies and BC and found that BC residents were 1.4 times more likely and the Atlantic provinces were about half (0.5) as likely to use CAM compared to the reference category [23]. A study involving a comparison of American and Canadian CAM use reported that CAM use was significantly higher in western regions than in other areas, with 39% of CAM users from the west, 57% from central and 5% from the east [24]. A study of people with physical disabilities and CAM use in the USA found that CAM use was most prevalent in the west (30%), followed by the mid-west (20%), northeast (14%) and south (10%) [81].

One possible explanation for this finding could be that western Canadians and Americans are more closely physically located to south-east Asia and have a higher Asian population, which may result in an overall openness to therapies that have their origin in the far east and that may be considered "alternative" in the western medical model. Another possibility is that western Canadians in general may have a less conservative ideology, making it more feasible and attractive to exercise the option of exploring alternative methods to improve health status. These are mere suppositions and more research is required to explore this finding.

Residence area. The results of the current research study did not find a significant difference between CAM users and non-CAM users based on area of residence (p=0.063). There are relatively few studies that discuss this issue. A small qualitative research study (n=50) reported the rural CAM users reported that rural females used a greater variety of CAM therapies than urban females [133]. An Australian set of researchers who studied rural and urban females (n=10,638) divided their study population into three groups: urban, rural and remote and found CAM usage highest in rural females [134]. These authors did state that a limitation to their study was the short list of types of CAM therapists in their survey, which may have presented an incomplete picture of actual CAM use in rural and urban areas. This statement highlights the importance of accurate research methodology when planning research studies and also points to a limitation of secondary data analysis. In both the Australian study and in the current research study, the interpretation of results is limited to the questions as formatted by investigators with a different set of priorities than those of analysts of secondary data.

Income. A review of the literature on CAM use for chronic pain reveals that one of the most significant and common predictors of CAM use is income and this result was also found in the current research study. The majority of publications about CAM use for chronic pain report a direct association of increased CAM use with higher income [23-25,28,53]. This finding might be explained by the fact that those with higher incomes have more disposable income which can be spent on improving quality of life through various means, including the use of CAM therapies [58,71]. Another factor could be that individuals in most countries, including Canada, who are living with low incomes are less likely to have employment that offers private insurance benefits and therefore receive little or no financial reimbursement for CAM expenses.

Sense of belonging to the local community. The results of the current research study did not find a significant difference between CAM users and non-CAM users based on sense of belonging to the local community (p=0.169). CAM therapies typically refer to individual activities to manage pain, such as massage, chiropractic or acupuncture (just to name a few) that are typically implemented on an individualized basis with a trained CAM practitioner working with one client. However, CAM could in fact include therapies that are social in nature, such as support groups and other community based intervention programs [95]. These types of interventions are generally categorized as ‘psychosocial’ interventions, with the focus being on the individual’s readiness and capacity to engage in social activities that may improve their functioning while living with chronic pain.

9.1.5 Biological status. The CCHS Cycle 3.1 has a total of 46 variables related to chronic health conditions, which included 31 distinct chronic conditions. These were analyzed in two different ways in this research study: (1) a list of prevalence rates for the ten most common chronic conditions, as well as (2) a list of chronic conditions for which the highest percentage of respondents report having chronic pain. The overall prevalence rate of Canadians with a chronic condition in this study (using a CCHS derived variable) seemed very high at 68.47% (SE=0.347), particularly since one Canadian report speculates that only one third of Canadians have a chronic condition [135]. Few studies could be found that compare overall prevalence rates for all chronic conditions combined but rather focused on specific conditions or grouping of specific diagnoses. One Canadian study using CCHS data that reports findings similar to this current research study states that, among seniors, 81% of respondents reported having at least one chronic condition [136]. Research literature of the chronic health conditions associated with chronic pain present similar findings as the current research [3, 5-16]. A review of health care research on chronic pain reveals that, most often, research is specifically focused on a specific disease process or health issue that has caused the chronic pain. In recent years, there have been changes in the concept of chronic pain causation in North America in that chronic pain, in the past, was thought to have a psychogenic or somatogenic cause, whereas recent technological advances have provided evidence of a complex interaction of nervous, immune, and endocrine system functions that may be responsible for the development and complexity of the chronic pain experience [18].

A Canadian study using CCHS data from 2001 to 2005 focused specifically on CAM use by people with a chronic disease and reported results similar to the current research study [137]. In the current research study, CAM use was highest for people with back problems (65%), arthritis / rheumatism (43%) and ‘allergy – non-food’ (43%). The Statistics Canada report (2010) using CCHS data found that the most commonly reported CAM therapy overall was massage therapy with a 69% prevalence rate [137]. These results are not surprising since massage therapy is known to be an effective CAM therapy for back pain [53,54].

In the current study, prevalence rates of CAM use were also higher for those with migraines, food allergies and mood disorders. However when logistic regression models were completed and the most parsimonious model selected, only two conditions remained with significant odds ratio for CAM use; those with back problems were more than twice as likely to use CAM (AOR=2.34, CI=1.90-2.88) and those with non-food allergies were 1.48 (CI=1.20-1.82) times as likely to use CAM than those who did not have these conditions. It would be interesting to conduct further analysis of the data set of the current research study whether certain types of chronic conditions are more likely to be associated with specific types of CAM therapies (e.g., back pain with massage; allergies with herbalist or homeopathy).

9.1.6 Symptoms. There is a vast amount of literature on the topic of chronic pain, and there is an urgency to gain an understanding of the factors associated with chronic pain as its impact on Canadians becomes more apparent. As previously stated, the prevalence of living with chronic pain among individuals aged 12 or older in Canada in this research study was 15.5% (SE= 0.32). This prevalence rate is consistent with other Canadian reports, some of which analyze similar Canadian population health data sets [3,5,6], but is lower than other Canadian research publications, which report prevalence rates ranging from 14 to 29% [8-11]. As discussed earlier, a review of the literature reveals that the definition of chronic pain varies from one study to the next, making comparison of research studies more complicated, and this may be the reason for the broad range of prevalence rates.

In this research study, the variable available within the CCHS to measure symptom status was the level of pain intensity: mild, moderate or severe. More than 50% of those with chronic pain rated their pain as moderate, with over 30% rating their pain as mild and only 16% rating their pain as severe. Monitoring trends in chronic pain intensity is important not only from a quality of life perspective but also in assessing the service needs of those living with chronic pain. A Statistics Canada report on chronic pain and dependency associated with chronic conditions suggests that effective pain management may reduce the amount of dependency associated with chronic conditions among Canadian seniors, and ultimately, enhance their ability to continue living in the community [136].

Regarding CAM use and symptom status, in the current research study, CAM users reported a lower prevalence of severe pain compared to non-CAM users and the opposite was true for those with moderate pain, with more CAM users than non-CAM users reporting moderate pain. One could speculate that those with severe pain would be incapacitated to such an extent that taking the initiative to engage in CAM therapy would simply be too challenging. Self-reports of pain intensity are considered the 'gold standard' in assessing pain outcomes because they reflect the inherently subjective nature of pain [138] but it is beyond the capacity of a cross-sectional survey to evaluate causality in the relationship of CAM use with pain intensity. When a logistic regression was completed, the results showed that there was no statistically significant relationship between severity of pain and CAM use 1see Table 12). A more rigorous investigation into the relationship between CAM use and chronic pain could serve to plan inter-professional collaboration in the health care services that are most effective for the different types of pain experience.

9.1.7. Functional status. A World Health Organization Bulletin (2003) reports that musculoskeletal conditions cause more functional limitations in the adult population than any other group of disorders and that they are the most common cause of severe long-term pain and physical disability, affecting hundreds of millions of people around the world [139]. In the current study, the CCHS question available to measure functional status was called "restriction of activities due to pain", with a series of four choices ranging from "none" to "most". This question was only asked of the people that had already stated they usually experience some level of pain or discomfort. Nearly 40% of respondents with pain rated it as preventing "some" or "most" of their activities, reinforcing the research literature that states that the burden of disability related to chronic pain is really very significant [3,,5-11].. As previously discussed, the current research study found that back pain and arthritis / rheumatism were the two most prevalent chronic conditions in the population and both are associated with issues with mobility, which leads to greater dependence issues [136]. WHO reports that musculoskeletal complaints make up 10-20% of primary care consultations and that the impact of musculoskeletal disorders on individuals and society is expected to increase dramatically [139]. Examining these trends is imperative in order to plan for effective health care service delivery.

Regarding CAM use and functional status, in the current research study, CAM users were more likely to report that pain restricted "a few" or "some" activities than to report that pain restricted "none" or "most" activities. Also, n<u>on</u>-CAM users were more likely than CAM users to report that pain prevented "most" activities . However, these relationships were found to be non-significant when logistic regression models were completed. The prevalence rates of CAM use could be related to mobility issues as discussed above, in that a higher level of restriction of activities may impede a person's ability to get to a site where CAM services are offered but this is speculative.

9.1.8 General health perceptions. The CCHS Cycle 3.1 contained not only a general question regarding the respondent's self-perceived overall health rating (including physical, mental and social well-being) but also included the Health Utilities Index 3 (HUI3) as well as the SF-36, two HRQOL assessment tools that have been used in Canada and internationally to measure HRQOL [52]. The CCHS Cycle 3.1 (2005) was developed and implemented in such a manner so that the data collected from Subsample 1 (which had the HUI3 questions as part of the questionnaire) would use bootstrap weights to provide nationally representative weighted estimates. This was not possible for the results of the SF-36 questionnaire because it was considered optional content in Cycle 3.1. However, the ability to analyze HRQOL using both a single-item approach and a multi-item approach provided an interesting dimension for analysis.

Using the single-item question on perceived HRQOL, the descriptive statistics demonstrated that those with high HRQOL tended to be under the age of 65, more likely to be in a married or common-law relationship, attained a higher level of education attainment, a higher income and a stronger sense of belonging to the community than those with a low HRQOL. The results also demonstrated rather predictable results for the types of chronic conditions that, in general, have a lesser effect on HRQOL, such as allergies, as opposed to conditions such as emphysema and COPD, which have a significant negative impact on HRQOL. Few research studies could be found that compare a comprehensive list of chronic health conditions by HRQOL; most focus on a particular diagnoses of similar set of diagnoses. However, a comprehensive research study was published in 2005 that examined the impact of multiple chronic conditions on HRQOL for populations in eight different countries in Europe, Japan and USA, concluding that arthritis, chronic lung disease and congestive heart failure had the most significant negative effect on HRQOL and hypertension and allergies had the lowest effect on HRQOL [140]. These results correspond closely to the results of the current research study.

In the current research study, the results to the single-item question regarding HRQOL were analyzed from a number of different perspectives, with some very interesting results. First, data could be compared for the chronic pain subset compared to those with no chronic pain. These results indicated that the prevalence of high HRQOL in the group with no chronic pain was much higher than with chronic pain (89.8%, SE=0.40 vs. 65.6%, (SE=1.06) (see Table 7).

Secondly, the HRQOL for those with chronic pain who used CAM was compared to those who did not use CAM. For CAM users, 75.0% (SE=1.55) of CAM users rated their HRQOL as high whereas only 61.5% (SE=1.30) of non-CAM users rated their HRQOL as high (X^2=9.89, p<0.000) (see Table 9).

Thirdly, data could also be analyzed from the perspective of participant ratings of HRQOL as high or low for those with chronic pain (using the single-item approach). For those who rated their HRQOL as high, 35.24% (SE=1.20) were CAM users whereas for those who rated their HRQOL as low, only 22.43% (SE=1.44) were CAM users (X^2=89.25, p<0.000). From every perspective, CAM users were more likely to rate their HRQOL as high than non-CAM users. The evidence is compelling to argue that there is a positive relationship between CAM use and HRQOL.

It is important to note that the results of the current research study do not provide any evidence of a causal relationship between CAM and HRQOL. Further research is required to examine whether CAM use actually improves the HRQOL for those with chronic pain or whether it is those with an inherently high HRQOL who tend to use CAM more than those with a low HRQOL.

9.1.9 Overall quality of life. In the current research study, data regarding HRQOL could also be analyzed using the results of the HUI3, a preference based HRQOL measurement tool that is widely used to measure HRQOL for those living with chronic pain. Only a supplementary analysis was completed using the HUI3 because two of the questions that were considered vital to this research study were actually part of the HUI3 questionnaire and this would have caused errors in the logistic regression models. These two questions were regarding the level of pain intensity and the restriction of activity due to pain. However, the results that could be obtained for the HUI3 were still interesting to the discussion in that the preliminary results matched the results of the single-item question so closely. For the general population, the HUI3 mean score was 0.88 on a scale of 0.00 to 1.00, which is remarkably similar to the finding of 89.8% of respondents rating their HRQOL as high on the single-item approach. Similarly, the HUI3 mean score was 0.63 for those with chronic pain compared to the finding of 65.6% of respondents in the chronic pain subset rating their HRQOL as high on the single-item approach. Though this is not the focus of this research study, a further analysis of the associations between scores on the HUI3 (a multi-item approach and scores using the global question of self-perceived health (a single-item approach) could offer new insights to this topic.

9.2 Research Objective #3

The third research objective was to compare the HRQOl of individuals with chronic pain who use CAM to those with chronic pain who do not use CAM, controlling for the socio-demographic and health-related variables. The discussion has already highlighted many of the findings to satisfy this objective. The most significant result was that CAM use was positively associated with high HRQOL, with CAM users being 1.48 (CI=1.16-1.88) times more likely to report their HRQOL as high compared to non-CAM users . This result is significantly difference from the few studies that were located on this topic. The study based in Mexico [55] found no significant relationship between CAM use and HRQOL, but this study differs significantly from the current research study in that a much larger proportion of the study population used a specific biological remedy that was a local herbal product and this may have skewed the results A study based in Sweden did have similar findings [38] and a third study from the USA also concluded that certain types of CAM were associated with an improved HRQOL [37]. More research needs to be initiated to see whether comparable results for the current research study could be replicated.

10.0 Study Limitations

There are several limitations to the current research study. The first is that the level of chronic pain may be under-estimated because of the exclusion of Canadians residing in institutions, on Indian reserves or Crown land, in the military or in some remote areas. Furthermore, the survey question on pain and discomfort does not provide clarity regarding the duration or frequency of pain and this may have had an impact on how the respondents answered this question. Also, the CCHS list of chronic conditions is not inclusive of all possible diagnosis and the responses solicited regarding chronic conditions were self-reported and not verified by other sources.

Specific limitations regarding CAM use and HRQOL need to be identified. First, there is no data in the CCHS available to link specific chronic conditions with specific CAM therapies. The current research study did not evaluate the possible interactive relationship of medication use or health care utilization with CAM use or HRQOL, which would have resulted in a more robust analysis of the research topic. Finally, a cross-sectional survey cannot provide any analysis of causal relationships between variables, most importantly on CAM use and HRQOL.

11.0 Knowledge Added / Knowledge Translation

The current research study adds to the developing knowledge base about CAM use and HRQOL in the context of living with chronic pain. Furthermore, it provides information about significant socio-demographic and health-related characteristics and ultimately provides a deeper understanding of the positive association between CAM use and HRQOL for Canadians experiencing chronic pain. The personal, societal and economic burden of chronic pain in Canada is significant; examining these issues may assist in planning the most appropriate and efficient means to allocate the limited financial and human resources within the Canadian health care system.

Identification of trends obtained from analyzing population health data sets such as these could assist in the development of policies and programs to more effectively prevent and manage the complex health care issues we encounter in community health services today. Studies such as these set the groundwork for completing more specialized research on these same topics, but with the opportunity to design the research methodology rather than to conduct a secondary data analysis where the questions have already been formulated and the data has been collected.

The following list identifies strategies that could be applied using the knowledge gained from the current research study and that, translated into actions, could improve the quality of life for Canadians living with chronic pain.

11.1 Further research on CAM use and HRQOL for those with chronic pain

The current research study provides benchmarks upon which more detailed research studies on this topic could be developed. The key findings of this research include significant socio-demographic and health-related characteristics associated with CAM use and with high HRQOL for Canadians with chronic pain. Because the data is from a cross-sectional survey, no trends can be articulated. A longitudinal randomized-control trial (RCT) that would monitor specific types of CAM therapies as well as ongoing reviews of HRQOL for research participants with chronic pain over the span of months and years could build on the knowledge acquired in the current research study. It could also provide valuable information for policy planners, educators and health care providers who are working to improve treatment strategies for those with chronic pain.

A study in the United States of veterans with chronic pain (n=401) published in 2009 involved a longitudinal RCT of CAM therapy effectiveness, measured in three dimensions: pain-related disability, pain intensity and depression. The study showed that using a collaborative approach for pain treatment assistance that involved four types of CAM therapies (massage, chiropractic, acupuncture and herbal medicine) resulted in modest but statistically significant improvements in the outcome measures [141]. A similar study could be completed using an established pain clinic in Canada that would be willing to broaden the inter-disciplinary treatment options to patients to determine the impact of CAM use on HRQOL. Other interesting research studies could involve: (1) the effectiveness of specific CAM modalities on HRQOL for specific chronic conditions, (2) the effectiveness of CAM therapies to decrease both pain intensity and restriction of activities related to chronic pain (since these two variable were found to have major differences in the HRQOL for CAM users in the current research study), and/or an evaluation of the cost-effectiveness of CAM therapies compared to conventional treatment strategies for those with chronic pain.

In order to achieve these research goals, it is necessary to increase funding for quality chronic pain research in Canada. The Canadian Pain Society at its 2009 annual meeting, reported that the Canadian Institute of Health Research (CIHR) funding for pain research in the previous year was less than 1% of the funding budget and that only six randomized controlled trials in pain had been published since 1999 [142]. Also, the CPS referred to statistics from Statistics Canada data of 2007 showing that the total spent on research and development in Canada in health care was $6.3 billion, yet the total spent on pain research and development was 0.25% of that amount. Recent research studies provide evidence of the effectiveness of certain CAM therapies and of the increased usage of CAM by persons with chronic pain. However, nearly every publication on the topic mentions the need for higher quality and more sophisticated research in this area. More work is also needed to standardize the quality of the care provided by CAM practitioners.

11.2 Health policy and planning

An important application of data analysis using Statistics Canada health surveys is to monitor trends in the health of Canadians as well as trends in health care utilization. The current research study could serve as a baseline for monitoring socio-demographic and health-related characteristics related to CAM use and HRQOL for Canadians living with chronic pain. The goal for the analysis of population health data needs to be focused on providing recommendations to health policy planners in all regions of Canada to explore the implementation of changes that are not only beneficial to the health of Canadians but that could prove to be cost-effective by preventing acute complications requiring hospitalization. This is especially true for the management of chronic conditions.

It is important to consider the highly significant association of HRQOL with both pain intensity and restriction of activities in the current research study. The development and implementation of a broad spectrum of treatment strategies, including CAM therapies, to assist in the reduction both of pain intensity and in the restriction of activities due to pain could have a significant impact on the overall health of Canadians with chronic pain.

Another significant finding of the current research study is that there was a modest but significant positive association between CAM use and high HRQOL. This result could in turn be used as a rationale for a change in public policy regarding the structure of pain clinics in Canada. The most efficacious and cost-effective, evidence-informed treatment for persons with chronic pain is through an interdisciplinary pain rehabilitation program [143]. An inter-professional team could include some of the following types of services: physiotherapy, occupational therapy, pharmacy, psychotherapy, family counseling, CAM therapies such as massage, acupuncture, and yoga, as well as dieticians and kinesiology [28,144]. This multi-disciplinary approach is formally endorsed by the Colleges of Physicians and Surgeons of Alberta, New Brunswick, Manitoba and Ontario [6] as well as by the World Health Organization [1]. Statistics Canada reports that access to a primary health care team reduces emergency room visits, improves coordination of care, reduces risk of hospitalization, and has a positive influence on Canadians' perceptions of the overall quality of the health care system [145].

11.3 Education

There are opportunities to use the results of the current research study in two types of education; education in Canadian universities regarding health care services and education for health care providers involved in the prevention and treatment of chronic pain. An evaluation of the research literature demonstrates an increased interest in chronic pain, CAM use and HRQOL in recent years, and the current research study adds to this body of knowledge. The recent trends in each of these three areas provide valuable knowledge to students in the health sciences regarding the aetiology of chronic pain, treatment strategies (including CAM therapies and their effectiveness for different chronic conditions) as well as the importance of evaluating HRQOL in health care. These concepts need to be discussed in university classrooms so that students are apprised of the importance of current research and its application in health care service delivery.

There is a need to educate health care providers on the effectiveness of patient-centered approaches to managing chronic pain and improving HRQOL. Professional education must be inter-professional and evidence-informed [86]. There is a need to develop regular educational seminars for primary care providers on current issues in chronic disease prevention and management, including the effectiveness of specific CAM therapies and strategies to improve HRQOL, which will then strengthen their capacity to treat patients with chronic pain more effectively.

The current research study provides valuable information to health care providers of the socio-demographic and health-related risk factors for chronic pain, including increased age, lower income, and lower levels of education. Additionally, it provides data on factors associated with high HRQOL, including chronic conditions linked to high and low HRQOL. This information could be directly applied to educate health care providers on effective strategies for planning and implementing treatment modalities to population cohorts most in need of prevention and management of their chronic pain. In a model of care that has a broader biopsychosocial perspective for assessment and treatment, pain treatment becomes more patient-centered and a variety of treatments are proposed based on a thorough assessment of the patient within the context of the family and community.

11.4 Treatment Strategies

Though the current research study offers only a snapshot of the socio-demographic and health-related characteristics of Canadians with chronic pain, their CAM use and their HRQOL, it is possible for the research results to inform treatment strategies. Together with other current literature on the research topic, opportunities exist to modify and develop treatment strategies for the most effective allocation of limited social and health care resources [50].

The current research study provides information of the positive association of CAM use and HRQOL. Though it does not provide any causal information, the results of the current research are consistent with other research literature that can discuss trends because their study designs support this type of data analysis. Research supports the effectiveness of individuals taking ownership of their own health and wellness, especially for chronic disease management, instead of relying on the health care system to "fix" their health care issues [143]. Particularly in pain management, where "cures" are often elusive and the pain may at best only be ameliorated, an educational process where patients and their families are integrally involved in the decision-making regarding medical and CAM therapies could be very effective at improving HRQOL [144]. Effective strategies include: integration of evidence-informed CAM therapies into pain clinics, matching self-management opportunities to individuals based on differences in coping style and abilities and involving patients in decision-making regarding their care needs [86,95,145].

11.0 Conclusion

The current research study is the first comprehensive nationally representative investigation of the relationship between CAM use and HRQOL for Canadians living with chronic pain. The key findings indicated that there were specific characteristics of the individuals and the environment that are important for understanding both CAM use and HRQOL. Furthermore, the data analysis demonstrated that CAM use is positively associated with a high HRQOL.

personal and societal costs. As medical costs escalate, it is becoming increasingly important to prioritize health care resources to Canadians. The development of a broad spectrum of chronic pain prevention and management strategies, including evidence-informed CAM therapies that are made accessible for all population groups, could prove to be effective to improve HRQOL in the long run, and it may decrease the need for more costly pain management interventions as patients' health services needs escalate. Chronic pain is closely linked to chronic heath conditions, many of which have no known cure. Therapies, in these cases, need to be focused on improving and preserving quality of life and CAM therapies may offer some valuable techniques and services to achieve this goal.

In summary, it is likely that a paradigm shift is required, not only among health professionals but among citizens of Canada. A small but incremental shift to self-care from medical cure is required, where individuals take increased responsibility for maintaining their own health and preventing illness and where health care providers promote these activities. It is hoped that the results of this research study will be of some benefit to health care practitioners and policy planners in Canada today.

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HEALTH RESEARCH ETHICS BOARD (HREB)

CERTIFICATE OF FINAL APPROVAL FOR NEW STUDIES

Delegated Review

PRINCIPAL INVESTIGATOR: Ms. L. Friesen	**INSTITUTION/DEPARTMENT:** UofM / Community Health Sciences	**ETHICS #:** H2013:245
APPROVAL DATE: June 13, 2013	**EXPIRY DATE:** June 13, 2014	
STUDENT PRINCIPAL INVESTIGATOR SUPERVISOR (If applicable): Dr. R. Chase		

PROTOCOL NUMBER: NA	**PROJECT OR PROTOCOL TITLE;** The Relationship Between Complementary and Alternative Medicine (CAM) Use and Health-Related Quality of Life (HRQOL) Among Individuals Living with Chronic Pain: Results from a Nationally Representative Sample
SPONSORING AGENCIES AND/OR COORDINATING GROUPS: NA	

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THE FOLLOWING ARE APPROVED FOR USE:

Document Name	Version(if applicable)	Date

Protocol:

Proposal received June 10, 2013

Consent and Assent Form(s):

Other:

Data Capture Sheet received June 10, 2013

CERTIFICATION

The above named research study/project has been reviewed in a ***delegated manner*** by the University of Manitoba (UM) Health Research Board (HREB) and was found to be acceptable on ethical grounds for research involving human participants. The study/project and documents listed above was granted final approval by the Chair or Acting Chair, UM HREB.

HREB ATTESTATION

The University of Manitoba (UM) Research Board (HREB) is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement 2, and the applicable laws and regulations of Manitoba. In respect to clinical trials, the HREB complies with the membership requirements for Research Ethics Boards defined in Division 5 of the Food and Drug Regulations of Canada and carries out its functions in a manner consistent with Good Clinical Practices.

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