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Exploring unmet healthcare needs, healthcare access, and the use of complementary and alternative medicine by chronic pain sufferers- An analysis of the National Population Health Survey

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A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Nursing

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Abstract

Background: Chronic pain is a condition nurses encounter in their practice often; estimated to affect 1 in 5 Canadian adults, resulting in significant disability, a deleterious impact on health and quality of life, and a large financial and operational burden on the health care system. It is a complex and multifactorial phenomenon that despite research efforts remains poorly understood. Consequently, the focus of chronic pain treatment targets the *management* of pain to improve quality of life and reduce suffering as much as possible, rather than a curative approach. Chronic pain has been recognized as one of the most pervasive and challenging conditions to manage by health professions. Subsequently, the treatment of chronic pain is considered an effectiveness gap, or a clinical area where current conventional treatments are not fully effective. As a result, more chronic pain sufferers are turning to Complementary and Alternative Medicine (CAM) to manage their pain, the use of which has increased significantly over the past few decades. Literature suggests unmet healthcare needs can motivate CAM use, and this is directly related to the concept of healthcare access. To the researcher's knowledge, the relationship between CAM use, unmet healthcare needs and healthcare access has not yet been studied within the context of Canadians with chronic pain.

Objectives: The purpose of this study was to explore the relationship between healthcare access, unmet healthcare needs, and CAM use in adults with chronic pain.

Methods: A secondary analysis of data from Cycle 9 of the National Population Health Survey. The Behavioural Model of Health Services Utilization was used as a theoretical lens to conduct a binary logistic regression analysis and related descriptive statistics of the sample.

Results: When controlling for demographics and health status indicators, the presence of unmet healthcare needs was found to predict the use of complementary and alternative medicine ($p < 0.001$). Healthcare access was not statistically significant in the model. Other statistically significant predictors of CAM use in adults with chronic pain were sex, education, income, employment, and restriction of activities.

Conclusion: Understanding healthcare access and unmet healthcare needs is critical to developing service improvement strategies. This study indicates that people may be engaging in CAM due to shortcomings of the conventional health care system. This has implications for policymakers and healthcare professions to develop strategies to improve chronic pain management. These findings also support the necessity of more research into establishing safe and effective CAM practices via regulatory standards and a sound evidence base to support these therapies.

Keywords

Healthcare access, unmet healthcare needs, complementary and alternative medicine, chronic pain, NPHS

Co-Authorship Statement

Publications resulting from this thesis will be co-authored by Dr. Richard Booth.

Dedication

I dedicate this thesis to my hero, John Edward LaChance.

Acknowledgements

There are so many people I feel grateful towards for helping to complete this work. I would first like to express my utmost gratitude to my thesis supervisor, Dr. Richard Booth, for his continuous support, encouragement, and advice in completing this graduate degree. I am so thankful that I had the opportunity to learn from him. His advice and motivation have made a lasting impression and positively influenced my future aspirations as a nurse researcher, educator and innovator. I would also like to extend my thanks to Nathalie Goodwin and her team at the Research Data Centre at Western for their support in navigating me through the intricacies of Statistics Canada survey data. I have been blessed with such a supportive network of family and friends, who I thank for their understanding, encouragement and support. Darryl, thank you for your unwavering support, motivation, and reassurance. I could not have done this without you.

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Chapter One

Introduction

Chronic pain is a common phenomenon nurses treat in Canada, estimated to affect 1 in 5 adults (Schopflocher, Taenzer, & Jovey, 2011). This condition results in significant disability, a deleterious impact on health and quality of life, and a large financial and operational burden on the healthcare system (Barrie & Loughlin, 2014; Duenas, Ojeda, Salazar, Mico, & Failde, 2016; Schopflocher, Taenzer, & Jovey, 2011; Wilson, Lavis, & Ellen, 2015). Although there have been conflicting opinions of how to define chronic pain, a comprehensive review arrived at the following accepted definition:

> Pain that persists 6 months after an injury and beyond the usual course of an acute disease or a reasonable time for a comparable injury to heal, that is associated with chronic pathologic processes that cause continuous or intermittent pain for months or years, that may continue in the presence or absence of demonstrable pathology; may not be amenable to routine pain control methods; and healing may never occur (Manchikanti, Singh, Datta, Cohen, & Hirsch, 2009, p.35).

Chronic pain is a complex and multifactorial phenomenon that remains poorly understood. Consequently, the focus of treatment in chronic pain is the *management* of pain to improve quality of life and reduce suffering as much as possible, rather than a curative approach (Phillips, 2008). Recognized as one of the most pervasive and challenging conditions to manage by the healthcare community (Meana, Cho, & DesMeules, 2004), the difficulty in treating chronic pain arises from the multidimensional health effects that occur contemporaneously with the primary condition (Phillips & Schopflocher, 2008). These health effects include mental health issues such as

depression and anxiety, and commonly, physical disability that can result in negative implications on social life, employment, and activities of daily living (Phillips, 2008). Chronic pain has also been found to be associated with the worst quality of life compared to other chronic diseases such as chronic lung or heart disease (Choinière et al., 2010). At the societal level, it has been estimated that $6 billion is spent annually in direct costs associated with chronic pain, and a corresponding $37 billion toward indirect costs related to absences from work in Canada (Choinière et al., 2010; Phillips & Schopflocher, 2008). Annually, the direct and indirect costs associated with chronic pain are greater than the combined economic burden of both cardiovascular disease and cancer in Canada (Choinière et al., 2010; Phillips & Schopflocher, 2008).

Due to the complex nature of chronic pain, the management of this condition considered an *effectiveness gap*, or a clinical practice area where available conventional treatments are not fully effective (Fisher et al., 2004). Key challenges to effective management of chronic pain that have been identified by health care providers in the literature include: a lack of knowledge, training, and supportive tools to assess and treat chronic pain; a lack of interprofessional collaboration; a lack of awareness that chronic pain represents an important clinical problem requiring treatment; difficulties in accessing the required health care professionals and services; and the continued perception of patients as recipients rather than active participants in their health care (Lalonde et al., 2015). Another identified effectiveness gap in the treatment of chronic pain relates to the perception or experience of pain by the individual and the response or understanding by the treatment team. Woolf et al. (2004) found that while physicians commonly believed perceived chronic pain to be well managed in their patient caseloads,

high levels of health care dissatisfaction and under-treatment of chronic pain symptomology was reported from their patients. Further, discrepancies in the perception of pain between patients and health care providers (including nurses) has led to reports of stigmatizing activities directed toward chronic pain patients (Carroll, 2018), as well as health care providers perceiving that patients were exaggerating or being disingenuous about their pain (Lalonde et al., 2015). As a result of these challenges, chronic pain often goes under-treated and levels of patient satisfaction related to chronic pain treatment are commonly poor (Lalonde et al., 2014; Mafi, McCarthy, Davis, & Landon, 2013).

Due to the frequently experienced poor levels of patient satisfaction and under-treatment of chronic pain, it has been found over the last few decades that chronic pain sufferers have been increasingly turning to various Complementary and Alternative Medicine (CAM) approaches to manage their care (Andrews & Boon, 2005; Canizares, Hogg-Johnson, Gignac, Glazzier & Bradley, 2017; Fisher et al., 2004; Institute of Medicine (US) Committee on the Use of Complementary and Alternative Medicine by the American Public, 2005; Rosenberg et al., 2008). CAM refers to:

> A variety of different medical systems and therapies based on the knowledge, skills and practices derived from theories, philosophies and experiences used to maintain and improve health, as well as to prevent, diagnose, relieve or treat physical and mental illnesses. CAM has been mainly used outside conventional healthcare, but in some countries, certain treatments are being adopted or adapted by conventional healthcare (Falkenberg et al., 2012).

Currently, there are different ways that CAM therapies can be classified. The American Federal agency for scientific research on CAM (National Centre for Complementary and

Integrative Health [NCCIH]) has classified CAM therapies into three groups: (a) natural health products that are available to consumers (herbs/botanicals, vitamins, minerals, probiotics, etc.); (b) mind and body practices, which are procedures or techniques that are given or taught by a trained practitioner (osteopathic manipulation, meditation, massage therapy, yoga, acupuncture, etc.); and, (c) other complementary health approaches that do not fit into the two groups above (traditional healers, traditional Chinese medicine, homeopathy, naturopathy, etc.) (National Center for Complementary and Integrative Health, 2016).

High rates of CAM use have been demonstrated in chronic pain patients, with chronic pain being shown to double the odds of seeking an alternative to conventional medicine (Khady Ndao-Brumblay & Green, 2010). Although the prevalence of CAM use is rising in both chronic pain sufferers and the general population (Fleming, Rabago, Mundt, & Fleming, 2007; Frass et al., 2012; Poynton, Dowell, Dew, & Egan, 2006), reliable evidence to support many CAM therapies is currently lacking. Due to this knowledge gap, Fischer et al. (2014) identified several areas related to CAM use in need of further investigation. A primary aspect outlined by Fischer et al. (2014) is the need to better understand the prevalence and complexion of CAM use by the general population. Further, Fischer et al. (2014) has suggested that a range of psychosocial, environmental, and efficacy aspects of CAM use also need to be studied, including but not limited to: needs and attitudes of CAM users and providers; safety of CAM; comparative effectiveness against conventional medicine to support clinical decision making and health policy; models of CAM integration into mainstream healthcare; and, the effects of

context to better understand how CAM use is influenced by non-treatment factors (Fischer et al., 2014).

The effects of context as related to CAM usage by pain suffers, including aspects related to a patient's perceived unmet healthcare needs (UHN), have been found to motivate CAM use (Jakes & Kirk, 2015; Piérard, 2012; Ronksley et al., 2013). The concept of UHN has been described as a phenomenon whereby the presence or absence of health care services is not the primary construct of interest; rather, an individual's perception relating to the quality (or lack thereof) of care they received is paramount (Nelson & Park, 2006). For instance, it is possible that individuals who use health care services find their needs not met due to increasing awareness of the inherent limitations of the offered services (Nelson & Park, 2006). In past research, the concept of UHN has been linked to both demographic variables such as age and gender, and also healthcare system utilization constructs like acceptability (attitudes toward illness, health care providers or the health care system), availability, accessibility and social support (Nelson & Park, 2006). Related to UHN, the concept of healthcare access (HA) has become a major issue within the chronic pain population in Canada (Morley-Forster, 2007; Peng et al., 2007). Currently, it is not uncommon for patients to experience wait times of over one year to access a pain clinic or specialist care (Morley-Forster, 2007; Pagé, Ziemianski, & Shir, 2017; Peng et al., 2007; Poulin et al., 2017). Further, Canadians without access to a primary healthcare provider are more than twice as likely to report difficulties accessing routine care in general compared to those with a regular provider (Sanmartin & Ross, 2006).

While the concepts of UHN, HA, and CAM use have been subject to preliminary exploration, there is still a significant lack of understanding regarding the connection between these variables in the context of adults experiencing chronic pain, and whether unmet healthcare needs and healthcare access are predictive of CAM utilization in this population. Further, no population-level study has explored the potential relationships between individuals who use CAM (and their specific demographics) and perceptions of UHN. Understanding UHN and HA are critical to developing service improvement strategies, specifically in the healthcare sector (Gill & White, 2009). Therefore, the purpose of this study was to explore the relationship between UHN, HA, and CAM use in adults with chronic pain in Canada using the 2010-2011 National Population Health Survey (NPHS).

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Chapter Two

Manuscript

Background and Significance

The assessment and management of pain has always been a core function of the nursing role (Lewandowski, 2004). With a prevalence of 20% in the Canadian adult population, chronic pain is often associated with a wide variety of health issues, and nurses care for patients suffering from chronic pain in most, if not all clinical settings (Barrie & Loughlin, 2014; Lewandowski, 2004). The burden this disease generates is immense, affecting multiple aspects of a person's life including physical, mental and emotional health; quality of life; family dynamics and personal relationships; employment and career opportunities; as well as the healthcare system, with higher service use and associated financial costs (Barrie & Loughlin, 2014; Duenas et al., 2016; Schopflocher et al., 2011; Wilson et al., 2015).

Nurses present a unique skillset and have a key role to play in chronic pain management by working as part of interdisciplinary teams, and contributing a holistic care approach, clinical expertise, and leadership (Dyscik & Furnes, 2012). A holistic approach to the treatment of chronic pain is critical, given various psychosomatic, biological, psychological, social, and spiritual components that contribute to the experience of pain, and must be considered in care planning (Dyscik & Furnes, 2012). A contemporary holistic chronic pain assessment should include a range of assessments related to how the patient conceptualizes pain and their wishes toward its management, including the potential use of alternative strategies like Complementary Alternative Medicine (CAM) (Carroll, 2018; Flanagan, 2018; Lewandowski, 2004). Unfortunately,

there is evidence that holistic assessments that include inquiries regarding the use of CAM are not uniformly occurring in Canada (Lewandowski, 2004).

In order to provide quality care to people with chronic pain, it is necessary for nurses to let the patient be the authority of his or her private pain experience (Lewandowski, 2004), which may include the use of CAM or non-traditional treatment methods. For instance, Fischer et al. (2014) posit that effective CAM interventions should be better incorporated into conventional health care approaches to improve access and treatment of conditions like chronic pain (Fisher et al., 2004). While current day CAM approaches include a range of natural health products and mind/body practices (Fleming et al., 2007; National Center for Complementary and Integrative Health, 2016) many of these therapies require empirical evidence to support their integration into the mainstream care of patients. Therefore, it is important for nurses to understand which CAM therapies their patients are using, the state of evidence of these practices, and the potential efficacy of these non-traditional approaches, especially for conditions like chronic pain (Chang & Chang, 2015).

Although previous studies have focused on the demographics of CAM users and motivational factors for its use in Canada, there is a gap in the literature regarding the influence of unmet healthcare needs (UHN) and healthcare access (HA) on CAM utilization in the Canadian chronic pain population. Generating a deeper understanding toward how UHN and HA are conceptualized by chronic pain populations is a preliminary, yet critical starting point toward the generation of deeper insights to inform healthcare service improvement (Gill & White, 2009). Therefore, the purpose of this study was to explore the demographic, perceived UHN, HA, and CAM usage

characteristics in adults with chronic pain in Canada using the 2010-2011 National Population Health Survey (NPHS). The Behavioural Model of Health Service Use (Andersen, 1968) was used as the study's guiding theoretical lens.

Theoretical Framework

Healthcare utilization is considered to be the point at which patients' needs meet the professional healthcare system (Babitsch, Gohl, & Von Lengerke, 2012). There have been a multitude of studies aimed at describing patterns of healthcare utilization in various settings, and resulting from this work, several explanatory frameworks have been developed that identify predictors of health care utilization (Babitsch et al., 2012). One of the most widely acknowledged models is the *Behavioral Model of Health Services Use* (BM), which was developed as a doctoral dissertation in 1968 by an American medical sociologist and health services researcher, Ronald M. Andersen (Andersen, 2008).

The BM (1968) has evolved over the years with five different versions of the model being released by Andersen (2008) in conjunction with other researchers; however, the main principles of the model have remained stable. The model was initially developed to assist in understanding why health services are used and to define and measure equitable access to health care (Andersen, 1968). A major goal of the model is to help define and measure access to care in four dimensions: (1) *potential access,* or the presence of enabling resources; (2) *realized access* or the actual use of services; (3) *equitable access*, or when predisposing demographic and need factors account for most of the variance in health service utilization; and, (4) *inequitable access*, or when social structure, health beliefs, and enabling resources determine who gets care (Andersen, 2008).

The most recent version of this model was used to inform this study as developed by Andersen and Davidson (2001), depicted in Figure 1. The model breaks down both *individual* and *contextual* determinants of health service utilization into three components: (1) *predisposing factors* -- existing conditions that predispose people to use or not use services, even though these conditions may not be directly responsible for use; (2) *enabling factors* -- facilitate or impede use of services; and, (3) *needs factors* -- conditions that individuals determine require treatment (Andersen & Davidson, 2001).

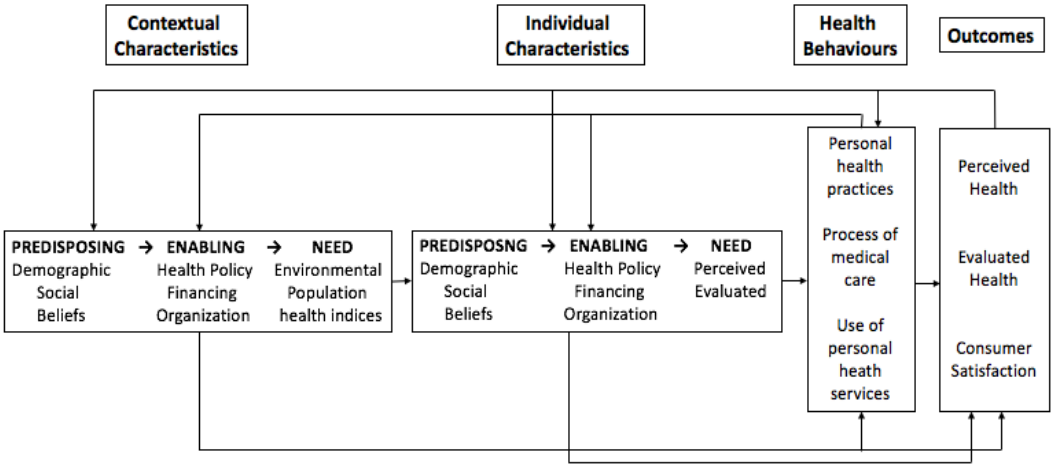

Figure 1. A Behavioral Model of Health Services Use. Reprinted with permission from "Improving Access to Care," by Andersen, R. & Davidson, P., 2013, in *Changing the US Health Care System: Key Issues in Health Services, Policy and Management*, p.35. Copyright 2014 by John Wiley & Sons Inc.

Contextual Characteristics

Contextual determinants are the environment and circumstances of healthcare access, including the health care organization, health provider-related factors, and community characteristics; measured at aggregate levels that can range from a family unit to the national health care system (Andersen & Davidson, 2001). *Contextual*

predisposing characteristics include: (a) demographic characteristics of a community, including age, gender, and marital status; (b) social characteristics of a community, including educational level, ethnicity, immigrant status, employment level, or crime rate; and, (c) beliefs, which include underlying values, cultural norms, or political perspectives (Andersen & Davidson, 2001). *Contextual enabling characteristics* highlighted in the model are: (a) health policies, which can be from all levels of government or private sectors that pertain to health; (b) financing characteristics, which include measures that indicate what resources are available to pay for health services, incentives to purchase or provide services, or expenditures for health services; and, (c) organization characteristics, which include the amount and distribution of health services and providers, as well as how they are arranged to offer services (Andersen & Davidson, 2001). *Contextual need characteristics* include: (a) health-related measures of the physical environment, such as air or housing quality; and, (b) population health indices, which indicate the overall health of the community, such as mortality and morbidity rates (Andersen & Davidson, 2001).

Individual Characteristics

As shown in Figure 1, contextual indicators can influence health behaviours and outcomes directly or through individual characteristics. *Individual predisposing characteristics* include: (a) demographic characteristics such as age and gender; (b) social characteristics, which establish a person's position in the community as well as their ability to manage presenting health issues, such as education, occupation, or social inclusion; and, (c) health beliefs or attitudes, values, and knowledge about health and services (Andersen & Davidson, 2001). *Individual enabling characteristics* include: (a)

financing, such as income and price of the health service; and, (b) organization of health services for individuals, such as possession of a regular source of health care and what that source is, or travel to and from that service (Andersen & Davidson, 2001). *Individual need characteristics* are broken down into (a) perceived; and, (b) evaluated. Perceived need characteristics are the individual's view of their own state of general health and functioning, their experience of and response to symptoms of illness, or the importance and magnitude of the health problem (Andersen & Davidson, 2001). Evaluated need is the professional judgement and objective measurement about a patient's need for medical care (Andersen & Davidson, 2001).

Health Behaviours

Health behaviours influence health status, and at the individual level include diet and nutrition, exercise, self-care, substance use, and adherence to medical regimens. At the process of medical care level, health behaviours reflect interactions between health care providers and individuals in the process of care provision. Health behaviours also have an effect on the use of personal health services (Andersen & Davidson, 2001).

Outcomes

There are three possible *outcomes* in the model that arise from health behavior, individual characteristics, and contextual characteristics: (a) *perceived health status*, or the extent to which a person can live a functional, comfortable, and pain-free existence measured by perceived reports; (b) *evaluated health status*, which is dependent on the judgement of the health care provider and measured by physiological testing, diagnosis and prognosis; and, (c) *consumer satisfaction*, which is how individuals feel about the care they received (Andersen & Davidson, 2001). The feedback loops, as seen in Figure

1, are important components of the model, indicating that outcomes can in turn influence aspects of the individual, community, institution, or nation. According to Andersen and Davidson (2001), it is these feedback loops that provide insights regarding access and improvement of care. These conclusions can result in contextual changes in health policy, with ensuing restructuring of the financing and organization of health services to improve access to care (Andersen & Davidson, 2001). See Appendix A for a depiction of how the study variables were incorporated into the BM in this analysis.

Usage of the Model in CAM Research

Multiple versions of the BM (Andersen, 1968) have been used in various studies regarding healthcare utilization and access, including population level survey data across an array of health care settings including primary and community care, outpatient care, tertiary health centres, and mental health (Babitsch et al., 2012). Several subjects have been studied using the model in relation to health service utilization; however, the most frequent or key variables examined were age, gender, education, ethnicity, income, health insurance, and having a usual source of care or a family doctor (Babitsch et al., 2012).

From a CAM perspective, a systematic review conducted by Lorenc et al. (2009) examined the use of several health service utilization models in conjunction with CAM use, and concluded that the BM (Andersen, 1968) was an appropriate and valid model to explore this subject (Lorenc, Ilan-Clarke, Robinson, & Blair, 2009). This systematic review found that the decision to use CAM versus conventional healthcare are two different processes, where choosing to use CAM is more dynamic, iterative, and individualistic as opposed to more logical and rational in conventional care (Lorenc et al., 2009). Further, Lorenc et al. (2009) highlighted factors that support the BM (Andersen,

1968) in the context of CAM use, including: age, gender, education, race, income, health insurance, accessibility/availability of CAM, evaluated need (i.e., specific condition, more health problems, chronicity of disease, presence of pain), perceived need (i.e., self-rated health, perception of severity of illness), and health care experience (Lorenc et al., 2009).

Literature Review

To inform the research study, a scoping literature review using the methodological insights provided by Levac, Colquhoun, and Brien (2010) was conducted using the following databases: Scopus, CINAHL, PubMed, and Google Scholar; selecting articles that were peer-reviewed and written in the English language. The search was based on the following concepts: *"chronic pain", "alternative medicine", "unmet healthcare needs",* and *"healthcare access"*. Searches were conducted individually and articles with a Canadian context were prioritized for health service access and utilization variables due to the unique nature of the healthcare system. The results of the literature review are organized by concept and presented below, followed by a summary of the findings. Given the breadth of the topic examined in this review, the literature synthesis has been developed to be sensitive to exploring the range of concepts, in conjunction with CAM, in an effort to demonstrate the linkages between these otherwise disparate concepts.

Complementary and Alternative Medicine

Complementary and alternative medicine (CAM) comprises any type of medical system or therapy that is not provided within the conventional healthcare system. Just as there are numerous definitions of CAM, there are various classifications of therapies/approaches are that are included in CAM with no consensus. The US National

Center for Complementary and Integrative Health categorizes it as: *natural products* (herbs, vitamins, minerals, and probiotics), *mind and body practices* (procedures or techniques administered or taught by a trained individual, such as yoga, chiropractic and osteopathic manipulation, medication, massage therapy), and *other complementary health approaches* (traditional healers, Ayurvedic medicine, traditional Chinese medicine, homeopathy, naturopathy) (National Center for Complementary and Integrative Health, 2016). In the Canadian context, the integration of CAM into health care is occurring at various levels, but the majority is by patients' increasing involvement in managing their own health by combining CAM modalities with conventional medicine (Tataryn and Verhoef, 2001). There is a concern that provincial regulations vary by province, and there is a lack of consistency in which CAM modality is regulated and by what authority, which creates a potentially dangerous situation for patients in terms of the safety and quality of care they are receiving (Andrews & Boon, 2005). Of studies regarding CAM in the literature, the majority focus on prevalence of use, predictors of use, and efficacy of treatments.

Predictors of CAM use in the literature can be broken down into four themes: sociodemographic factors, personal factors, environmental factors, and health related factors. Sociodemographic factors are the most prominent in the literature with the strongest associations to CAM use in adults with chronic pain. Female gender was identified repeatedly as having a significant independent association with CAM use, (Bertomoro et al., 2010; Dubois et al., 2017; Fleming et al., 2007; Jawahar, Yang, Eaton, McAlindon, & Lapane, 2012; Klingberg, Wallerstedt, Torstenson, Hwi, & Forsblad-D'Elia, 2009; Lapane, Sands, Yang, McAlindon, & Eaton, 2012; Mbizo, Okafor, Sutton,

Burkhart, & Stone, 2016; Sadiq, Kaur, Khajuria, Gupta, & Sharma, 2016; Sirois, 2008; Tamhane et al., 2014; Yang, Dubé, Eaton, McAlindon, & Lapane, 2013) and as a predictor of CAM use in logistic regression after controlling for confounding factors (Callahan et al., 2009; Khady Ndao-Brumblay & Green, 2010; Lapane et al., 2012; Lind, Lafferty, Tyree, Diehr, & Grembowski, 2007). Other significant predictors in the literature were age, where younger adults were more likely to engage in CAM than the older cohorts (Artus, Croft, & Lewis, 2007; Fleming et al., 2007; Hoerster, Butler, Mayer, Finlayson, & Gallo, 2012; Huang et al., 2015; Khady Ndao-Brumblay & Green, 2010; Klingberg et al., 2009; Lind et al., 2007; Yang et al., 2013); education, where higher educational levels were found to predict a higher likelihood of CAM use (Bertomoro et al., 2010; Dubois et al., 2017; Fleming et al., 2007; Hoerster et al., 2012; Khady Ndao-Brumblay & Green, 2010; Lapane et al., 2012; Rosenberg et al., 2008; Sirois, 2008); race or ethnicity, where CAM use was significantly more common in Caucasians than African Americans (Fleming et al., 2007; Jawahar et al., 2012; Khady Ndao-Brumblay & Green, 2010; Lapane et al., 2012; Lapane, Yang, Jawahar, McAlindon, & Eaton, 2013; Yang, Sibbritt, & Adams, 2017; Yang, Jawahar, McAlindon, Eaton, & Lapane, 2012); as well as geographic location, with higher CAM prevalence among people in urban settings (Bertomoro et al., 2010; Huang et al., 2015; Mbizo et al., 2016a).

Personal beliefs, attitudes, and personality traits have been studied as predictors of CAM use in the literature, however these types of variables are commonly difficult to measure quantitatively. Conceptualizations of personal beliefs found to be associated with CAM use in chronic pain populations that have been previously reported in the

literature include: higher perceived control over health and higher reward motivations (Sirois, 2008); lack of effectiveness of conventional medicine (Ahmad, 2016; Gaul, Schmidt, Czaja, Eismann, & Zierz, 2011; Lambert, Morrison, Edwards, & Clarke, 2010); and, higher self-perceived healthy lifestyles, including better stress coping and personal resilience (Sirois, 2014). Therefore, personal beliefs have been found to not only influence whether a person uses CAM, but also as key predictors in the type of CAM selected by the individual to treat their condition (Murthy et al., 2015).

Health related factors that have been found to predict CAM use reflect the nature of the illness and how the individual's life is impacted. As a result, it has been found that those who turn to CAM are typically more affected by the illness and find it more difficult to manage (Klingberg et al., 2009). Some of these factors include: health status (Klingberg et al., 2009), quality of life (Alvarez-Nemegyei, Bautista-Botello, & Dávila-Velázquez, 2009; Jawahar et al., 2012; Klingberg et al., 2009), and severity of the condition (Lambert et al., 2010; Lapane et al., 2012; Lind et al., 2007;Yang et al., 2013). Characteristics of the pain itself also predict CAM use, such as: level of pain (Artus et al., 2007; Fleming et al., 2007; Gaul et al., 2009; Khady Ndao-Brumblay & Green, 2010; Sadiq et al., 2016); percentage of time spent in pain (Gaul et al., 2009); number of limitations as a result of the pain (Khady Ndao-Brumblay & Green, 2010; Mbizo et al., 2016); type of chronic pain (Sirois, 2008; Tan, Win, & Khan, 2013); and chronicity or duration of the pain (Alvarez-Nemegyei et al., 2009; Chenot et al., 2007; Denneson, Corson, & Dobscha, 2011; Dubois et al., 2017; Gaul et al., 2009; Sadiq et al., 2016).

Other reported factors associated with CAM use have been found to be contextual in nature, and dependent on lifestyle factors such as dominant cultural and traditional

beliefs, the influence of religiosity or spirituality, or the type of medical insurance coverage possessed by sufferers. For instance, a German study did not find higher income and education to be associated with CAM use (Chenot et al., 2007). However, the fact that several popular CAM modalities such as massage and acupuncture were integrated into publicly funded conventional care in the country where the study occurred could explain this finding (Chenot et al., 2007). In the United States and Canada, employment, health insurance coverage, and higher income were associated with CAM use (Dubois et al., 2017; Fleming et al., 2007; Lambert et al., 2010; Obalum & Ogo, 2011).

Chronic Pain and CAM

Chronic pain is a debilitating condition that affects individuals physically, psychologically, and socially, as well as having ill effects on their health-related quality of life (Duenas et al., 2016). It is defined as pain that continues six months or more after an injury or beyond the usual course of an acute condition that may be without an identifiable cause where healing may never occur (Manchikanti, Singh, Datta, Cohen, & Hirsch, 2009). There is ample evidence supporting the link between people with chronic pain and the increased use of CAM (Bauer, Tilburt, Sood, Li, & Wang, 2016; Millar, 2001; Roth & Kobayashi, 2008). Furthermore, there is increasing evidence that CAM can be an effective adjunct or alternative treatment for chronic pain (Chao, Tippens, & Connelly, 2012; C. V Little, 2013). Commonly described CAM treatments used in chronic pain populations include: massage; acupuncture; herbs and supplements; and, mind-body therapies such as meditation, guided imagery, yoga, and hypnosis (Bauer et al., 2016). Other research has shown that chronic pain patients who use CAM in addition

to conventional care are healthier, more active, and more social; suggesting CAM provides better management of their condition (Foltz et al., 2005).

Research has also been completed regarding predictors of CAM use in chronic pain populations, finding many demographic elements (i.e., age, race, education) and other healthcare utilization factors being associated with usage (Khady Ndao-Brumblay & Green, 2010). Given the effectiveness gap that exists around chronic pain in the healthcare system, other work has found that UHN and HA are important factors in the determination of CAM use. For instance, wait time for treatment is one indicator of HA, and current wait times to see a pain specialist in Canada can be over a year (Morley-Forster, 2007; Pagé et al., 2017; Peng et al., 2007; Poulin et al., 2017). Long wait times for treatment of chronic pain have been associated with a general decline in emotional health and loss of quality of life (Lynch et al., 2008). Issues with accessing healthcare services and having unmet healthcare needs have been found to lead to feelings of frustration or dissatisfaction among these patients, which have been linked to CAM use in the form of negative pain care perception and dissatisfaction with mainstream healthcare approaches (Foltz et al., 2005; Khady Ndao-Brumblay & Green, 2010).

Unmet Healthcare Needs

The concept of a healthcare *need* is defined as "[a] physical, psychological, social or environment related demand for aid, care, or a service, with the goal of solving or reducing a problem that is experienced or expressed" (Houtjes, 2015, p.16). There is a distinction between met and unmet healthcare needs (UHN), in that a healthcare need is met when a person receives help or finds a suitable solution to the problem. Conversely, UHN occur when health care is needed to address a particular health concern, but (a) is

not received; (b) fails to adequately address the health problem; or, (c) is deemed unsuitable by the recipient (Casey, 2015). UHN have been recognized as key indicators of access to care, and the most frequent reported reasons for UHN are related to the characteristics of the healthcare system (Sanmartin, Houle, Tremblay, & Berthelot, 2002).

UHN have been studied in terms of their presence and perceived reason for the unmet need, and have been categorized in different ways (Casey, 2015). For instance, UHN were examined in terms of availability (perceived deficiencies in health care delivery), accessibility (issues with cost or transportation) and acceptability (personal circumstances and attitudes towards health care) of services (Chen & Hou, 2002; Ly, Bl, Sibley, & Glazier, 2009). UHN have also been examined in terms of delayed medical care (for reasons related to cost or access), self-reported health status, or limited functional ability (Hoerster et al., 2012). Casey (2015) used the National Public Heatlh Survey (NPHS) to compare UHN in those with a disability versus the general population, and classified reasons for having UHN into personal and structural reasons. Of the structural variables, there were significant associations between UHN and healthcare wait times, household income, as well as lacking a primary health care provider and pharmaceutical insurance (Casey, 2015; Chen, Hou, Houle, Tremblay, & Berthelot, 2002; Ly et al., 2009). Other associations between UHN and demographic variables have been identified, including: gender (female), age (younger), education (higher), and ethnicity (Indigenous) (Casey, 2015; Chen et al., 2002).

The consequences of UHN have also been studied in the literature. There is evidence that experiencing UHN negatively effects individuals, impacting their

independence, general health, and wellbeing (Casey, 2015). UHN were recorded as a reason for seeking out CAM, with those holding the belief that the traditional healthcare system did not meet their needs being more likely to seek out alternative therapy (Millar, 2001). Further, those with UHN were 1.5 times more likely to use CAM than those who did not report UHN (Millar, 2001).

Healthcare Access

Healthcare access (HA) has been measured historically in Canada through several indicators, including rates of visits to a physician, surgery, use of diagnostic tests, spatial accessibility, wait times, and access to a regular medical doctor (Clarke, 2016; Harrington, Wilson, Rosenberg, & Bell, 2013; Konvicka, Meyer, McDavid, & Roberson, 2008; Sanmartin, Gendron, Berthelot, & Murphy, 2004; Claudia Sanmartin & Ross, 2006). There are numerous other indicators that have been used to measure HA, and it is considered an indicator of the performance of the healthcare system overall (Claudia Sanmartin & Ross, 2006).

Equitable HA has been a topic of examination in Canadian research. Researchers have outlined that certain groups of the population are more likely to report difficulty accessing health services (Clarke, 2016; Harrington et al., 2013). Characteristics of people more likely to report difficulty accessing health services include: reporting fair or poor perceived health; being under the age of 65; female gender; possessing higher levels of education; being employed full-time; being an immigrant; and possessing a chronic condition (Clarke, 2016; Harrington et al., 2013). Currently, it is estimated that upwards of one in four Canadians requiring health care services encounter barriers, including health care provider availability and long wait times (Clarke, 2016; Harrington et al.,

2013; Sanmartin et al., 2004). Access to health care is of particular concern to individuals with chronic pain, where interprofessional pain treatment facilities are unable to meet clinical demands of these patients in terms of regional accessibility and reasonable wait times for first appointments (Peng et al., 2007).

Finally, there are conflicting reports in the literature regarding the relationship between CAM use and HA. It was found that CAM users were more likely than non-users to have a regular physician, to have seen a specialist in the past year, and to have increased visits to a physician (Millar, 2001). Access to a family physician has been related to CAM use in the literature, where general practitioners within independent clinics were more likely to recommend CAM services to their patients or provide CAM services to their patients themselves (Hirschkorn, Andersen, & Bourgeault, 2009). There is also evidence that issues with access to a physician lead to CAM use, where people who experienced difficulty accessing a physician were more dissatisfied with their conventional care, and 85% indicated they would consider consulting a CAM provider if they experienced difficulty accessing a physician again (Sirois & Purc-Stephenson, 2008).

Summary of the Literature

Findings from current research demonstrate that chronic pain is a complex condition and has detrimental effects on those afflicted. Chronic pain is commonly ineffectively treated by conventional health care practices, and as a result, CAM is being increasingly considered by sufferers to manage chronic pain. A significant issue in chronic pain populations is the potential for UHN and the various difficulties related to obtaining timely health care services (i.e., HA). Due to these identified knowledge gaps,

further research to investigate the relationships between UHN, HA, and CAM is needed to support chronic pain populations in their treatment and sustainment.

Research Questions

The research questions addressed by this study are:

1. What are the demographic, perceived UHN, HA, and CAM usage characteristics of Canadians who have chronic pain?
2. What are the predictors of CAM usage in chronic pain populations?

The Behavioural Model of Health Services Use (Andersen, 1968) was used as the theoretical lens to support the objectives of the study.

Methods

Design and Data Source

The study was a secondary analysis of data from the 2010-2011 National Public Health Survey (NPHS): Household Component (Cycle 9) using a cross-sectional predictive nonexperimental design facilitated by binary logistic regression. Logistic regression is a form of correlation which tests for a relationship or association between two variables (Polit & Beck, 2016), and was used to determine whether HA and UHN predict the use of CAM. The chosen research design was appropriate for this project as the research question was not amenable to experimental design (Polit & Beck, 2016).

The NPHS was developed by Statistics Canada in 1992 based on recommendations from the National Health Information Council, suggesting an ongoing national survey of population health is needed in order to improve the health status of Canadians (Statistics Canada, 2012a). The objectives of the NPHS were to provide the following: indicators of health status of the population, data to assist in understanding the

determinants of health, an increased understanding of the relationship between health status and healthcare utilization, and longitudinal information on health and illness (Statistics Canada, 2012a). The NPHS collected information related to the health of the Canadian population and associated socio-demographic information (Statistics Canada, 2012a), including a longitudinal sample consisting of 17,276 people who were interviewed every two years. The participants were asked a common set of questions with every cycle, as well as focused content that changed with each subsequent cycle of the survey. Topics in the survey included aspects related to disability, diseases and health conditions, healthcare services, lifestyle and social conditions, mental health and wellbeing, and disease prevention/surveillance considerations (Statistics Canada, 2012a). The survey was completed using a computer-assisted personal interview application by trained interviewers (Statistics Canada, 2012a).

Population Characteristics

The target population of NPHS Household Component included residents in the ten Canadian provinces, and excluded individuals living on First Nations reserves and Crown Lands; residents of health institutions; full-time members of the Canadian Forces; and specified remote areas in Ontario and Quebec (Statistics Canada, 2012a). A stratified two-stage sample design was used for sample selection based on the Labour Force Survey (LFS): each province was divided into Major Urban Centres, Urban Towns, or Rural Areas from which strata were formed in six clusters, where dwellings were randomly selected (Statistics Canada, 2012a). For the sampling of the first cycle of the NPHS, households were selected, and within each household, one member 12 years of age or older was chosen to be the longitudinal respondent (Statistics Canada, 2012a). In

all statistical analyses, the longitudinal full subset weight must be used to account for the sampling design of the survey as recommended by Statistics Canada (2012a). The response rate for Cycle 9 of the NPHS was 69.7% (N=12,041) (Statistics Canada, 2012b).

The population of interest for this study was NPHS respondents 18 years of age and older who had a chronic pain diagnosis. A chronic pain diagnosis was presumed if respondents answered *no* to the question "Are you usually free of pain?" as has been done in previous studies using the NPHS (Chen & Hou, 2002; Friesen, 2014; Gilmour, 2015; Mo et al., 2013; Reitsma, Tranmer, Buchanan, & VanDenKerkhof, 2012; Van Den Kerkhof, Hopman, Towheed, Anastassiades, & Goldstein, 2003; Vandenkerkhof, 2011). G*Power 3.1 (Faul, F., Erdfelder, E., Lang, A.‐G., & Buchner, 2007) was used obtain a power analysis. Given an analysis with two predictors, an alpha of 0.05, odds ratio of 1.5 and a power of 0.8, a total of 308 participants were required to achieve statistically significant results. CAM users were identified in the NPHS via the question: "In the past 12 months, [have/has] [you/FNAME] seen or talked on the telephone to an alternative health care provider such as an acupuncturist, homeopath or massage therapist about [your/his/her] physical, emotional or mental health?" with the response being dichotomous (*yes/no*) (Statistics Canada, 2012b).

UHN was identified through participants' response in the NPHS to the question "During the past 12 months, was there ever a time when [you/FNAME] felt that [you/he/she] needed health care but [you/he/she] didn't receive it?" which was answered dichotomously (*yes/no*) (Statistics Canada, 2012b). HA was assessed by proxy via the question: "[Do/Does] [you/FNAME] have a regular medical doctor?" which also had a dichotomous (*yes/no*) response (Statistics Canada, 2012b).

The NPHS also includes representative data on sociodemographic characteristics which were built into the logistic regression model, including: age, sex, race, immigrant status, employment status, education, and income. Variables indicative of health status were also incorporated into the regression model, including: presence of a chronic condition, long term disability status, restriction of activities, and usual intensity of pain. Due to regulations for release from the Research Data Centre (RDC), some variables had to be recoded to accommodate sufficient case sizes of categories. Please see Appendix A for a table describing the operationalization of NPHS variables used within this study.

Protection of Human Rights

At Western University, ethics approval was not required for a secondary analysis using Statistics Canada data (Research Data Technology Centre, 2008). The *Statistics Act* (1985) as cited in Statistics Canada (2010a) prescribed the Agency [Statistics Canada] to protect the confidentiality of identifiable individual responses. Any disclosure of identifying information is a punishable offence (Statistics Canada, 2010a). The *Privacy Act* required that the individual was informed of the purpose of data collection and informed consent was mandatory for voluntary participation in the NPHS, where participants had the right to refuse to answer any question or end the interview at any time (Statistics Canada, 2010a). There were also several measures in place to protect the identity of respondents: all data accessed by a researcher has been previously de-identified; researchers can only access data required for the project; and researchers must obtain "Reliability Status" before accessing the data and swear a legally binding oath to protect confidentiality (Statistics Canada, 2010a). Access to data is only available at the on-campus Research Data Centre (RDC), which is a secure physical environment where

there is no external link to internet or access to personal electronic communication and storage devices. Finally, before the data is released to a researcher by an RDC Analyst, the data is vetted for confidentiality (Statistics Canada, 2010a).

Data Analysis

To test the research question, a multivariate logistic regression was completed using Statistical Software Package for Social Sciences (SPSS) version 23 (IBM, 2015). The significance level (alpha) was 0.05. All analyses were run with weighted data to comply with Statistics Canada Research Data Centre (RDC) regulations, and all reported results are of the weighted dataset. The variables included in the analysis were: CAM use (dependent variable), age, sex, immigrant status, race, employment status, education, income, long term disability, restriction of activities, presence of a chronic condition, usual intensity of pain, unmet healthcare needs, and access to a medical doctor. See Appendix A for an overview of the operationalization of NPHS variables used in this analysis.

The assumptions for a binary logistic regression are that the dependent variable (CAM use) must be dichotomous, and the independent variables can be categorical or continuous (Kellar & Kelvin, 2013). All variables used in the regression were either dichotomous or categorical (See Appendix A). First, descriptive statistics and frequency tables were run, followed by assessing for frequency and pattern of missing data and outliers using a missing values analysis in SPSS. The only variable of concern was income, which had 250 missing values. Due to the categorical nature of all variables, Little's MCAR was not appropriate, as it requires at least one variable that is of continuous, quantitative data (Little, 1988, IBM, n.d.). The binary logistic regression in

SPSS only allows listwise deletion of the missing cases in the analysis (IBM, n.d.-b). Thus, listwise deletion of missing cases was used, and 1294 participants were entered into the regression model, which remains considerably larger than the required sample size for this study of 308 as per the G*power analysis. According to Kang (2013), listwise deletion is a reasonable strategy if the sample size is large enough.

Another assumption of a logistic regression is multicollinearity where strong associations between independent variables can affect the accuracy of results (Kellar & Kelvin, 2013). Consequently, before running the regression all bivariate relationships between each independent variable and dependent variable were assessed, followed by relationships between all independent variables. Due to the categorical nature of the variables and the assumptions required to test the interrelationships, correlations were not appropriate in this analysis (Kellar & Kelvin, 2013). Thus, significant associations were noted, however the strength of the associations were not amenable to testing.

The final assumption of a binary logistic regression is that dummy codes are used for categorical variables with more than two levels (Kellar & Kelvin, 2013). Dummy codes were created for the following variables: age, income, education, employment status, and usual intensity of pain. The independent variables were entered into the logistic regression model using a hierarchical approach to control for the confounding factors on the dependent variable. The first step included sociodemographic predictors based on insight from the literature: age, income, health status, education, sex, employment status, immigrant status, and ethnicity; which were entered into Model 1. Subsequently, all variables regarding health status were entered into Model 2: usual intensity of pain, presence of chronic condition, long term disability, and restriction of

activities. Finally, the variables of interest, UHN and HA, were entered into Model 3. Analysis of the results of these models determined which variables were predictors of CAM use at a significance level of < 0.05.

Results

Descriptive Results

Table 1 provides a description of the total sample size fitting inclusion criteria (n=1688), which was adults 18 years of age or older who responded *no* to "Are you usually free of pain?" The following data has been weighted according to Statistics Canada RDC regulations. One in five adults with chronic pain reported using CAM in the previous 12 months. More women than men reported having chronic pain, and the average age of the sample was 59, with 61% of respondents between 40-69 years old. The majority of the sample were white non-immigrants. There was a relatively even distribution of education levels, however the largest percentage of respondents had completed some level of post-secondary education. The majority of the sample reported an income of less than $59,999. Though a relatively small percentage of the sample reported unemployment, half of the sample reported not being in the labor force. Situations where respondents reported not being in labor force included: retirement, having an illness or disability, pregnancy, caring for children or family, in school or educational leave, or being disabled (Statistics Canada, 1994); indicating that over half of those with chronic pain were not working at the time of the survey. Health status indicators demonstrated lower levels of health in people with chronic pain, where half of the sample reported the usual intensity of the pain as severe, more than half reported a restriction in activities, and almost all of the sample reported having a chronic condition.

The variables of interest in this study showed one in five respondents with chronic pain reported unmet care needs, though most had access to a medical doctor.

Table 1

Characteristics of Sample

Variable	n (%)
Age	
18 – 29	140 (8.3)
30 – 39	132 (7.8)
40 – 49	275 (16.3)
50 – 59	456 (27.0)
60 – 69	292 (17.3)
70 – 79	221 (13.1)
80 +	173 (10.2)
Sex	
Male	668 (39.6)
Female	1020 (60.4)
Race	
White	1526 (90.4)
Black	32 (1.9)
Asian	89 (5.2)
Aboriginal/First Nations	14 (0.9)
Multiple	12 (0.7)
Missing	15 (0.9)
Immigrant status	
Yes	291 (17.2)
No	1396 (82.7)
Missing	1 (0.1)
Education	
≤ Highschool	349 (20.7)
Highschool	219 (13.0)
Some post-secondary education	428 (25.4)
Post-secondary degree/diploma	615 (36.4)
Missing	77 (4.5)
Employment status	
Employed	700 (41.5)
Not employed	75 (4.4)
Not in labor force	826 (49.0)
Missing	87 (5.2)
Total household income from all sources	
≤ $19,999	179 (10.6)
$20,000 – $39,999	333 (19.7)
$40,000 – $59,999	288 (17.1)

$60,000 – $79,999	222 (13.1)
$80, 000 – $99,999	124 (7.3)
≥$100,000	293 (17.3)
Missing	250 (14.8)
CAM use	
Yes	348 (20.6)
No	1301 (77.1)
Missing	39 (2.3)
Usual intensity of pain	
Mild	348 (20.6)
Moderate	872 (51.6)
Severe	257 (15.2)
Missing	39 (2.3)
Presence of chronic condition	
Yes	1561 (92.5)
No	87 (5.1)
Missing	40 (2.4)
Long-term disability status	
Yes	879 (52.1)
No	800 (47.4)
Missing	9 (5.3)
Restricted in activities	
Yes	1137 (67.4)
No	546 (32.3)
Missing	5 (3.0)
Unmet care needs	
Yes	3602 (21.3)
No	1288 (76.3)
Missing	52 (3.3)
Access to a medical doctor (HA)	
Yes	1487(88.1)
No	155 (9.2)
Missing	46 (2.7)

Note. The following categories were treated as missing in the dataset: *Not applicable, Don't know, Not stated.*

Determinants of Complementary and Alternative Medicine Use

A logistic regression analysis was performed of data from Cycle 9 of the National Public Health Survey (NPHS) to assess predictors of complementary and alternative medicine (CAM) use by adults with chronic pain in Canada. The regression generated three models which tested the association between 15 independent variables and the

likelihood of using CAM, entered by a hierarchical approach. CAM use (*yes/no)* was the dependent variable and those who had consulted an alternative practitioner were coded as 1 while those who did not were coded as 0. The adjusted odds ratios and 95% CI for factors independently associated with using CAM are presented in the following tables, where independent variables with significant odds ratios are marked with asterisks ($p < 0.05$*, $p < 0.001$**).

Model 1 included the following sociodemographic measures: sex, age, income, education, employment status, immigrant status, and race. The statistically significant predictors of CAM in Model 1 were: age, sex, household income, education, and employment. Results indicate that men were 45% less likely to consult an alternative care practitioner than women in the past 12 months. Respondents whose total household income was less than $39,999 were less likely to consult CAM than those who reported income over $100,000. Age was the strongest sociodemographic predictor of CAM use, where individuals from 30-39 years of age were more than twice as likely to consult CAM compared to adults over 80 years of age. Those who were employed were less likely to consult CAM than those not in the labour force. Relative to having completed a post-secondary degree, respondents with less than high school education were less likely to consult CAM.

Table 2

Model 1 – Predictors of CAM Use in Adults with Chronic Pain

Predictors	OR	95% CI
Age		
18 – 29	1.43	[0.60, 3.37]
30 – 39	2.40*	[1.04, 5.57]
40 – 49	1.71	[0.77, 3.78]
50 – 59	1.45	[0.67, 3.11]

60 – 69	1.06	[0.49, 2.31]
70 – 79	1.05	[0.46, 2.41]
>80 (reference)		
Sex		
Male	0.45**	[0.33, 0.60]
Female (reference)		
Income		
≤ $19,999	0.37*	[0.19, 0.72]
$20,000 – $39,999	0.45**	[0.29, 0.72]
$40,000 – $59,999	0.88	[0.59, 1.33]
$60,000 – $79,999	0.77	[0.51, 1.17]
$80, 000 – $99,999	0.62	[0.37, 1.05]
≥$100,000 (reference)		
Education		
< High school	0.36**	[0.21, 0.60]
High school	0.88	[0.57, 1.35]
Some post-secondary	0.82	[0.59, 1.14]
Post-secondary degree (reference)		
Race		
White	0.60	[0.27, 1.35]
Black/Asian/Aboriginal/Other (reference)		
Immigrant Status		
Yes	1.25	[0.79, 1.96]
No (reference)		
Employment		
Employed	0.67*	[0.47, 0.96]
Unemployed	0.64	[0.21, 1.28]
Not in labour force (reference)		

Note. OR = odds ratio; CI = confidence interval; * = $p < 0.05$; ** = $p < 0.001$

In Model 2, age, sex, household income, education, and employment remained significant predictors. Respondents within the age bracket of 30-39 were almost three times more likely to use CAM than those over 80 years of age. Men remained less likely to use CAM than women. Those who made under $39,999 a year were less likely to use CAM than households who earned greater than $100,000 a year. The $80, 000 – $99,999 income bracket became a significant predictor in Model 2, also showing lower odds of using CAM compared to income reported greater than $100,000. Those with less than high school education were 40% less likely to use CAM than those with a post-secondary

degree. The only statistically significant health indicator that added to the model was restriction of activities, which made an individual two times more likely to consult CAM use than those who did not report a restriction in activities. The presence of a chronic condition was not a statistically significant predictor of CAM use in this analysis, however this could be influenced by the overwhelming proportion of those who reported a chronic condition in this study (93%).

Table 3

Model 2 – Predictors of CAM Use in Adults with Chronic Pain

Predictors	OR	95% CI
Age		
18 – 29	1.80	[0.75, 4.3]
30 – 39	2.57*	[1.11, 5.97]
40 – 49	1.84	[0.83, 4.09]
50 – 59	1.47	[0.68, 3.16]
60 – 69	1.12	[0.51, 2.45]
70 – 79	1.16	[0.50, 2.67]
>80 (reference)		
Sex		
Male	0.45**	[0.33, 0.61]
Female (reference)		
Income		
≤ $19,999	0.31**	[0.16, 0.60]
$20,000 – $39,999	0.40**	[0.25, 0.64]
$40,000 – $59,999	0.88	[0.58, 1.34]
$60,000 – $79,999	0.72	[0.47, 1.10]
$80, 000 – $99,999	0.53*	[0.31, 0.90]
≥$100,000 (reference)		
Education		
< High school	0.39**	[0.23, 0.66]
High school	0.90	[0.58, 1.39]
Some post-secondary	0.86	[0.61, 1.19]
Post-secondary degree (reference)		
Race		
White	0.46	[0.20, 1.06]
Black/Asian/Aboriginal/Other (reference)		
Immigrant Status		
Yes	1.24	[0.78,1.96]
No (reference)		

Employment		
Employed	0.63*	[0.44, 0.90]
Unemployed	0.627	[0.31, 1.26]
Not in labour force (reference)		
Presence of chronic condition		
Yes	1.11	[0.58, 2.11]
No (reference)		
Long term disability		
Yes	1.07	[0.72, 1.59]
No (reference)		
Restricted in activities		
Yes	1.95*	[1.26, 3.03]
No (reference)		
Usual intensity of pain		
Mild	0.77	[0.45, 1.32]
Moderate	0.75	[0.45, 1.23]

Note. OR = odds ratio; CI = confidence interval; * = $p < 0.05$; ** = $p < 0.001$

Model 3 added the variables of interest – unmet healthcare needs (UHN) and access to a medical doctor (HA). Only UHN was found to be a statistically significant predictor of CAM use, where those who reported an unmet healthcare need were two times as likely to use CAM than those who did not ($p < 0.001$). Access to a medical doctor made an individual 1.4 times *more* likely to use CAM, though this result did not reach statistical significance ($p = .178$). After adding the variables of interest to the model, age ceased to be a statistically significant predictor. Sex, income, employment status, education, and restriction of activities remained statistically significant predictors. According to the Omnibus Test of Model Coefficients, the overall significance of the model was < .001, and the final model accounted for 19.4% of the variance in CAM use in adults with chronic pain. The Hosmer and Lemeshow Test was insignificant, indicating the model fit the data. The results indicated that people with chronic pain who are female, not in the labour force, report higher income, have completed a post-secondary degree, and report restrictions in activities and unmet healthcare needs were more likely to use

CAM in the past 12 months. The strongest statistically significant predictor of CAM use in this analysis was having unmet healthcare needs, which has implications for health policy and service delivery. Figure 3 depicts all of the statistically significant predictors of CAM use.

Table 4

Model 3 – CAM use in adults with chronic pain

Predictors	OR	95% CI
Age		
18 – 29	1.52	[0.63, 3.69]
30 – 39	2.13	[0.91, 5.01]
40 – 49	1.64	[0.73, 3.64]
50 – 59	1.30	[0.60, 2.82]
60 – 69	1.03	[0.47, 2.27]
70 – 79		
>80 (reference)		
Sex		
Male	0.48**	[0.35, 0.65]
Female (reference)		
Income		
≤ $19,999	0.30**	[0.15, 0.60]
$20,000 – $39,999	0.39**	[0.24, 0.63]
$40,000 – $59,999	0.91	[0.60, 1.39]
$60,000 – $79,999	0.73	[0.47, 1.12]
$80, 000 – $99,999	0.55*	[0.32, 0.95]
≥$100,000 (reference)		
Education		
< High school	0.39**	[0.23, 0.67]
High school	0.91	[0.58, 1.41]
Some post-secondary	0.86	[0.61, 1.20]
Post-secondary degree (reference)		
Race		
White	0.47	[0.20, 1.10]
Black/Asian/Aboriginal/Other (reference)		
Immigrant Status		
Yes	1.30	[0.82, 2.06]
No (reference)		
Employment		
Employed	0.64*	[0.44, 0.92]
Unemployed	0.67	[0.33, 1.35]
Not in labour force (reference)		

Presence of chronic condition		
Yes	0.98	[0.51, 1.88]
No (reference)		
Long term disability		
Yes	1.02	[0.68, 1.53]
No (reference)		
Restricted in activities		
Yes	1.90*	[1.29, 2.97]
No (reference)		
Usual intensity of pain		
Mild	0.71	[0.41, 1.22]
Moderate	0.73	[0.44, 1.20]
Severe (reference)		
Unmet healthcare needs		
Yes	2.02**	[1.45, 2.81]
No (reference)		
Access to a medical doctor		
Yes	1.42	[0.85, 2.38]
No (reference)		

Note. OR = odds ratio; CI = confidence interval; * = $p < 0.05$; ** = $p < 0.001$

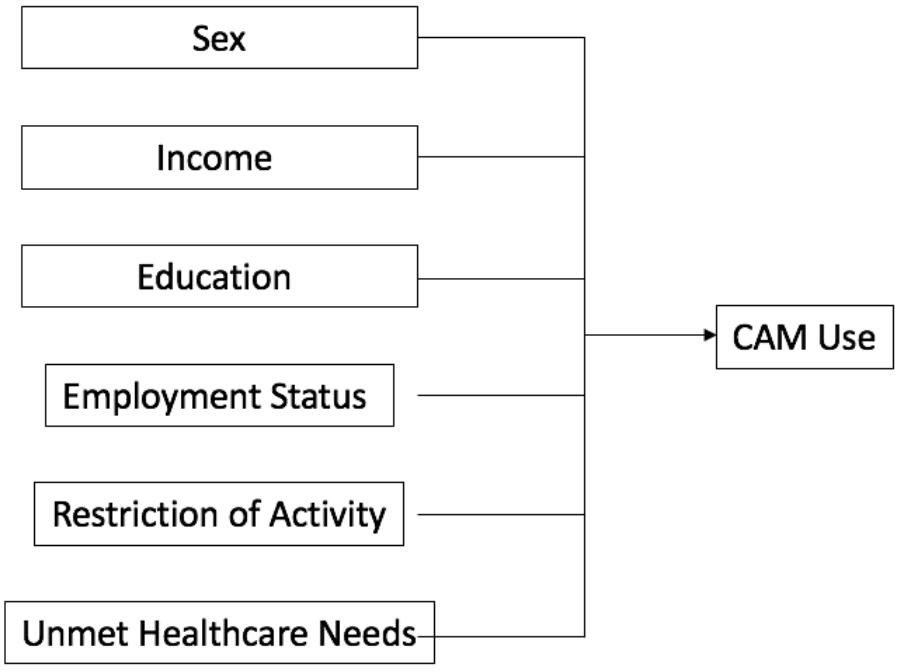

Figure 2. Significant Predictors of CAM Use in Adults with Chronic Pain

Discussion

The purpose of this study was to analyze a population level survey to (1) discover demographic, perceived UHN, HA, and CAM use characteristics; and, (2) determine any predictors of CAM use in Canadian adults with chronic pain. Overall, the final model explained 19.4% of the variance in CAM use with the following variables being statistically significant predictors: sex, income, education, employment status, restricted in activities, and unmet healthcare needs.

Sex was a significant predictor of CAM use ($p < 0.001$), where females were more likely to choose CAM than males, which is in keeping with previous research when controlling for other variables (Callahan et al., 2009; Khady Ndao-Brumblay & Green, 2010; Lapane et al., 2012; Lind et al., 2007). Demographic results of this analysis show that chronic pain effects women more than men. Higher rates of chronic pain in women is consistent with the literature, and not only is the prevalence of chronic pain higher in women, the burden of chronic pain is also higher in women compared to men (Meana et al., 2004; Reitsma et al., 2012). This study shows that women may be more inclined to seek out CAM than men due to the increased burden of chronic pain in females.

People were less likely to use CAM if they reported having less than high school education relative to people with a completed post-secondary degree. This supports other findings in the literature, where CAM use has been associated with higher levels of education (Lapane, Sands, Yang, McAlindon, & Eaton, 2012; Lapane et al., 2013; Mbizo, Okafor, Sutton, Burkhart, & Stone, 2016; Yen et al., 2015). The significance of income and employment in predicting CAM use in this study is not surprising, as CAM modalities are not currently covered by the Canadian healthcare insurance system.

Therefore, those who wish to use CAM are required to pay out of pocket, or possess third-party benefit coverage through employer or post-secondary insurance plans. Over half of respondents with chronic pain reported not being in the labour force despite 80% of the sample having some level of education, and only 23% being over 70 years old at the age of retirement. This indicates that reasons people with chronic pain report not being in labor force could be due to illness and disability. The finding in this study of the significant relationship between income and employment status and CAM use are in line with several studies in the literature (Dubois et al., 2017; Fleming et al., 2007; Furler, Einarson, Walmsley, Millson, & Bendayan, 2003; Lambert et al., 2010; Lapane, Sands, Yang, McAlindon, & Eaton, 2012). However, there is preliminary evidence that income as a predictor of CAM use may be dependent on the structure and organization of the health system. For instance, a study conducted in Germany did not find higher income to be associated with CAM use (Chenot et al., 2007). Given the fact that several popular CAM modalities such as massage and acupuncture are integrated into the German conventional healthcare and covered by a national health insurance plan may explain this finding (Chenot et al., 2007). In the present study, half of chronic pain sufferers reported they were not in the labour force, and those who had an income of less than $39,999 were less likely to use CAM, implying a potential issue with inequitable access to CAM in Canada. The linkage between income and CAM use should be subjected to further examination in order to better determine the likely societal and health system extraneous variables that appear to influence the association.

In this study, respondents with chronic pain who reported a restriction in activities were twice as likely to use CAM ($p < 0.001$). A restriction in activities is an indication

that chronic pain is significantly affecting their health and quality of life, and the significant predictive effect of being restricted in activities aligns with findings in the literature where lower health status and higher severity of the condition was related to the use of CAM (Alvarez-Nemegyei et al., 2009; Jawahar et al., 2012; Klingberg et al., 2009; Lambert et al., 2010; Lapane et al., 2012a; Lind et al., 2007; Yang et al., 2013). The findings from this study suggest that many people with chronic pain report a restriction in activities, which may result in an inability to be in the workforce, where not being in the labour force was a positive predictor of CAM use. However, not being in the labour force may impact their ability to afford CAM therapies if an individual is not covered by an insurance plan. Further examinations toward how income interacts with other CAM predictors is needed to better understand this dynamic.

The research model contributes some deeper insight into the relationship between UHN and CAM use. Having UHN was the strongest predictor of CAM use, and the significant predictive effect of UHN on CAM use is consistent with findings from another study examining the Canadian Community Health Survey in people with any chronic condition (Williams, Kitchen, & Eby, 2011). UHN has commonly been studied in terms of characteristics of people who perceive UHN and the types of unmet need they experienced, including the reasons behind reports of UHN (Ponzio, Tacchino, Zaratin, Vaccaro, & Battaglia, 2015). This present study provides deeper information related to the perspective of what patients do to address their unmet needs. Within this analysis, it would appear that many individuals who experience UHN and chronic pain are also users of CAM. While this study was unable to examine reports of UHN *after* people with chronic pain receive CAM, it is a future area of research that should be undertaken. To

date, the temporal relationship of UHN with CAM use has not been fulsomely examined. For instance, in Lambert et al. (2012), most participants tried CAM *after* seeing a conventional physician for treatment. Millar (2001) examined CAM use in those with chronic conditions and found that individuals' use of alternative practitioners increased as the number of reported chronic conditions rose. Given that that patients with chronic pain use healthcare services more than those who do not and the likelihood of patients experiencing UHN increases with the rates of health service utilization (Gerdle et al., 2008), further examination of the temporality of UHN and its relationship to CAM usage is warranted.

Access to a medical doctor was not statistically significant in predicting CAM use in any of the models analyzed in this study, though the odds ratio presented showed that there was in *increased* likelihood of using CAM if an individual had access to a physician. This finding is interesting for a number of reasons, as there are conflicting reports in the literature on the effect of access to a medical doctor on CAM use. Several studies report participants being introduced to CAM through the recommendation of a physician (Aveni et al., 2016; Chenot et al., 2007; Dubois et al., 2017; Rhee et al., 2016; Yang et al., 2017). Other studies report a significant association with access to a medical doctor; however, Pierard (2012) found that those who do not have a regular medical doctor were *less* likely to use alternative services. Sirois and Purc-Stephenson (2008), who surveyed a convenience sample (N=235) of people in an underserved urban centre with low physician availability in Canada found 85% of participants stated they would consult CAM provider should they have healthcare access difficulties in the future. The insignificant effect of access to a medical doctor on CAM use in this study could be

explained by the fact that a very small percentage of the sample reported not having access to a medical doctor in this model. Further research is needed to explore the relationship between these variables.

The significant predictors in this study support some components of Andersen's Behavioural Model of Health Service Utilization (1968) in adults with chronic pain, however not all. This may be a reflection of the niche sample selected for this study, or that choosing to use CAM is fundamentally different than choosing to use a conventional health service, which would justify the need for the development of CAM-sensitive service use model to support future research and practice.

Limitations

Data derived from the NPHS survey provides a range of benefits to a researcher (i.e., large sample size and representativeness of the Canadian population); regardless, with all research there are limitations. First, all confidence intervals reported need to be interpreted with caution. Due to the multi-stage survey design, there is no simple formula that can be used to calculate variance estimates to obtain confidence intervals (Statistics Canada, 2010b). Therefore, Statistics Canada uses the bootstrapping method, which takes into count the sample design when calculating variance estimates and provides the bootstrap weights with the survey data (Statistics Canada, 2010b). However, the latest version of SPSS no longer supports Statistics Canada bootstrap weights (Gagné, Roberts, & Keown, 2014), and as a result they were not able to be used in this analysis. This means that the derived odds ratios and confidence intervals may not be representative of the actual population parameters and should be interpreted with caution (Currie & Wang, 2004).

This study is limited by the use of self-reported data, for which the amount of reporting error is unknown. This includes the variable used to identify people with chronic pain. Given the self-report nature of the data (rather than an official medical diagnosis of chronic pain derived from a healthcare administrative data set), the reliability of the variable will always be in question. Similarly, many other variables used in this study are based on self-reports, including UHN, presence of a chronic condition, restriction of activities, and presence of a long-term disability, which could affect the validity of the results.

Although the NPHS provided the most recent population level data available in Canada regarding CAM use, the data itself is from 2011 and may not be a contemporary reflection of the current level of CAM use, UHN, and physician availability. The measurement of CAM is also a limitation, which is a concept that is difficult to accurately conceptualize and may not be fully understood by those completing the survey. For instance, marijuana is considered a form of CAM if it is being used for health purposes, yet this was not covered in the NPHS. Finally, this study did not include all predictors of CAM use that were drawn from the research literature. Therefore, it is possible that other predictors of CAM use could have a confounding effect on the association between UHN, HA, and CAM use.

Conclusion

Chronic pain is a complex and debilitating condition that is not fully managed despite efforts of health care providers in conventional medicine. A consequence of insufficient management of chronic pain in this study was unmet healthcare needs, which was shown to be a significant predictor of the use of complementary and alternative

medicine, along with sex, income, education, employment status, and restriction of activities. The results of this study have implications for health care providers, policy makers, researchers, and educators in health professions to provide the supports needed to ensure patients are receiving safe and effective management of their chronic pain condition. This includes better preparing nurses to discuss and understand CAM interventions being used by their patients, investing in research in establishing what CAM therapies are safe and effective, examining characteristics and causes of UHN and the role CAM plays in fulfilling those needs, as well as testing of new models of care that are more integrative and effective.

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Chapter Three

Discussion of Implications

The purpose of this study was to examine the relationships between complementary and alternative medicine (CAM) use, unmet healthcare needs (UHN), and healthcare access (HA) in adults with chronic pain using the National Population Health Survey (NPHS). In this study, UHN were statistically significant predictors of CAM use ($p < 0.001$) and the final model was able to explain 19.4% of the variance in CAM use in this population. Other predictors of CAM use that were statistically significant in this analysis included: sex, income, education, employment status, and restriction of activities. The theoretical, education, practice, and research implications are discussed below.

Implications for Theory

The Behavioural Model of Health Service Use (BM) (Andersen, 1968) was originally designed to examine conventional healthcare utilization. As suggested by the findings of this study, the factors and motivations associated with the decision to use CAM may differ from individuals who seek conventional healthcare services for their pain management (Lorenc et al., 2009). Therefore, a framework that possesses higher levels of sensitivity to CAM users would benefit this domain of research. For instance, the development of a more CAM-sensitive framework could be accomplished through amendment of the BM (Andersen, 1968) model to better incorporate CAM specific factors that have been determined to predict utilization. Given that the final research model derived in this study was only able to explain 19.4% of variance in CAM use, it is likely that other extraneous variables exist that are related to the decision to use CAM.

Unfortunately, many of the variables that have been suggested in the literature to influence CAM use are difficult to measure or examine directly (e.g., personal attitudes and beliefs, cultural factors and social beliefs, personality traits), and are therefore understudied in the research literature.

A CAM specific model of healthcare service use would also help to better develop a more precise definition of how CAM can be conceptualized. Given the variety of different CAM interventions that currently exist, the development of a CAM-sensitive model of healthcare utilization would help to provide deeper consistency across research studies examining CAM related interventions. The production of a CAM-sensitive model would also allow for the generation of clearer guidelines highlighting which CAM modalities are beneficial and safe for patients with chronic pain. To date, there is no unifying framework or model that has been used to evaluate the efficacy or safety of CAM, especially from a healthcare system utilization perspective.

The variable of UHN also deserves further theoretical attention as related to CAM use and chronic pain suffers. The significant association between UHN and CAM use indicates that more research is needed to better describe unmet healthcare needs of chronic pain populations. Unfortunately, examining the characteristics of people with UHN was beyond the scope of this study, and has yet to be fully examined in other research of chronic pain populations. Further, characteristics reflecting the state of health of people with chronic pain needs to be studied to determine how these UHN affect health, or if health status is a moderator of UHN.

Implications for Education

The results of this study have implications for nursing education, in that the use of CAM is growing in prevalence and nurses should be provided with formative education toward its existence in patient populations (Chang & Chang, 2015; Christina, Abigail, & Cuthbertson, 2016; Hirschkorn & Bourgeault, 2005). To enable accurate health education to patients with chronic pain, knowledge regarding CAM therapies, including insights regarding their indication and efficacy is required (Christina et al., 2016). To foster the improvement in nurses' knowledge and confidence in discussing CAM with their patients, fundamental concepts of CAM should be embedded in nursing education. As outlined by the College of Nurses of Ontario (2014) *Entry-to-Practice Competencies for Registered Nurses*, nurses should be able to "[c]ollaborate…with other health care team members to develop health care plans that promote continuity for clients as they receive conventional, social, [and] *complementary and alternative health care"* [emphasis added] (Little, 2013; The College of Nurses of Ontario, 2014, p.7). While an entry-to-practice mandate, given the growing use of CAM in consumer populations and the recent legalization of marijuana in Canada, further educational emphasis of CAM should be provided in nursing curricula. To do this, Little (2013) suggests that information related to CAM can be incorporated into already existing curricula, including deepening discussions regarding the use of CAM for pain management, and using complementary and alternative approaches as adjuncts to conventional healthcare practices.

Implications for Practice

This study suggests that: (a) people with chronic pain have UHN in Canada; and, (b) people with chronic pain are also using CAM. This has implications for nurses who work in all areas of health care and commonly interact with people suffering from

chronic pain. First, it is important for nurses to engage in holistic assessments of patients who have chronic pain in order to determine what their needs are and how they are coping with pain. This may include opening a dialogue regarding their use of CAM in order to assess the safety of the interventions and determine what is missing from the care plan, in order to help minimize the potential of UHN.

Second, one of the most significant extrapolations arising from this study is the finding that conventional treatment likely does not fully address the needs of people living with chronic pain. Given the prevalence of CAM use as uncovered in this study, the assumption could be made that individuals suffering from chronic pain are more likely to seek alternative approaches to pain management and treatment. With the impending legalization of marijuana in Canada, practice-based implications related to the use of this intervention need to be urgently developed. Currently, medical marijuana is considered a complementary and alternative therapy, but remains a stigmatized alternative treatment intervention due to its historical status as an illegal substance (Cairns & Kelly, 2017; National Centerfor Complementary and Integrative Health, 2017; Nunberg, Kilmer, Pacula, & Burgdorf, 2011; Reinarman, Nunberg, Lanthier, & Heddleston, 2011). With Canadian legislation nearing completion to extend the legalization of medical marijuana to all instances (as long as the individual is over the legal age limit), the use of marijuana will likely increase for both medical and recreational purposes. Therefore, marijuana use for management of a health condition is an issue that nurses will also need to discuss with their patients, regardless of their predisposing health condition. This discussion may include: facilitating access to marijuana for patients where this intervention is indicated; providing education regarding

precautions, contraindications and adverse effects of marijuana; and, facilitating the client's actions and choices regarding medical marijuana use (The College of Nurses of Ontario, 2017).

Implications for Policy

Among the significant variables associated with CAM use this study identified, the association of income, employment, and education with CAM indicates a major implication for health policy reform. Access to CAM appears to be an issue as determined by the influence of income, employment, and education levels on health service utilization. Given there is virtually no coverage for CAM under Canadian Medicare, Canadians who choose to use CAM must pay out of pocket unless they have extended health coverage privately or through their employer/post-secondary education organization. Price ranges for CAM therapies vary widely depending on the type of service and provider, and can cost up to $250/month in Canada (Furler et al., 2003). Chronic pain patients are already at risk for a loss of income due to their condition and the effect of pain on their ability to work (Khady Ndao-Brumblay & Green, 2010), and may suffer further inequities regarding access to CAM. Therefore, incorporating coverage of safe and effective CAM therapies into Medicare would reduce the barriers that people with chronic pain (among other chronic conditions) experience in managing their health condition. Based on preliminary findings in the literature, this integrative approach to chronic pain management could result in addressing UHN in the population (Jakes & Kirk, 2015); improving the quality and satisfaction of health services (Rhee et al., 2016); reducing reliance on prescription medication, improving patient safety, and providing cost efficiencies in the healthcare system (Buckenmaier & Schoomaker, 2014).

Further, evidence demonstrates that CAM use, including marijuana, can reduce the need for opioid prescriptions (Powell, Pacula, & Jacobson, 2015; Vigil, Stith, Adams, & Reeve, 2017). Given the current opioid crisis in Canada (Government of Canada, 2018), the reduction in the use of opioids through other CAM approaches should be seen as a proactive and potentially important policy implication for further healthcare system refinement (Bradford & Bradford, 2016; Fleming et al., 2007; Franklyn, Eibl, Gauthier, & Marsh, 2017; Powell et al., 2015; Sun, Gan, Dubose, & Habib, 2008).

Recommendations for Future Research

This study has generated some areas of future research that are needed to improve chronic pain management. Firstly, the concept of UHN is understudied and needs more investigation to reveal the determinants of UHN, consequences of UHN, and ways to ameliorate UHN in adults with chronic pain. It was beyond the scope of this study to examine from a temporal perspective how reports of UHN differ when people with chronic pain receive CAM as an adjunct to conventional medicine. A temporal analysis is needed to determine if CAM is effective in addressing UHN. It would also be beneficial to learn whether the nature of unmet needs differ between CAM users and non-users, as well as what needs CAM addresses. This study did not measure how UHN and HA effect CAM use in any other patient populations, thus more research is needed to see in what circumstances these constructs are related to CAM utilization. From a theoretical perspective, there is a need for: (a) a model of health service utilization specific to CAM use, and (b) a clearer definition of what exactly CAM entails in order to provide consistency and allow comparability of findings across populations. Once CAM therapies receive sufficient evidence to support their integration into conventional medicine,

successful models and conceptual frameworks of CAM integration will allow health services to implement safe and effective CAM therapies in chronic pain management.

Conclusion

Chronic pain is a complex and debilitating condition that has been found to be not fully managed by traditional health care approaches. A consequence of insufficient management of chronic pain in this study was UHN, which were shown to be significant predictors of CAM use, along with sex, income, education, employment status, and restriction of activities. The results of this study have implications for health care providers, policy makers, researchers, and educators to help advocate for improved safe and effective management approaches to chronic pain. This includes better preparing nurses to discuss and understand CAM interventions being used by their patients; examining characteristics and causes of UHN and the role CAM plays in fulfilling those needs; and the testing of new models of care that are sensitive toward CAM integration into traditional health care approaches.

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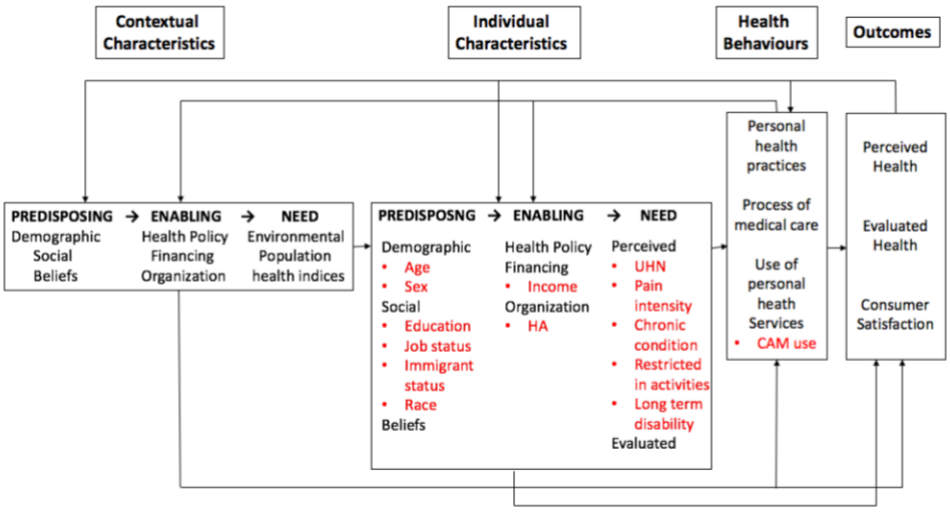
Appendix A

Operationalization of the BM in the Analysis



The bullet points indicate variables utilized from the NPHS. Adapted from "Improving Access to Care," by Andersen, R. & Davidson, P., 2013, in *Changing the US Health Care System: Key Issues in Health Services, Policy and Management*, p.35. Copyright 2014 by John Wiley & Sons Inc.

Appendix B

Operationalization of NPHS Variables in the Analysis

Study Variable	NPHS Variable
Age*	Age
18 –29	Continuous variable (0-99 years old)
30 – 39	
40 – 49	
50 – 59	
60 – 69	
70 – 79	
80 +	
Sex	Sex
Male	Male
Female	Female
	Not stated
Race*	Cultural or racial origin
White	White
Other	Black
	Korean
	Filipino
	Japanese
	Chinese
	Aboriginal peoples of North America
	South Asian
	South East Asian
	West East Asian and North African
	Multiple race category
	Not stated
Immigrant status	Immigrant Status
Yes	Yes
No	No
Missing	Not stated
Education	Highest level of education, respondent**
< High school	Less than secondary school graduation
High school	Secondary school graduation
Some post-secondary education	Some post-secondary
Completed post-secondary	Post-secondary graduation
	Not applicable
	Not stated
Total household income*	Total household income – all sources**
$\leq$ $19,999	No Income
$20,000 – $39,999	Less than $5000
$40,000 – $59,000	$5000 to $9000
$60,000 – $79,000	…

$80, 000 – $99,000	$100,000 or more
≥$100,000	Not stated
Missing	
Employment status	Current labour force status**
Employed	Employed
Unemployed	Unemployed
Not in labor force	Not in the labour force
Missing	Not applicable
	Not stated
Usual Intensity of Pain	How would you describe the usual intensity of
Mild	your pain or discomfort?
Moderate	Mild
Severe	Moderate
	Severe
	Not applicable
	Don't know
	Not stated
Long term disabilities	Do you have any long-term disabilities or
Yes	handicaps?
No	Yes
Missing	No
	Don't know
	Not stated
Has a chronic condition	Has a chronic condition**
Yes	Yes
No	No
Missing	Not applicable
	Not stated
Restricted in activities	Flag for restriction of activity**
Yes	Yes
No	No
Missing	Not stated
Unmet healthcare needs (UHN)	During the past 12 months, was there ever a time
Yes	when you felt that you needed health care but you
No	didn't receive it?
Missing	Yes
	No
	Don't know
	Not applicable
	Not stated
Access to medical doctor (HA)	Do you have a regular medical doctor?
Yes	Yes
No	No
Missing	Don't know
	Not applicable
	Not stated

Complementary and Alternative Medicine (CAM) use Yes No Missing	In the past 12 months, have you seen or talked on the telephone to an alternative healthcare provider such as an acupuncturist, homeopath, or massage therapist about your physical, emotional or mental health? Yes No Not applicable Don't know Not stated

Note. SPSS automatically treated the following categories as missing in the dataset: *Not applicable, Don't know, Not stated*. * indicates variables recoded from NPHS data for the purposes of the present study. ** indicates derived variables created by Statistics Canada

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1 Figure 2.1

No

Unmet care needs, access to a regular medical doctor, and CAM use in Canadian adults with chronic pain: Findings from the National Population Health Survey

Aug 2018 50

Ms. Jessica LaChance 1607-405 Waterloo St.

London, ON N6B3R7 Canada Attn: Ms. Jessica LaChance

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Appendix D: Curriculum Vitae

Education	
University of Western Ontario PhD (Nursing)	2018 – 2022
University of Western Ontario Masters of Science in Nursing	2016 – 2018
University of Western Ontario Bachelors of Science in Nursing	2008 – 2012

Experience	
Research Experience:	
Arthur Labatt Family School of Nursing – UWO Graduate Research Assistant PI: Dr. Richard Booth, Assistant Professor, UWO *Evaluation of a technology-enabled, gamified electronic medication administration record (eMAR) system for use in simulated clinical education*	2017 – 2018
Arthur Labatt Family School of Nursing – UWO Graduate Research Assistant PI: Dr. Richard Booth, Assistant Professor, UWO *The importance of trust in the adoption and use of intelligent assistive technology by older adults to support aging in place: A scoping review*	2017 – present
Arthur Labatt Family School of Nursing – UWO Graduate Research Assistant PI: Dr. Gillian Strudwick, Assistant Adjunct Professor, UWO; Project Scientist, Centre for Addiction and Mental Health, Toronto, Ontario *Identifying how patient portals may be effectively used among mental health patient populations in Ontario to support digital inclusion*	2018 – present
Teaching Experience:	
Arthur Labatt Family School of Nursing – UWO Clinical Instructor – N2221B Professional Practice: Families and Communities	2018
Arthur Labatt Family School of Nursing – UWO Teaching Assistant **–** N1160 Foundational Concepts of Professional Nursing II	2018
Arthur Labatt Family School of Nursing – UWO Teaching Assistant – N4400 Advanced Concepts for Professional Practice	2017
Arthur Labatt Family School of Nursing – UWO Teaching Assistant – N2230 Health Promotion and Caring: Supporting Health	2017
Professional Experience:	

Arthur Labatt Family School of Nursing – UWO iHEAL Nurse Interventionist	2018 – present
London Health Sciences Centre Registered Nurse – Inpatient Pediatric Oncology/Surgery/Medicine	2015 – 2018
London Health Sciences Centre Registered Nurse – Cardiology Inpatients/Coronary Care Unit/Cardiac Day/Night Unit	2012 – 2014
Academic and Administrative Experience:	
International Society of Complementary Medicine Research Communications Executive	2017 – 2018
Society of Nursing Graduate Students MScN Representative, VP Social	2017 – present
Sigma Theta Tau International Governance Committee	2017 – present
Registered Nurses Association of Ontario Communications ENO	2017 – present

Publications

Booth RG, McMurray J, Strudwick G, Forchuk C, Morse A, Lachance J, Baskaran A, Allison L.(2017). The importance of trust in the adoption and use of intelligent assistive technology by older adults to support aging in place: A scoping review protocol. JMIR Research Protocols. 6(11), 218. DOI:10.2196/resprot.8772

Presentations/Conferences/Workshops

LaChance, J. & Morris-Strain, A. (2018). Associated Factors of CAM Use in Adults with Chronic Pain: A Scoping Review. STTI 30th Annual Research Conference: "Closing the Gap: Research and Scholarship in a Clinical World", London, Ontario, November 10, 2017

McMurray, J., Booth, R. G., Strudwick, G., Forchuk, C., Morse, A., **Lachance, J.**, Baskaran, A., Allison, L. (2017). A scoping review exploring the concept of trust in the adoption and use of intelligent assistive technology to support older adults age in place. 46th Annual Scientific and Educational Meeting of the Canadian Association on Gerontology, Winnipeg, Manitoba, October 19-21, 2017

LaChance, J. (2017) The Effect of Health Care Service Quality and Satisfaction on Complementary and Alternative Medicine Use. Retiring with Strong Minds Research Presentation Series, London, Ontario, June 2, 2017.

Awards/Recognitions

RNAO Nursing Research Interest Group Graduate Scholarship ($1500)	2018
Ontario Graduate Scholarship ($15,000)	2018
Western Graduate Research Scholarship ($3968)	2017

Ontario Student Grant ($4185)	2017
Dean's Honor List	2011 – 2012, 2016 – 2017
RNAO Nursing Education Initiative Grant ($1500)	2016
Ontario Graduate Scholarship ($15,000)	2016
Western Graduate Research Scholarship ($3968)	2016
Ontario Student Grant ($3948)	2012
Ontario Student Grant ($3948)	2011
The Audrey Metzler Memorial Award in Nursing ($3400)	2009 – 2012
North Dumfries Award ($1500)	2009
Western Scholarship of Distinction ($1500)	2008