A longitudinal analysis of the chiropractic profession from 1996 to 2007

by

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An oral defense of this thesis took place on November 29, 2018 in front of the following examining committee:

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The above committee determined that the thesis is acceptable in form and content and that a satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate during an oral examination. A signed copy of the Certificate of Approval is available from the School of Graduate and Postdoctoral Studies.

Abstract

Aim: To explore the relative attractiveness of chiropractic in Ontario, Canada from 1996-2007.

Methods: We conducted a longitudinal cohort study using administrative registration data from 1996-2007. *Stickiness* and *Inflow* concepts acted as proxy measures for relative attractiveness. Survival analysis was employed to identify practitioner groups more likely to leave practice.

Results: Chiropractors grew from 1,955 to 4,185 from 1996-2007 in Ontario. Increases occurred in the proportions of female, and foreign-trained chiropractors. *Stickiness* indicators averaged changes of 0.29/year from 1997-2003, but from 2004-2007 the average was 8 times greater, at 2.42 points/year. Survival analysis showed that certain groups, like newer practitioners were at greater risk of leaving practice (HRR 1.33, $p<0.05$; CI 1.04-1.73). However, time-varying analysis showed a post-delisting, increase in profession-wide likelihood of leaving.

Conclusion: The chiropractic profession became less attractive in synchrony with government policy decisions. Following delisting in 2004, the likelihood of leaving practice increased for most chiropractors.

Keywords: chiropractic, Ontario, health human resources, health policy, retention, labour

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There is a legend in the Zen tradition that all graduate student candidates should hear before committing to a program. It is about a student who climbed mountains in search of a great master. When the student found the master, he asked how long his studies would take if he was diligent. The master replied it would take 10 years. The student complained that his father was ill, and that he wanted to finish sooner. The master replied that it would therefore take 30 years. The student, taken aback, insisted that he would take on any hardship to reach mastery more quickly. In that case, the master said, it would take 70 years to finish.

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CHAPTER 1: INTRODUCTION

Canada's health care system, like its international counterparts, is subject to constant scrutiny and revision, driven mainly by three forces: supply and demand economics, public oversight, and moral obligation (Evans, 2003). These forces, perpetually superseding one another, act to reinvent health care in a manner reminiscent of the concept of Plutarch's ship of Theseus: with these constantly shifting principles and changing health needs, what we call Canadian health care today, is very different from what it was over 50 years ago, when its blueprints were laid out (MacKinnon, 2013). Within this system, provincial policy-makers must iteratively take stock of available resources, and determine how to use them to provide the most efficient coverage for the public. Decisions made by provincial governments are influenced directly by the federal government and the Canada Health Transfer, which is tied to Canadian law.

Since the enactment of the *Canada Health Act*, health care has been considered, and is intended to be, a universal, "public contract model" in Canada ("Canada Health Act, RSC 1985," 2012; Deber, Gamble, & Mah, 2012). Although the *Canada Health Act* provides a strong incentive for the public administration of health care, delivery of care is widely delegated to private providers through provincial insurance plans. These plans are described by Deber et al. as more of "a floor rather than a ceiling", where a change in setting may also change who pays for care (Deber et al., 2012). Canadian health care is persistently haunted by the notion that it is unsustainable (Evans, 2003; Landry et al., 2012; Parkin, 2016; Speer & Lee, 2016), which acts as the driver determining the types of coverage provincial governments will sanction. This is realized predominantly under provincial oversight programs, such as the Ontario Ministry of Health and Long-Term Care (MOHLTC), which uses provincial insurance programs to fund health services, such as hospitals and physicians. The Canadian Institute of Health Information (CIHI) recently reported in *National Health Expenditure Trends* that public sector funding remains constant, at roughly 70% of all health expenditures (Canadian Institute of Health Information, 2016) with little to no change to the 70:30 public-private ratio observed by Deber more than a decade before (Deber, 2002). The private component of health care spending includes user fees for public services, private insurance, employer benefits and out of pocket payments for "much of pharmaceuticals, rehabilitation, dental care, [and] complementary and alternative medicines" (Canadian Institute of Health Information,

2016; Deber, 2002). The *Commission on the Future of Health Care in Canada*, hereafter referred to as the Romanow Report, recommended that the *Canada Health Act* be modernized, as health care ought to embody more than acute care, hospitals and select physician services (Commission on the Future of Health Care in Canada & Romanow, 2002). Despite these recommendations, Ontario continues to operate on a model in which the Physician Services Committee, with equal representation from the Ontario Medical Association (OMA) and MOHLTC, decides which health care services will receive public funding. For the remaining 30% of private funding, a consumerist model exists where health care providers vie with one another for coverage by private insurers and benefits plans, as well as direct, out-of-pocket funding from the public.

For private health services that are not funded by the public insurance model, public perception has the power of agency, supporting independent practitioners either through out of pocket payments, or subscribing to health insurance plans which include their services. Public agency can therefore tip the scale in favour of some services, while pushing others out (Kelner, Wellman, Welsh, & Boon, 2006). Deber characterized health care as a division between 'need' and 'consumerism', where the languages of patient rights and evidence-based medicine provide the context for the regulatory approach (Deber, 2003). This public consumerism, which Saks terms 'user demand', is a relatively new and growing movement, with the power to open doors, and challenge practices used to supress support for Complementary and Alternative Medicine (CAM) (Saks, 2015). Coulter and Willis refer to the consumerist movement in health care, along with the politicization of health, as a major force responsible for the rise in popularity of CAM (Coulter & Willis, 2004). In Canada, CAM providers largely exist outside provincial insurance plan coverage, creating a landscape of competing services on the health care periphery in each province.

CAM professionals must work on the margins of health care, within provincial landscapes, acting within and amongst themselves to secure sufficient resources to survive. Economist Robert Evans used the Homer-Dixon, Neo-Malthusian model of violent conflict over renewable resources to demonstrate the health-policy-related conflicts experienced by high-income countries, such as Canada (Evans, 2003). In the public-private funding model, conflict erupts as professions on the margins of health care are perceived to be more successful, while groups of subsidized practitioners begin to feel threatened. As health policy decisions limit public funding in times of scarcity, professions are consequently drawn into competition for resources. Anderson described

how a vacuum emerged as conventional medicine and the health care system moved towards treatment of infectious diseases and acute symptoms, and away from chronic illness (Anderson, 2003). Kelner et al. believe that alternative health professions have flourished as a result of that vacuum. They argue that non-medical health professions, such as chiropractic, have used social closure tactics, including professionalization and the creation of body of peer-reviewed research, to secure jurisdictional claims over these areas (Kelner et al., 2006). Relying on those tactics was necessary, since failure to secure either public or private resources can put the future of CAM professions at risk, but it has also changed the professions. In the Ontarian context, Coburn claimed that, by the 1990s, chiropractic had been tamed, 'medicalized', and had begun to rely on medical tenets such as the model of general diagnosis. At a time when the *Regulated Health Professions Act* had come into play, Coburn believed that chiropractic, like nursing, was "quite willing to pay the price of (somewhat) increased state regulation through a re-defined College, in return for greater (implied) official recognition" (Coburn, 1993; "Regulated Health Professions Act," 1991). Proponents such as McGregor et al. are less critical than Coburn, viewing the transformations in a more positive light. They suggest that chiropractic is moving away from competition with medicine, and towards inclusion in health care teams as spine specialists (McGregor, Puhl, Reinhart, Injeyan, & Soave, 2014; Nelson et al., 2005).

Since its founder, D.D. Palmer, was born in Pickering, chiropractic has long been woven into the fabric of health care in Ontario, but throughout its existence, internal and external forces have threatened its survival. In recent history, the status quo existence of the chiropractic profession in North America has been challenged by market share encroachment of other health care professions, a divisiveness within the profession, and a growth in the number of practitioners despite unchanging utilization rates (Mior & Laporte, 2008). In addition, the McGuinty government delisted coverage of certain services from Ontario Health Insurance Plan (OHIP) in 2004, including chiropractic, and certain services offered by physiotherapists and optometrists. Delisting was justified as a means necessary to free up funds to address the issue of instituting federally endorsed primary care reform (Aggarwal, 2009; Smitherman, 2004). George Smitherman, Minister of Health and Long-Term Care when delisting occurred, cited the overarching goal of committing $600 million to an interdisciplinary team approach to primary health care. The Ontario Liberal plan incorporated a resurgence of the Harris government's Family Health Networks, renamed Family Health Teams (FHTs) (Aggarwal, 2009; Harris et al.,

2015; Hutchison, Levesque, Strumpf, & Coyle, 2011). The plan would also establish regional health authorities, known as Local Health Integration Networks (Fenn, 2006). In the long-run, the Liberal strategy would lay the groundwork for the Ontario Action Plan for Health Care (Ministry of Health and Long-Term Care, 2012).

The employment of FHTs has been driven in part by the need to improve the supply and distribution of health care providers. Since appearing as Recommendation 15 of the Romanow Report, the focus of those responsible for provincial health care has shifted to "good primary care", which requires "interprofessional and institutional coordination, integrated information technology, strong leadership and governance, and well-directed funding" (Commission on the Future of Health Care in Canada & Romanow, 2002; The Conference Board of Canada, 2014). The shift has come as the government attempts to curb shortages and rising fees in the traditional medical system (Canadian Institute of Health Information, 2014). It hinges on caring for patients by facilitating dialogue between an array of specialists in one place. The model proposed is more patient-centric, underscoring the provincial government's effort to address recommendations of the 2012 *Commission on the Reform of Ontario's Public Services* and the Ontario Health Action Plan. Recommendation 5-1 of the Drummond Report, states: "The system should be centred on the patient, not on the institutions and practitioners in the health care system" (Commission on the Reform of Ontario's Public Services, 2012; Ministry of Health and Long-Term Care, 2012). This approach has been adopted to reduce care delivery times and divert patients with primary care health concerns from hospital emergency rooms to a clinical setting, where they can be more efficiently helped. The "Family Health Team/Community Health Centre" model has shown encouraging system-wide improvements in clinical care for management of chronic conditions without adding more strain to the health care system (Harris et al., 2015; Hutchison et al., 2011; Marchildon & Hutchison, 2016).

Health care has become so complex in current times that it is no longer feasible for a single specialist to offer patient-centred care to all patients, and expect a uniform result. Internationally, primary care physicians have indicated that they feel ill-equipped to deal with the multiple conditions that chronic illness patients present with, and there is special emphasis on this sentiment in Canada (Schoen et al., 2006). Schoen et al. proposed multidisciplinary teams, including non-physician primary care providers, to improve coordination of care, outcomes and efficiency. This notion was supported by their physician respondents (Schoen et al., 2006). Specializing in Musculoskeletal (MSK)

complaints, chiropractors represent one such primary care provider in the Ontario health care system with the potential to help advance the provincial government's model. There is a strong link between chronic pain and conditions and CAM use (Canizares, Hogg-Johnson, Gignac, Glazier, & Badley, 2017). It has been shown that chiropractors are effective treating some of health care's costliest conditions. Although other specialized health care providers, such as physiotherapists and massage therapists, address MSK complaints, chiropractors see the largest portion of MSK patient complaints, especially those concerning the low back (Canizares et al., 2017; Piérard, 2012; Sweetman & Yang, 2013).

The study of health care practitioners who rely mainly on private funding is of interest to Ontarians for two reasons. First, these services are offered in Ontario because the public continues to support their use (Coburn, 1993; Kelner et al., 2006). Second, specialists, such as chiropractors, can be recruited to work within the current team-based approach in health care to ply their trade in a more cost-effective, patient-centred and efficient model, in which everyone benefits. Piérard gathered data from the 2003 Canadian Community Health Survey, Statistics Canada and the Fraser Health Institute, and showed that the Canadian public consulted chiropractors more frequently than providers who offer similar services, such as Registered Massage Therapists, physiotherapists, homeopaths or acupuncturists (Piérard, 2012). Chiropractic has been rated the preferred alternative care for chronic pain patients nationally (Beaudet, Courteau, Sarret, & Vanasse, 2013). Chiropractors have historically drawn their income from 11% of Ontarians (Mior & Laporte, 2008), mainly from third party coverage and out of pocket payments.

My study will analyze practitioner activity from 1996-2007. I have chosen this time frame to investigate whether there was a change in the number of practitioners choosing to leave the profession in Ontario following the government's decision to delist chiropractic services from the provincial health plan in 2004. The McGuinty government's decision to delist health services followed through on its intended purpose to save money for health care reform. The purpose of my study is to add to previous work investigating the unintended consequences experienced by targeted health professions in Ontario following delisting, particularly with regard to retention.

1.1. Background

In Canada, the health care system is based on medical need rather than on the ability to pay; a defining characteristic of Canadian society (Deber, 2003). Another defining characteristic is the persistent notion held by governments that health care is unsustainable. Evans believes that governments continue to cite three 'zombies', or arguments that have been killed intellectually, but will not stay buried. These are the interlinked claims of increased demand due to demography, technology and public attitudes (Evans, 2003). Despite Evans' insistence that health care is viable, the idea of unsustainability persists, as evidenced by the report published by the *Commission on the Reform of Ontario's Public Services*, chaired by Don Drummond. The report claimed that, since the Canada Health Transfer (CHT) will soon be tied to Gross Domestic Product (GDP) growth, and "health costs tend to increase more rapidly than nominal GDP", "Ontario's CHT payment could be $2.3 billion to $3.8 billion lower than under the current formula" (Commission on the Reform of Ontario's Public Services, 2012). While the commission offered a set of recommendations that could be used to contain costs, provincial governments have not always had open consultation processes before making decisions about health care.

Changes to Ontarian health policy in the last 20 years demonstrate that at the crossroads of social responsibility, where health care and health economics meet, complications materialize regarding delivery of care to constituents, and paying for those costs. The provincial government cannot pay for everything, and costs for existing care continue to grow. Representatives of the province at MOHLTC must decide which services merit continued coverage, and support via public funding, (i.e. through OHIP). In the broader Canadian setting, health care services that do not fit the provincial and federal government's interpretation of "medically necessary", or "medically required" as per the *Canada Health Act* ("Canada Health Act, RSC 1985," 2012) can only thrive if the public or insurers are willing to pay for them. In Ontario, public pay primary health care services are determined through a consultation process with equal representation between the provincial government and the Ontario Medical Association (OMA), embodied in the Physician Services Committee (Flood, Tuohy, & Stabile, 2004; Minister of Health and Long-Term Care & Ontario Medical Association, 2013). The Physician Services Committee arose from an agreement struck between the provincial government and the OMA in 1997. Since the committee structure vests all representative power from

the health sector in the OMA, members of other health professional groups may feel that their interests are underrepresented in negotiations with the province (Brosseau, Koski, & Johnson, 2004) and may be tempted to migrate elsewhere, despite the province's need for them. The Public Health Agency of Canada has suggested that some of the mounting costs for chronic pain could be mitigated through initiatives such as “healthy aging” (Public Health Agency of Canada, 2014). Healthy aging was described by the Healthy Aging and Wellness Group in 2006 as improving and preserving good health, but it is also has been described as the absence of clinical disease, “freedom from physical disability, plus preserved cognitive, affective and social function” (Hamer, Lavoie, & Bacon, 2014; Healthy Aging and Wellness Group, 2006). In order to realize initiatives such as these, Ontario requires a diverse health workforce, including professionals equipped to promote the healthy behaviours cited by the Public Health Agency of Canada’s report.

According to the *Commission on the Reform of Ontario’s Public Services*, the average annual growth rate of health care costs escalated to 6.3% of Ontario’s GDP between 2007 and 2012. This increase in health care costs overtook the province's overall annual GDP growth (Commission on the Reform of Ontario's Public Services, 2012), forcing the provincial government to explore methods to curb these costs without compromising services. One of the largest costs to health care is the treatment of MSK pain (Coyte, Asche, Croxford, & Chan, 1998; da Costa & Vieira, 2010; Woolf & Pfleger, 2003). MSK pain, including arthritis, rheumatism, and back pain, has long topped the lists as one of the most expensive sets of disorders facing the country (D'Astolfo & Humphreys, 2006). In a Nanos national telephone survey about all types of chronic pain, lower back and upper back were the two most commonly reported areas, totalling 31.8% of all complaints registered (Schopflocher, Taenzer, & Jovey, 2011). Busse et al. reported that annual medical expenditures for low back pain in Canada are estimated to be between $6 and $12 billion, not including losses due to time off work and the related disability payments (Busse et al., 2015). The increase in costs referred to by Drummond mirrors the increase in prevalence of MSK-related conditions. Perruccio et al., following the National Health Population Survey and the Canadian Community Health Survey, predict that the prevalence of arthritis, which sat at roughly 13% in 2008 (Public Health Agency of Canada, 2014), will be experienced by 21-26% of the population by 2021 (Perruccio, Power, & Badley, 2006).

The need for services that treat MSK disorders will likely increase as the Canadian population ages. According to the World Health Organization's Global Burden of Disease, MSK disorders grew from being responsible for 27.9 million disability-adjusted life years (DALYs) in 1990 to 43.3 DALYs in 2010 for people aged 60 years and older, a 55.2% increase (Prince et al., 2015). Of MSK disorders, 19.1 million DALYs were allocated to low back pain (Prince et al., 2015) and are considered preventable by some, whereas others suggest conservative, invasive medicine remains ineffective in terms of treatment outcomes (MacKay, Canizares, Davis, & Badley, 2010). As life expectancy increases, further growth in this statistic is likely (Morlion, 2013; Prince et al., 2015).

The increase in prevalence of MSK conditions will also impact the use of health care services and providers. Sweetman and Yang report that during the years 1990-2006 in Ontario, approximately 27% of the population sought out a chiropractor, with an average of about 10 visits per year (Sweetman & Yang, 2013). Roughly 95% of complaints seen by chiropractors are MSK-related (Balon & Mior, 2004). As of 2004, the cost for chiropractic treatment is covered primarily through insurance or out of pocket, and not through OHIP. Additionally, those patients with the means to do so are more likely to choose chiropractic care to address their MSK complaints (Beaudet et al., 2013; Foltz et al., 2005). Although chiropractors are well-positioned to assist the province with its growth in MSK-related health statistics, the profession has a long history of overcoming hurdles, such as lack of inclusion in the traditional Western health hierarchy (Coburn, 1993; Saks, 2015).

Researchers have stated that chiropractors face barriers to widespread acceptance in mainstream health care (McGregor et al., 2014; Weis et al., 2016), along with secondary problems, such as oversupply, which in turn might affect the retention of practitioners in the province (Mior & Laporte, 2008). Further work is needed to clarify this. The literature assessing health care professional retention includes laboratory technologists, dietitians, respiratory therapists, nurses, physiotherapists, speech-language pathologists and audiologists (Berta, Laporte, Deber, Baumann, & Gamble, 2013; Gamble, 2002; Gamble, Daniels, Deber, Laporte, & Isaac, 2011; Landry et al., 2012; Miller, 2011). There is a gap in the literature concerning retention of chiropractors in Ontario. This study will help address this gap by using the methodology established in other retention-based projects to assess the health of the profession. This will be achieved by looking at the number of practitioners in the province in the years 1996-

2007. The time frame studied was chosen to examine whether the decision to completely delist chiropractic services in 2004 coincided with a change in the probability that chiropractors chose to cease practice in Ontario, or move elsewhere.

1.2. Objectives

My project investigates the retention of chiropractors in the province of Ontario in the years 1996-2007, utilizing the administrative data collected by the College of Chiropractors of Ontario (CCO) on its registrants. Registration with the CCO is required to lawfully practice chiropractic in this province. I intend to establish normative registration behaviour for Ontarian chiropractors. Then, I will compare that normative data to the registrant decisions in the years following delisting, to determine whether there was any change in the proportion of chiropractors choosing to cease practice in the province.

As a secondary objective, I will look at subgroups within the population of chiropractors based on number of years spent in practice, location, school of graduation and sex, to examine whether subgroups based on these characteristics were more likely to exhibit different behaviour than their peers. I compare the behaviour of these subgroups over the entire period to the years following delisting to determine whether any of the variables were predictive of change.

1.3. Research Questions

My study will examine whether a government policy related to health care can have an impact on the number of health professionals who choose to remain in practice. It will do so by attempting to answer the following questions:

1. During the years 1996-2007, do Alameddine et al.'s descriptive proxies for the attractiveness of a health profession remain constant across all CCO registrants?
2. If the proportion of chiropractors choosing to begin or stay in practice in Ontario changed following de-listing in 2004, were the following variables predictive of those changes:
    - Years in Practice
    - Location (designated by Local Health Integration Network)
    - School of Graduation
    - Sex

1.4. Overview

This thesis consists of five chapters, including this one. The following guide provides a short description of the remaining chapters:

- Chapter 2 contains a literature review, applying Doern and Phidd's theoretical framework of ideas, structure and process (Doern & Phidd, 1992) to the political climate in health care in Ontario at the turn of the millennium. It will explore cases of different health professions, and how provincial government decisions affected them as it wrestled with primary health care reform. Finally, it will bring to the forefront the decision made by the McGuinty government to delist chiropractic, optometry and physiotherapy from the provincial insurance plan in order to provide a context for the study of health human resources proposed by my thesis.
- Chapter 3 describes the methods used to track professional activity in Ontario. It introduces the variables that were collected using the CCO database. It describes the tools that were used to measure the attractiveness of the chiropractic profession, as well as measures of the retention of professionals. The third chapter will also contain a discussion of how survival analysis was employed to study the variables, to investigate whether certain characteristics might be correlated with specific behaviours.
- Chapter 4 will outline the results, beginning with descriptive totals by variable, and followed by the outcomes from the retention-based attractiveness analysis. Finally, the results from the survival analysis are presented.
- Chapter 5 contains discussion of the results. The discussion begins by contextualizing the descriptive data, and then explores the ramifications of the attractiveness and retention, or 'Stickiness' and 'Inflow' results, followed by the survival analysis. The strengths and limitations of the study are explored, and the work is concluded.

CHAPTER 2: LITERATURE REVIEW

2.1. Literature Review Overview

This chapter contains a narrative review of the literature in order to provide the rationale to conduct a study looking at the retention of chiropractors in Ontario from 1996-2007. For the review, I conducted a search of PubMed, MEDLINE and the Cumulative Index to Nursing and Allied Health. The following search terms were used in combination: *aged*, *Ontario*, *Canada*, *musculoskeletal diseases*, *prevalence*, *chiropractic*, *insurance coverage*, *reimbursement mechanisms*, *health care reform*, *health policy*, *interprofessional relations*. The review will use Doern and Phidd's theoretical framework of ideas, structure and process (Doern & Phidd, 1992) to examine the historical context in which the decision to delist health services in 2004 was made.

The idea, in this context, was primary health care reform, which was a prominent issue in Ontarian health care between 1996-2007 and was endorsed in the final report of the Commission on the Future of Health Care in Canada in 2002 (Commission on the Future of Health Care in Canada & Romanow, 2002). The Commission made it clear that the ~~t~~their proposed changes to the health care system would evolve beyond doctors and hospitals, which were "fine for the time" in the 1960s, but "not sufficient for the 21st century" (Commission on the Future of Health Care in Canada & Romanow, 2002).

The structure, according to Flood, Tuohy and Stabile, which was mainly responsible for deciding which health services should receive public funding, was the Physician Services Committee (Flood et al., 2004). The Committee's membership was divided equally between representatives from the Ontario Medical Association (OMA) and the Ministry of Health and Long-Term Care (MOHLTC). This left little room for Ontario's many other health professions to negotiate with the government in this setting. Flood et al. remarked that there was "little evidence of a systematic approach to the de-listing process" and that certain health professionals were concerned about their lack of ability to "make input into the decision-making process" (Flood et al., 2004).

The process, for which the McGuinty government was ultimately responsible, was the delisting of chiropractic, physiotherapy and optometry services, announced with its 2004 budget in May of that year. This particular change came about as a tough decision that the McGuinty government deemed necessary in order to make health care more sustainable, and free up resources to enact reform (Smitherman, 2004).

Doern and Phidd's framework of ideas, structure and process adequately describes the political workings of primary health care reform and the decision to delist health services in 2004. However, in the case of delisting, what the framework does not encompass is the effect those changes might have had on players in the system. In the case of delisting, this thesis will explore a potential outcome of the McGuinty government's policy decision to delist health services on one of the affected groups: chiropractors.

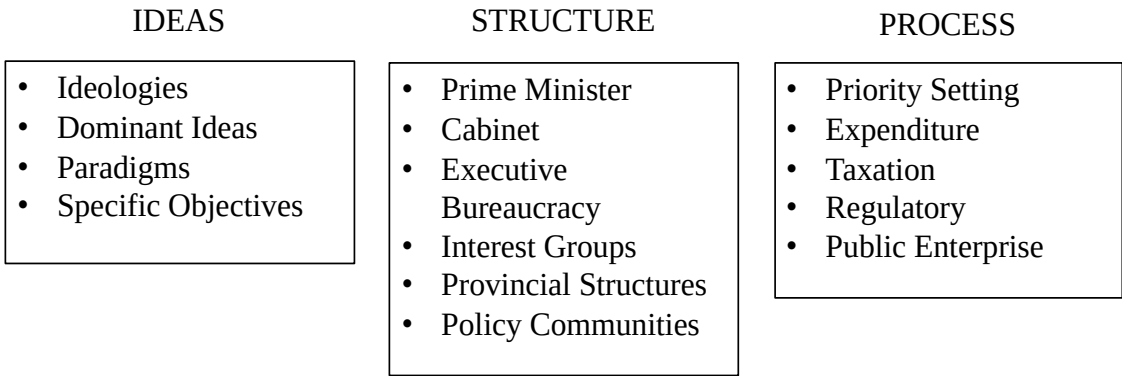

Figure 2-1: Doern and Phidd's Components of the Interplay Approach (Doern & Phidd, 1992).

2.2. The Idea

One of the greatest catalysts for primary health care reform in Ontario was the Commission on the Future of Health Care in Canada, established by the federal government in 2001 to review Medicare. The Commission's final report noted that the federal share of health spending had dropped, and that provincial governments were shouldering more of the burden to fund the system. Recommendations from Chapters 4 and 5 of the Commission's report focussed on the efficiencies of integrated teams of health care providers and renovating primary health care (Commission on the Future of Health Care in Canada & Romanow, 2002). Doern and Phidd refer to ideas as "the desired end states, the sense of public purposefulness, that individuals and groups seek to obtain through state action" (Doern & Phidd, 1992). The section below will elaborate on the pressures the Ontario provincial government felt to reform the health care system. It will also highlight a commonly held idea that health professionals need to work together in teams to provide care more efficiently for Ontarians.

2.2.1. Aging Canadians and the Need for Efficiency

A significant source from which the provincial government in Ontario received cues for primary health care reform was *Building on Values: The Future of Health Care in Canada*, the final report of the Commission on the Future of Health Care in Canada. The report used concepts, such as aging populations and sustainability, that would eventually be echoed in the province's Action Plan for Health Care. The Commission's Report stated that "Canada will be "greyer" in the future than it is now … [and] the demand for particular kinds of services will increase" (Commission on the Future of Health Care in Canada & Romanow, 2002). Statistics Canada data clarifies that Canadians are indeed older: the median age of Canadians was 40 years in 2012, up more than 10 years since 1982, and projections indicate that seniors will make up a quarter of the population in 2036 (Statistics Canada, 2015). However, the rhetoric concerning exactly how aging populations utilize more of our universal health care system's resources remains a contentious issue. Concerns for health care costs to sky-rocket as a result of an aging population persists in Ontario, despite having been debunked in the past (Evans, 2003). Tanuseputro et al. studied a quarter million people in the province in their last year of life from 2010 to 2013. Of this cohort, 80% were over the age of 65, and cost the system an estimated $3 billion dollars annually, with inpatient care being the highest expense (Tanuseputro et al., 2015). Those costs, especially costs pertaining to hospitals, fall mainly to provincial governments, although the federal government has traditionally supplemented earmarked funds in one form or another of the Canada Health Transfer (CHT).

The CHT has its complexities, and through restructuring and equalization payments, the amounts transferred to the provinces have fluctuated since the federal government dedicated a portion of the transfer directly to health spending. At times, the amount transferred to Ontario has dipped, causing consternation about the sustainability of the budget for health, which typically eats up over 40% of provincial government program spending (Barua, Palacios, & Emes, 2017; Commission on the Reform of Ontario's Public Services, 2012; Evans, 2003). A 2017 Fraser Institute report was one of the latest sources to voice the pervasive sentiment that health care spending, as it stands, is on an unsustainable trajectory (Barua et al., 2017). The paraphernalia from the 2012 MOHLTC Action Plan for Health Care warned that the cost of care for seniors "is three times higher than for the average person", a line which was likely borrowed

from the Romanow Report. The Action Plan also claimed that health care spending, unchecked, would rise to 70% of the provincial budget within 12 years (Ministry of Health and Long-Term Care, 2012). Canadian Institute of Health Information data confirm the conclusion that Canadians aged 65 and older use more resources (Canadian Institute of Health Information, 2017b).

The extent to which aging populations utilize more health care system resources is debatable. There is a body of North American research which looks at health care costs, and identifies a specific group of users as responsible, but age has little to do with their findings. Deber and Lam elucidated that in Canada, regardless of age or gender, a small proportion of the population accounts for the majority of health expenditures (Deber & Lam, 2009). Their conclusions are supported by other research which has uncovered the same, long-standing trend in the United States. Berk and Monheit looked at US records from 1929-1996, and consistently found that health care costs were concentrated among the few, and that in all years studied, the 50% of the population that spent the least used only about 3% of health resources (Berk & Monheit, 2001). This presents a fundamental flaw with the tendency to hang increased health care costs on an aging population.

Projections about health care costs and aging have at times bordered on alarmism, and some analysts have attempted to dispel preoccupations with looming projections. Robert Evans, a Canadian health economist, evaluated national Gross Domestic Product (GDP), examining health expenditures proportionate to government revenues. He found that as of 2002, the cost of running the Canadian system had remained relatively the same for over 20 years (Evans, 2003). Nonetheless, the idea that health care system spending levels were tenuous has shaped the political environment in Ontario. The focus of successive governments since the late 90's has been to tighten spending and to create a leaner system (Commission on the Reform of Ontario's Public Services, 2012). Marchildon and Hutchison exemplify the continuing preoccupation with aging and health care costs. Although they agree with Deber and Lam's assessment that a few users account for much health care spending, they contend that age must still be counted as a factor, along with geographical location, when considering how to distribute resources (Marchildon & Hutchison, 2016). From Romanow to Drummond, the call to reform has been tied in great part to efficiency, and a team-based approach. The problem was defined by Romanow's commission as "partly about supply", but "also about distribution, scope of practice, patterns of practice, and the right mix of skills

among various health care providers". The vision for primary health care was that it "provide important benefits to Canadians … and give them access to teams and networks of qualified health providers" (Commission on the Future of Health Care in Canada & Romanow, 2002). For Drummond ten years later, the call was similar: "Family Health Teams should become the norm for primary care … [t]hey need to be big enough to support a wide range of providers … [and] add more specialists to their teams" (Commission on the Reform of Ontario's Public Services, 2012).

2.2.2. The Solution: Primary Health Care Reform

In 2003, the Liberals won the provincial election in Ontario, and the new government set to work implementing primary health care reform right away. The province reputedly "faced a daunting health reform agenda and a major fiscal and bureaucratic repositioning agenda, and both agendas were on an accelerated time table" (Fenn, 2006). Under the McGuinty government, MOHLTC re-envisioned a model of interprofessional collaboration between health care professionals. The providers were already present in the system, and MOHLTC proposed using a blended capitation remuneration model: the FHT (Commission on the Reform of Ontario's Public Services, 2012; Marchildon & Hutchison, 2016; Ministry of Health and Long-Term Care, 2012). Some of the building blocks for the proposed system already existed as relics from the provincial government's Progressive Conservative predecessors (Fenn, 2006). By September 2004, a Health Results Team was created to assist then Minister of Health and Long-Term Care, George Smitherman, who reported that 52 FHTs were in operation by 2005. Smitherman's Health Results Team projected that by 2008, the number of FHTs would grow to 150 (Ministry of Health and Long-Term Care, 2006; Smitherman, 2005). The administration of these teams remained a challenge, but the Ontario Liberals had a "new devolved organizational structure" in mind that would reduce the role of the Ontario government to one of "stewardship" (Fenn, 2006).

The other brainchild attributed to Smitherman and Gail Paech of the Health Results Team was the Local Health Integration Network (LHIN). In 2005, the 14 newly minted LHINs were to be "geographically-based non-profit organizations designed to plan, integrate and fund local health services … within a specific geographic area" (Health Results Team, 2005). Fenn describes the LHINs more succinctly, as the body responsible for health system management. They were to collect indicators within their defined regions, and evaluate system performance, "including individual institutions and

programs" (Fenn, 2006). Yet the mandate for LHINs remained obscure as far as the extent of their administrative power. The Commission on the Reform of Ontario's Public Services, headed by Don Drummond, believed that the LHINs fell short of their potential in the first few years. The Drummond Report states that, "In theory, LHINs have the authority to allocate budgets across the various components of care; in practice, they do not" (Commission on the Reform of Ontario's Public Services, 2012). Despite the criticism, the report saw LHINs as the preferred tool to have authority and resources to oversee localized regions (Commission on the Reform of Ontario's Public Services, 2012), as envisioned by Romanow's commission. They had the capability to "ensure that services are adapted to the needs and characteristics of the population served" (Commission on the Future of Health Care in Canada & Romanow, 2002). A white paper by MOHLTC responded to the Drummond Report recommendations, proposing to enhance the mandate of the LHINs to include "primary care planning and performance management" (Ministry of Health and Long-Term Care, 2015). The provincial government in Ontario appears to be inching closer to finally realizing primary health care reform, despite entrenched stakeholder groups, which have resisted the idea since it was first introduced in the 1970s (Commission on the Future of Health Care in Canada & Romanow, 2002; Committee on Community Health Centre Project & Hastings, 1972).

2.3. The Structure

The second of Doern and Phidd's concepts is structure, or "the main organizations through which and by which policy is influenced and made" (Doern & Phidd, 1992). At the time of the Romanow Commission, a prominent structural change that was called for was the implementation of integrative health teams, and the inclusion of all health professions (Commission on the Future of Health Care in Canada & Romanow, 2002). However, the Ontario provincial government also needed resources to create this program, and it needed the cooperation of one of the most powerful stakeholders in Ontarian health care, the OMA. Flood, Tuohy and Stabile clarify that in Ontario, when the provincial government intends to make changes to the OHIP funding structure for health care services, the consultation process happens at the Physician Services Committee (Flood et al., 2004). The Physician Services Committee membership is divided equally between representatives from MOHLTC, and the OMA, and is chaired by a professional facilitator. This structure relies substantially on physicians, at the exclusion of other health professions (Flood et al., 2004).There are 26

health professions indicated in the *Regulated Health Professions Act* ("Regulated Health Professions Act," 1991), and yet only one of those is fairly represented at the table in health care negotiations between the professions and the government. This structure has the potential to become problematic in ways that impede the progression of initiatives such as primary health care reform, especially on the multidisciplinary front. Health professional groups excluded from the consultation process have diminished lobbying power. Those groups without input into decision-making at the provincial level may more easily find themselves the targets of provincial health policy changes, and attacks from their peers.

2.3.1. Structural History: Non-Physician Health Profession Targeting

In Canada, negotiations between governments and health care providers take place under a tent habitually dominated by medical interest groups (Hutchison et al., 2011). The Canadian structure for health care stems back to the beginning of Medicare, when provincial governments struck deals with physician associations. Those accommodations, which came into play in the 1960s, froze health care delivery practices in place for decades afterwards (Tuohy, 1999). The accord between physicians and provincial governments in Canada has been blamed for several false starts in primary health care reform (Hutchison et al., 2011). A consumerist movement has simultaneously arisen in health care, in which patients have become empowered, and have taken a proactive role to seek out their care (Canizares et al., 2017). Hutchison et al. describe how those who are better-educated commonly rely on their own agency to bypass the family physician referral system, and deal directly with specialists (Hutchison et al., 2011). Yet for many others, as Tuohy highlights, the idea of shopping for health care is infeasible, and the costs of error are very high. In these cases, it is necessary for individuals to delegate authority to a physician to manage their care. It is then up to the physician to act as gate-keeper, and either provide, or select a provider for those needs (Tuohy, 1999). The structure of the Canadian health care system therefore imparts power on physician interest groups which represent both those in the role of health care manager, as well as providers, so that ample grounds exist for conflicts of interest. The clout that physicians have through the health care structure has afforded them power both individually, through referrals (Wranik et al., 2017), and collectively through OMA representation on the Physician Services Committee (Flood et al., 2004). It has also historically given physicians a security which their non-physician counterparts do not

enjoy. Nationally, the traditional structure has had residual, hierarchical effects on the way that physicians fit into interdisciplinary teams. Non-physician providers cite physicians' lack of ability to relinquish control of the clinical setting as an impediment to collaboration (Wranik et al., 2017).

There is a long history of interprofessional competition in health care in the English-speaking world, and at times it has threatened non-physician health professionals' ability to practice. Saks uses the distinctions of 'marginalized' versus 'marginal' professions to highlight inequalities in the health professions. The term 'marginalized professions' refers to professional groups which have a "less well accepted position within orthodox ranks", whereas 'marginal professions' refer to those professions operating "outside the legitimated state-supported division of labour" (Saks, 2015). Both marginal and marginalized groups have been singled out in the past. For marginal groups, one of the most notable areas where contention has existed has been between traditional medicine and Complementary and Alternative Medicine (CAM). Saks listed the most prominent tactics employed by elite members of the medical profession who have been hostile to other professions in Britain and the United States. These include "enforcing orthodox curricula control in medical schools, debunking the practices and practitioners of CAM in the medical journals, limiting access to official medical research funding, and instigating career blockages for those collaborating with unorthodox practitioners" (Saks, 2015). These tactics have also been employed in Canada.

Focussing in again on the case of Ontario, Evans wrote that fluctuations in federal-provincial transfers from the mid-1990s to the mid-2000s created pressure and a struggle for resources on the health care system (Evans, 2003). This struggle was occurring while the provincial government was revamping its efforts to implement primary health care reform. The conflict manifested in different ways for marginalized versus marginal groups. The cases of four professions - two marginalized and two marginal - that have been affected by health care structure in Ontario recently are outlined below. For marginalized professions, provincial government policy changes were implemented which directly affected them. The Ontario government was more successful at cuts aimed at professions with weaker lobbying power, and less say in the decision-making process. Both Harris and McGuinty governments made decisions which adversely affected nursing professions, resulting in long-term labour consequences. Pharmacists were also targeted, and when this professional group attempted to strong-

arm the provincial government to gain leverage, the Ontario Liberals were able to utilize public reaction to cost-cutting to the detriment of pharmacies. Marginal professions have also felt the effects of provincial health care policy and structure in Ontario, but in many cases they have been accompanied by the involvement of medical professionals, who appear to speak for their profession, and on behalf of the health care system. Conflicts between medicine and marginal professions are especially felt by providers and their patients (Mootz, Hansen, Breen, Killinger, & Nelson, 2006; Villanueva-Russell, 2011). Medical professionals who have attacked marginal professions in Ontario have prominently used the traditional strategies mentioned by Saks (Saks, 2015).

2.3.1.1. The Nursing Professions: Restructuring, Primary Health Care Reform

Before the modern era of Action Plans for Health Care in Ontario, one preferred strategy of reform was to make cuts to health care spending in areas deemed less essential than others. The province's familiar tack of health care reform in the face of unsustainable costs, whether fiscal or political in nature, stems back at least as far as the Common Sense Revolution of the Harris government. During the mid-1990s the provincial government turned its attention to restructuring hospitals, and nursing professions were singled out. The regard Premier Harris had for nurses became clear when he infamously compared those who had full-time employment in the hospital industry to Hula-Hoop factory workers after the Hula-Hoop craze died down (Harris, 1997). Nurses, who were already suffering from a labour shortage prior to the Ontario Conservatives coming to power, saw a threat to their job stability as hospital work-forces were down-sized. O'Brien-Pallas and Baumann reported a 6% drop in the supply of registered nurses, and an 8% drop in the supply of registered practical nurses from 1994 to 1998. They described an atmosphere replete with layoffs, and casualization of the workforce. There was also a reduction in enrolment in community college programs which was only mildly offset by an increase in enrolment in university nursing programs (O'Brien-Pallas & Baumann, 2000). Shifts in the employment structure for health care in the province have marked it in such a way that an entire generation of nurses arguably never recovered. The long-term consequences are accounted for by Estabrooks in 2005: the fallout from the Harris government's strategy could be measured in job satisfaction, turnover, ability to provide quality care, physical and psychological well-being, and disruptions to healthcare team relationships (Estabrooks, Midodzi, Cummings, Ricker, & Giovannetti, 2005). It is debatable how much of the $1.1 billion in savings identified by

the Health Services Restructuring Commission was actually realized, since the intent was to reinvest recovered funds into other health care services (The Ontario Health Services Restructuring Commission, 2000). The effects of nurse fatigue and burnout have been well-studied, and have been linked with errors or near errors on the job, implying further costs to health care felt by the workforce and patients (Canadian Nurses Association & Registered Nurses Association of Ontario, 2010).

The McGuinty government, despite campaign promises, continued to contribute to the provincial government's poor track record with nurses in its first term. One of the Ontario Liberals' most popular election campaign promises in 2003 was their plan to hire on 8,000 more nurses (Mackie, 2003; Mackie & Galloway, 2003). In mid-January of 2005, tensions rose again as Minister Smitherman announced that up to 757 full time equivalent positions for nurses in hospitals would be cut to help the hospitals balance their budgets. Irmajean Bajnok, Acting Director of the Registered Nurses Association of Ontario, expressed the sentiment that sanctioning of nurse layoffs would "send nurses packing, either to other jurisdictions or to other professions". She also pointed to the effect it would likely have on students considering nursing, as well as employment prospects for new graduates (MacKinnon, 2005). At Queen's Park, Linda Haslam-Stroud, then president of the Ontario Nursing Association, was quoted as saying that nurses felt "betrayed by the government". The nursing positions lost would likely include those "who provide psychiatric care, work in the emergency department, in obstetrical care and in cardiac care" – they were not administrative positions (Martel, 2005). Alameddine et al. showed that from 1993-2006, overall growth in College of Nurses of Ontario registrants, including active registrants, was flat, despite a population increase of 18% in the province, or nearly two million people (Alameddine, Baumann, Onate, & Deber, 2011; Newfoundland & Labrador Statistics Agency, 2017). There are two telling statistics from the Alameddine et al. paper which echo Bajnok's statements. The first is that the data show that nurses who relocated out of province were resistant to returning to work in Ontario, despite maintaining their registrations. The second is that in 2003, the number of nurses registered to practice in Ontario who were neither working nor seeking nursing work shot up over 1,000, and stayed relatively high through the year 2006 (Alameddine et al., 2011). Provincial policy changes have had proven consequences on labour for nurses in the past, but for other singled out health professions, such as pharmacists, broader economic data must be used to explain the impact of policy decisions.

2.3.1.2. Pharmacists: Transparency, and the Drug Benefits Plan

Pharmacists make up another health professional group under Saks' marginalized category that has been affected by provincial decision-making since the Ontario government began instituting primary health care reform. The labour distribution of pharmacists is unlike that of nurses. The Canadian Pharmacists Association reports that 70% of pharmacists work in community pharmacies, 15% work in hospitals, and the remaining 15% work in industry, the government, associations, or colleges and universities (Canadian Pharmacists Association, 2018). A prominent attribute which distinguishes pharmacists from nurses in terms of labour is the model by which they practice. Pharmacist welfare is often tied to pharmacies, making it difficult to determine the extent to which policy changes affect them. Evans commented that so long as there is a "steady up-trend in prescriptions to be filled … pharmacists will be needed to fill them" (Evans, 2010). Pharmacists and pharmacies can be affected by policy change, though, and these effects are tied to national and international markets.

Another of the Ontario provincial government's strategies to contain spending in health care focussed on public money spent on drugs, and pharmacists were embroiled in the resulting policy changes. The *Transparent Drug System for Patients Act*, or Bill 102, was adopted in 2006, and established that the Ontario provincial government would pay 50% of brand-name drug prices for their generic drug equivalents ("Transparent Drug System for Patients Act," 2006). The Act was passed at a time when it had become clear that Canadians paid some of the highest prices for generic drugs in the world. The system was blamed for the price inflation: it allowed drug manufacturers to offer product rebates to pharmacies, who could then bill those drugs back to the province at the prices on the provincial drug formulary for greater profit. The provincial government curbed the rebates with the Act, but continued to allow manufacturer-pharmacy kickbacks of up to 20% for "professional allowances" (Silversides, 2009). The office of Deputy Minister of Health, Helen Stevenson, cited $683 million in savings in the first two years following the Act. It also claimed to have curbed inflation of drug prices from 10% to 5% (Scott, 2010). However, in 2008, drug manufacturers reported having paid out $680 million in professional allowances to pharmacies, an amount similar to that which they paid for pharmacy rebates in 2006 (Silversides, 2009). This gave every indication that despite the measures taken, nothing had really changed with respect to the relationship between pharmacies and drug manufacturers. Additionally, allegations arose in the years

following Bill 102 that secretive deals were taking place between provincial government representatives and drug manufacturers. These deals concerned whether the manufacturers' products would be covered on the Ontario Drug Benefit formulary (Picard, 2010). In 2010, Stevenson quietly resigned from office following freedom-of-information requests from the Information and Privacy Commissioner. The requests uncovered inequitable pricing practices of brand name drug companies in favour of Ontario, raising the ire of other provinces (Radwanski, 2010a). The provincial government responded that year by cracking down on deals between drug manufacturers and pharmacies (Evans, 2010; Radwanski, 2010b). These exchanges between the provincial government and pharmacies would play out on the stock market rather than in the labour force.

The Ontario Liberals' aim for Bill 102, and the 2010 correction, was to curb generic drug prices. While pharmacists appear to have weathered the changes well, there were unintended, economic consequences for the province. The effect of Bill 102 and the 2010 policy decisions on the number of pharmacists and pharmacies in Ontario has not been studied extensively in the scientific literature as there were no labour force disruptions to speak of. The Ontario College of Pharmacists began to publicly track pharmacies in the province by the following types in 2010: independently owned, chains, and pharmacies operating under a banner or franchise (Ontario College of Pharmacists, 2010). Accounting for a classification change for pharmacies implemented in the college's 2011 annual report, the proportion of pharmacies by type appears to have stayed consistent, and pharmacy numbers have steadily been growing for the past 5 years. The number of pharmacists in the province also appears to have been growing at an average annual rate of 4% since 2007. However, Evans noticed a more immediate change in the stock market. Shares in Shoppers Drug Mart, one of the largest pharmacy chains in the province, dropped 16% overnight in April, 2010, with its market value bottoming out a further 10 points lower in June, to three-quarters what it was worth earlier in the year (Evans, 2010). In retaliation, Shoppers Drug Mart pointedly cut store hours in Health Minister Deb Matthews' home town. This both served to shift attention away from independent pharmacy owners, as well as weakening the resolve of the political opposition to speak out on behalf of pharmacists (Radwanski, 2010b, 2010c). It has been speculated that independent pharmacy owners took the greater hit in these exchanges with the provincial government, but this hit likely affected store profits rather than individual salaries (Evans, 2010).

The formation of the Independent Pharmacists Association of Ontario supports the notion that organized resistance had formed to Bill 102, although there has been little activity on the association's web site since 2010 (Donovan Consulting Group, 2007; Independent Pharmacists Association of Ontario, 2008). Most likely, however, the costs of the policy changes were originally absorbed by pharmacies, and then transferred to more vulnerable Ontarians. Examples of those who eventually shouldered the cost include those no longer covered by employer drug plans (Silversides, 2009), lower income individuals who often fail to fill prescriptions (Lexchin, 2015), and recipients of dispensing services through seniors' homes (Welsh, 2016).

2.3.1.3. Homeopathy: Legitimacy through Regulatory Establishment

Marginal professions, like homeopaths, are less often targeted by provincial policy changes, since they rely on out-of-pocket or third party payments, limiting the number of policy levers the provincial government may employ. Instead, an overarching concern for this profession in recent times has been the pursuit of legitimization through the establishment of a regulatory college. Homeopaths have only been counted among regulated health professionals in Ontario since 2015, with the proclamation of the *Homeopathy Act, 2007*. The College of Homeopaths of Ontario offers little comparative information on its registrants at this time, save that it issued certificates of registration to 486 homeopaths in 2017, nearly double the amount of certificates issued in its first year in 2016 (College of Homeopaths of Ontario, 2017). Kelner et al. reported that homeopathy might have been widely used in other parts of the world, but in Canada, it was only beginning to experience a small revival by 2006, with about 2% of the population visiting a practitioner (Kelner et al., 2006). Canizares et al. used the National Population Health Survey in 2010 to set utilization rates at about 3%, although the survey question concerning homeopathy use was worded so as to include naturopaths as well. The researchers also showed that naturopaths and homeopaths were becoming more popular with Baby Boomers and Generation X over time, with utilization rates climbing by almost 50% over 15 years (Canizares et al., 2017). The addition of homeopaths to the *Regulated Health Professions Act* stirred up another type of targeting which differs from that experienced by nurses and pharmacists, but one which is more familiar to other marginal professions. It entails the involvement of other health professionals, rather than direct confrontation with provincial governments.

The official establishment of the College of Homeopaths of Ontario in April of 2015 spurred a reaction from some in the medical profession which Saks might call a classical response (Saks, 2015). Dr. David Juurlink, a decorated scholar at the Sunnybrook Research Institute, went on record at the time, stating, "the idea that we have a College of Homeopaths, really is an embarrassment. We don't have a College of Wizards or a College of Astrologers for good reason" (Brown, 2015). Others speculated that including homeopaths under the regulatory umbrella was advantageous; Dr. Matthew Stanbrook, a respirologist, and Deputy Editor at the Canadian Medical Association Journal, was quick to point out the potential benefits of having the college, including enforced accountability, and the threat of professional misconduct for those registrants who fail to seek out appropriate care for patients with medical conditions (Brown, 2015). The controversy regarding homeopathy spilled over into academic research at the Leslie Dan Faculty of Pharmacy at the University of Toronto. Dr. Heather Boon, the Dean at Leslie Dan, was conducting a clinical trial to understand why patients so strongly supported homeopathic treatment of Attention Deficit Hyperactivity Disorder. She was attacked on air and in the press by Dr. Joe Schwarcz of McGill's Office of Science for Integrity, who had circulated a petition among 90 scientists who allegedly questioned Dr. Boon's study. Dr. Schwarcz, who was given a chance on national radio to hear from Dr. Boon directly about her study, publicly denounced it as a waste of money, despite his earlier statement that he was not challenging Dr. Boon’s academic freedom. He further stated that involving an institution with a reputation such as the University of Toronto, and an investigator of Dr. Boon’s stature, gave homeopathy a level of legitimacy it did not deserve (Tremonti, 2015). The media also seemed to have a stake in the debate over whether the college should be granted regulatory status, with one headline reading “We’re aiding and abetting homeopathic quackery” (Picard, 2015). This attack style appears in an earlier example in Ontario involving chiropractic, where there was another unified attempt by professionals and the media to rally against public acceptance of a marginal health care profession.

2.3.1.4. Chiropractors: Spinal Manipulation, Stroke and OHIP Delisting

Another example of interprofessional attacks on a health profession can be seen in the case of chiropractors in the early 2000s. Chiropractic, though more established in Ontario, still fits under Saks’ categorization as a marginal health profession (Saks,

2015). Chiropractors have at times enjoyed partial coverage for their services under OHIP. Included among regulated professions since the *Regulated Professions Act* and *Chiropractic Act* were passed in 1991, the College of Chiropractors of Ontario reported 4,311 active members in December, 2016 ("Chiropractic Act," 1991; College of Chiropractors of Ontario, 2016; "Regulated Health Professions Act," 1991). Kelner et al., when comparing chiropractors to homeopaths, noted that the Canadian chiropractic training program was rigorous, containing elements of medical science in its curriculum in a bid to increase professional legitimacy (Kelner et al., 2006). For Welsh et al., that legitimacy reputedly came at the cost of a narrower scope of practice (Welsh, Kelner, Wellman, & Boon, 2004). Despite successful attempts by the chiropractic community to gain mainstream acceptance, it was targeted by medical professionals on both academic and public fronts at the turn of the millennium. One procedure offered by chiropractors came under particular scrutiny by neurologists: adjustment of the neck, or cervical manipulation, as it is commonly referred to in the literature. At the Canadian Stroke Consortium in 2000, Norris et al. presented cases which they claimed provided evidence of a causal relation between cervical manipulation and stroke. In 2002 Beletsky presented the same message at the American Stroke Association's 27th International Stroke Conference in San Antonio (Beletsky, 2002; Norris & Beletsky, 2001; Norris, Beletsky, & Nadareishvili, 2000). The group's attacks on chiropractic happened in concert with another effort in Ontario led by Dr. Murray Katz. Katz, who had trained as a pediatrician, styled himself a Medical Legal Expert operating out of McGill University in Montreal, Quebec (Coren, 2000). He took his crusade to the public at the inquest into the death of Lana Dale Lewis, where it was to be determined whether chiropractic care she had received before her death had contributed to her fatal stroke. Katz was eventually dismissed from the Lewis Inquest when it was revealed that he had unethically coerced an official of the Coroner's Office to re-open Ms. Lewis' case (Abbate, 2001). Norris' and Beletsky's basis for the association between chiropractic care and stroke was challenged, and the incidence of cases where cervical manipulation resulted in stroke was disputed (Haldeman, Carey, Townsend, & Papadopoulos, 2001; Kapral & Bondy, 2001; Rothwell, Bondy, & Williams, 2001). Despite this, erroneous claims about incidence and attempts to establish causality persisted (Ernst & Canter, 2006; Leon-Sanchez, Cuetter, & Ferrer, 2007; Smith et al., 2003). These accusations would have the potential to impact the chiropractic profession for many years before

strong, well-designed studies appeared in the scientific literature examining stroke and cervical manipulation.

Clarification regarding chiropractic care and strokes would eventually be published in the scientific literature, but not before the initial, negative claims could take hold and permeate in Ontario. An exhaustive analysis (109 million person-years over a 9-year period) was published by Cassidy et al. in 2009. The team investigated whether a causal link existed between chiropractic care and stroke following the dissection of the vertebrobasilar artery (VBA). The paper concluded that patients already experiencing symptoms of a VBA dissection were more likely to seek a chiropractor, and this was responsible for the association observed by Norris. This association was not causal; it was in fact uniform across all primary care providers, suggesting that a patient was no more likely to experience a stroke after a visit to a chiropractor than to a physician (Cassidy et al., 2009; Choi, Boyle, Cote, & Cassidy, 2011). The Cassidy et al. paper may have helped to redeem the perception of chiropractic treatment, but the criticisms levelled at the profession had ample time to cause damage to its reputation in Ontario. In 2002, the media had also picked up on interprofessional tensions between chiropractors and their fellow health care professionals. The front page of one Toronto newspaper featured a headline reading "MDs Warn of Chiropractic Peril"; citing literature which launched inaccurate accusations, such as that “neck manipulations … [trigger] as many as 200 strokes a year” (Evenson, 2002). At a time when the government was searching for services to cut from provincial health, this attention did not bode well for the chiropractic profession.

Chiropractors would deal not only with interprofessional conflict at the turn of the millennium, but it would also face the systemic costs of primary health care reform in Ontario. The McGuinty Liberals announced in their 2004 budget that they would be delisting chiropractic services, among others, from OHIP. Whether interprofessional relations and media coverage for chiropractic at this time was an influential factor, or merely coincidental, the decision to completely delist the services of chiropractors was carried out as planned. Coverage for physiotherapy and optometry under OHIP was also targeted in the delisting decision. In the case of physiotherapy, the provincial government had proposed to fully delist services in the 2004 budget, but switched its decision to partial delisting days before the enactment (Landry et al., 2006). Delisting health services from OHIP in 2004 had implications for patients seeking care for chronic conditions, especially lower income Ontarians. In 2006, Landry et al. published a study

which followed a cohort of physiotherapy patients from pre- to post-delisting, and concluded that 17.7% of physiotherapy patients discontinued treatment because they were unable to access private insurance or pay out-of-pocket (Landry et al., 2006). They suspected that, since physiotherapy was only partially delisted, and nearly half of their sample was still eligible for public coverage, the effect would have been much greater had full delisting been implemented as originally planned by the McGuinty government. Similarily, Jin et al. analyzed optometry in the Canadian Community Health Survey results pre- and post-delisting, and found a threefold increase over time in the disparity between Ontarians with the highest and lowest incomes utilizing eye care services (Jin, Buys, Hatch, & Trope, 2012). The authors concluded that delisting contradicted the Health Canada objective to reduce health care inequalities. While the provincial government may have saved funds in terms of budget line items with its decision, another result was a transfer of costs to groups who could not afford them. This is also supported in research on chiropractic services and delisting. Sweetman and Yang report that of the 23% reduction in chiropractic utilization they observed in national survey data following delisting, the detrimental effects of the policy change were felt mostly among middle and low income households, with a greater emphasis on the latter group (Sweetman & Yang, 2013).

2.4. The Process

The delisting of health services announced in the 2004 Ontario provincial budget exemplifies the third of Doern and Phidd's concepts: process. Process is defined as, "the regularized rhythms relationships and behaviour flowing from … policy- and decision-making activity" such as "spending, taxation and regulation" (Doern & Phidd, 1992). The McGuinty government referred to delisting as a tough decision, but one which allowed them to make the health care system more sustainable (Smitherman, 2004). Whether the decision to delist truly resulted in cost-savings to Ontarian health care is unclear. However, the setting in which delisting was implemented provides a unique opportunity to study the professions affected by these changes. Each of the three targeted professions had a regulatory body which was tracking the number of professionals who were permitted to practice in the province at the time the decision to delist services was made. The McGuinty Liberals began their first term with a service cut which was very similar to measures undertaken by their Conservative predecessors. Delisting targeted services which all addressed chronic types of health complaints, and coincidentally, one

of the initiatives that became focal during primary health care reform in Ontario was how the system dealt with chronic illness. The rollout of new initiatives intended to address chronic complaints in the health care system may have mitigated the extent to which the provincial government felt backlash for its changes.

2.4.1. Framing Delisting: Desperate Times Call for Desperate Measures

Liberal provincial governments in Ontario over the last 15 years have utilized popular sentiment, often speaking directly to Ontarians through media releases, to push tough decisions through parliament. The tactic of appealing to the public is described by Béland as favouring “communicative discourse” over “coordinative discourse” – the latter describing instances where politicians work with industry partners instead (Béland, 2009). From 2003-05, the newly elected McGuinty government required a vehicle to create the change that it promised its constituents on the campaign trail, and the order of the day was that desperate times called for desperate measures. Marmor et al. discuss how, when the public witnesses economic strain, for example through "persistent stagflation", it can erode support for certain programs that are otherwise "sacrosanct", creating an incentive “to explore transformative but not fiscally burdensome options” (Marmor, Freeman, & Okma, 2005). The authors of the Romanow Report argued that the Canadian health care system was as sustainable as Canadians wanted it to be, and that governments were tasked with deciding how and where to invest funds (Commission on the Future of Health Care in Canada & Romanow, 2002). In this context, Minister Smitherman’s argument to push ahead with delisting might have kept its traction despite public confrontation, because of the invocation of primary health care reform - a prominent issue in the provincial election of 2003 (Aggarwal, 2009; Haydt, 2014). The resistance that mounted against the decision to delist can be found in Hansard coverage of Queen’s Park. An indicator of the magnitude of this resistance is evident in the fact that it was not only the political opposition voicing concern, but instead dissent arose from representatives from all political parties, as well as popular advocates.

2.4.2. Delisting and Public Opinion

When the McGuinty government delisted chiropractic care, and coverage for much of physiotherapist services and eye exams from OHIP, the decision was met with

considerable resistance from the public. In the case of chiropractic, Members of Provincial Parliament (MPP) brought 165 petitions from their constituents opposed to the cut from mid-May, when the intention to delist was announced, to December 1, 2004. Of the 103 seats in parliament at the time, petitions were brought forward by 51 MPPs, including 21 Liberal party members. The opposition attacked Liberal party cohesion, pointing out that the resolve of some backbenchers was faltering due to pressure from their ridings (O'Toole, 2004). Frank Klees, the Progressive Conservative MPP for Oak Ridges, accused Liberal MPPs Ernie Parsons and Kim Craitor of going on record in the media (on radio and in the press) to question delisting, and promising to fight it (Klees, 2004). The effects of the decision were felt on the political scale as well; Premier McGuinty received a letter from Réginald Bélair of the Federal Liberal government suggesting that delisting, among other decisions, was hurting their chances of winning the federal election that year (Martel, 2004). On June 17, a demonstration against delisting took place outside of Queen's Park, with Olympic medallist, Curt Harnett, acting as a spokesperson, (Witmer, 2004a). Mr. Harnett's message was that delisting would cost the government more than it would save from the cuts, since the public would be going to general practitioners to seek alternative care. Despite the resistance, the Ontario Liberals pushed through with delisting optometry and chiropractic as originally planned, and partial delisting of physiotherapy services.

2.4.3. How the McGuinty Government Succeeded

The arguments against delisting had been mounted, and party support appeared to be wavering, and yet the Ontario Liberals persisted with delisting optometry and chiropractic services on schedule in late 2004. Béland states that ideas are sometimes "powerful ideological weapons" that can form a public discourse. If that discourse is framed correctly, it can convince stakeholders that change is necessary through the "social construction of the need to reform" (Béland, 2009). This appears to have been the recipe for the McGuinty government's success. In addition, the introduction of new initiatives to combat chronic health conditions, that would form the foundation of how the health care system would address chronic health care in the province, might also have helped to distract the public eye. One of these initiatives was the creation of the Ministry of Health Promotion, which was tasked with creating a healthier province through such preventive measures as "nutritious eating and appropriate physical activity" (Ministry of Health Promotion, 2006). Over the next five years, the Ministry of Health Promotion

eventually morphed into the Ministry of Health Promotion and Sport, and was finally merged with MOHLTC. Although short-lived, the Ministry of Health Promotion and Sport served as a vehicle to reinvigorate the public health system, and it helped support another newly launched initiative: Operation Health Protection. Operation Health Protection was announced in 2004, and although its primary focus was infectious diseases, its bestowal of new, arm's length reporting powers on the Chief Medical Officer of Health allowed Dr. Sheela Basrur to broaden the scope of her office to include chronic diseases (Basrur, 2005). This was formative for the eventual Ontario Action Plan for Health Care (Ministry of Health and Long-Term Care, 2012). The Action Plan was tasked with determining better and more efficient ways to address chronic complaints and focus on preventive approaches to care, while addressing hospital wait times and accessibility. A significant way in which the plan's authors envisioned achievement of this goal was through utilizing the primary health care reform that was already in progress, reconceptualizing front line care for patients.

2.5. The Role of Feedback: Response to Delisting

Doern and Phidd's framework of ideas, structure and process can be used to sequentially plot how primary health care reform, through the lens of the status quo structure of the health care system, could be responsible for a decision such as delisting. Assuming Doern and Phidd's framework is cyclical, then how the health care system reacted to the process is noticeably absent from their view. Feedback from the political opposition, as well as in the media, highlights how in the instance of delisting, the Ontario Liberals may have partially succeeded in reining in health care spending, but there were unintended outcomes from that decision. Certainly, the issue of primary health care reform was not solved as result of delisting. Instead, delisting appears to have been one of many steps intended to bring Ontario on board with health care reform happening in other provinces. This decades-long reform, envisioned by Tommy Douglas, was succinctly described by Marchildon as a reallocation of resources from "downstream illness care" to "upstream illness prevention and health promotion", and the democratization of health decision-making (Marchildon, 2005). As it evolved over the next several years, the provincial government's health care strategy incorporated experimentation with structure, and the government shifted the focus of the reform to target other health professions. Outcomes from past policy decisions ought to be

accounted for as potential, causal factors for future iterations of ideas, changes to structure, and processes in the name of long-term initiatives. Primary health care reform continues to be a prominent issue in national health care policy more than 15 years after the Romanow Report was published. Some of the health care concerns faced by the present-day provincial government parallel the projections made by detractors of delisting back in 2004.

2.5.1. Consequences of Delisting

Political opposition to the McGuinty government's decision to delist health services from OHIP at Queen's Park, and others who expressed dissent in the media, centred on the concern of equal access for individuals who would no longer be able to afford their care. MPPs raised the concerns of individual constituents such as Judy Trudel of Kapuskasing (Bisson, 2004) and Cindy Beatty (Witmer, 2004b). There was also concern expressed on behalf of entire ridings, such as Howard Hampton's, where many Ontarians were doing heavy industrial work, who would no longer be able to afford specific types of care after delisting occurred (Hampton, 2004). In the media, public concerns were voiced as well. Maureen Henderson, a Toronto chiropractor, commented that the benefit of a cost savings of $157 million a year would be far outstripped by the number of Ontarians, mostly poor and retired, who did not have extended health care. These individuals would not be able to afford the cut health services, and would be forced into emergency wards across the province (Harding, 2004). The reaction of the political opposition, as part of the parliamentary process, is to be expected however, the public reaction appeared to support these assertions. A *Toronto Star* article cited a health premium and delisting as the top two reasons for a 15-point slip for the Liberals in a Nanos Research poll in the summer of 2004. The same article cited an EKOS Research poll which found that the majority of Ontarians considered the 2004 provincial budget "bad" or "terrible" (Urquhart, 2004). Of the 47% of individuals expressing discontent for the McGuinty government in a later Ipsos-Reid poll, the majority came from rural Ontario, and were more likely to be aged 55 or older (Ipsos-Reid Corp, 2004). The discontent was temporary, and the McGuinty government would eventually regain lost ground in the polls.

2.5.2. Long-term Outcomes of Delisting

The long-term outcomes of decisions made in their first term quickly became the concern of historians and health policy scholars. On the one hand, other decisions made in provincial health care attracted attention; after the Ontario Liberals secured a majority government in the 2007 election, another heath care scandal erupted concerning eHealth Ontario in 2009 (CBC News, 2009). This served to shift attention away from decisions made in the previous term. On the other hand, a number of factors make the study of how the public was affected difficult. For instance, other government decisions, such as the health premium, or the implementation of the LHINs, obscure the impact that delisting may have had on Ontarians' access to care. When considering the concerns raised by Dr. Henderson about vulnerable populations accessing emergency services, this too is difficult to study. MacKay et al. mention that the health care system cost for MSK disorders is great, including emergency department utilization, and that a strategy involving health human resources is called for (MacKay et al., 2010). Mustard et al. published data which show an increase in MSK complainants' utilization of emergency services in Ontario in 2005 and 2006, but it was followed by a decline afterwards. They admit that a number of variables, including changing classifications, a recession in 2008, and improvement in workplace safety training may have influenced the decline in claims (Mustard, Chambers, Ibrahim, Etches, & Smith, 2014). Finally, historical analysis of other health services delisting data across Canada in the 1990s reveals that scholars have trouble pinpointing the effects of such health policy decisions. Stabile and Ward report that partial delisting at that time had a negative effect on the probability individuals with household incomes of less than $30,000 would utilize physiotherapy, optometry and chiropractic services, regardless of insurance coverage. However, the data for utilization does not follow a predictable rule, and for some populations, there is an increase in utilization of health services following delisting (Stabile & Ward, 2006). While understanding the effects of delisting on the general population is complicated, it is possible to see how the professions targeted by delisting fared.

The decision to delist chiropractic, physiotherapy and optometry services from OHIP has been considered from the perspective of patients' utilization of the health care system in Ontario, but it may also be considered from the perspective of potential impact on the health workforce. A report by CIHI spanning the years 1997-2011 shows that in 2004, the number of practicing physiotherapists in the province dropped from 5,921 to

5,494 (8%), and in 2005, they saw a further decline of 180 practitioners (3%). The total number of optometrists in Ontario dropped by 2% in 2005, and while the number of chiropractors continued to grow throughout the period, the surge seen in previous years of roughly 6% per year dropped in half to an average of 3% from 2005 until 2010 (Canadian Institute of Health Information, 2013). The total number of health professionals working in the province gives some indication of the well-being of each group, but tools exist to give greater meaning to this data, and assess more precisely how professionals behaved. Landry et al. studied the three main sectors in which physiotherapists operate: “Hospital”, “Community” and “Long-Term Care”. They asserted that all sectors expanded from 1999-2007, seemingly at odds with the attrition evident in CIHI’s data, but Landry’s team also noted that the growth in this profession was much slower than others (Landry et al., 2012). Of the three sectors, “Community” and “Long-Term Care” experienced both the greatest influx of professionals, and the weakest retention in 2005 and 2006. Most remarkably, nearly half of all practitioners moving in to the Long-Term-Care sector in 2004 had moved out again by 2005, and by 2006, physiotherapists in this sector did not fare much better (Landry et al., 2012). There is no equivalent study concerning optometrists at the time of delisting. Sweetman and Yang studied chiropractors, and concluded that the profession saw earnings reductions in the years following delisting, at the cost of “reduced service delivery and increased private-sector payments” (Leonard & Sweetman, 2014; Sweetman & Yang, 2013). However, chiropractors have not been studied from the perspective of retention, and such a study might be able to create parallels between the experiences of chiropractors and Landry et al.’s findings for physiotherapists.

2.6. Conclusion

The McGuinty government’s move to delist health services in 2004 highlighted cost-savings as a major objective of its budget, redirecting those funds to the initiative of primary care reform. In so doing, it may also have contributed to longer-term systemic concerns, such as negatively impacting how health care addresses chronic complaints in Ontario. The province was simultaneously moving toward reforming the health care system to one that would draw on teams of health professionals. It is therefore not only important to understand how provincial government decisions affected the public, but also how those decisions might have affected the health workforce. The remainder of my work will look at how delisting chiropractic services might have affected the number of

chiropractors who practice in Ontario. As a persistently utilized health human resource dedicated mainly to MSK disorders, the province's ability to retain these professionals may also be linked to its ability to tackle a group of expensive, sometimes preventable complaints.

CHAPTER 3: METHODS

3.1. Research Design

I conducted a quantitative, longitudinal analysis of a cohort including all chiropractors registered to practice with the CCO from 1996-2007. I employed secondary use of administrative data collected for regulatory body registration purposes.

3.2. Ethical Review and Confidentiality

The study protocol was reviewed and approved by the University of Ontario Institute of Technology Research Ethics Board, File # 13-126 (Appendix C).

Confidentiality was assured by assigning randomly generated, unique identifiers to each registrant in the database. Postal codes were truncated to forward sortation areas anonymize registrant location, as this was a potential identifier for registrants living in more isolated regions of the province. All files containing registrant information were encrypted and password-protected, and then stored on a secure server at the Canadian Memorial Chiropractic College (CMCC).

3.3. Data Source: College of Chiropractors of Ontario Database

I obtained permission from the CCO to use annual registration data collected on all registrants in their database in 2014 (see Appendix C). Representatives there were able to grant access to a comprehensive database of registrants. Since chiropractors must be registered with the CCO to practice in Ontario, this list included all licensed practitioners of chiropractic who worked in the province until 2013. It was then necessary to work with the CCO, making use of their directories to follow each registrant over time, and making note of each status switch and location change. Between the CCO and the historical records at the Canadian Memorial Chiropractic College, I was able to secure CCO Membership Directories dating back to 1996. I was able to secure each successive year until 2007. The membership directory for the year 2008 could not be located, and given the amount of labour required to incorporate each directory into the database, I made the decision to confine my inquiry to the years 1996-2007. The data conversion process lasted from September, 2015 until September, 2016.

I included the years leading to 2004 in the analysis to establish normative data for CCO registrants in Ontario. These normative data were compared to practitioner

behaviour, measured by switches in CCO registration status, after delisting. I chose a longer lead up time to draw comparisons to, and build upon previous work describing the state of the chiropractic profession in Ontario during this period (Kopansky-Giles & Papadopoulos, 1997; Mior & Laporte, 2008; Mior & Waalen, 2008; Waalen & Mior, 2005). For example, Mior and Laporte triangulated registrant information from the CCO database with enrollment and tuition data from the CMCC, as well as administrative and insurance billing data from OHIP, for the years 1990 to 2004 (Mior & Laporte, 2008).

3.3.1. Database and Variables

The CCO registrant database consists of personal and educational information for all chiropractors registered to practice in Ontario. The database contained the following 6 items:

- Date of Birth
- Sex
- Year of Graduation
- School of Graduation
- Postal Code
- Status

Additional employment sector data (e.g., academic, or associateships versus private ownership of clinics) has been used in other health labour force studies. Hastie stratified occupational therapist registrants by employment categories such as ‘Permanent’, ‘Temporary’, ‘Self-Employed’ or ‘On Leave’ (Hastie, 2009). Landry et al. were able to categorize physiotherapists by place of employment, e.g., ‘Hospital’, ‘Community’ and ‘Long-Term Care’ (Landry et al., 2012). Unfortunately, neither the CCO’s nor any other available databases collect such information, thus limiting access to other employment related variables.

All efforts were made to show that the regulatory body collected the same information for each year that was analyzed. Where possible, source documents, such as registration forms, allow researchers the opportunity to ascertain that the information present in a database has been collected using the same questions. This is important in order to ensure that the variables do not change over time. Therefore, I followed up with the CCO in November, 2014 to request copies of the annual registration forms from 1996 to 2007. I was informed over the next several months that a search would be

performed by the regulatory body. When the search was completed, I was informed that these forms were not held on file, and my contact at the CCO could do little more than to assure me that no changes were made to the registration form during those years.

3.3.2. Independent Variables

The independent variable chosen for this study was *Status*. *Status* is used by the CCO to define registrant employment status and activity levels. It is tracked under the following types:

- Active
- Non-Resident Active
- Inactive
- Non-Resident Inactive
- Retired

For purpose of analysis, these five types were then converted into three general variable classes, active, inactive and retired.

3.3.2.1. Independent Variable Class: Active

Practitioners holding an *Active* status constitute chiropractors who had paid their registration fees, and who had the ability to operate in the province without hindrance. Registrants holding an *Active* status each year at the CCO were vetted by the college, and found to have graduated from an accredited program, and successfully passed licensing examinations. *Active* registrants are the only registrants who are capable of full-time practice in the province.

3.3.2.2. Independent Variable Class: Inactive

I classified the following variables/statuses as *Inactive*:

- Non-Resident Active
- Inactive
- Non-Resident Inactive

In order to be listed under these statuses, registrants would have had to make a status switch on their registration forms that year. Although *Non-Resident Active* registrants continue to be able to contribute to the health workforce, their status delineates that they

are no longer in the province, and therefore they have chosen to re-locate elsewhere, despite the potential for occasional contributions.

3.3.2.3. Independent Variable Class: Retired

Registrants listed under the *Retired* status were given a different classification than *Inactive or Non-Resident* registrants. For *Retired* registrants other, potentially confounding factors, likely influenced their decision to switch status. The largest factor driving registrants to make this switch would be age, or stage in career.

3.3.3. Dependent Variables

The following dependent variables were used in my model: date of birth, sex, year of graduation, school of graduation, and postal code (which has been changed to Local Health Integration Network, as explained below).

3.3.3.1. Date of Birth

I chose *Date of Birth* to determine when registrants were susceptible to changes which might have acted as confounding factors in the analysis. For example, I chose to collect *Date of Birth* to calculate female registrants who may be starting families, and therefore may be taking extended absences from practice. I also chose *Date of Birth* to compare registrants ages to the year they graduated, to be able to determine more efficiently which registrants were prone to retire with fewer years in practice than their colleagues.

3.3.3.2. Sex

I collected registrant data on *Sex* because it allowed me to explore the theme of diversity and equality among chiropractors. Additionally, I chose *Sex* to be able to explore the theme of female health professionals and raising families; evidence states that education and fertility are inversely related, and this particularly affects females who study scientific disciplines (Adamo, 2013; Boulis, 2004; Wolfinger, Goulden, & Mason, 2010). Garke and Dollin reported that 60% of Canadian medical students - and 49-62% of those enrolled in medical specialty schools - were female in 2008. They claimed that raising a family disproportionately influenced which specialty females chose as a career (Gartke & Dollin, 2010). *Sex* was also found by Mior and Waalen to be a predictor of practice income (Mior & Waalen, 2008). The self-reported sex of chiropractors in Ontario

provides a window into how factors such as maternity and income disparity might be affecting the health workforce, as well as being able to generate comparators for other professions.

3.3.3.3. Years in Practice

The CCO variable *Year of Graduation* was used as a proxy for the number of years that practitioners have been in practice. Registrant number of years' experience in practice is helpful as a potential indicator to determine the probability that newer practitioners were more prone to switch to inactive status than their more established counterparts. An earlier, 2005 study by Waalen and Mior posited that chiropractors in practice for more than six years bring in the highest earnings (Waalen & Mior, 2005). This is further supported by their later study, which found that mean income and average number of new patients peaked between 8-13 years in practice (Mior & Waalen, 2008).

I subtracted the year being analyzed from the self-reported graduation date that each registrant supplied on the registration forms to create the variable *Years in Practice*, referring to the number of years since a registrant graduated from their chiropractic training program. I then used Waalen and Mior's evidence of higher earnings to break out registrants into five-year intervals (Waalen & Mior, 2005). I stratified *Years in Practice* into 7 groups:

- < 5 Years
- 6-10 Years
- 11-15 Years
- 16-20 Years
- 21-25 Years
- 26-30 Years
- > 30 Years

I chose this variable to help determine when practitioners were choosing to retire, and whether this changed over time.

3.3.3.4. School of Graduation

The variable *School of Graduation* provided me with information on how many registrants were trained in-province, and how many were coming from institutions outside. I chose to track where registrants graduated in order to describe the proportion

of graduates from different schools making up the workforce in Ontario, and how it has changed over time. This allowed me to compare how attractive the province was for people trained locally, as opposed to those who trained elsewhere.

Kopansky-Giles and Papadopoulos reported that the school from which Ontario chiropractors graduated from had an effect on earnings, although the magnitude of this effect was debated by Mior and Waalen (Kopansky-Giles & Papadopoulos, 1997; Mior & Waalen, 2008). A longitudinal analysis of retention using this variable may therefore contribute further insight into this practice characteristic.

3.3.3.5. Local Health Integration Networks (LHIN)

The variable *Postal Code* was provided in a truncated format, with only the first three digits of the code or the forward sortation area. I requested the regional data in this format in order to employ a data set with similar characteristics to Mior and Waalen's 2008 paper, and to provide the same level of confidentiality. They concluded that inner-city Toronto chiropractors had lower incomes compared to their counterparts elsewhere in the province (Mior & Waalen, 2008). I gathered registrant location in order to explore whether differences in retention existed between urban and rural practitioners. I also chose location to study which areas were more attractive for chiropractors to work in Ontario.

Mior and Waalen's use of postal codes allowed for stratification into only four regional categories (Mior & Waalen, 2008). I was able to use a conversion algorithm to reclassify these regions into LHINs, in order to employ a more sensitive location analysis, with the aim of further exploring regional differences.

3.3.4. Inclusion/Exclusion Criteria

All chiropractors registered with the CCO between the years 1996-2007 were included for analysis. Registrants listed on the CCO database who did not appear as *Active* or *Non-Resident Active* for at least one year during the time frame were excluded from analysis, since these individuals did not make up part of the practicing health professional workforce for chiropractors, and did not have decision-making power to cease practice for the duration of the study. Additionally, active registrants who switched to *Inactive*, *Non-Resident Inactive* or *Retired* statuses, or who no longer held any status at all within one year of graduating from a chiropractic program were excluded. Recently

graduating individuals were excluded in order to account for practitioners who returned to their home provinces or countries after completing their studies in Ontario.

3.3.5. Data Analysis

3.3.5.1. Descriptive Data

I began by compiling descriptive data, and reporting on frequencies and proportions. I described registrant frequencies by *Date of Birth*, *Sex*, *Years in Practice*, *School of Graduation*, and *LHIN*.

3.3.5.2. Stickiness and Inflow Analysis

In order to investigate the retention of chiropractors in Ontario, I used the variables to form subgroups, and applied the concepts of 'Stickiness' and 'Inflow'. Alameddine et al. introduced these parameters to describe changes in a setting relative to its expansion or shrinkage (Alameddine et al., 2006). It was originally developed to study whether nurses working in a particular setting in a particular time period would continue to work in that setting in the next time period (e.g., from a hospital to a long-term care setting), as well as to calculate how many new nurses were entering a setting in one time period who were not in that setting in the previous one. This methodology has since been used to describe a number of other professions, including respiratory therapists, occupational therapists and physiotherapists, among others (Alameddine et al., 2009; Alameddine et al., 2011; Berta et al., 2013; Gamble et al., 2011; Hastie, 2009; Landry et al., 2012). My study will add the analysis of chiropractors to this growing body of literature.

Stickiness analysis is a tool that can determine how key variables may impact the attractiveness of Ontario for chiropractors to practice in the years studied. In this study, the number of chiropractors working in the province, per *Active* versus *Inactive* registration status for all CCO registrants, was counted and compared between a given year (t) and then the next year in sequence (t+1). The term t refers to the yearly cut-off date for CCO registrations, which annually occurs in January.

Stickiness at time *t* was defined as:

$$Stickiness_t = \left[\frac{N_{t\&t+1}}{N_t}\right] \times 100$$

where N_t represents all CCO registrants in a year, and $N_{t\&t+1}$ represents all CCO registrants who continued to be active in the following year.

Inflow refers to the amount of new practitioners entering the profession each year. A high Inflow indicates professional expansion for chiropractors in Ontario, as it implies that more new practitioners are entering the workforce. It is determined by subtracting the number of registrants in year *t*-1 from year *t*.

Inflow at time *t* was defined as:

$$Inflow_t = \left[\frac{N_t - N_{t\&t-1}}{N_t}\right] \times 100$$

where $N_{t\&t-1}$ represents the total CCO registrants in a year, plus the total CCO registrants in the prior year.

The variable *t* was measured in intervals of one year, commencing at the CCO's predetermined registration cut-off date. Stickiness for time *t* was measured by taking the number of active registrants at *t* who continue to be active at *t+1*, annotated as *t&t+1*. For our purposes, *t+1* represents data collected for the interval immediately following time *t*. This total was then divided by the number of registrants at time *t*. In that way, time *t* was set up as a baseline in each segment. Inflow was measured by subtracting the number of registrants active in *t* and the year before (*t&t-1*) from registrants who were active at time *t.* Analysis was conducted on all intervals from 1996-2007.

Stickiness and Inflow outputs are represented as percentage scores. The overall attractiveness of the profession may be inferred by comparing percentages between years. Plots of Stickiness by year and Inflow by year were prepared and examined for any trends over time or any years that stood out as a point of inflection or change.

In addition to the overall population switching from *Active* to *Inactive* class, I analyzed the relationship between attractiveness of the profession and other variables listed above using a Cox proportional hazards model with time to inactive as the outcome. The Cox analysis provided hazard ratios, establishing ratios, their confidence limits and p-values (testing ratio=1) to make inferences about which individual characteristics contributed to increased likelihood of practitioners switching from *Active* to *Inactive* class.

3.3.5.3. Cox Proportional Hazards Analysis: Outcome Definition and Modification

I conducted a Cox Proportional Hazards survival analysis to assess the frequency of registrants switching from *Active* to *Inactive* class. Cox Proportional Hazards models the hazard function of a time to event outcome with effects of variables expressed as Hazard Ratios to make inferences about the relationship between the independent variables and time to event. The model results can be used to identify which subgroups are more or less likely to experience the event of interest at any given time. A basic assumption of the model is that hazards for different levels of an independent variable are proportional over time, so that the hazard ratios do not vary over time. However, this assumption can be tested and the model can be extended to allow for time-varying hazard ratios.

Survival analysis requires the establishment of an event to which a cohort is exposed within a given time frame. The event is represented as a switch in the event indicator variable from “0” to “1” in the data set: either the event happened in a given year, conditional on it not having happened before, or the event did not happen. The event set was a switch from *Active* to *Inactive* class. Although registrants in this project may have experienced the event more than once, upon experiencing the event, they were removed from the at-risk population.

I used the variables *Years in Practice, Sex, School of Graduation* and *LHIN*. *Date of Birth* was not analyzed, as it was found to correlate strongly with *Years in Practice*. Registrants may have been more easily identified using *Date of Birth*, a factor which would need to be considered when presenting the results of the study. *Years in Practice* was considered a superior indicator, since it was based instead on the number of years that a practitioner had been practicing in their field. For the variable *Years in Practice* the group *11-15 yrs* was used as the reference group because descriptive analysis revealed that this subcategory had a middling amount of practitioners in a relatively stable phase of their career. These assumptions are supported by Mior and Waalen (Mior & Waalen, 2008).

Sex and *School of Graduation* were included in the model as dichotomous variables. For *Sex*, males were representative of roughly 70% of the sample population and were therefore used as the reference group. For *School of Graduation*, since graduates of CMCC comprised slightly more than 70% of all registrants recorded in the data, I compared graduates of that institution to graduates of all other institutions

appearing in the data set, using CMCC graduates as the reference group. Graduates from 'non-CMCC' institutions were trained at foreign institutions, or in the case of a handful of registrants, out of province, at the Université du Québec à Trois-Rivières (UQTR). CMCC is the only school in English-speaking Canada to confer a Doctor of Chiropractic degree. All other institutions, save UQTR, recorded in the registrant database are located either in the United States, or the United Kingdom.

Finally, *LHIN* was treated as a categorical variable with categories as shown in Figure 4-14. *Hamilton Niagara Haldimand Brant* was chosen as the reference *LHIN*, since the number of observations for this area was close to the median for all groups, and the descriptive analysis made clear that the fluctuation in registrant numbers was not as great in this region.

Registrants holding an *Active* status for at least one year during the period studied were counted as exposed. In addition to the exclusion criteria mentioned above, registrants with 20 years or more in practice switching to *Retired* status at any point during the years studied were excluded from analysis. These switches represented cases where there was potential for other confounding factors influencing the switch from *Active* to another status.

3.3.5.4. Cox Proportional Hazards: Sensitivity Analysis

The CCO has an exception built in for registrants which allows them to temporarily switch from *Active* to *Inactive* class for up to five years, and then revert to *Active* status. Therefore, I conducted a sensitivity analysis to see the influence on the results of including those registrants experiencing the main outcome. In the sensitivity analysis, the outcome event was defined by switching from *Active* to *Inactive* class for two consecutive years instead of just one.

The CCO allows registrants to switch to *Inactive* status, and then switch back to *Active* status in the following year, without penalizing them. For registrants who do not plan to practice within a time frame, this temporary switch is advantageous, since it allows them the opportunity to return after a short hiatus, where they are only required to repay the registration fee for the year that they stay inactive, if they chose to return to practice. For example, registrants who administratively manage a clinic, or registrants in the academic sector, may wish to leave the option open to return to practice following other obligations. A registrant may remain inactive as many as five years before the CCO enforces sanctions such as re-writing the licensing examinations. Since there is

allowance in the system for registrants to temporarily switch statuses without penalty, sensitivity analysis was merited to determine that any effects observed were not owing to a sub-population of registrants who made use of this exception, and who may therefore have switched from *Active* to *Inactive*, and then back to *Active* class again. In the Cox Proportional Hazards analysis, a switch from *Active* to *Inactive* class was treated as an event, regardless of whether they returned to practice in Ontario in any of the years following.

In the sensitivity analysis, the unaltered data set was revisited, and an event was counted only in cases where a switch was made from *Active* to *Inactive* class for at least two years. This was done because while registrants might be listed as inactive for more than two years without penalty, such a switch would have resulted in the loss of chiropractic practice as a main source of income. Further, those registrants who remained inactive for more than two years were not practicing in Ontario, and if they had not migrated elsewhere, they may have been plying a different trade for subsistence, whether practice management, academic, or other. Regardless, these registrants were no longer practising chiropractic, which is the outcome of interest in this study.

3.3.5.5. Cox Proportional Hazards Analysis: Time-Varying Analysis

After the basic Cox proportional hazards models were fit and examined, the proportional hazards assumption was tested by including interactions between each independent variable and time. The years selected for comparison against the entire timeframe were selected based on anomalous results in the *Stickiness* and *Inflow* output. A priori, the delisting of chiropractic services announced in December 2004 was of interest and so trend changes that might be tied to that event were scrutinized more carefully.

The basic Cox proportional hazards survival analysis model assumes that the relationship between explanatory variables and the outcome, or the risk of becoming *Inactive*, is constant over time. Given the delisting policy of 2004, I wanted to check whether that assumption of time invariance was appropriate. This was checked by introducing time-varying effects for each independent variable.

A comparison was made between overall hazard ratios, and those for two specific years, with the intention of identifying whether relationships between the independent variables and time to event were the same over the entire time frame, or whether they might vary by year. Beta values and variance and covariance elements for

each variable studied were elicited, to compute hazard ratios and 95% CI by year to determine whether and where they varied.

The data was organized and imported into Stata (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP.)

CHAPTER 4: RESULTS

4.1. Results Overview

This chapter progresses sequentially through the results as they were reached. I will cover the descriptive results first: frequencies and proportions of CCO registrants from 1996-2007, stratified by each variable studied. Next, I have displayed the profession-wide results from the Stickiness and Inflow analysis. Finally, I present the results from the Cox Proportional Hazards Survival Analysis, again breaking out the description by variable. Discussion will follow in the next chapter.

4.2. Descriptive Statistics

I created graphs of proportions and drew up a frequency table to describe changes in the sample population based on each variable collected. This section contains a table describing the frequencies of registrants by CCO status type, year by year. Next, I report on registrants in all statuses, with the exception of the descriptive analysis of LHINs in Section 4.2.5. For LHINs, I utilized data only on registrants with an *Active* status. All tables and figures for the descriptive analysis were prepared in Microsoft Excel (Version 16.5.)

		Year											
		1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Registrant Status	Active	1863	2015	2170	2255	2397	2573	2756	2905	3010	3148	3136	3249
	Non-Res Active	18	27	42	36	39	55	47	63	68	46	44	58
	Inactive	45	48	43	53	60	59	76	75	98	123	115	125
	Non-Res Inactive	9	12	17	24	36	32	49	54	59	73	70	50
	Retired	20	20	26	31	34	36	35	44	57	76	75	91
	Not Listed	0	43	78	115	155	206	258	310	375	395	586	612
	TOTAL	1955	2165	2376	2514	2721	2961	3221	3451	3667	3861	4026	4185

Table 4-1: CCO registrants by status, year to year. Non-Resident has been abbreviated to "Non-Res".

4.2.1. Date of Birth

For *Date of Birth*, the number of registrants in the 65 or older category is small, thus risking the potential to reveal registrant identity. Therefore, I have reported proportions for *Date of Birth* rather than frequencies to mitigate against possible identification of registrants. Five groups were created, separated into 10-year categories; with the first group representing the youngest registrant and the last for those aged 65 and older. The proportions have been plotted in the bar graph in Figure 4-1. The variable *Date of Birth* is presented using five groups. The youngest registrants with an *Active*

status in the data set were 23 years old. Registrants' graduation years were subtracted from their age to reach an average graduation age of 27.8 years (s.d.=3.26).

Figure 4-1 shows that the overall proportion of registrants under the age of 35 starts out at 36%, peaks at 44% in 2003, and then declines by the end of the reported period to 34%. In the second group of registrants, aged 35-44 years old, the proportion tapers from 44% to 28% in the middle of the time frame, and then grows again to 35% towards the end. There is an increase in the proportion of registrants aged 45-54 from 15% to 21% in 1999, which remains constant throughout the rest of the time frame. There is also a change in proportion of registrants aged 55-64 from 3% at the outset to 9% by the year 2007.

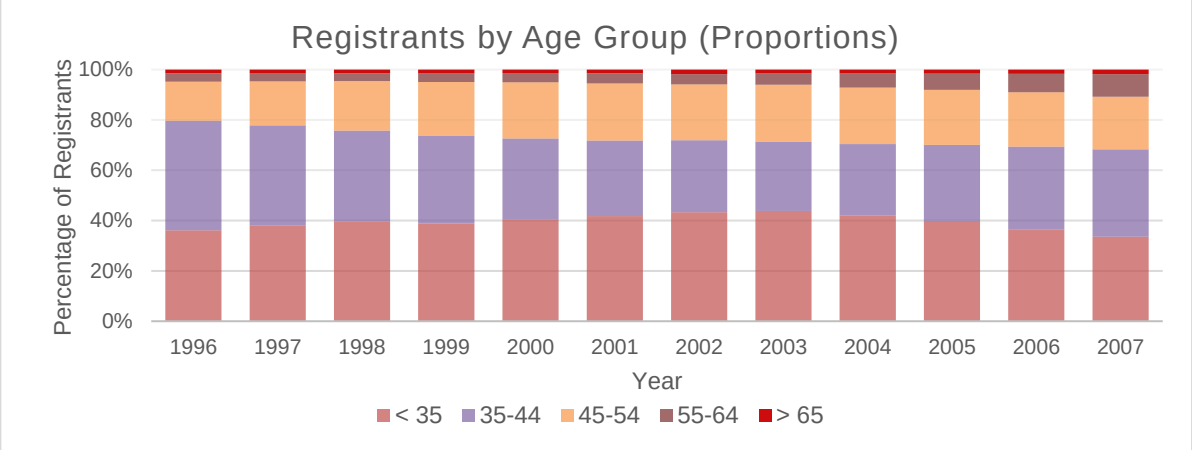

Figure 4-1: Stacked bar graph of variable Date of Birth by age group following CCO registrants from 1996-2007.

4.2.2. Sex

The male and female ratio changed during the years studied. Registrant frequencies indicated that the number of female registrants in Ontario almost tripled from 382 to 1,071. Figure 4-2 shows a steady, gradual change in male-female proportions, so that at the beginning of the time frame, the ratio of male to female practitioners was 80:20, and by the end, the ratio was 70:30. About 1% of registrants did not report their sex and were excluded from this analysis.

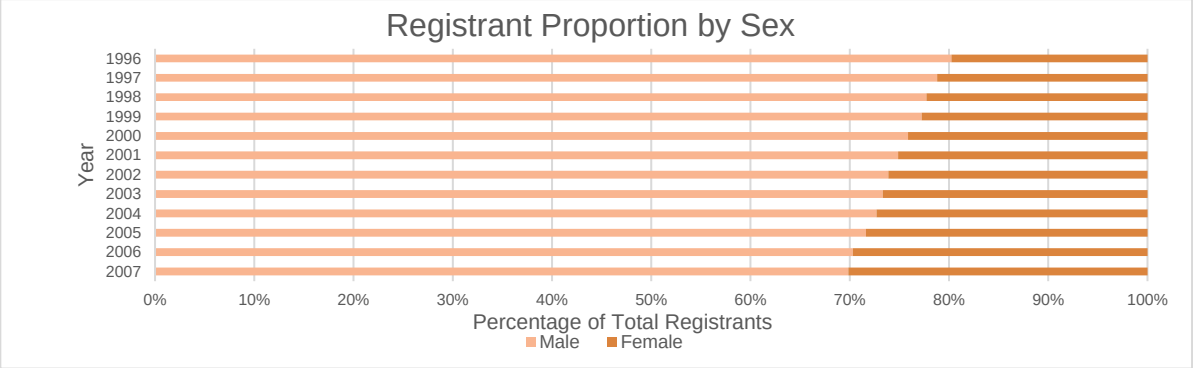

Figure 4-2: CCO registrants proportionally by self-reported sex, 1996-2007.

4.2.3. Years in Practice

The number of registrants with less than five years' experience peaks at 926 in the year 2004, and afterwards begins to decline (Table 4-2). Registrants in the *6-10 yrs* and *11-15 yrs* categories, as well as those who had been practicing for more than 20 years grew in number. Notably, the number of registrants in the *6-10 yrs* category more than doubled in the time frame, overtaking the *0-5 yrs* category in the last year studied.

Registrant numbers in the *16-20 yrs* category grew at the beginning of the time studied, but from 1999 onwards experienced a drop in numbers in each consecutive year until 2004. Growth occurs in the last three years, although the number of registrants does not recover to the amount in 1996. Declines also occur in the *16-20 yrs* and *21-25 yrs* groups close to the time that delisting was deliberated and passed into effect.

The graduation date was not captured for roughly 5% of registrants in the database and excluded from this analysis.

		Year											
		1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Years in Practice	**0-5 yrs**	450	550	661	684	766	822	898	915	926	920	832	781
	6-10 yrs	322	338	350	373	401	471	547	638	705	788	825	875
	11-15 yrs	329	321	311	306	308	319	330	344	371	404	452	521
	16-20 yrs	363	370	381	372	347	332	311	301	296	301	303	314
	21-25 yrs	143	188	225	270	320	347	362	371	357	330	310	298
	26-30 yrs	80	78	81	98	110	134	180	217	259	311	322	338
	> 30 yrs	184	187	193	196	204	208	208	215	230	258	268	323

Table 4-2: Registrants stratified by number of years in practice.

4.2.4. School of Graduation

The registrants were then analyzed according to the schools from which they received their chiropractic training. Figure 4-3 highlights that the proportion of Canadian-educated chiropractors practicing in the province of Ontario remained the dominant

faction between the years 1996-2007. As with *Sex*, there was a steady, gradual shift in the ratio of CMCC to non-CMCC graduates in the period studied, starting from 89:11 at the outset, settling to 72:28 for the last four years recorded. The number of graduates from foreign institutions registering to practice at the CCO accelerated rapidly from the beginning of the time frame, peaked in 2000-2001, and then slowed to more conservative growth from 2004 to the end of the time studied. The number of CMCC graduates practicing in Ontario grew by a factor of roughly 1.5, from 1,746 to 2,562 during the study period. In contrast, non-CMCC graduates nearly quintupled from 209 to 1,012.

The registrant population included graduates from 19 institutions other than CMCC. The largest number of foreign graduates completed their training at the National University of Health Sciences, followed by New York Chiropractic College.

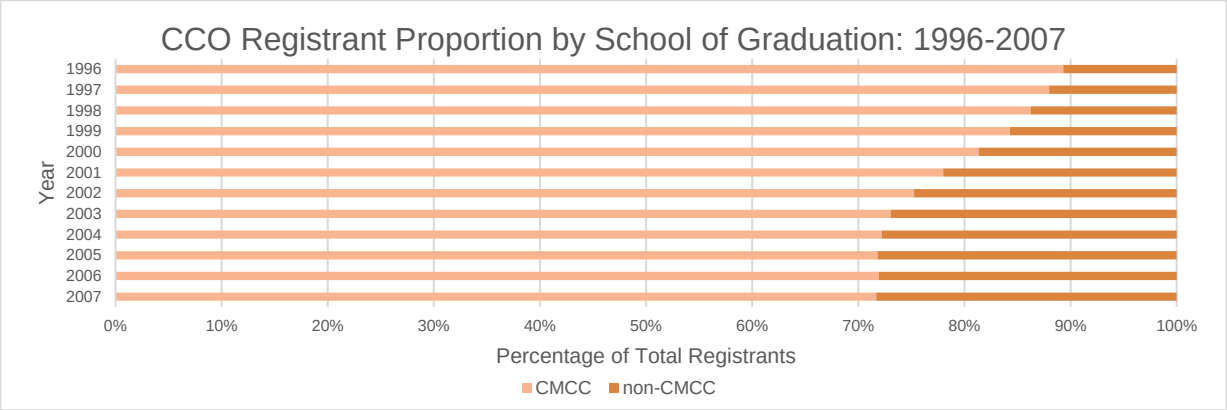

Figure 4-3: CCO registrants proportionally by School of Graduation, 1996-2007.

4.2.5. LHINs

In relation to the location of the registrants, data were collected across all LHINs in Ontario. Given the number of categories, a bar graph has been provided to more easily assess fluctuations in registrant location. Figure 4-4 presents the frequencies of registrants in each area of Ontario, progressing from LHIN 1 on the left to LHIN 14 at the end, on the right. Since growth occurred across all regions, the frequencies in 1996 are represented with the wider, darker bars in the background, and the numerical values listed at their lower peaks. The frequencies of registrant location in 2007 are presented in the foreground, with the thinner, lighter bars. I calculated the proportion of registrants in each LHIN relative to the total number of registrants in 1996, and then listed the change in that proportion as calculated in 2007 in parentheses next to the frequencies listed for each LHIN in 2007.

The frequencies and proportions reveal that *Central*, located to the north of Toronto, contained the most registrants by 2007, becoming more populated than *Toronto Central*. *Hamilton Niagara* and *Central East* maintained their statuses as the third and fourth most populous registrant areas in Ontario, although they did not grow as quickly as other areas, such as *Mississauga Halton*. Registrants in *Champlain,* in the Ottawa area, outgrew their counterparts in *South West*, which includes the city of London (refer to Figure 4-14 at the end of this chapter for a map). Although they are counted among the 7 least populous areas with respect to registrants, *Waterloo Region*, *Erie St. Clair*, *North Simcoe Muskoka* and *Central West* roughly double in number. The number of registrants in *North East* grew, but this LHIN had the poorest growth in the time studied.

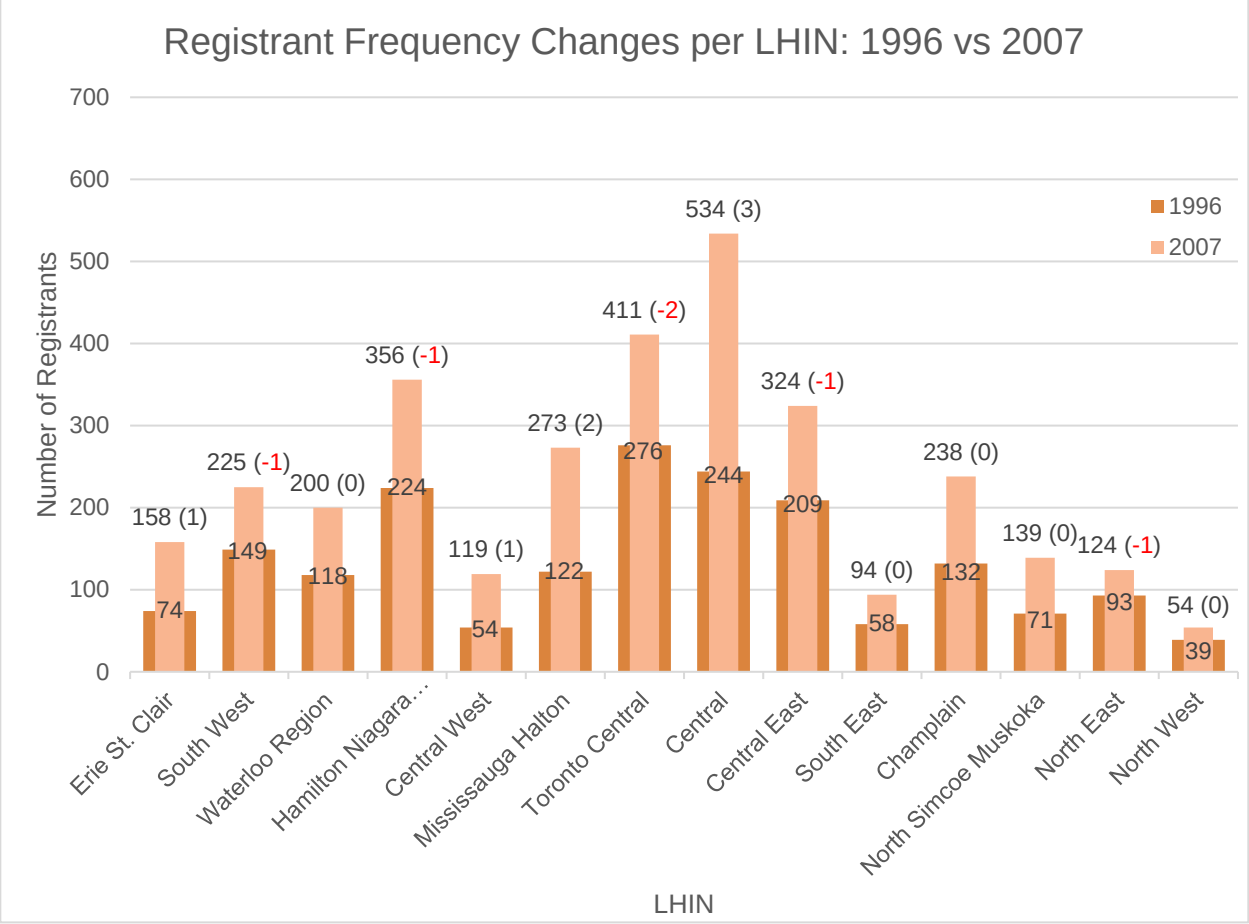

Figure 4-4: CCO registrants stratified by LHIN, with comparison of growth between 1996 and 2007 data.

4.3. Data Standardization

For purposes of analysis, *Date of Birth* was found to correlate strongly with *Year of Graduation* (r=0.95). Registrants may have been more easily identified using *Date of Birth*, a factor which would need to be considered when presenting the results of the study. Therefore, I decided to use *Year of Graduation* to calculate the number of years each registrant had been in practice, starting from their year of graduation, and to remove *Date of Birth* from my analysis.

Thus, the revised list of dependent variables used in this work in the remainder of Chapters 4 and 5 is as follows:

- Years in Practice
- Local Health Integration Network
- School of Graduation
- Sex

For the independent variable, *Status*, there were over 400 cases where registrants appeared in one year, but were not listed in the registry in the following year. These registrants sometimes underwent periods of inactivity, and then re-appeared under one of the other statuses again. During the periods for which no status was assigned, I created a sixth status category: *Not Listed*. This category was included with other inactive categories, since placement here would entail failure to submit the CCO annual registration form and pay the fee to remain an active practitioner in Ontario.

4.4. Stickiness and Inflow for Total Sample Population

Stickiness and Inflow was calculated for the total number of registrants in Ontario, by year, as shown by the plots in Figure 4-5 and Figure 4-6. These plots indicate two points in time where the rate of growth for CCO registrants suddenly changed. For profession-wide Stickiness, the indicator is stable until 2004 when a larger precipitation occurred, followed by a sharp decline in 2006.

An earlier disruption can be seen in the profession-wide Inflow chart in Figure 4-6, in 1999. Growth occurs again from 2000-2002. Then, from 2003, there is a steady decline until 2006, when the Inflow indicator drops to roughly the same level as 1999. There is a small growth in 2007.

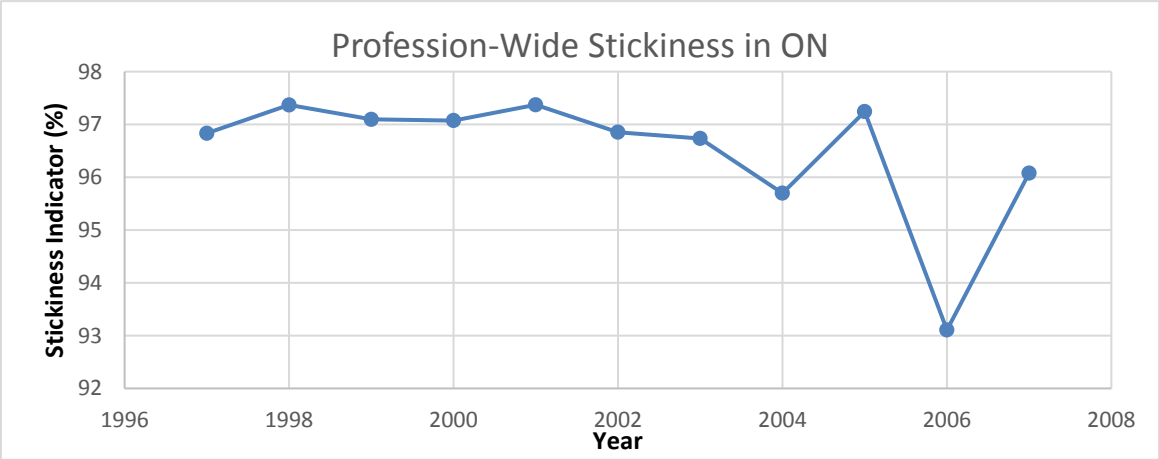

Figure 4-5: Profession-Wide Stickiness for Chiropractors Registered to Practice in Ontario, 1996-2007.

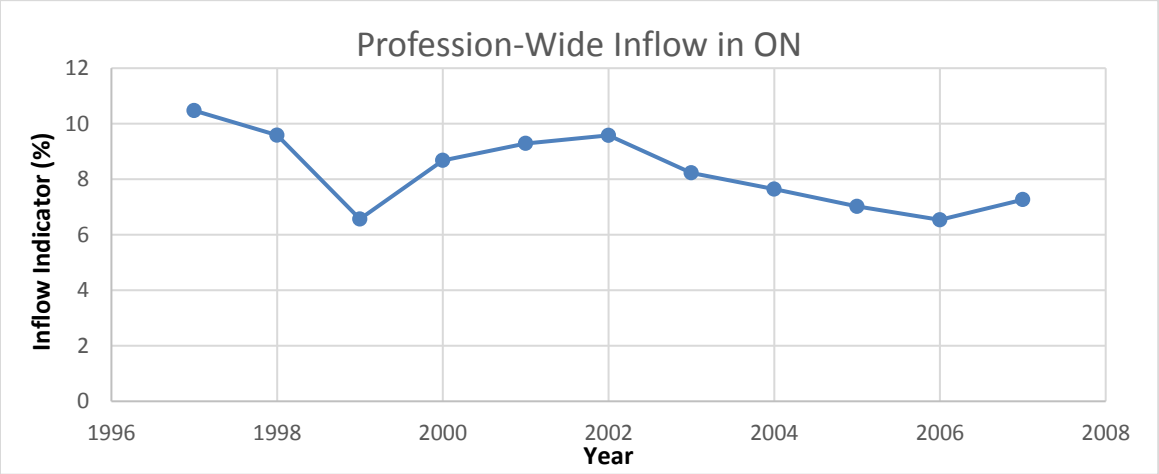

Figure 4-6: Profession-Wide Inflow for Chiropractors Registered to Practice in Ontario, 1996-2007.

4.5. Cox Proportional Hazards Survival Analysis

To explore whether registrant characteristics might act as a predictor for switches from *Active* to *Inactive*, a Cox Proportional Hazards Survival Analysis was calculated. A cohort of 4,009 registrants was followed from 1996-2007, with 34,855 person-years of data. Two sets of data were processed for each variable. Sections 4.5.1-4 list Stata outputs for each variable from the original data set. A detailed account of the sensitivity analysis appears in Appendix A. The survival analysis results are not presented in this section because on the whole, they were very similar to the results presented here. However, I have made a note of those cases where the survival analysis differs prominently from the results in this section, and the reader may compare the charts presented in this Chapter with those listed in Appendix A.

I started by plotting a Kaplan Meier Estimate of the survivor function to compare with the Stickiness results reported in Section 4.4 (Figure 4-7 and Table 4-3). In the year 2006, the Kaplan Meier estimate demonstrates that approximately one fifth of all switches from *Active* to *Inactive* class occurred, and this also shows up as the biggest single year drop in the survivor function from 0.81 to 0.76 – a drop of 0.05, compared to most other years which have a drop on the order of 0.02-0.03.

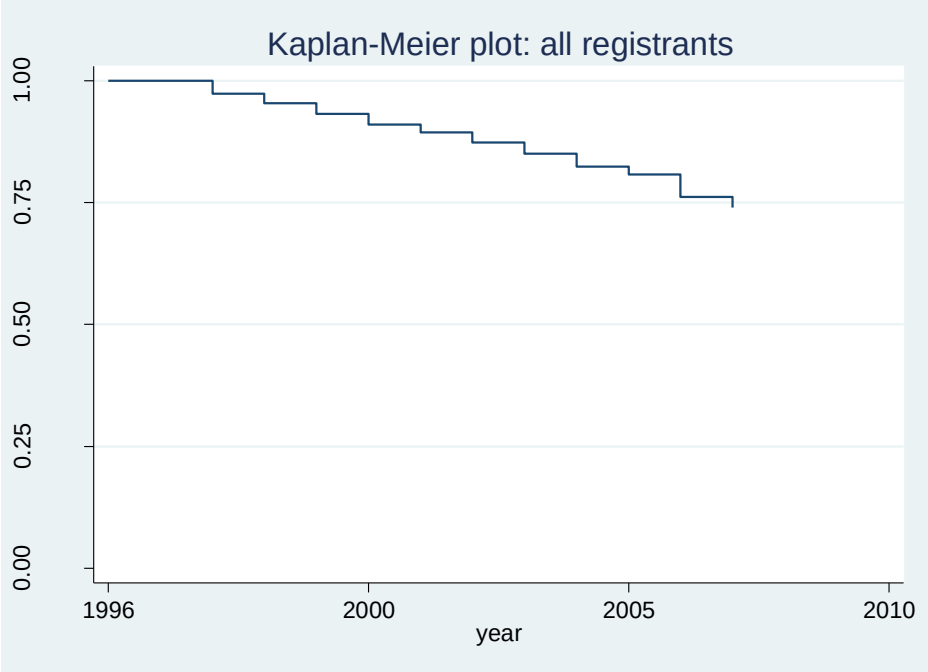

Figure 4-7: A Kaplan Meier survival estimate of the chiropractic profession from 1996-2007.

Year	*Active Registrant Total*	*Registrants Switching Status*	*Net New Registrants*	*Survivor Function*	*Standard Error*	*95% Conf. Interval*
1996	1863		205	1	.	.
1997	2068	54	192	0.97	0.00	0.97 – 0.98
1998	2206	44	125	0.95	0.00	0.94 – 0.96
1999	2287	54	188	0.93	0.01	0.92 – 0.94
2000	2421	55	215	0.91	0.01	0.90 – 0.92
2001	2581	46	244	0.89	0.01	0.88 – 0.91
2002	2779	67	205	0.87	0.01	0.86 – 0.89
2003	2917	76	191	0.85	0.01	0.84 – 0.86
2004	3032	92	176	0.82	0.01	0.81 – 0.84
2005	3116	63	151	0.81	0.01	0.79 – 0.82
2006	3204	183	144	0.76	0.01	0.75 – 0.78
2007	3165	92		0.74	0.01	0.72 – 0.75

Table 4-3: The values used to plot the Kaplan Meier graph. Note the year 2006, where there is a drop equating to 20% of the total decline in the time studied. To calculate Active Registrant Total for the next year in sequence, subtract the Registrant Switching Status value, and add Net New Registrants.

4.5.1. Years in Practice

The group 11-10 yrs was chosen as the reference group for this variable.

The group > *30 yrs* shows a statistically significant (p<0.001) probability of switching to *Inactive* within the period analyzed compared to the reference group, with a hazard ratio of 2.02 (95%CI 1.48-2.77). The hazard ratio for *26-30 yrs* is 1.22 (95%CI 0.85-1.76).

Survival analysis shows that registrants in the group < *5 yrs* were 1.33 times more likely (p<0.05; CI 1.04-1.73) to switch to *Inactive* compared to those in the reference group within this time frame. During the time frame studied, these registrants made up about a third of all cases analyzed.

Practitioners with 21-25 years' experience were the least likely to switch to *Inactive* status (HR 0.71). The *p* value is statistically significant in the sensitivity analysis (p<0.05), and the hazard ratio drops further, to 0.66. The output shows that *6-10 yrs*, *11-15 yrs*, *16-20 yrs* had very similar hazards over time, while *21-25 yrs* had slightly lower hazards and < *5 yrs*, *26-30 yrs* and > *30 yrs* had significantly higher hazards of switching to *Inactive*.

Group	*HRR*	*s.e.*	*z*	*p*	*95% Conf. Interval*	
< 5 yrs	1.33	0.17	2.18	0.03	1.03	1.71
6-10 yrs	0.95	0.14	-0.35	0.73	0.71	1.27
16-20 yrs	0.84	0.15	-1.02	0.31	0.60	1.18
21-25 yrs	0.71	0.13	-1.84	0.07	0.49	1.02
26-30 yrs	1.22	0.23	1.06	0.29	0.85	1.75
> 30 yrs	2.03	0.32	4.45	0.00	1.48	2.77

Table 4-4: Output for Cox Proportional Hazards survival analysis of CCO registrants by years in practice. Group 4, or the group with 11-15 years' experience, was chosen as the reference group. HRR represents the hazard rate ratio for which the 95% Confidence Interval has been provided in the leftmost column, and the standard error has been provided under s.e. Z scores and p values have been provided.

4.5.2. Local Health Integration Networks

The next variable considered was registrant location, codified by LHIN as shown in Table 4-5. The reference group for this variable was *Hamilton Niagara Haldimand Brant*.

Of the LHINs, those where registrants had an increased likelihood of switching to *Inactive* status were *Central*, *Champlain*, *North East* and *North West* (8, 11, 13 and 14). In the sensitivity analysis in Appendix A, *Central* evidences a number of registrants who have only temporarily switched. *Champlain* remains relatively constant with regard to the sensitivity analyses. *Champlain* is also uniquely located in Ottawa and the surrounding

regions, right on the border with Quebec. Of the LHINs with registrants more likely to cease practice, *Central* is the only region with a *p* value with statistical significance in the sensitivity analysis.

Conversely, LHINs where registrants had a decreased likelihood of switching to *Inactive* status were: *South West*, *Waterloo Region*, *Central West* and *South East* (2,3,5 and 10). The hazard ratios did not change greatly when employing the sensitivity analysis. The most notable change was that the hazard ratio for *South West*, when adjusted for sensitivity, evidences statistical significance. Registrants in *Central West* were less than half as likely to switch to *Inactive* compared to their peers (HR 0.42/0.45).

Group	*HRR*	*s.e.*	*z*	*p*	*95% Conf. Interval*	
Erie St. Clair	1.04	0.20	0.19	0.85	0.71	1.51
South West	0.73	0.14	-1.64	0.10	0.50	1.06
Waterloo Region	0.69	0.14	-1.81	0.07	0.46	1.03
Central West	0.42	0.13	-2.71	0.01	0.23	0.79
Mississauga Halton	0.96	0.16	-0.22	0.83	0.70	1.34
Toronto Central	1.11	0.16	0.73	0.46	0.84	1.46
Central	1.36	0.18	2.36	0.02	1.05	1.77
Central East	1.15	0.17	0.95	0.34	0.86	1.53
South East	0.66	0.18	-1.53	0.13	0.39	1.12
Champlain	1.33	0.21	1.84	0.07	0.98	1.81
North Simcoe Muskoka	0.87	0.19	-0.66	0.51	0.57	1.33
North East	1.33	0.25	1.54	0.12	0.93	1.92
North West	1.51	0.37	1.66	0.10	0.93	2.45

Table 4-5: Output for Cox Proportional Hazards survival analysis of CCO registrants by LHIN. The reference group for this analysis was Hamilton Niagara Haldimand Brant (LHIN 4).

4.5.3. School of Graduation

The reference group for this variable was *CMCC*.

The output in Table 4-6 reveals that graduates of foreign institutions were more likely (HR 1.33, p<0.001) to switch from *Active* to *Inactive* class during the years 1996-2007. A relatively small confidence interval supports this assertion.

A Kaplan-Meier plot was generated for School of Graduation (Figure 4-8), to better visualize the rates at which registrants in each dichotomized category switched from *Active* to *Inactive* class. It is possible to distinguish the years 1999, 2004 and 2006 as points in time when greater decline was experienced by either one or both groups. In the years 1999 and 2004, the declines are experienced at a greater rate for non-CMCC graduates. Comparatively, their CMCC graduate counterparts experience declines

similar to other years. The decline seen in 2006 affects both groups, which experience their biggest drop that year (with the exception of the non-CMCC group's decline in 1997, described further below, in Chapter 5: Discussion).

Group	*HRR*	*s.e.*	*z*	*p*	*95% Conf. Interval*	
Non-CMCC	1.33	0.10	3.65	0.00	1.14	1.54

Table 4-6: Output for Cox Proportional Hazards survival analysis of non-CMCC graduate CCO registrants.

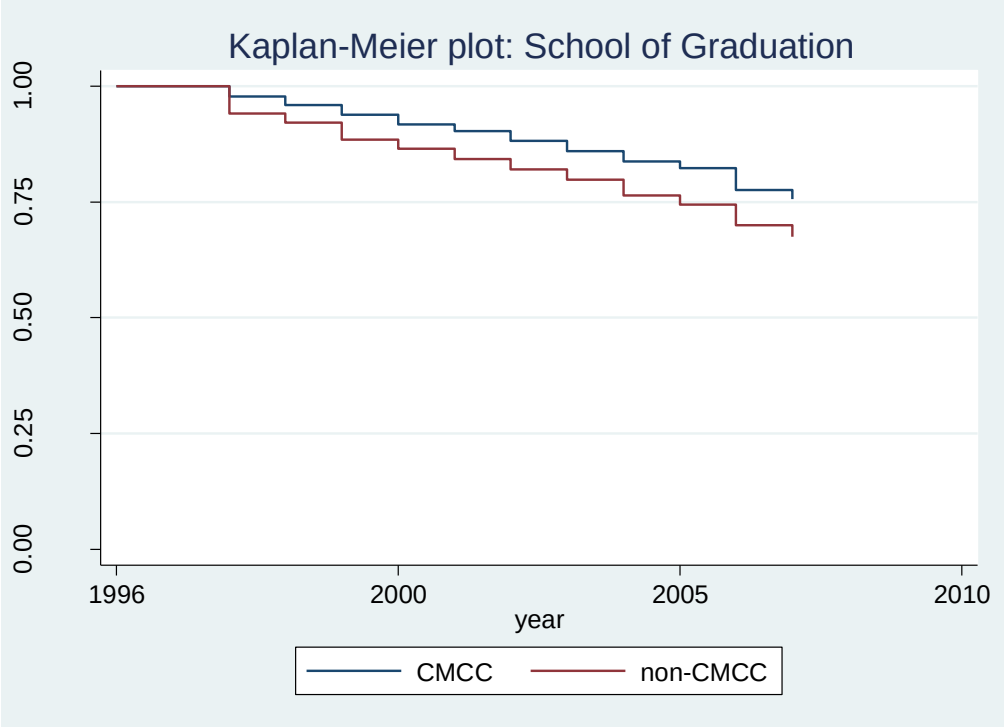

Figure 4-8: Survival plot of registrants using School of Graduation

4.5.4. Sex

The reference group for this variable was *male*.

The fourth and final category analyzed using Cox Proportional Hazards was *Sex*. The number of observations supports the gender divide in chiropractic reported elsewhere (Mior, 2010; Mior & Waalen, 2008) at a ratio of 3:1 in the male-female (76% male, 24% female) divide in those cases where information on sex was available. The output in Table 4-7 shows that females were more likely to cease practice in Ontario during this timeframe (HR 1.60, p<0.001).

The Kaplan-Meier survival estimate plot shown in Figure 4-9 indicates when more registrants of one sex switched to *Inactive* status than the other. The plots for *Sex*

and *School of Graduation* are similar: however, female registrant numbers appear to have declined at a more noticeable rate than males in the year 2000, and; once again, there was a larger number of status switches for both sexes in the year 2006, which carries over to 2007 for female registrants.

Group	*HRR*	*s.e.*	*z*	*p*	*95% Conf. Interval*	
female	1.60	0.12	6.41	0	1.39	1.85

Table 4-7: Output for Cox Proportional Hazards survival analysis of female CCO registrants.

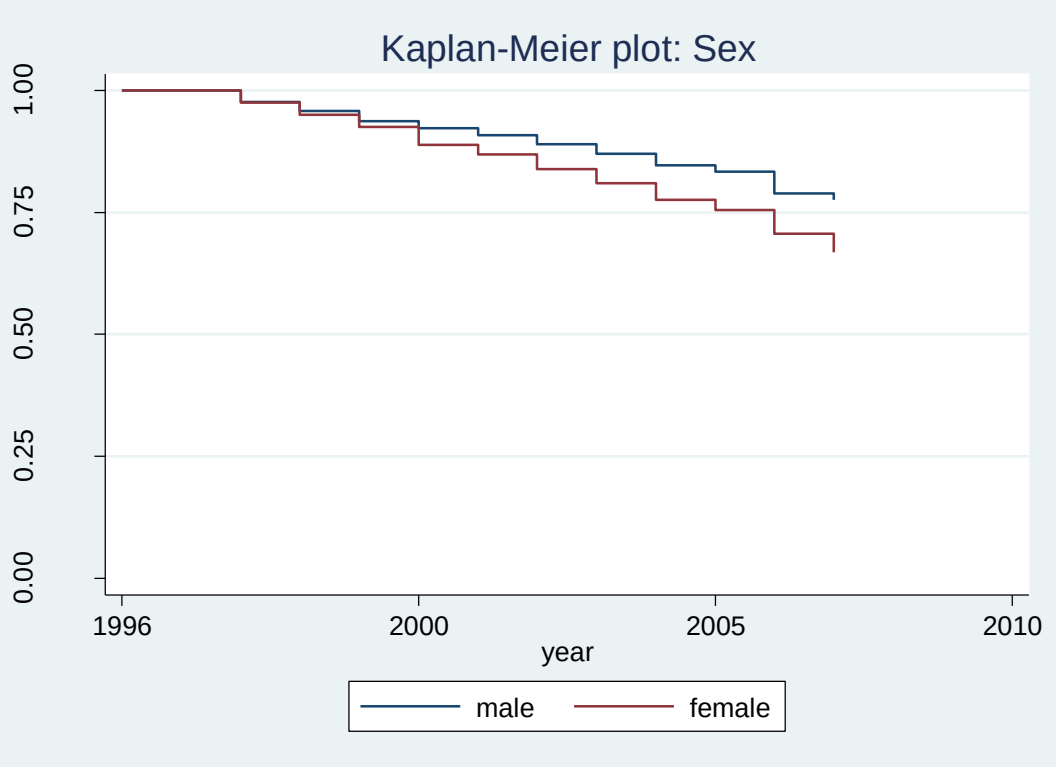

Figure 4-9: Kaplan-Meier survival estimate plot by sex.

4.6. Survival Analysis: Time-Varying Coefficients

Hazard Rate Ratios (HRR) were produced to allow for the study of specific years, since the results in Section 4.4 and in the Kaplan Meier plots pointed to the years 1999 and 2006. The results for the year 1999 appear in Appendix B, although they did not reveal any statistically significant time-varying effects. The results for the year 2006 appear in Appendix B, and statistically significant effects were detected for that year. The results of the analysis are contextualized below.

4.6.1. Time-Varying Coefficient Analysis of the Year 2006

The analysis of Time-Varying Coefficients reveals that comparatively, in 2006, the behaviour of registrants according to the variable *Years in Practice* is statistically different from other years. There is an increase in hazard ratios across all categories analyzed in the year 2006. Figure 4-10 demonstrates aggregate hazard rate ratios and confidence intervals, split by the variable categories of *Years in Practice*.

I have drawn a blue dotted line across the groups to indicate the U-shaped pattern exemplifying registrant likelihood of switching statuses for the years 1996-2007, excluding the year 2006. Next, I drew a red dotted line drawn through the hazard rate ratios determined for the year 2006. The dotted lines help to highlight an increase in hazard ratios across all categories for 2006, compared to other years.

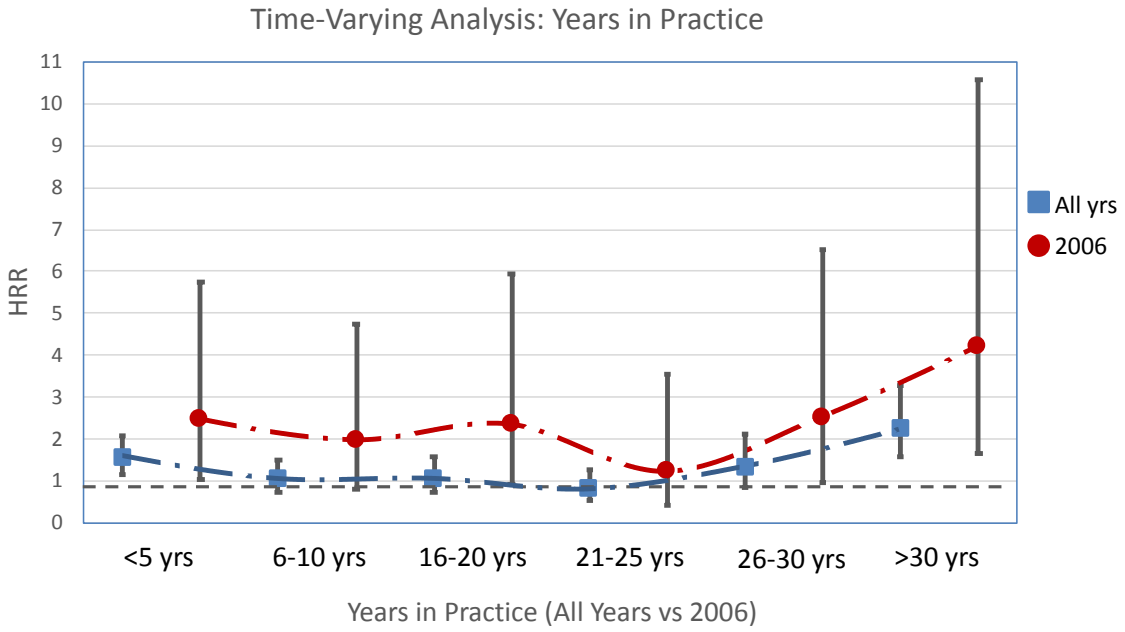

Figure 4-10: Time-Varying Analysis by Years in Practice (reference group: 11-16 yrs). The blue boxes refer to Hazard Rate Ratios for all years except 2006, and the red circles refer to Hazard Rate Ratios for the year 2006 alone. The whiskers cover the confidence intervals. For this figure, I have drawn lines through each set of Hazard Rate Ratios to clarify the unanimous increase in magnitude for the year 2006.

Figure 4-11 provides a similar comparison for registrant locations which experienced the greatest changes in 2006, compared to all other years. Moving from left to right on the figure, the hazard ratios in *Central* and *Central East* doubled in 2006, with the lower bounds of the associated confidence intervals above 1. *North East* mirrors this to a lesser degree. In contrast, the change in *North West* occurs in the opposite direction, with the hazard rate ratio dropping to 0.47.

Finally, analysis of 2006 demonstrates changes in the variables *School of Graduation* and *Sex*, where the hazard ratios are reduced, as is clarified in Figure 4-12 and Figure 4-13. For most years, female CCO registrants were more likely to switch to *Inactive* than male, but this difference is not as apparent in 2006. The same observation was evident for non-CMCC graduates.

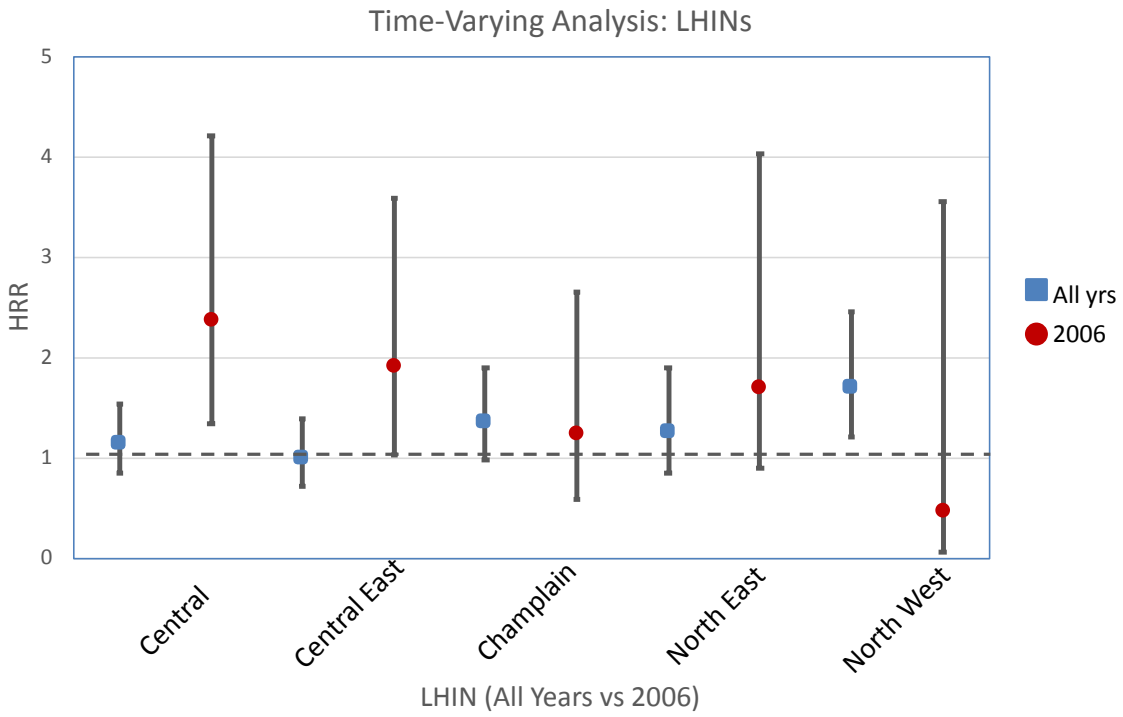

Figure 4-11: Time-Varying analysis results for registrant location. An excerpt of Central, Central East, Champlain, North East and North West (LHINs 8, 9, 11, 13 and 14) is displayed, in order to show that some Hazard Rate Ratios increased, while others decreased in LHINs in 2006.

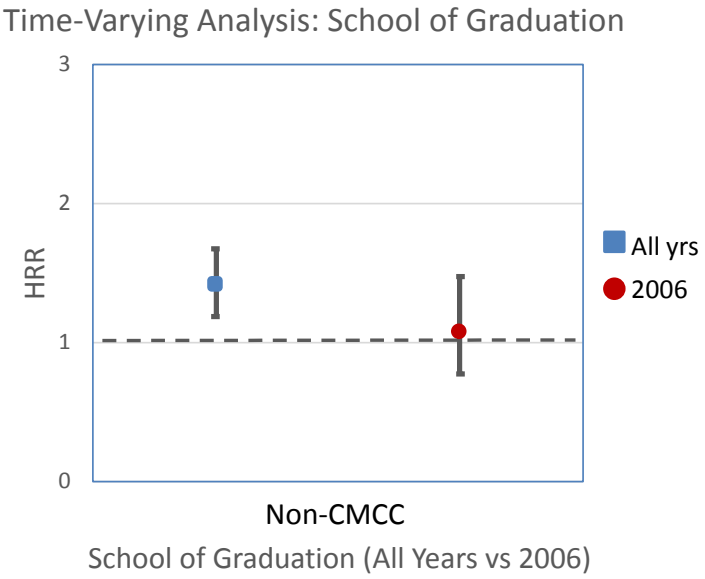

Figure 4-12: Time-varying analysis comparison of non-CMCC graduates (reference group: CMCC) in Ontario between 2006 and all other years.

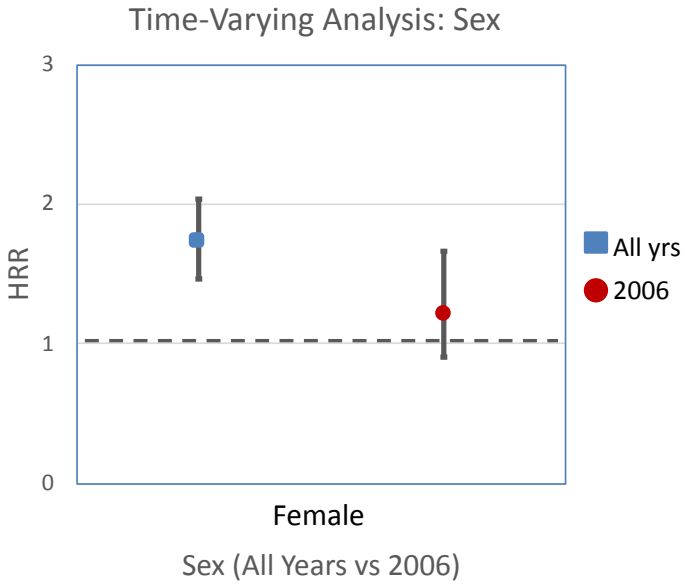

Figure 4-13: Time-varying analysis comparison of female CCO registrants (reference group: Male) between 2006 and all other years.

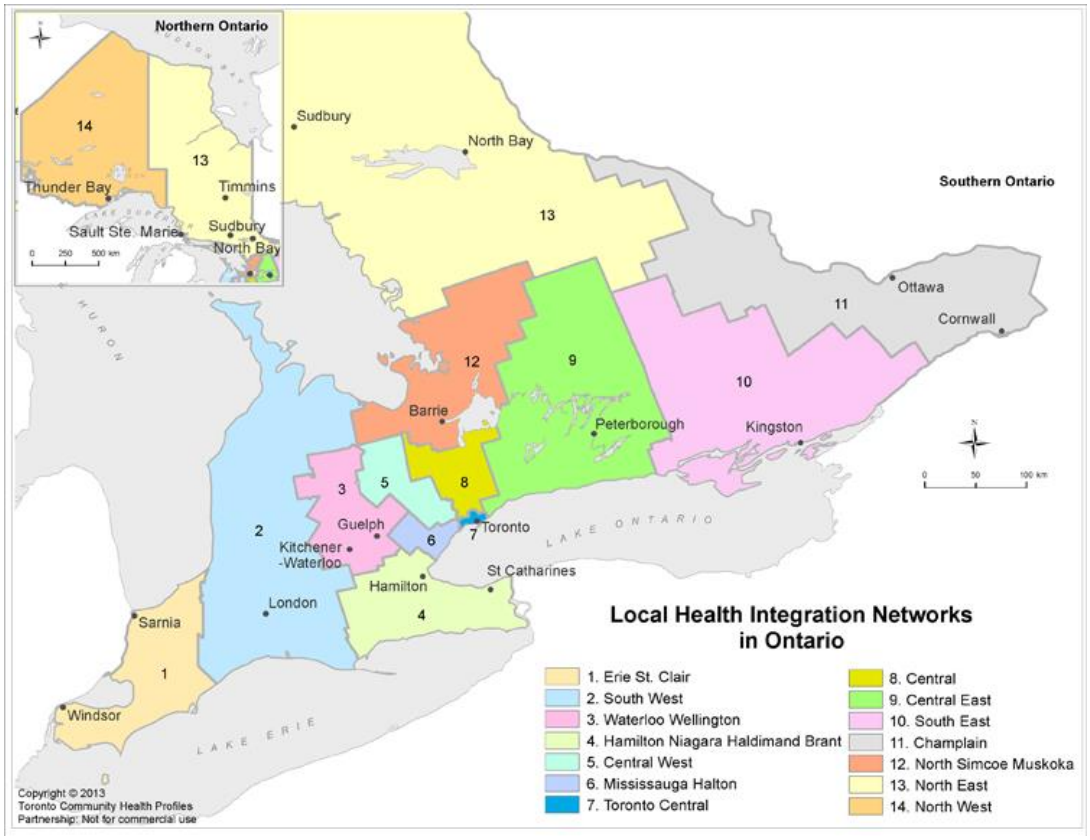

Figure 4-14: Map of Local Health Integration Networks (LHIN) in Ontario.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1. Discussion of Findings

I conducted this study to investigate whether the Ontario government's decision to delist chiropractic services coincided with changes to the practice status of CCO registrants. The results of my analysis pointed to a statistically significant change in status switches in the year 2006, when a greater number of CCO registrants chose to switch from *Active* to *Inactive* class. It was not possible to causally link delisting to the results of my analysis. However, the magnitude of registrants switching their status in 2006 was greater than in any other year studied. My secondary aim was to establish which variables collected by the CCO might be predictive of the likelihood to switch to *Inactive* class. The survival analysis indicated that certain groups of registrants were more likely to make this switch than others during the time frame studied. However, the time-varying analysis indicated that following delisting, specifically in 2006, the contrast between those more and less likely to switch decreased. Instead, nearly all groups experienced an increase in risk of switching to *Inactive* class.

5.1.1. Descriptive Data

The results from analysis of frequencies and proportions showed that the demographic characteristics of the chiropractic profession were diversifying from 1996-2007. Chiropractors who had registered with the CCO during the study time period were predominantly male, but the growth in female practitioners shifted the ratio of male-female practitioners by roughly one point per year. In 1996, females accounted for 382/1,934 of all Active registrants but grew to 1,071/3,554 by 2007. With the exception of the year 2006, the increase in annual number of male registrants was greater than that for female registrants. Female chiropractors began to make up 50% or more of registrants who graduated from 2005-2007. The ratio between domestically and foreign trained registrants moved closer to parity during this time frame. This rapid growth in registrants who trained abroad suggests Ontario was becoming an attractive location to practice. It was not possible to distinguish how many registrants were native Ontarians who chose to study abroad, and then returned home to practice. While I cannot conclude where registrants were born, it may be an important factor in explaining why Canadian-trained graduates made up less than half of the chiropractic workforce in northwestern

Ontario by 2007, and why the proportion of Canadian-trained chiropractors had also decreased in northeastern and southwestern Ontario.

Descriptive analysis of the other two dependent variables, *Years in Practice* and *Local Health Integration Network*, provided further evidence of shifting trends and insight into changes in the profession. The frequencies for the variable *Years in Practice* revealed that there was a healthy flow of newly graduated practitioners into the health workforce from 1996-1998, but it was unsustainable. The *0-5 yrs* subgroup grew by about 100 registrants per year for the first 3 years, until 1999 when growth nearly halted. The group's rate of growth then appeared to recover but slowed and peaked in 2004, and then declined in the following years. While most other *Years in Practice* subgroups expanded, *16-20 yrs* contracted, with fewer practitioners in 2007 than in 1996. The subgroup *21-25 yrs* experienced a contraction after 2003, but began to expand again at the end of the time period. This supports speculation that a number of practitioners were seeking early retirement or switching careers. Finally, analysis of the variable *LHIN* showed an increase in registrants in suburban Toronto, most notably north of the city in *Central* and to the west in *Mississauga Halton*. Of the other areas which seem to have done well in the comparison given in Figure 4-4, *Erie St. Clair* and *Central West* were most prominent. In contrast, *Toronto Central*, which is an inner-city zone, proportionately contracted during the study period. The number of registrants in Northern Ontario grew at the slowest rates. There was also slow growth in *South West*, *Central East* and *Hamilton Niagara*. The slower growth in these areas may be related to practitioner oversaturation (Mior & Laporte, 2008), although the methodology I used was unable to definitively conclude this. The changes in proportion of practitioners by region may also have been related to the changes taking place in the proportion of the general population in each LHIN. Statistics Canada census data on population growth at large in the LHINs are comparable to the changes seen in practitioner populations (Statistics Canada, 2006, 2009, 2017).

5.1.2. Stickiness and Inflow

The results for *Stickiness* and *Inflow* suggest there was a particular year during 1996-2007 where the year-year changes differed from the other years studied. The results for profession-wide *Stickiness* show an average fluctuation of 0.29 points from 1997-2003, but then became erratic between 2004-2007, fluctuating at a year-year average of 2.42 points, or 8 times as much as previous years. Specifically, the

profession became 4.14 points less sticky in the year 2006, when more registrants (217) switched to *Inactive* status than entered the workforce (205). Given the transition from a period of stability to instability occurred from 2004 onwards, these results suggest a relationship to the decision to delist chiropractic services from OHIP. Profession-wide *Inflow* results also showed a sudden change in the rate of registrants switching to *Inactive*, but the change occurred in 1999. In Figure 4-6, a 3.03 point difference was noted in indicator levels between 1998 and 1999. In the next data point, there was a 2.12 point recovery, and small growth for the next two years. Finally, from 2003 until the end of the time frame, there was a gradual downward slope, with *Inflow* hitting its lowest point in 2006 at 6.54. A potential explanation for the observation in 1999 *Inflow* was the Ontario provincial government's reduction to OHIP coverage of chiropractic services from $220 to $150 per Ontarian that year.

Stickiness and *Inflow* indicators also imply that there was an impact on the relative attractiveness of chiropractic in Ontario in the years 1999 and 2006 for the variables *Sex* and *School of Graduation*. Female registrant *Stickiness* averaged 1.3 points lower than male registrants from 1996-2007 with the largest differences in the years 2000 (2.7 points) and 2007 (3.3 points). This highlights that female registrants were more prone to switching to *Inactive* status than were male registrants. The differences in *Stickiness* values between registrants with foreign training versus those with Canadian training showed an identical average of 1.3 points lower for non-Canadian graduates from 1996-2007. However, the largest differences were found in 1997 (4.8 points) and 1999 (3.1 points). For *Inflow*, results for the variables *Sex* and *School of Graduation* demonstrated stronger practitioner growth in female registrants, as well as registrants with training outside of Canada. For the variable *Sex*, the average *Inflow* value for females from 1997-2003 was 13.41, nearly double the average value of males at 7.49. For *School of Graduation*, the 1997-2003 average *Inflow* value for non-CMCC graduates more than tripled that of CMCC graduates, at 21.74 versus 6.03. While the readout from Figure 4-6 does not evidence the same erratic behaviour at the second half of the time studied as for *Stickiness*, the average values for *Inflow* were markedly different from the first half, as decline set in. Average *Inflow* values dropped almost 3 points for females, from 13.41 to 10.62, but the reduction in values was more drastic for non-CMCC graduates, where the indicator drops to half of the initial value, from 21.74 to 9.03.

The results from the *Stickiness* and *Inflow* indicators for the chiropractic profession during the years 1996-2007 in Ontario allow for comparison to other health professions during this same period. Landry et al.'s study of physiotherapists examined these same indicators from 1999-2007, in Ontario (Landry et al., 2012). Their results show that there was an overall expansion of practitioners by 21%, from 5,003 to 6,064 registrants. Assuming that Landry et al. reported on all registrants, and not just active ones, the rate of growth for physiotherapy was lower than in chiropractic, where the number of chiropractors scaled from 2,399 to 3,574 at a 49% expansion. Comparison of means for *Inflow* and *Stickiness* reveals that as a profession, chiropractic did not attract as many practitioners (7.9 versus 20.7), but it was much stickier (96.4 versus 81.4). Although Landry et al. did not report on years 2002- 2004, by the year 2004-5 *Stickiness* values had weakened for physiotherapists in Ontario, while at the same time, *Inflow* values had strengthened. While this is not entirely consistent with my observations for the chiropractic profession, the stability in *Stickiness* values from 1999-2002 compared to weaker values at the end of the time period is similar. Of the other studies in the literature assessing *Stickiness* and *Inflow*, Hastie's work assesses occupational therapists in a similar time frame, from 1998-2006, with comparable analysis (Hastie, 2009). The *Stickiness* and *Inflow* means for the overall profession indicate occupational therapy, like physiotherapy, was not as sticky a profession as chiropractic from 1998-2006 (92.5 versus 96.5), but their workforce attracted more new practitioners (12.7 versus 8.1). *Stickiness* and *Inflow* values for occupational therapists vary much more greatly than for chiropractors, which was most notable in a 12.9 point drop in *Inflow* from 1998 to 1999, followed by a steep climb of 15.2 in the following year. This was offset by a peak in overall *Stickiness* in 1999. Similar studies looking at respiratory therapists, and nurses in long-term care and community care access centres only provide means as comparators (Alameddine et al., 2006; Gamble et al., 2011). Mean *Stickiness* and *Inflow* values for these groups are more similar to those provided by Landry et al. for physiotherapists (Landry et al., 2012). The comparison of different professional groups suggests that the relative attractiveness of the chiropractic profession had more in common with occupational therapists than with physiotherapists, nurses and respiratory therapists.

5.1.3. Survival Analysis

The results from the Cox Proportional Hazards analysis shed insight on how certain subgroups of CCO registrants acted during the study period. The results revealed that practitioners with the highest probability of leaving the profession during the study period were those beginning and ending their careers. The *0-5 yrs* group was 1.33 times more likely to cease practice, or move elsewhere (HR 1.33, CI 1.03-1.71). The *> 30 yrs* group were 2.03 times more likely to cease practice in Ontario (HR 2.03, CI 1.48-2.77). It is not clear why practitioners in this group chose to leave practice at this rate, but given their proximity to retirement, potential explanations may differ compared to registrants listed under *0-5 yrs*. The descriptive data exhibited 169 instances from 1996-2007 where registrants switched to *Retired* status. The data suggested CCO registrants may not have switched the *Retired* status when retiring in the traditional sense – when they reached the age of 65, and decided to cease earning income from practicing for a living. Instead, the data reveal that of those making the switch for whom either date of birth or graduation date was available, 103 had not reached the age of 65, and one third of those were under the age of 40. The manner in which registrants retired may also have confounded the analysis, since in many cases, practitioners transitioned into *Retired* status, making use of *Inactive* status prior to a final switch to *Retired* status. Registrants making this sort of transition would have triggered inclusion into the group leaving practice before switching to *Retirement* status. In a few cases, practitioners in the *0-5 yrs* group also switched to *Retirement* status, thus eliminating them from analysis instead of recording a switch to *Inactive* status. With respect to the number of retirement ready registrants who switched to *Inactive* instead of *Retired* status, the higher Hazard Rate Ratios for this group only served to highlight the difficulty that the *0-5 yrs* group must have been experiencing as they attempted to start to practice in Ontario, giving an indication of how conditions may have been driving new registrants elsewhere.

For the results of the survival analysis for the LHINs, Table 4-5 reveals that areas highlighted by the descriptive data in Figure 4-4 as being most or least likely to experience growth also exhibited the highest Hazard Rate Ratios for switching to *Inactive*. For example, registrants practicing in the *Central* LHIN had one of the highest hazards of switching to *Inactive* (HR 1.36, CI 1.05-1.77), despite experiencing the most growth during the study period. In northern Ontario, growth was slowest in *North East* (HR 1.33, CI 0.93-1.92) and *North West* (HR 1.51, CI 0.93-2.45) LHINs. *Champlain* was

the other LHIN where the probability of switching to *Inactive* was high (HR 1.33, CI 0.98-1.81). Although it was not prominently featured in Figure 4-4, this LHIN is located on the border with Quebec, and ease of migration may have played a factor in the noted results. In contrast, registrants in *Central West* were least likely to switch to *Inactive* (HR 0.42, CI 0.23-0.79), followed by *Waterloo* (HR 0.42, CI 0.23-0.79) and *South West* (HR 0.42, CI 0.23-0.79). Interestingly, these LHINs all border one another. In the graph, these regions do not stand out particularly from others: population sizes were closer to the mean, as was their relative growth compared to other LHINs. Perhaps the lack of variability is responsible for the lower probabilities for switching to *Inactive* which were reported in this region during this period. Unfortunately, I did not have sufficient information to make larger inferences, such as whether there was a rural-urban divide in registrant status switches.

Strong differences in probability of switching to *Inactive* status were also noted in the survival analysis according to *Sex* for the years 1996-2007. When looking at a Kaplan-Meier survival plot comparing male and female registrants, certain years in particular stand out. Female practitioners were 1.6 times more likely to cease practice during the study period (HR 1.60, CI 1.39-1.85). The survival estimate curves in Figure 4-9 descend at roughly the same rate, with the exception of two pronounced differences: in the year 2000, the divide between the proportions of male and female practitioners switching to *Inactive* varied noticeably, and in 2006, registrants of both sexes apparently experienced a larger decline. However, for females, the decline was sustained for two years. These two points in time corresponded well with the outcomes from Figure 4-5 and Figure 4-6. This may signify that there was an increased vulnerability to changing practice status by female practitioners during the study period. Another potential driver for switches from *Active* to *Inactive* classes concerns family-planning. Family-planning may serve as a confounding factor for drawing conclusions regarding the effect of delisting on registrant retention. Adamo has looked at the causes for female attrition in the highly educated workforce in Canada, but she questions the theories that “long hours, a heavy workload, high stress levels and motherhood” are barriers to recruitment and retention (Adamo, 2013). Instead, she argues that while women in medicine feel pressure in choosing between their profession and their families, it is not enough to drive them out of their professions. Adamo’s study investigated females pursuing careers in academia and medicine, and drew on earlier work using data from the 2000 Census Public Use Microdata Sample (PUMS) in the US, comparing the fertility rates of female

medical doctors, professors and lawyers to the general population (Wolfinger et al., 2010). The conclusions reached by these studies do not speak directly to female chiropractors in Ontario, who may face other barriers particular to their practice model. Further work looking at female chiropractors in Ontario is necessary before a conclusion can be reached on whether family-planning was a confounder.

The results of the survival analysis for the variable *School of Graduation*, similar to the *Stickiness* and *Inflow* results, were comparable to *Sex*, with the exception of a sharper decline at the beginning of the time frame for the *Non-CMCC* group. Foreign graduate *Stickiness* outputs were weakest in 1997, with a larger drop in proportion to the total registrant sub-group. This corresponds to the Kaplan-Meier plot output for non-CMCC graduates in Figure 4-8. The significance of this is mitigated when considering that only 14 *Non-CMCC* registrants switched to *Inactive* status in 1997, well below the average of 25 switches per year for this group over the period studied. The number of *Non-CMCC* graduates practicing in the province more than quadrupled from 188 to 896 from 1996-2007, making the result from 1997 seem negligible in comparison to growth over the next few years, even though it came up as statistically significant in the analysis. As with *Sex*, the proportionally larger group, *CMCC*, switched to *Inactive* at a greater rate in 2006 compared to prior and subsequent years, and this effect is also seen in the *Non-CMCC* group.

The survival analysis sensitivity results did not vary greatly from the results discussed in this section, except in the case of *Central* LHIN. When comparing the results between the two analyses, the Hazard Rate Ratio for this area drops from 1.36 to 1.14, and the probability that registrants located in *Central* would switch statuses is no longer statistically significant (compare p=0.02 to p=0.30). This substantial change in probability demonstrates that the sensitivity analysis was merited. It gives rise to speculation that inner city practitioners make use of the CCO exception to switch statuses temporarily more than their colleagues elsewhere. The reason for such a difference is not evident within the data analyzed. It should be noted that despite temporary switching being more prevalent in this region, the descriptive results still show a proportionate contraction in representation of CCO registrants from 1996 to 2007. Given the lack of substantial changes elsewhere between the survival analysis and the sensitivity, I maintain that the sensitivity remain an appendix to this work, and that discussion concerning it be limited.

5.1.4. Time-Varying Analysis

The previous discussion on survival analysis focussed primarily on the effects on sub-groups of registrants over the entire period studied, but review of the time-varying analysis shows how the behaviour of registrants changed in the year 2006 in particular. At the outset, the survival analysis conducted elucidated that certain groups, such as new and seasoned practitioners, females, and non-CMCC graduates were at greater overall risk of switching to *Inactive* status during the years 1996-2007. The time-varying analysis, however, shows that in the year 2006 there was a profession-wide effect, which temporarily altered the probability that particular registrants would switch to *Inactive* in Ontario.

Figure 4-10 to Figure 4-13 show that in Ontario in the year 2006, the survival analysis outputs for many variable subgroups change drastically. Figure 4-10 shows that for *Years in Practice*, all groups experience an increase in the likelihood of switching to *Inactive*. This implies that the change experienced in that year, which coincided with delisting, unilaterally affected practitioners, however the group *21-25 yrs* was less affected by the change compared to the others. Conversely, the Hazard Rate Ratios decreased for *Non-CMCC* (HR 1.08, CI 0.78-1.48) and female (HR 1.22, CI 0.90-1.67) groups. Finally, the Hazard Rate Ratios increased for registrants in the *Central* (HR 2.37, CI 1.34-4.20) and *Central East* (HR 1.91, CI 1.02-3.58) LHINs, and to a lesser extent, in the *North East* (HR 1.70, CI 0.75-3.89). On the other hand, the Hazard Rate Ratios for other LHINs decreased, such as *Champlain* (HR 1.24, CI 0.58-2.65) and *North West* (HR 0.47, CI 0.06-3.55). The significance of the changes to *Local Health Integration Network* in the time-varying analysis is debatable, with each of the 14 regions experiencing changes in varying directions. However, where I set out to discover which groups were more prone by analyzing how the variables changed in 2006, I was surprised to discover that the significance between groups observed in all other years was in fact diminished. In a sense, all groups were affected, and not any one in particular.

5.2. Strengths

My study was well-equipped to explore the relative attractiveness of chiropractic in the province of Ontario around the time that a health policy decision was made directly concerning that profession, between the years 1996-2007. The data provided by the CCO captured all chiropractors practicing in good standing in this area, and available

parameters allowed for robust statistical analysis. Since all practicing chiropractors in Ontario are required to register with the CCO, the sample population employed in this study was used to accurately describe these health professionals. The administrative data provided by the CCO allowed for an ecological investigation pre- to post-delisting. Additionally, following the *Stickiness* and *Inflow* analysis, the data was sufficient to allow me to narrow analysis down to one particular year, and compare it to all other years.

5.3. Limitations

My study also had limitations. Most chiropractic practitioners work in private practices (Canadian Institute of Health Information, 2017a). In conducting this investigation, I was unable to track switches from independent practice to other sectors, such as academic employment, public service, or practice management. An inquiry was made to the CCO regarding whether this information is known, and it was determined that during the time studied, the registration form did not capture employment sector. The lack of information on sectors limits the degree to which I was able to compare *Stickiness* and *Inflow* to other research looking at health professionals (Berta et al., 2013; Gamble, 2002; Gamble et al., 2011; Landry et al., 2012; Miller, 2011).

Another concern that arose during this study relates to the quality of the data collected from the regulatory body: the CCO. During the request for data from the CCO, I learned that examples of the registration forms from 1996 to 2007 were not held in their records. This did not come as a surprise, since very little guidance comes from the province on how records of registration ought to be kept. In 1991, the Regulated Health Professions Act was passed, including 21 professions at the time - and since then, 5 more professions have been included under the Act ("Regulated Health Professions Act," 1991). The purpose of the Act was to provide a legislative framework for health regulatory colleges for each of these professions, who are charged with setting standards for practice, investigating complaints about members, and where necessary, disciplining them (Ministry of Health and Long-Term Care, 2009). Since regulatory status might be associated with legitimacy and good standing, as discussed in the case of homeopaths in Chapter 2, the costs involved in establishing these regulatory colleges have been shouldered by the professions with little complaint. With the onus of establishing regulatory bodies downloaded from provincial governments to the professions, the types of questions appearing on the registration forms may vary substantially from one college to another. Any line of research comparing regulatory

body data, even when comparing the same profession in different provinces, is hindered by lack of standardization during collection. With the establishment of the Health Professions Database through Health Force Ontario in 2008, it has been hoped that progress will be made towards standardization. However, much work still needs to be done to ensure that regulatory body registration forms collect similar data to permit comparisons between professions with more ease.

Ultimately, the methodology employed in this study is incapable of providing causal explanations for behaviours observed in the population studied. While I am confident that I can track changes that occurred in the health labour force in Ontario based on previous, normative behaviours, I cannot definitively conclude why those changes occurred. My results do distinguish that significant changes occurred, and further investigation into causal explanations for these changes is merited.

5.4. Areas in Need of Further Research

My thesis is a quantitative assessment of the retention of chiropractors in the province of Ontario, the intention of which was to monitor the relative attractiveness of their profession. While my analysis was able to detect significant changes in the relative attractiveness for certain years, further investigation into why these events occurred should be explored. For example, qualitative, structured interviews of stakeholders may provide insight on why changes in status occurred.

There are other potential factors, in addition to those related to health policy decisions that might explain the migration and work behaviours of chiropractors in Ontario. For example, the descriptive data in Section 4.2.4 elucidates that the number of CCO registrants who had graduated from foreign institutions grew substantially during the time frame studied, but it does not explain what made the province so attractive to people in this group. Further investigations looking what drew graduates of international chiropractic programs to Ontario from 1996-2007 might help clarify these factors. These additional investigations might highlight whether conditions elsewhere in North America precipitated greater migrations of chiropractors towards Ontario, or whether more Ontarians were training to be chiropractors elsewhere, and then returning home.

The methods used in this study may not be sufficient to conclusively determine that one set of circumstances was responsible to a greater degree for the behaviours exhibited by this particular health labour workforce. The results of this study may be

used to compare future analyses of chiropractors. The results of this study may also be compared to labour analyses for other health professions.

5.5. Implications

My research was undertaken to explore the delisting of health services in 2004, to better understand the outcomes of that decision in order to guide future health policy, especially in the province of Ontario. This study examined the relationship between health policy changes which targeted chiropractors, and the potential effect that these decisions had on CCO registrants switching from *Active* to *Inactive* classes. In 2004, professions were targeted in the name of primary health care reform (Smitherman, 2004). Chiropractors and physiotherapists are two professions whose services included coverage of care for MSK disorders. This disorder type is locally and internationally recognized as one of the most prominent and costly health concerns affecting populations of the world (Mustard et al., 2014; Prince et al., 2015). Furthermore, the prevalence of MSK disorders, including low back pain, increases with age, and the population of Ontario is aging (MacKay et al., 2010; Perruccio et al., 2006). However, in 2004, Ontario's government chose to decrease provincial insurance plan coverage of providers who specialize in care for MSK disorders. Following the decision to delist chiropractic services, my results show that a greater number of chiropractors switched from *Active* to *Inactive* classes. The profession-wide results from the *Stickiness* and *Inflow* analysis highlight that the years following both full and partial delisting decisions show distinct changes in those indicators, not found anywhere else in the time frame. Following 2004, there was greater attrition in the number of chiropractors serving Ontario at the same time that the government was attempting to increase the number of FHTs and other interdisciplinary health teams in the province. Romanow, in discussion of Recommendation 15 of his report, stated "If Canada is to move ahead on major reform to its health care system, the mix and skills of health care providers and how they work together must be addressed" (Commission on the Future of Health Care in Canada & Romanow, 2002). The government in Ontario appeared to address this recommendation with the establishment of FHTs and LHINs. Analysts have continued to assess the value that FHTs and the regionalization of health care into LHINs bring to the system, and how these initiatives can be improved to realize Romanow's vision (Commission on the Reform of Ontario's Public Services, 2012; Harris et al., 2015; Hutchison et al., 2011; Marchildon & Hutchison, 2016).

The outcomes of my research warn that health policy decisions targeting health professions may have unintended impacts on those professions, where the focus of these decisions ought to be on inclusivity instead. In the review of the literature conducted in Chapter 2, I applied the Ideas, Structure and Process theory developed by Doern and Phidd to recent health policy decisions in Ontario (Doern & Phidd, 1992). While this framework can be utilized to understand how health policy is practiced, I posited that feedback from the final, Process phase ought to inform the primary, Ideas phase in future decision-making. In this way, provincial governments in Ontario might use the framework of health policy in an iterative sense, where the outcomes of previous decisions guide future steps taken. Like the authors of the Drummond Report, I believe that the LHINs can play a key role in the administration of provincial healthcare (Commission on the Reform of Ontario's Public Services, 2012). One way which LHINs can exercise authority is through the oversight of the development of interdisciplinary teams, FHTs or otherwise. That oversight could include initiatives aimed at the recruitment and retention of health professionals who provide the best care within each of Ontario's health regions.

5.6. Conclusion

My study was the first to monitor the relative attractiveness and retention of the chiropractic profession between the years 1996-2007 using Alameddine et al's *Stickiness* and *Inflow* analysis (Alameddine et al., 2006). I used this analysis to determine whether a health policy decision made by the provincial government in 2004 to delist health services impacted the chiropractors whose services were targeted. A profession-wide effect was observed in the year 2006, coinciding with the timeline following the implementation of the policy decision to delist chiropractic services. Certain sub-groups of the profession studied were at greater risk during the entire study period. However, following delisting, chiropractors appear to have been affected in a specific, profession-wide way. The duration of this effect is unclear.

According to Minister Smitherman, the decision to delist health services in 2004 was necessary to pave the way for primary health care reform (Aggarwal, 2009; Smitherman, 2004). In particular, it was necessary to make cuts to health services in Ontario to make funds available to implement a new, Family Health Team model under the Ontario Action Plan for Health. The results of my study suggest that health policy changes have intended consequences, such as stabilizing spending or off-loading care,

but they also have unintended consequences. In this case, the unintended consequences may be linked to statistically significant decreases in the retention of existing chiropractors, as well as a disruption to the number of new practitioners attracted to the health workforce.

Appendix A Cox Proportional Hazards Analysis Using Sensitivity Results

This section lists and briefly discusses the results of the sensitivity analysis conducted as a result of the discussion in Section 3.3.5.4. The sensitivity analysis was employed because I learned that the CCO allows registrants to switch from *Active* to *Inactive*, and then back to *Active* again, for up to five years. At five years, registrants may be asked to re-sit licensing examinations. Considering that those registrants using this exception were posing a potential confounder to my analysis, I conducted a sensitivity analysis to determine whether there were substantive changes in the results.

Comparison between the original analysis and the sensitivity analysis reveals moderate differences. The most prominent difference between original and sensitivity data sets occurs in the results for the LHINs. The largest difference observed was in *Central* LHIN. The other areas where differences of moderate size were noted (HR change >0.1) were *North East* and *North West*, although it is possible that these changes were more drastic due to the smaller practitioner populations in these locales. In Chapter 4 and Chapter 5, I highlight the differences between this analysis and the survival analysis where they were more prominent.

Group	*Haz. Ratio*	*Std. Err.*	*z*	*P>z*	*[95% Conf.*	*Interval]*
< 5 yrs	1.34	0.18	2.09	0.04	1.02	1.75
6-10 yrs	0.88	0.14	-0.76	0.44	0.65	1.21
16-20 yrs	0.81	0.15	-1.15	0.25	0.56	1.16
21-25 yrs	0.66	0.14	-2.00	0.05	0.44	0.99
26-30 yrs	1.19	0.24	0.89	0.38	0.81	1.77
> 30 yrs	2.11	0.35	4.46	0.00	1.52	2.93

Table A-1: Sensitivity Analysis results for Years in Practice

Group	Haz. Ratio	Std. Err.	z	P>z	[95% Conf.	Interval]
Erie St. Clair	1.05	0.21	0.23	0.82	0.71	1.54
South West	0.63	0.13	-2.23	0.03	0.42	0.94
Waterloo Region	0.68	0.14	-1.83	0.07	0.45	1.03
Central West	0.45	0.15	-2.46	0.01	0.24	0.85
Mississauga Halton	0.94	0.16	-0.36	0.72	0.67	1.31
Toronto Central	1.05	0.16	0.36	0.72	0.79	1.41
Central	1.14	0.16	0.90	0.37	0.86	1.50
Central East	1.15	0.17	0.92	0.36	0.85	1.55
South East	0.61	0.18	-1.73	0.08	0.34	1.07
Champlain	1.25	0.21	1.36	0.17	0.91	1.73
North Simcoe Muskoka	0.93	0.20	-0.34	0.74	0.61	1.42
North East	1.15	0.23	0.68	0.49	0.77	1.70
North West	1.35	0.36	1.12	0.27	0.80	2.27

Table A-2: Sensitivity Analysis results for Local Health Integration Networks

Group	Haz. Ratio	Std. Err.	Z	P>z	[95% Conf.	Interval]
Non-CMCC	1.37	0.11	3.86	0.00	1.17	1.61

Table A-3: Sensitivity Analysis results for School of Graduation

Sex	Haz. Ratio	Std. Err.	Z	P>z	[95% Conf.	Interval]
female	1.60	0.13	6.03	0	1.38	1.87

Table A-4: Sensitivity Analysis results for Sex

Appendix B Time-Varying Coefficient Analysis Tables

Below are plots of the beta values, variance and covariance elements in order to compare the years 2006 and 1999 to all other years analyzed using Cox Proportional Hazards survival analysis. The first table may be used as a companion to the figures in Section 4.6.1.

Group	*beta1*	*s.e.1*	*beta2*	*s.e.2*	*covar*	*comb b*	*comb b var*	*comb s.e.*	*hrrAll*	*[95% CI]*		*hrr2006*	*[95% CI]*	
Erie St. Clair	0.18	0.20	-1.36	0.78	-0.04	-1.18	0.57	0.75	1.19	0.80	1.77	0.31	0.07	1.34
South West	-0.48	0.22	0.74	0.45	-0.05	0.26	0.15	0.39	0.62	0.40	0.95	1.30	0.61	2.77
Waterloo Region	-0.31	0.22	-0.40	0.60	-0.05	-0.71	0.32	0.56	0.73	0.48	1.13	0.49	0.16	1.48
Central West	-0.85	0.35	-0.06	0.83	-0.12	-0.90	0.57	0.75	0.43	0.21	0.86	0.40	0.09	1.77
Mississauga	0.00	0.18	-0.15	0.45	-0.03	-0.15	0.17	0.41	1.00	0.70	1.42	0.86	0.39	1.91
Toronto Central	0.05	0.16	0.29	0.36	-0.02	0.34	0.11	0.33	1.05	0.77	1.42	1.41	0.74	2.68
Central	0.13	0.15	0.73	0.33	-0.02	0.86	0.09	0.29	1.14	0.85	1.53	2.37	1.34	4.20
Central East	-0.01	0.17	0.66	0.36	-0.03	0.65	0.10	0.32	0.99	0.71	1.38	1.91	1.02	3.58
South East	-0.70	0.34	1.10	0.59	-0.11	0.39	0.23	0.48	0.49	0.26	0.96	1.48	0.58	3.82
Champlain	0.30	0.17	-0.09	0.42	-0.03	0.22	0.15	0.39	1.36	0.97	1.89	1.24	0.58	2.65
North Simcoe	-0.13	0.24	-0.02	0.57	-0.06	-0.16	0.27	0.52	0.87	0.55	1.40	0.86	0.31	2.36
North East	0.23	0.21	0.30	0.47	-0.04	0.53	0.18	0.42	1.26	0.84	1.89	1.70	0.75	3.89
North West	0.53	0.26	-1.29	1.06	-0.07	-0.76	1.07	1.03	1.70	1.03	2.82	0.47	0.06	3.55
< 5 yrs	0.45	0.15	0.46	0.46	-0.02	0.90	0.19	0.43	1.56	1.16	2.11	2.47	1.06	5.74
6-10 yrs	0.06	0.18	0.63	0.48	-0.03	0.69	0.20	0.45	1.06	0.75	1.50	1.99	0.83	4.76
16-20 yrs	0.08	0.19	0.78	0.51	-0.04	0.86	0.22	0.47	1.08	0.75	1.58	2.37	0.95	5.93
21-25 yrs	-0.18	0.21	0.40	0.58	-0.05	0.21	0.29	0.54	0.83	0.55	1.27	1.24	0.43	3.57
26-30 yrs	0.31	0.23	0.62	0.53	-0.05	0.93	0.23	0.48	1.36	0.87	2.12	2.53	0.98	6.52
> 30 yrs	0.83	0.19	0.61	0.50	-0.03	1.44	0.22	0.47	2.28	1.59	3.29	4.22	1.68	10.56
non-CMCC	0.35	0.09	-0.27	0.18	-0.01	0.07	0.03	0.16	1.41	1.19	1.68	1.08	0.78	1.48
Female	0.55	0.08	-0.35	0.18	-0.01	0.20	0.02	0.16	1.73	1.47	2.04	1.22	0.90	1.67

Table B-1: Companion table to Section 4.6.1. Displays results from time-varying analysis for the year 2006 compared to all other years.

Group	beta1	s.e.1	beta2	s.e.2	covar	comb b	comb b var	comb s.e.	hrrAll	[95% CI]		Hrr1999	[95% CI]	
Erie St. Clair	0.02	0.20	0.30	0.73	-0.04	0.31	0.50	0.71	1.02	0.69	1.50	1.37	0.34	5.46
South West	-0.32	0.20	0.12	0.73	-0.04	-0.20	0.50	0.71	0.73	0.49	1.07	0.82	0.20	3.26
Waterloo Region	-0.43	0.22	0.73	0.68	-0.05	0.29	0.42	0.65	0.65	0.42	0.99	1.34	0.38	4.76
Central West	-0.91	0.33	0.56	1.13	-0.11	-0.35	1.17	1.08	0.40	0.21	0.78	0.71	0.09	5.87
Mississauga	-0.02	0.17	-0.50	0.83	-0.03	-0.52	0.67	0.82	0.98	0.70	1.38	0.60	0.12	2.95
Toronto Central	0.14	0.14	-0.66	0.66	-0.02	-0.52	0.42	0.65	1.14	0.86	1.52	0.59	0.17	2.10
Central	0.30	0.14	0.20	0.53	-0.02	0.50	0.26	0.51	1.35	1.03	1.76	1.64	0.61	4.44
Central East	0.14	0.15	0.00	0.60	-0.02	0.14	0.33	0.58	1.15	0.85	1.55	1.15	0.37	3.57
South East	-0.48	0.29	0.69	0.87	-0.08	0.21	0.67	0.82	0.62	0.35	1.09	1.23	0.25	6.09
Champlain	0.28	0.16	0.08	0.63	-0.03	0.36	0.37	0.61	1.33	0.97	1.82	1.43	0.44	4.70
North Simcoe	-0.16	0.22	0.26	0.85	-0.05	0.10	0.67	0.82	0.85	0.55	1.32	1.10	0.22	5.45
North East	0.29	0.19	0.00	0.73	-0.04	0.28	0.50	0.71	1.33	0.91	1.94	1.33	0.33	5.31
North West	0.37	0.26	0.52	0.86	-0.07	0.89	0.67	0.82	1.45	0.87	2.41	2.43	0.49	12.03
< 5 yrs	0.53	0.15	0.55	0.44	-0.02	1.08	0.17	0.41	1.69	1.25	2.29	2.94	1.32	6.55
6-10 yrs	0.17	0.17	0.22	0.52	-0.03	0.39	0.24	0.49	1.19	0.85	1.66	1.48	0.57	3.84
16-20 yrs	0.28	0.18	-1.17	0.69	-0.03	-0.90	0.44	0.67	1.32	0.92	1.89	0.41	0.11	1.51
21-25 yrs	0.13	0.21	0.17	0.64	-0.04	0.31	0.36	0.60	1.14	0.76	1.73	1.36	0.42	4.42
26-30 yrs	0.45	0.21	-1.08	1.07	-0.04	-0.63	1.11	1.05	1.57	1.05	2.35	0.53	0.07	4.20
> 30 yrs	0.96	0.18	0.73	0.59	-0.03	1.69	0.31	0.56	2.61	1.83	3.73	5.40	1.81	16.11
non-CMCC	0.26	0.08	0.40	0.32	-0.01	0.66	0.10	0.31	1.30	1.11	1.52	1.94	1.05	3.56
Female	0.49	0.08	-0.26	0.32	-0.01	0.23	0.10	0.31	1.63	1.40	1.89	1.25	0.68	2.31

Table B-2: Time-varying analysis for the year 1999 compared to all other years.

Appendix C Consultation and Ethics Approval

This proposal makes secondary use of data collected for purposes other than research. It has been approved by UOIT's Research Ethics Board (file 13-126). With respect to the handling of the data, all appropriate precautions have been taken to ensure privacy and confidentiality of any personal, identifying information gathered by the investigator. Such measures included storing all physical data in a locked cabinet in a secured area, in the Office of Research Administration at the Canadian Memorial Chiropractic College, and employing encryption of electronic data on password protected files. Further, any information included in manuscripts will be presented in aggregate form, with particular care taken so as not to publish any features that would lead to the identification of any individual party about whom data has been collected. These measures include refraining from the analysis of areas containing groups of fewer than 5 practitioners, such that they would be individually identifiable. This study will make use of data collected by Ontario's chiropractic regulatory body, the College of Chiropractors of Ontario (CCO), for purposes of practitioners maintaining an active, practicing status within the province of Ontario. In 2014, the CCO agreed to share de-identified registrant data with the investigator.

UNIVERSITY OF ONTARIO INSTITUTE OF TECHNOLOGY

RESEARCH ETHICS BOARD
OFFICE OF RESEARCH SERVICES

Date: June 23, 2015
To: Mark Fillery
From: Bill Goodman, REB Chair
REB File #: 13-126
Project Title: A Longitudinal Analysis of the Ontario Chiropractic Profession Over the Last Two Decades

DECISION: APPROVED
CURRENT EXPIRY: June 1, 2016

NOTE: Notwithstanding this approval, you are required to obtain/submit, to UOIT's Research Ethics Board, any relevant approvals/permissions required, prior to commencement of this project.

The University of Ontario, Institute of Technology Research Ethics Board (REB) has reviewed and approved the above research proposal. This application has been reviewed to ensure compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2 (2014)) and the UOIT Research Ethics Policy and Procedures.

Please note that the (REB) requires that you adhere to the protocol as last reviewed and approved by the REB. Always quote your REB file number on all future correspondence.

CONTINUING REVIEW REQUIREMENTS:

- **Renewal Request Form**: All approved projects are subject to an **annual** renewal process. Projects must be renewed or closed by the expiry date indicated above ("Current Expiry"). **Projects that are not renewed within 30 days of the expiry date will be automatically suspended by the REB; and projects that are not renewed within 60 days of the expiry date will be automatically closed by the REB.** Once your file has been formally closed, a new submission will be required to open a new file.
- **Change Request Form**: any changes or modifications (i.e. adding a Co-PI or a change in methodology) must be approved by the REB through the completion of a change request form before implemented.
- **Adverse or unexpected Events Form**: events must be reported to the REB within 72 hours after the event occurred with an indication of how these events affect (in the view of the Principal Investigator) the safety of the participants and the continuation of the protocol. (I.e. un-anticipated or un-mitigated physical, social or psychological harm to a participant).
- **Research Project Completion Form**: must be completed when the research study has completed.

All Forms can be found at http://research.uoit.ca/faculty/policies-procedures-forms.php.

REB Chair Dr. Bill Goodman, FBIT bill.goodman@uoit.ca	Ethics and Compliance Officer compliance@uoit.ca

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October 3, 2014

Mark Fillery
63 Baltray Crescent
Toronto, ON
M3A 2H3

Dear Mr. Fillery,

This letter serves as confirmation that the College of Chiropractors of Ontario (CCO) will provide you information on the following variables collected from its registrants:

- Birth Date
- Gender
- Graduation Date
- School of Graduation
- Business Address
- Class
- Status

This information is being provided to you for the sole purpose of conducting research. We understand that the data is being used to conduct a longitudinal analysis of the Ontario chiropractic profession over the last two decades.

I trust this letter suffices for your needs.

Sincerely,

Joel Friedman, BSc, LL.B
Director, Policy and Research

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