### PREDICTORS OF CANCER PREVENTION AND EARLY DETECTION COUNSELLING BELIEFS IN NATUROPATH AND MEDICAL TRAINEES: A COMPARATIVE STUDY

by

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### Abstract

### Introduction

Research suggests that at least 50% of cancers could be prevented through lifestyle modifications including reductions in tobacco and alcohol, increases in physical activity, weight control, diet improvements, safer sex practices and sun protection (Colditz, Sellers, & Trapido, 2006). The early detection of cancer increases the chance of successful treatment of the disease. Health care providers in both the complementary and alternative medical and biomedical health systems can encourage patients to lead cancer free lifestyles. Health care students develop cancer-counselling beliefs during their training that may influence their future counselling practices. The main purpose of this study is to explore possible differences between naturopath and medical students' counselling selfefficacy in terms of cancer prevention and early detection.

#### Methods

A cross-sectional research design was employed for this study. Online surveys were administered to assess medical (n=121) and naturopath (n= 121) students' cancer prevention and early detection beliefs. Univariate and multivariate logistic regression analyses were performed for each independent variable and the outcome variable. Odds ratios were calculated and their 95% confidence intervals were reported.

### Results

Significantly more naturopath (87%) than medical (45%) students believed that over 50% of cancers could be prevented. Naturopath students (89%) also expected to spend more time (>30 minutes) with their patients than medical students (3%).

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Naturopath students rated counselling on most cancer prevention and screening practices as more important, and they were more confident in their ability to counsel. Regardless of educational program, if students perceived cancer screening and prevention practices to be more important, they reported higher self-efficacy for counselling. No significant differences between students' counselling self-efficacy was observed when controlling for educational program and potential confounders.

#### Discussion

With cancer remaining the number one killer of Canadian adults, our future health care professionals must develop positive, evidence-based cancer prevention and early detection beliefs. Many similarities and differences were observed between medical and naturopath students and further investigations should examine the extent to which students' beliefs predict counselling behaviours. There is a need for increased collaborative, educational research to encourage positive cancer prevention and screening beliefs in medical and naturopath students.

## Preface

All research described in this study was conducted by Laura Dale under the approval of the University of British Columbia Behavioural Research Ethics Board (certificate H13-00829). This study was also granted approval by the University of British Columbia's Faculty of Medicine Research Access Committee.

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## List of abbreviations

- BINM- Boucher Institute of Naturopathic Medicine
- BSE- Breast self exam
- CAM- Complementary and alternative medicine
- CBE- Clinical breast exam
- DRE The digital rectal exam
- FOBT Fecal occult blood test
- Pap- Papanicolaou test
- PSA Prostate specific antigen test
- UBC- University of British Columbia

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# Dedication

To Anne Dale,

When it's over, so they say,

It'll rain a sunny day.

### **Chapter 1: Introduction**

### **1.1** Importance of prevention and impact on cancer

In 2007, cancer surpassed cardiovascular disease as the leading cause of death in Canada. Every day approximately 500 Canadians will be diagnosed with cancer and two out of every five Canadians will develop cancer during their lifetime (Canadian Cancer Statistics, 2013). The Canadian health care system is bearing the financial burden associated with cancer treatments. In 2004, cancer cost Canadians 17.1 billion dollars; this cost was associated with hospital visits, physician fees, chemotherapeutic drugs, long-term disability institutions, home care, and productivity losses attributed to premature death and disability (Mirolla, 2004). One can assume that in 2013, the cost associated with cancer will be drastically higher as more people are being diagnosed with the disease.

Cancer prevention and early detection methods provide an opportunity to reduce this cost and save thousands of lives. Research suggests that at least 50% of cancers could be prevented through lifestyle modifications including reductions in tobacco and alcohol use, increases in physical activity, weight control, diet improvements, utilization of safer sexual practices and controlling sun exposure (Colditz, Sellers, & Trapido, 2006). These "modifiable risk factors" are popular targets for health researchers worldwide as they are easier to influence than genetic predispositions.

Unfortunately, many Canadians do not understand the importance of lifestyle and the role it plays in cancer development. For example, in a national study, only approximately 30% of Canadians thought alcohol consumption, physical activity and obesity were linked to an increased risk of cancer (Canadian Partnership Against Cancer, 2010). Moreover, cancer is frequently presented by the media as being a threatening,

unavoidable disease that is rarely curable (Clarke & Everest, 2006) which may also contribute to Canadians' poor understanding of cancer preventability. How can intervention programs intending to increase cancer prevention health behaviours possibly be effective, if the average Canadian does not fully understand the role of modifiable risk factors? Increasing Canadians' understanding of how modifiable behaviours and early detection practices relate to cancer may provide a powerful incentive to adopt such behaviours.

#### **1.2** Impact of health care on cancer control

A variety of methods can increase Canadians' understanding of modifiable risk factors for cancer control including the use of public health campaigns, social media or increased communication with health care providers. Increased communication with health care providers provides an opportunity to impact cancer control. This is especially important as health advice provided by health care providers has been suggested to 'prime' patients, especially women, to act on subsequent educational information (Kreuter, Chheda, & Bull, 2000) and advice provided during a consultation.

Health providers in Canada are a diverse group of professionals who aim to better the health of their patients. These providers tend to self-categorize into two main health systems. Arguably, the most common health system in North America is the biomedical system<sup>1</sup>; this system comprises a range of providers including nurses and physicians. The

<sup>1</sup> The term 'biomedical' was chosen to describe the health systems in which the students operate. Other common terminology includes 'traditional', 'western', and 'allopathic' medicine. Although all of these terms are commonly used in the literature, we chose the term 'biomedical' as we believe it is the least pejorative descriptor as it has no reference to age of practice, culture or geography. For simplicity, students in the biomedical system are referred to as medical students (not biomedical students).

second health system is Complementary and Alternative Medicine (CAM). This system comprises five main domains of care including: whole medical systems, mind-body medicine, biologically based practices, manipulative and body-based practices and energy medicine (National Center for Complementary and Alternative Medicine, 2013). Naturopathic physicians' practices often include a variety of CAM therapies including acupuncture, homeopathy, massage, hydrotherapy and clinical nutrition; thus, they are considered to be 'whole medical system' practitioners.

A detailed explanation of both naturopath and medical health professionals follows. We also discuss literature related to counselling for cancer prevention and early detection to provide examples of ways in which these professionals may be able to influence Canadians' cancer prevention and early detection practices.

### 1.2.1 Medical physicians and cancer prevention

Most (American) adults report that medical physicians are their most trusted and influential source of health information (Krewski et al., 2006). When health care providers offer advice to patients, it is often well received and followed, to a greater degree than for information provided by family or friends; these findings have been reported for alcohol, exercise, and some smoking counselling (M. Fleming, Lawton, Johnson, & London, 2012)(Bull & Jamrozik, 1998)(Pederson, 1982). Lack of preventive counselling during routine consultations represents a missed opportunity for health promotion.

In addition to a patient's willingness to prioritize physicians' cancer prevention advice, this health advice is heeded for prolonged periods of time. It has been shown that brief physician health counselling is associated with a variety of long-term cancer prevention and early detection behaviours. Patients' long-term skin cancer prevention practices, including regular and appropriate sunscreen application and hat use increases when health care providers briefly counsel them on such practices (Bandi, Cokkinides, Weinstock, & Ward, 2010). As skin cancer is the most prevalent cancer in Canada (Canadian skin cancer foundation, 2013), lifetime adherence to these prevention practices could substantially reduce the Global incidence of skin cancer.

Brief counselling by physicians has also been associated with more challenging addictive behaviour change, including long-term reductions in alcohol and smoking. Metaanalyses have found that brief physician-led alcohol counselling sessions can lead to substance reductions lasting for beyond a year and perhaps up to 48 months (Bertholet, Daeppen, Wietlisbach, Fleming, & Burnand, 2005). Similarly, extensive research on physician-led smoking cessation counselling has been conducted for more than 40 years. A recent Cochrane Review (2008) summarized the results of smoking cessation advice provided by a physician in 41 studies conducted between 1972 and 2007. The authors found that there is potential benefit from brief and simple advice provided by physicians to their patients (Stead, Bergson, & Lancaster, 2008). Patients who also receive prescriptions for nicotine replacement therapy and/or follow-up care from physicians in addition to brief counselling are more likely to quit or reduce smoking (Stead, Bergson, & Lancaster, 2008).

Resulting from the extensive smoking cessation literature, many tools have been developed to ensure physicians have access to evidence-based smoking cessation counselling information in a form that is compatible with clinical practice. The Canadian Action Network for the Advancement, Dissemination, and Adoption of Practice-informed

Tobacco Treatment (CAN- ADAPTT) has developed a practice-informed Clinical Practice Guideline (CPG) for smoking cessation in Canada. These guidelines advise health providers to counsel on the 5 A's (ask, advise, assess, assist and arrange) and use other evidencebased smoking cessation counselling resources. These well-researched and established guidelines for smoking cessation counselling simplify this process for physicians; thus, physicians may be more inclined to counsel patients using these pre-established counselling criteria.

Unfortunately, many other risky health behaviours do not have such wellestablished CPGs, as does smoking cessation. This may contribute to the limited counselling physicians perform regarding these health risk factors (Cabana, 1999) and represents a missed counselling opportunity. For instance, physicians should ideally inquire and counsel all patients on the health benefits of regular physical activity, yet this rarely occurs in practice. A study examining the relationship between a patient's BMI and physician's physical activity counselling found that patients with a low BMI were less likely to receive physical activity counselling from their physicians (Kreuter, Scharff, Brennan, & Lukwago, 1997). This is an interesting finding, as a person's BMI is not truly indicative of physical activity; thus, a thin "couch potato" will be less likely to receive physical activity counselling even though sedentary time has been linked with numerous poor health outcomes (Schofield & Quigley, 2009). Similar problems arise for dietary counselling. Persons who present with an average BMI often miss out on therapeutic nutritional counselling by health professionals (Kreuter et al., 1997).

In an ideal situation, medical professionals would counsel and provide all preventive services as recommended by preventive service guidelines. Realistically, if a

physician were to counsel patients on all preventive services (including a variety of noncancer related recommendations), an estimated 7.4 working hours per day would be needed to achieve this goal (Yarnall, Pollak, Østbye, Krause, & Michener, 2003). Medical physicians must realistically choose how much and what type of preventive health counselling is completed during a routine visit, as most patients' primary concerns, as perceived by a physician, and perhaps by the patients themselves, are acute medical conditions (Chernof et al., 1999).

### 1.2.2 Medical physicians and early detection of cancer

In addition to general cancer prevention counselling, early detection of cancer through screening plays an important role in reducing cancer mortality. Observable reductions in mortality are assumed to result when more effective cancer treatments are available, and more effective treatments are available for cancers that are detected earlier. It is highly recommended that medical physicians follow evidence-based guidelines outlined by the Canadian Task Force on Preventive Health Care (CTFPHC) for cancer screening because some screening practices are controversial. Low quality and expensive tests are frequently debated, as many of the cancers they detect do not respond well to treatment or have slow progression rates posing no problems for the patient (e.g., prostate cancer).

In 2012, the CTFPHC updated its guidelines for mammography use for the detection of breast cancer. These guidelines apply only to women at average risk of breast cancer and do not apply to women at higher risk. According to the guidelines, mammography should be used for the detection of breast cancer every 2-3 years for women aged 50-74,

whereas it is not routinely recommended for women aged 40-49 (CTFPHC, 2013). The past guidelines recommended more frequent screening (approximately every 1-2 years), and screening starting at age 40. However, the recent guidelines were revised in light of evidence that a mortality benefit was not observed through the earlier and more frequent mammograms. However, as health care is a provincial responsibility, the British Columbian guidelines apply. In British Columbia, women ages 50-79 are suggested to have regular screening mammograms at least once every 24 months (British Columbia Cancer Association, 2013).

Previous research examining mammography rates in women receiving regular care from family physicians has shown that they were more likely to participate in screening mammography within the current recommended time frames. Future research will show if this trend is maintained for the new guidelines as well. Other breast cancer screening services, including the use of magnetic resonance imaging (MRI), clinical breast exams (CBE) or breast self-exams (BSE), are not routinely recommended screening practices. Currently, there is no clinical evidence to suggest the use of MRI for screening purposes, and only low quality evidence for the use of CBEs to screen for breast cancer (CTFPHC, 2013). Finally, the Canadian Task Force also recommends against women performing routine BSE, as women frequently detect small non-cancerous changes in the breast tissue, and no mortality reduction benefit has been demonstrated in studies of BSE to date.

With respect to cervical cancer, the Canadian Task force is currently updating its national screening guidelines and currently provincial guidelines are the standard of care. The most common screening test is the Papanicolaou (Pap) test that can detect the development of abnormal (pre-cancerous) cells. A considerable number of Canadian

women do not get screened for cervical cancer on a regular basis despite the effectiveness of the Pap test (Worthington, McLeish, & Fuller-Thomson, 2012). Regular screening guidelines for British Columbia include Pap tests once a year for the first three years since sexual debut or turning 21 years old. If these results are normal, then screening can ensue every two years (BCCA, 2013a). A large Canadian study found that physicians play an important role in adherence to cervical cancer screening guidelines (Worthington et al., 2012). This study specifically found that women who lost access to their regular physician significantly reduced their adherence to provincial Pap guidelines (Worthington et al., 2012).

Physical examinations by a health care provider, or personal self-exams can detect abnormal skin lesions at a highly treatable phase (Epstein, Lange, Gruber, Mofid, & Koch, 1999). Yet, skin cancer is much easier to prevent (at the population level) than it is to screen for, as physicians would have to examine every patient's body for small skin abnormalities. This would require a substantial amount of time and training that may explain why many physicians do not perform high rates of skin examinations (Geller et al., 2002).

Prostate cancer is rare in younger men, but it is the most common cancer among men in Canada. In British Columbia, there is no screening program for prostate cancer (BCCA, 2013b). The standard way to detect prostate cancer is through a digital rectal exam (DRE) by physicians during a routine physical. If a physician suspects an abnormal prostate growth, a prostate specific antigen (PSA) test, and an ultrasound-guided biopsy can be performed. Yet it should be noted that the PSA test is not endorsed by any major guideline and should not be considered to be a screening tool. Many barriers prevent men from

receiving prostate cancer screening using the DRE including perceptions of low risk, lack of urinary symptoms, fear of cancer or embarrassment (Ferrante, Shaw, & Scott, 2011). Some men experiencing these barriers were more willing get screened if some of these structural barriers were removed including direct recommendations from their family physician(Ferrante et al., 2011).

Finally, colorectal cancer is the second leading cause of cancer death in both men and women (CCAC, 2013). Since 2000, death rates from colorectal cancer have been in decline. Early diagnostic procedures are extremely effective and can usually lead to treatment that will result in complete cures of cancer. The Canadian Task Force suggests that there is good evidence to support fecal occult blood testing (FOBT), and fairly good evidence to suggest sigmoidoscopy in health exams in men and women 50 years and older. There is insufficient evidence to include or exclude a colonoscopy as an initial screening test in a health exam (CTFPHC, 2013). Interestingly, there is some controversy between the British Columbia cancer screening guidelines with guidelines suggesting FOBT followed up by colonoscopy if any positive results from FOBT are found (BC Guidelines, 2013). Colorectal cancer screening rates in Canadians are inadequate; less than 20% of eligible Canadians reported having received colorectal cancer screening within the recommended time frame (Zarychanski, Chen, Bernstein, & Paul, 2007). Fortunately, people with increased contact with a family physician were more likely to report being screened for colorectal cancer (Zarychanski et al., 2007).

#### 1.2.3 Naturopathy and cancer prevention

According to the Canadian Association of Naturopathic Physicians, naturopathy blends modern scientific knowledge with traditional and natural medicine, while attempting to stimulate the healing power of the body to treat the underlying cause of disease (CNPBC, 2012). There are six defining principles of naturopathic medicine: first, do no harm, recognition of the healing power of nature, identification and treatment of the cause of disease, understanding that a doctor is a teacher, the treatment of the whole person and a focus on prevention. Naturopathic medicine was founded in Europe in the 1800's and brought to North America by Benedict Lust and naturopathy remains popular to this day. In Canada, a 2011 survey of Ontario residents estimated that over 2 million people were seeing a naturopathic doctor (Innovative Research Group, 2011). Moreover, the survey found that over half of all Ontarians agreed that naturopath medicine is leading to better outcomes for those who use it, and 72% of respondents agreed that were familiar with naturopathic medicine had a positive perspective of the practice (Innovative Research Group, 2011).

The majority of existing literature describes effects of therapies including herbal medications, acupuncture and massage on health conditions. Limited information (especially peer-reviewed literature) has been published on the cancer preventive practices of CAM providers. Regardless of this limitation, it has been implied that naturopaths routinely provide high rates of general wellness and health promotion information during consultations (Boon et al., 2004; Smith et al., 2005).

The existing literature on general chronic disease preventive counselling by naturopathic physicians provides a possible scenario for what may occur with regards to

cancer prevention. For example, health changes required for diabetes management are similarly used to prevent cancer. Nutritional changes, including low calorie diets with ample fruits and vegetables, are often discussed with patients suffering from type II diabetes. Research suggests that a naturopathic dietary approach to diabetes may improve self-management and glycemic control, and have influences in other domains of self-care behaviours (Oberg, Bradley, Allen, & McCrory, 2011). Furthermore, in the only known study to investigate exercise-counselling practices among naturopathic physicians, an exercise prescription was offered to 94% of diabetic patients, and 38% of office visits with diabetic patients included instruction or follow up on physical activity (Bradley & Oberg, 2006).

#### 1.2.4 Naturopathy and early detection of cancer

As naturopaths are accredited primary care physicians, they are able to perform cancer-screening procedures including the FOBT, CBE, Pap test, DRE and the PSA (Boucher Institute of Naturopathic Medicine, 2013). Naturopaths can refer and counsel patients on mammography but cannot perform the screening procedure directly (nor can family physicians). A major gap exists in literature pertaining to the cancer screening services provided by naturopaths and how this counselling influences patients. Most literature published in this area has not been peer-reviewed and is located in non-academic formats, including blogs and personal webpages. The absence of peer-reviewed literature does not imply that naturopaths do not counsel on cancer screening practices; rather, the literature that does exist suggests that cancer screening is an important part of the integrative aspect

of naturopathy (BCNA, 2013) although specific practices and their impact on patients have not been detailed.

Many naturopathic clinics in British Columbia offer cancer-screening procedures not commonly used in biomedical practice. For instance, thermography is a tool used by some practitioners to detect breast tumours. This procedure was first developed in 1956 as a non-invasive procedure for breast screening. Without breast compression or exposure to radiation, thermography uses infrared temperature measurement of the outside layer of the breast to 'detect' cancer growth. This procedure is extremely controversial and Health Canada has issued a statement reminding Canadians that use of thermography machines for breast cancer screening is not approved in Canada because of a lack of evidence supporting its effectiveness (Health Canada, 2012a).

### 1.3 Integration of health care modalities

Canadians are increasingly pursuing more integrative forms of health care. In 2010, more than 80% of Canadians had access to consultations with general practitioners and a large portion were also receiving health care from CAM practitioners (Health Canada, 2010). Interestingly, these CAM users appear to use CAM to supplement, not substitute for, conventional medicine (Gray, Tan, Pronk, & O'Connor, 2002). This association also appears to hold true for some cancer preventive services, including breast screening. Dale and Gotay's review of the literature found that women who participate in biomedical cancer screening (defined in the literature as BSE, CBE or mammography) service may also seek out CAM therapies (Dale & Gotay, 2012).

For Canadians to receive optimal integrative health, CAM and medical providers need to collaborate to ensure patient safety. Before collaborative research and practice can take place, comparative research is needed to provide the groundwork to inform collaboration. In the case of cancer prevention, CAM and biomedical health systems almost certainly emphasize different modifiable risk factors. If health providers go so far as providing contradictory advice – such as a naturopath advising a patient to decrease dairy consumption for gastrointestinal issues and a family physician advising increased dairy consumption for colorectal cancer risk reduction - this contradictory advice can negatively impact a person's understanding of health risk, and create distrust toward all health care providers. For instance, women who received contradictory advice about the safety of eating fish while pregnant expressed confusion and anger towards the source of this contradictory information (Vardeman & Aldoory, 2008). Many of these women reported only paying attention to the information that aligned with their previous beliefs on fish consumption during pregnancy (Vardeman & Aldoory, 2008). These findings suggest that if CAM and medical providers are providing contradictory health advice, people may be less likely to adopt health-promoting behaviours.

Novak et al., (2001) authored one of the only comparative analyses of naturopathic practitioners' and oncologists' views of cancer prevention and early detection. This qualitative study interviewed 10 oncologists and 11 naturopaths regarding their beliefs about the role of diet in breast cancer prevention and treatment. When oncologists were asked to discuss the role of diet in cancer prevention, they reported that diets high in fruits, vegetables and fibre are simply better for women's health but would not decrease a woman's risk of developing cancer. In contrast, naturopaths emphasized the importance of

dietary composition in the prevention and control of breast cancer. For example, naturopaths believed that exposure to dietary toxins, certain dietary fats, processed, coloured, refined foods, etc., all contributed to an increased breast cancer risk. The findings from this study show that there are significant differences in beliefs about cancer prevention between naturopaths and oncologists.

Since the Novak comparative study was completed more than a decade ago (in 2001), it is important that collect more recent information to determine if there are any major changes in systems of beliefs, particularly in health care students, that have occurred in the past decade. My research will explore potential differences in cancer prevention and early detection beliefs reported by naturopath and medical students and examine how these differences affect students' counselling self-efficacy for cancer prevention and early detection measures.

### 1.4 Training programs

### 1.4.1 Medicine

When Canadians need health care, they most often turn to primary health care providers (Health Canada, 2012b). Prospective physicians generally enter medical school after completing an undergraduate degree from a post secondary institution. On average, medical degree programs are four years long. The first and second years are typically course-based, covering many science-relevant topics including anatomy, pharmacy, microbiology, and genetics. In third year, most schools introduce students to clinical rotations, which include patient-physician interactions that continue into fourth year.

Post-graduation, students enter residency programs (varying in length) accredited through the Royal College of Physicians and Surgeons of Canada. The Royal College also

verifies that a physician has met all requirements for certification in his/her area of speciality through written examination. Provinces are responsible for the regulation of their health professionals and in British Columbia, the College of Physicians and Surgeons is the regulatory body. Finally, the British Columbia Medical Service Plan (MSP) provides British Columbian residents with medical coverage including medically required services provided by a physician.

### 1.4.1.1 University of British Columbia (UBC)

Each year UBC's medical school enrols 288 new students. These students are distributed across four main campuses located across the province (Victoria, Kelowna, Prince George and the Greater Vancouver area). The Greater Vancouver campus enrols the vast majority of new students, in relation to the other campuses, and annual enrolment is approximately 192 new students. Over all of the four years, 800 students are based in Vancouver. First and second year students partake in course-based learning, while third and fourth year students are in clinical rotations. These rotations can be in hospitals, community clinics or doctors' offices across British Columbia.

UBC medical students learn about cancer and cancer prevention in a variety of courses throughout their degree program. Doctor Patient and Society (DPAS) is a longitudinal course (course runs continuously throughout the first two years of study) that offers an interdisciplinary approach to current health care issues. Study areas include topics such as the social determinants of health, evidence based medicine and prevention. This course briefly examines cancer control in the preventive module while also touching on some CAM issues. As medical students are required to process and retain large

quantities of information it can be assumed that only a limited amount of time is spent on CAM.

Students also experience some cancer education in their second year during their Foundations of Medicine block course. This block course consists of seven main courses that are taken from September to April that focus on specific human body systems (e.g., the blood and lymphatic system). These courses briefly discuss relevant cancer and cancer prevention activities when appropriate.

Currently, the UBC medical school is engaged in a curriculum renewal that started in 2008. According to UBC, this renewal aims to produce graduates who can meet the needs of future patients in the changing health environment. It is unknown if these curriculum renewals will include a stronger focus on cancer prevention, as detailed course outlines are not available to the general public. Yet it would seem appropriate, given that cancer is the number one cause of death in Canada. However, it has been published that increased flexibility will be built into the medical school curriculum to allow students self-directed learning opportunities in areas that interest them personally. This may ultimately result in increased prevention research through partnerships with the School of Population and Public Health.

#### 1.4.2 Naturopathy

To obtain a naturopathic medical degree, a student must complete a four-year (fulltime) degree at an accredited naturopathic university that includes curriculum on botanical medicine, homeopathic medicine, nutrition, physical medicine, psychology and counselling and traditional Asian medicine. Prior to enrolment, students must complete a

three to four year undergraduate degree where they complete certain pre-requisite courses. In Canada there are two accredited naturopathic schools: Canadian College of Naturopathic Medicine in Toronto, Ontario and Boucher Institute of Naturopathic Medicine (BINM) in New Westminster, British Columbia.

Graduates from an accredited college of naturopathy are required to pass the Naturopathic Physician Licensing Exams and pass provincial jurisprudence and oral examinations. In British Columbia, naturopathic physicians are regulated by the College of Naturopathic Physicians of British Columbia, which ensures safe and ethical standards of the profession's practice and acts to ensure the highest quality of care (CNPBC, 2012). British Columbia's medical service plan (MSP) does not customarily cover naturopath services, but naturopaths can prescribe pharmaceutical medicines to their patients. Furthermore, naturopaths in British Columbia can perform minor surgeries and treat most health-care concerns, including many cancer-screening procedures including the FOBT, CBE, Pap test, DRE and the PSA.

#### **1.4.2.1** The Boucher Institute of Naturopathy

BINM has been operating for 11 years and has been accredited for four. It is similar to UBC in terms of educational training and clinical experience, as both degrees are fouryear postgraduate programs. Every year, 36 new students (on average) are enrolled in the program. This equates to approximately 140 naturopath students in all four years of study. Pre-requisite courses for enrolment include one full year of Biology, English or Humanities and one half year of General Chemistry, Organic Chemistry and Biochemistry.

Over the four years, students partake in both classroom style learning, and also clinical practice. Five categories of courses constitute the academic curriculum at BINM including biomedical sciences, professional development, naturopathic therapeutic modalities, clinical science and clinical practice and integration. There are no electives at BINM.

A course on oncology and cancer prevention is offered at BINM in term nine (third year) in the biomedical science category, providing an in-depth study of the biology of cancer (Boucher Institute of Naturopathic Medicine, 2012). This course surveys the clinical investigation, staging, grading, epidemiology and growth of specific cancers. The application of naturopathic medicine to cancer prevention, therapy, complications and emergencies is also discussed in this course. General cancer and cancer prevention may also be taught briefly in other courses.

### 1.5 The research problem

Medical physicians infrequently discuss modifiable risk factors for cancer prevention (Katz, Lambert-Lanning, Miller, Kaminsky, & Enns, 2012) despite the eighth paragraph of the modern Hippocratic Oath reading: "I will prevent disease whenever I can, for prevention is preferable to cure". What is contributing to this deficiency in cancer prevention communication and is this deficiency also apparent for counselling on procedures for the early detection of cancer?

The lack of cancer prevention counselling by medical physicians becomes particularly apparent when examining rates of chronic disease prevention counselling by holistic health providers; high rates of prevention counselling is consistently reported by holistic health

providers in areas such as diet and breast cancer prevention (Novak & Chapman, 2001). Yet, little is known about how naturopathic physicians counsel on cancer prevention and early detection practices. Do they counsel on cancer prevention in the same way they do for chronic disease prevention; or do they distinguish between cancer and chronic disease more generally? What are their views on cancer early detection procedures? Are they counselling on evidence-based practices? What types of cancer prevention or early detection beliefs are created or fostered during training?

This research project aims to address some of these questions by examining the beliefs of medical students at the University of British Columbia (UBC) and students at the Boucher Institute of Naturopathy (BINM). The Lewis model suggests that counselling behaviour is directly influenced by a health professionals belief concerning the health practice (Lewis, Wells, & Ware, 1986). Additionally, as there are many institutional barriers confounding the relationship between physicians' beliefs and counselling intentions (such as limited time and monetary remuneration (Frank, Segura, Shen, & Oberg, 2010;) assessment of trainees' beliefs will allow for a greater understanding of the psychology of cancer prevention and early detection that can be influenced through educational intervention.

There is a compelling need to compare and cancer prevention and early detection beliefs in medical and naturopath students, as improvements in cancer prevention and early detection communication are urgently needed. Fortunately, there is no better time for comparative health research, as Canadians are increasingly seeking out holistic health care, to a greater degree than ever before (Andrews & Boon, 2005).

### 1.6 The purpose of the study

The main purpose of this study is to explore possible differences between naturopath and medical students in terms of cancer prevention and early detection counselling beliefs. Specifically, the perceived importance of cancer prevention and screening procedures will be assessed. Sociodemographic and potential key correlates will be examined to determine their influence on students' cancer prevention and early detection counselling self-efficacy.

### 1.7 The research questions

- 1. To what extent do medical and naturopath students differ regarding:
  - a. Perceived importance of cancer risk factors and early detection practices
  - b. Cancer beliefs, CAM beliefs, and prevention beliefs
  - c. Counselling self-efficacy for cancer prevention and early detection practices.
- 2. What are the sociodemographic and potential key correlates of 1a, 1b and 1c?
- 3. What is the relationship between students' beliefs (towards cancer, CAM and prevention beliefs) and perceived importance (of cancer risk factors and early detection practices) with counselling self-efficacy for cancer prevention and early detection practices?
  - a. How do these relationships differ for medical and naturopath students?
### **Chapter 2: Literature review**

This literature review begins with an overview of common cognitive beliefs associated with health care providers' cancer prevention and early detection counselling, with a specific focus on beliefs regarding: cancer, prevention and CAM. The perceived importance of certain cancer prevention and early detection practices of practicing health providers and trainees is briefly discussed. The final section of the review examines some of the known sociodemographic and potential key correlates associated with cancer prevention and screening by health care providers.

### 2.1 Social theories and health care providers

Many prominent theories in health psychology focus on understanding, predicting, influencing or changing health behaviours (Poole, Matheson, & Cox, 2011). A common theme exists in which attitudes and beliefs influencing behaviour. This thesis measures medical and naturopath students' beliefs concerning a wide variety of aspects relevant to cancer prevention and early detection. The sections to follow in the literature review will describe why these belief measures are an important stepping-stone towards increased use of social theories in comparative health research.

### 2.1.1 Defining beliefs and attitudes:

According to the Stanford Enclyopedia of Philosophy, a belief is a general term used to describe something we perceive to be true. This 'truth' could refer to a concept, person or object and can change over time. Forming beliefs have been suggested to be one of the most basic and important features of the human mind (Schwitzgebel, 2011). For example, a medical student may hold the following beliefs at any given time: exercise is able to increase heart rate, exercise decreases body weight, and exercise can prevent cancer.

Attitudes are described by Eagly and Chaiken (1993) as being "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (as cited in Eagly & Chaiken, 2007). This abstract definition is flexible and forgiving for attitudinal researchers that were once restricted by older definitions. In other words, attitudes can be the summation of individual beliefs towards a 'particular entity'. In the previous example regarding exercise beliefs, this same medical student may have positive attitudes towards exercise because he or she believes it can increase heart rate, decrease body weight and prevent cancer.

### 2.1.2 Model

Lewis' model was extremely relevant to the design and development of this thesis. This comprehensive model predicts counselling practices in physicians. This model was developed because of concerns regarding ways to increase the volume and effectiveness of physicians' prevention counselling (Lewis et al., 1986). The model shown in Figure 1 depicts how a physician's personal beliefs and attitudes concerning disease prevention, personal health habits, clinical knowledge and barriers including financing systems policies contribute to counselling attitudes and counselling behaviours.

Lewis also indicates that the health providers' 'perceived skill' relating to counselling falls on the causal pathway between beliefs and counselling behaviour. 'Perceived (counselling) skill' could be referred to as counselling self-efficacy. Self-efficacy is traditionally defined as a measure of the belief in one's own ability to perform a certain task (Bandura, 1977).

There is ample justification for measuring a variety of cancer related beliefs, as will be done in this thesis, because the psychological literature posits that intentions to engage

in a behaviour are preceded by beliefs. Health care providers' beliefs regarding cancer, prevention, perceived importance and CAM will be discussed in detail using examples from medical and naturopath students whenever possible.





### 2.2 Cancer beliefs

Few research projects have examined the influence of cancer-specific beliefs held by health care providers. This is an important area of research, as the Lewis model of Physician Counselling postulates that variations in personal beliefs could influence the type and amount of services recommended. A large majority of available belief/attitudinal studies were completed between the late 1960s and the 1980s. As beliefs and attitudes are influenced by social, cultural, and environmental factors, it is important that researchers continue to study health care providers' cancer specific beliefs and attitudes to identify changing patterns over time. Nurses' cancer beliefs have been examined to a greater degree than those of other medical professionals. The literature suggests that nurses, more often than not, harbour negative cancer attitudes such as viewing the disease as stigmatising and often worry about cancer causing disfigurement (Box & Anderson, 1997). These negative attitudes result from the beliefs held by nurses concerning the effectiveness of preventive measures and a belief that they will ultimately develop the disease. For example, Box and Anderson conducted qualitative interviews with nurses to understand their attitudes and beliefs towards cancer. The authors found that even when nurses reported engaging in personal cancer prevention behaviours, underlying negative cancer attitudes hindered the effectiveness of their cancer prevention counselling (Box & Anderson, 1997). In other words, the personal beliefs that led to the nurses' negative cancer attitudes influenced the way they interacted and counselled their patients.

Many older studies examined medical students' beliefs and attitudes regarding cancer. Since these studies are dated, we should interpret their findings with caution, as these attitudes may be different for twenty first century students. Kaye (1981) examined medical students' attitude towards heart disease and cancer. Overall, many students had very negative cancer attitudes, with older students (in higher academic years) having less negative cancer attitudes which might be attributed to their increased knowledge of cancer as they progressed through their degree.

### 2.3 Perceived importance of cancer prevention and early detection practices

It seems reasonable to also assume that health care providers' belief in the importance or worth of certain cancer prevention and early detection practices, in

addition to their general cancer perceptions, may relate to their cancer prevention or early detection counselling beliefs. Physicians, for example, are more likely to practice preventive medicine when they judge it to be important (Dietrich & Goldberg, 1984). Problems arise when physicians perceive certain cancer prevention or screening practices to be of lesser importance, as is seen with skin cancer prevention counselling. Physicians consistently rank skin cancer prevention counselling as of low priority/importance when compared to other cancer prevention counselling (Geller 1998). It can be assumed that they ultimately engage in skin cancer prevention counselling less often than a screening procedure believed to be more important (such as mammography) for the early detection of breast cancer.

Efficacy beliefs regarding certain cancer prevention methods can vary significantly between practitioners. Referring back to the skin cancer example, primary health care providers who believed behaviours such as sun protection to be important were more likely to practice such clinical counselling (Cac, Walling, Vest, & Ting, 2008). Furthermore, perceived importance of certain cancer screening methods for the early detection of cancer has been shown to also influence a physician's willingness to counsel on such practices. For example, there are no screening programs in British Columbia for the early detection of prostate cancer because the PSA and DRE are poor quality screening procedures. When physicians do not believe that prostate cancer screening is effective, and perceive other screening methods or counselling practices to be more important, they are less likely to report counselling their patients on the utility of prostate cancer screening (Guerra, Jacobs, Holmes, & Shea, 2007).

This same study further described some of the cognitive thought processes underpinning the physicians' limited prostate cancer screening counselling. A particular physician in this study was recorded saying: "if you have a 15-minute visit, there are other things that I may value as more important, like managing cholesterol or exercise or diet, weight loss, other things that may benefit [the patient]" (Guerra et al., 2007, p.904). The perceived importance of certain cancer screening practices and modifiable risk factors appears to influence physicians' counselling practices.

### 2.4 Health care providers' complementary and alternative medical beliefs

A number of studies have assessed both physicians' and students' CAM beliefs. Many physicians have voiced caution, yet continue to remain open minded about alternative medicines (Boucher & Lenz, 1998). Therefore, the common stereotype that medical physicians completely disagree with all CAM practices may not be entirely true; many physicians are even willing to accept that CAM is a promising health field (Boucher & Lenz, 1998).

The literature suggests that positive attitudes toward CAM are common among recently-trained physicians (Jump, Yarborough, Kilpatrick, & Cabel, 1999) and nursing students (Kreitzer, Mitten, Harris, & Shandeling, 2002). In a large (n=1784) survey of American medical students, it was found that students held positive attitudes regarding the principles of CAM (Abbott et al., 2009).

Varying beliefs regarding CAM might drive these positive attitudes described previously. For example, other studies have shown that many medical students believe

that CAM is effective because of a combination of scientific, therapeutic and placebo effects (Derr, Shaikh, Rosen, & Guadagnino, 1998).

#### 2.5 Sociodemographics

In the case of cancer prevention and early detection counselling by health care providers, scientific literature tends to focus on medical practitioners and their particular correlates of counselling. Naturopath students and physicians have not been researched in the same manner and may not have the same correlates. The paragraphs to follow briefly summarize some of the recent literature on some of the sociodemographic correlates of health care providers, mainly practicing physicians or medical students, who counsel on cancer risk reduction methods.

### 2.5.1 Gender

Female primary care physicians tend to perceive chronic disease prevention more important than their male counterparts (Frank & Segura, 2009), yet the reason for these gender differences still requires further investigation. Female physicians are significantly more likely to offer mammographic services and Pap smears (including pelvic examinations) to women over the age of 40 (Ramirez et al., 2009; Thind, Feightner, Stweart, Thorpe, & Burt, 2008)(Pham, Schrag, Hargraves, & Bach, 2012). Yet it should be mentioned that Pollak et al., found many cancer preventive services, including mammography and Pap smears exceeded the length of time that is recommended to deliver the services for both male and female physicians(Pollak et al., 2008).

Female physicians also appear to be more likely than males to discuss physical activity and skin health behaviours, including sunscreen use and shade protection (Hornung, Hansen, Sharp, Poorsattar, & Lipsky, 2007) while also providing more general preventive health counselling (Thind et al., 2008). Female medical students are also more oriented toward preventive health care and health promotion counselling (Bellas, Asch, & Wilkes, 2000). In contrast, gender does not seem to predict screening for colorectal cancer and this is thought to be due to colorectal cancer screening being a gender-neutral test (Ramirez et al., 2009).

### 2.5.2 Year of study

As medical school students progress through their four years of training, it is commonly reported that they have a significant increase in cancer prevention knowledge through a better understanding of modifiable cancer risk factors (Geller et al., 2002). Increased cancer prevention counselling intentions is particularly strong when medical schools have cancer prevention courses within their curriculum. Students have high rates of cancer prevention knowledge and self-reported competencies when they complete these courses compared to students who did not take the cancer prevention course (Lee, Wilkereson, Harrity, & Hodgson, 2006).

Immediate introduction of these cancer-focused courses appears to similarly increase cancer prevention and early detection knowledge and attitudes. This is an important realization as the introduction of a cancer control educational course can immediately influence a student's cancer control perceptions. Students who complete a newly introduced cancer education program reported higher self-perceived counselling

skills for tobacco cessation/prevention, sun protection and performance of skin cancer examination (Geller et al., 2002).

### 2.5.3 Area of specialty

Primary care Canadian physicians and medical students intending to specialize in family medicine are more likely to report counselling their patients on general health prevention activities than physicians in different specialities (Frank, Carrera, Elon, & Hertzberg, 2007; Frank, Segura, Shen, & Oberg, 2010). Similarly, practicing family physicians in contrast to those practicing other specialities are more likely to counsel on nutritional behaviours (Sciamanna et al., 2002) and exercise (Walsh, Swangard, Davis, & McPhee, 1999) behaviours. Female primary care physicians were more likely than those not in primary care to provide skin cancer counselling or screening for a typical patient (Saraiya, Frank, Elon, Baldwin, & McAlpine, 2000). Finally, students intending to specialize in primary care are more likely to have positive attitudes towards health promotion and prevention (Bellas et al., 2000).

These studies cited above use self-reports to access clinical practice, which may differ from physicians' actual preventive behaviour counselling as directly assessed through standardized patients. Family physicians unknowingly interacting with a standardized patient did not perform any better than those not certified in family medicine (Hutchison, Woodward, Norman, Abelson, & Brown, 1998). Of course, with the nature of this research project, we should keep in mind that there might be differences between what physicians say they will counsel on and what they counsel in practice.

# **Chapter 3: Methodology**

### 3.1 Study design

A cross-sectional research design was employed for this study. Online surveys were administered to assess medical and naturopath students' cancer prevention and early detection beliefs.

### 3.2 Sample

### 3.2.1 Participant recruitment

After university wide ethical approval from the University of British Columbia (Behavioural Research Ethics Board – BREB) and specific approval from the Faculty of Medicine (Research Access Committee – RAC), an introductory e-mail was distributed to students with the embedded FluidSurvey link where students could access the questionnaire. The Faculty of Medicine's administration assistance distributed the introductory email to all medical students in early June 2013. BINM distributed the introductory email during class time also in early June and students had the option of completing the questionnaire immediately or at a later time.

A follow-up email was sent in late June 2013 to both medical and naturopath students reminding them to complete the questionnaire.

### 3.2.2 Remuneration

To increase survey participation, both the Faculty of Medicine and BIMN approved the distribution of a small monetary incentive. The first 121 medical students to complete

the questionnaire, and all naturopathy students (n=121), received a \$5.00 coffee e-gift certificate. E-gift cards were distributed electronically to interested students during the first week of July 2013.

E-mail addresses collected for those participants wishing to receive a compensatory \$5.00 coffee e-gift certificate were collected using a separate FluidSurvey embedded within the original questionnaire. This ensured that the personal e-mails collect were not linked with the questionnaire responses, allowing the working data file to remain confidential.

### 3.2.3 Sample inclusion criteria

Eligibility criteria included students enrolled during the 2012-2013 school year at University of British Columbia's medical program and at Boucher Institute of Naturopathy program.

### 3.2.4 Sample exclusion criteria

Students were excluded from this study if they were on a leave of absence from their degree or were completing a 5<sup>th</sup> year. This included students at BINM who were finishing their 6-year of part time study. Students were also excluded from this study if they did not complete at least 80% of the questionnaire.

### 3.3 Instrument

### 3.3.1 Instrument development

The complete questionnaire can be found in Appendix-A. The questionnaire used many previously established measures described in Table 1.

A panel of experts in chronic disease prevention, the project's committee members, examined the questionnaire to ensure content and face validity. Discussions with experts in naturopathic care attempted to ensure that the questions were relevant to naturopathic students.

The questionnaire was piloted with ten School of Population and Public Health Masters or Doctoral students. Many of these students were practicing physicians receiving an additional post-graduate degree. Students identified minor typographical errors with the questionnaire that were corrected. Furthermore, one question was added to the questionnaire as a result of the pilot testing. The question asked about the students' level of comfort with counselling future patients on cancer prevention and cancer screening. This question was included as a 'potential key correlate'.

### 3.3.2 Instrument description

Briefly, the questionnaire queried students on four main constructs: 1) sociodemographics and potential key correlates, 2) perceived importance of cancer prevention and screening methods, 3) global beliefs (cancer beliefs, prevention beliefs and CAM beliefs) and 4) counselling self-efficacy beliefs regarding cancer prevention and screening methods.

Participants' sociodemographic and potential key correlates were assessed using both open and close-ended questions. The open-ended question measured students' area of preferred specialization after graduation, and undergraduate degree. Close-ended questions assessed students': age, gender, type(s) of additional certification(s), number of years completed of degree program, ethnicity, personal family history of

cancer/preventable diseases, expected time spent with future patients, expected percentage of time spent on cancer prevention counselling, and expected percentage of time spent on cancer early detection counselling.

Assessment of a student's degree program (naturopathy or medicine) was not assessed directly; indirect assessment occurred by sending out two versions of the same questionnaire to students in the different programs (responses from the two questionnaires were housed in different databases to ensure medical and naturopath students responses were separate). The indirect assessment of the students' degree programs prevented students from realizing the comparative nature of this study, thus preventing potential bias: e.g., students promoting their own program to make the other program appear less attractive.

Fifteen 5-point Likert-style questions assessed students' perceived importance of cancer prevention and screening techniques. The Canadian Family Physician Cancer and Chronic Disease Prevention Survey (CFPCCDPS) was the most influential questionnaire informing the development of these questions. The CFPCCDPS was developed by a team of experts in survey methodology, preventive health care, primary care and cancer prevention (Katz et al., 2012). This questionnaire provides a comprehensive assessment of practices related to cancer prevention in primary care in Canada and was used in a survey of 1010 members of the College of Family Physicians of Canada in 2012. To ensure that we represented the relevant cancer prevention and screening techniques in our questionnaire, we also examined surveys and published resources from the Canadian Cancer Society,

Canadian Task Force on Preventive Health Care and the Canadian Partnership Against Cancer.

Students' cancer beliefs, prevention beliefs and CAM beliefs were measured using questions that varied from bivariate 'yes-no' agreement to continuous 5-point Likert-style questions. Four questions were extracted from The Cancer Attitude Questionnaire (Lebovits, Croen, & Goetzel, 1984) ('I tend to feel pessimistic about the outcome of cancer disease, given our present treatment methods', 'At the "gut level", cancer and death seem almost synonymous to me', 'I feel optimistic about our ability to control cancer in the foreseeable future', 'I personally would prefer to diet of heart disease than cancer').

Four questions used to measure prevention beliefs were extracted from the 'Healthy Doc' Medical School Questionnaire (Erica Frank, 2007) ('Health providers need more training in prevention', 'Prevention is less interesting to me than treatment', 'Patients are more likely to adopt healthier lifestyles if health providers counsel them to do so', 'Health providers have a responsibility to promote prevention with their patients'). These questions were ideal for measuring health care providers' personal prevention beliefs and were chosen because they were also used to assess hundreds of medical students' beliefs in the US and Canada. The health care providers' prevention beliefs will be referred to as 'prevention beliefs' for the duration of the thesis. These questions were not synthesized into a 'health belief measure' in the 'Healthy Doc' questionnaire, but for the purposes of this thesis, a summary score was created.

Eight questions were extracted from the Complementary and Alternative Medicine Beliefs Inventory (CAMBI)(Bishop, Yardley, & Lewith, 2005) ('It is important for treatments to boost my immune system', 'Treatments should enable my body to heal itself',

'Treatments should increase my natural ability to stay healthy, 'Treatment providers should treat patients as equal partners', 'Patients should take an active role in their treatment', 'Treatment providers should help patients make their own decisions about treatments', 'Health is about harmonizing your body, mind and spirit', 'Imbalances in a person's life are a major cause of illness').

Finally, the outcome variable for this thesis will be referred to as students' 'counselling self-efficacy'. Counselling self-efficacy <sup>2</sup> was measured using similar 5-point Likert-style questions informed by guidelines from the Canadian Cancer Society, Canadian Task Force on Preventive Health Care and the Canadian Partnership Against Cancer. In the questionnaire the outcome was measured using the following phrase: 'counselling my future patients on X, Y or Z will be an effective strategy for the prevention or early detection of cancer'. In summary, the outcome variable 'counselling self-efficacy' refers to the students' perceptions that they have the ability to counsel on cancer prevention or early detection for future patients.

<sup>2</sup> Significant differences exist between the words 'efficacy' and 'effectiveness' within a public health context. The term efficacy is commonly used to describe an outcome that would occur in an ideal research situation, whereas effectiveness describes how well an outcome occurs in real life circumstances. We believe that students, with limited 'real life' counselling experience (compared to practicing physicians) would only be able to respond to counselling efficacy beliefs as counselling effectiveness is strongly influenced by institutional barriers, such as lack of time and money. With this in mind we chose to frame our outcome questions as follows: "counselling my future patients on X, Y, Z will be an effective strategy for cancer prevention/early detection" because in plain English efficacy and effectiveness have almost identical definitions. Even though both medical and naturopath students are completing health professional degrees (and it might be expected that they would know the subtle differences between effective and efficacy) resulting from the nature of our anonymous questionnaire we could not clarify any definitions; thus we chose to use the descriptor 'effective' as it more commonly understood.

# Table 1: Source of survey items

| Questionnaire<br>component  | Citation           | Questionnaire<br>Name  | Target<br>Population                 | Format  | Validity  | Reliability  | Number<br>of Survey<br>Items<br>Used |
|---|--------------------|--|--------------------------------------|---|---|--|--------------------------------------|
| Cancer Beliefs<br>(Pessimism scale<br>chosen)   | Lebovits<br>(1984) | Croen and<br>Lebovits Cancer<br>Attitude<br>Questionnaire                          | First year<br>medical<br>students    | 28 item with 7<br>attitude dimensions<br>measured on a 6-<br>point Likert scale   | Panel of experts has judged<br>the CAQ to have construct<br>validity;<br>Factor analysis of pre/post<br>test data from two cohorts  | Chronbach's alpha<br>used to compute<br>reliability of factors<br>and subscales<br>(Pessimism scale:<br>0.57)  | 4                                    |
| Beliefs towards<br>complementary and<br>alternative<br>medicines (Holistic<br>health scale<br>chosen) | Bishop<br>(2005)   | The<br>complementary<br>and alternative<br>medicine beliefs<br>inventory           | Laypersons                           | Cross sectional<br>internet<br>questionnaire with<br>17 questions;<br>Measured on a 7<br>point Likert- like<br>scale (1: strongly<br>disagree, 4: neither<br>agree nor disagree,<br>and 7: strongly<br>agree) | Criterion validity established<br>for CAMBI (strong positive<br>Spearman's coefficients); Good<br>congruent validity established<br>between CAMBI and a<br>commonly used well<br>developed questionnaire<br>(Holistic Complementary and<br>Alternative Medicine<br>Questionnaire) | Chronbach's alphas<br>were satisfactory for<br>all subscales (holistic<br>health: 0.73)<br>Measure a range of<br>CAM related beliefs;<br>Includes 4 subscales<br>with good reliability;<br>Not as reliable in<br>populations of older<br>age, lower income<br>and ethnic diversity | 8                                    |
| Prevention beliefs  | Frank<br>(2007)    | Healthy Doc-<br>Healthy Patient<br>Questionnaire                                   | Undergraduate<br>medical<br>students | Cross sectional<br>survey; variety of<br>question types<br>ranging from short<br>answer to 5-point<br>Likert scales.  | Large validated medical student questionnaire first 6<br>used in US medical students; survey has been used in<br>assessing 1 <sup>st</sup> through 4 <sup>th</sup> year medical students in the<br>US and Canada.   |  |                                      |
| Cancer and Chronic<br>Disease Prevention<br>Beliefs   | Katz<br>(2012)     | Canadian Family<br>Physician Cancer<br>and Chronic<br>Disease Prevention<br>Survey | Physicians                           | 16 item<br>questionnaire;<br>Continuous<br>questions measured<br>on a 5 point Likert-<br>semantic scale from<br>(Always-Never,<br>Strongly agree-<br>Strongly disagree)                                       | Expert team of methodologists assessed validity and<br>reliability of the questionnaire; designed for Canadian<br>physicians; was pilot-tested in English and French to<br>establish internal and external validity.  |  |                                      |

### 3.3.3 Management of survey data

Each participant was required to read the consent form that was imbedded in the electronic survey distributed to the participants of this study prior to access to the survey. Both Ms. Dale's and Dr. Gotay's contact information were found in the consent form, should the participant have had any questions or concerns. Both researchers were familiar with the study and the process of informed consent.

The survey was designed and implemented using FluidSurvey, a reliable survey design tool. FluidSurvey employs the latest firewall technology, data encryption and has privacy policy statements ensuring that the company will never sell or share the data collected. Furthermore, all data collected on FluidSurvey are housed in Canada.

Only students sent the direct link to the survey were able to access the survey. All data collected from the online survey was entered into encrypted excel spreadsheets. To ensure the safety of this data file, the file was only saved on an external hard drive. This hard drive is currently being kept at the UBC's School of Population and Public Health building in a secure locked cabinet.

At the end of the study, FluidSurvey was contacted to remove the data from their website.

### 3.4 Variables

Table 2 presents the study variables for this thesis. These variables include 17 outcome variables, five primary independent variables and 16 sociodemographic and psychological belief explanatory variables.

# Table 2: Study variables

| Outcome Variables  |  |
|--|--|
| Counselling self-efficacy for smoking cessation for cancer prevention          |  |
| exercise for cancer prevention   |  |
| • diet for cancer prevention   |  |
| alcohol reduction for cancer prevention  |  |
| sun protection for cancer prevention   |  |
| •safe sexual practices for cancer prevention                                   |  |
| •obesity for cancer prevention   |  |
| •environmental risk factor reduction for cancer prevention                     |  |
| •mammography for the early detection of cancer                                 |  |
| •thermography for the early detection of cancer                                |  |
| •BSE for the early detection of cancer   |  |
| •CBE for the early detection of cancer   |  |
| •PSA for the early detection of cancer   |  |
| •DRE for the early detection of cancer   |  |
| •the Pap test for the early detection of cancer                                |  |
| •FOBT for the early detection of cancer  |  |
| • flexible sigmoidoscopy for the early detection of cancer                     |  |
|  |  |
|  |  |
| Primary Explanatory Correlates   |  |
| Training program (medical school and naturopathy school)                       |  |
| Perceived importance of types of specific types of cancer prevention and early |  |
| detection activities   |  |
| Cancer beliefs   |  |
| Prevention beliefs   |  |
| CAM beliefs  |  |
|  |  |
| SocioDemographics  |  |
| • Age  |  |
|  |  |
| • Gender   |  |
| <ul><li>Gender</li><li>Recent degree</li></ul>                                 |  |
| <ul> <li>Gender</li> <li>Recent degree</li> <li>Year of study</li> </ul>       |  |

- Certifications\*
- Ethnicity

\* Deleted because the majority of students failed to respond to this question

### Potential key correlates

- Family history of disease that could have been prevented
- Family history of cancer
- Percent of cancers thought to be preventable
- Expected time spent with future patients
- Expected percentage of time spent with future patients on cancer prevention
- Expected percentage of time spent with future patients on cancer screening
- Comfort with cancer prevention counselling
- Comfort with cancer screening counselling

### 3.5 Statistical data analysis

### 3.5.1 Data cleaning

All data collected using FluidSurvey were imported directly into Excel for cleaning. All open-ended questions were categorized into the appropriate categories of fixed responses. Furthermore, open-ended categorical variables were sorted into subgroups based on themes identified by L.Dale. Responses that did not fit into the appropriate constricted categories were sorted into the 'other' subgroup after careful consideration.

The data were then imported into R Version 3.0, a free open source software, for statistical computing. The ordinal and continuous variables' raw scores were collapsed into logical categories. Resulting from limited observations, 5-point Likert-scale variables were collapsed into dichotomous categories. Attempts were made to ensure similar numbers of observations existed in each category. The bivariate categories (e.g., 'Very Important' versus 'Other') were identical for both medical and naturopath students for comparative purposes. Summary scores were calculated for three Likert-questions subgroups (cancer beliefs, health provider prevention beliefs and CAM beliefs). The collinearity of each item was assessed to prevent the inadvertent introduction of bias into the measures. The composite scores were calculated by reverse scoring all negative sub-questions and calculating the arithmetic mean for each variable as suggested by the authors of these scales (Bishop et al., 2005; Lebovits, Croen, & Goetzel, 1984). Similarly, the prevention belief score was calculated using an arithmetic mean. These variables where then collapsed into bivariate categories.

### 3.5.2 Descriptive analysis

Frequencies and counts were calculated for each study variable stratified by academic program. Measures of central tendency were calculated for sociodemographic and potential key correlates. Graphical representations were completed for each study variable. Each variable was examined for unusual or impermissible responses.

### 3.5.3 Medical school representativeness:

Basic sociodemographic characteristics of medical students are published every year and are freely available on the UBC medical school webpage. Data are collected on age, previous degree, GPA, and other variables. Comparison between characteristics of our sample and these published statistics was used to examine the representativeness of respondents to the overall medical student population. We will not be conducting similar analyses with the naturopath students, as we were able to sample over 86% of the student population.

### 3.5.4 Research question 1

Research question 1 examines to what extent medical and naturopath students differ regarding:

- a. Perceived importance of cancer risk factors and early detection practices
- b. Cancer beliefs, CAM beliefs, and prevention beliefs
- c. Counselling self-efficacy for cancer prevention and early detection practices

This question was descriptive in nature. Cross-tabulations were performed for categorical variables and trends were explored. Contingency tables displayed low cell counts that could pose problems in the logistic regression modeling. Univariate logistic regression models were generated for variables stratified by study program to quantify the strength of the association. Crude odds ratios and 95% confidence intervals were reported.

### 3.5.5 Research question 2

Research question 2 examines the sociodemographic and potential key correlates of perceived importance, cancer beliefs, CAM beliefs, prevention beliefs and counselling self-efficacy.

The independent correlates chosen a-priori (cancer preventability, comfort with cancer prevention counselling, comfort with cancer screening counselling, family history of cancer, family history of disease that could have been prevented, expected time spent with future patients, expected percentage of time spent with future patients on cancer prevention, expected percentage of time spent with future patients on cancer screening, age, gender, undergraduate degree, area of specialization, year of study and ethnicity) were cross-tabulated with the variables (perceived importance, cancer beliefs, CAM beliefs, prevention beliefs and counselling self-efficacy) stratified by program. Significant relationships between the sociodemographic and potential key correlates and the variables (perceived importance, cancer beliefs, CAM beliefs, prevention beliefs and counselling selfefficacy) were highlighted and used in further analysis.

### 3.5.6 Research question 3

Research question 3 examines the relationship between students' beliefs (towards cancer, CAM and prevention beliefs) and perceived importance (of cancer risk factors and early detection practices) with counselling self-efficacy for cancer prevention and early detection practices and how these relationships differ for medical and naturopath students.

Descriptive logistic regression methods were used to model the relationship between students' beliefs (towards cancer, towards prevention and towards CAM) and perceived importance (of cancer risk factors and early detection practices) with counselling self-efficacy for cancer prevention and early detection practices. Bivariate analyses, including contingency and frequency tables, were performed for each independent variable with the outcome variable. Zero cell counts were identified. Univariate logistic regression analyses were performed for each independent variable and the outcome variable. Odds ratios were calculated from these test statistics and their 95% confidence intervals are reported. Sociodemographic and the potential key correlates showing significant associations (p-value < 0.05) with the outcome variable (students' counselling self-efficacy) were entered into a multivariate logistic regression model with the independent variables. The standard error value of the primary independent variable

was examined during the addition of the sociodemographic and potential key correlates to check for multicolinearity in addition to variance inflation factors.

For research question 3 part a, additional multivariate logistic regression models were conducted stratified by the academic program. This allows for assessment of the differences between students' beliefs and perceived importance with counselling selfefficacy for cancer prevention and early detection practices. A single multivariate logistic regressions, controlling for academic program, was calculated without the inclusion of the independent variables: CAM beliefs and prevention beliefs as they were highly correlated with academic program. Correlation calculations were performed for each program and the primary outcome.

### 3.6 Missing data

Of the 121 medical and 121 naturopath students, Appendix-B shows the number of observations missing for each variable. Overall, there were low rates of missing data. Missing data was imputed by calculating and inserting the median score for each ordinal variable, stratified by the program, for all variables that were missing fewer than 10 observations. Missing nominal variables, such as speciality or ethnicity, were imputed using the variables' mode value. Furthermore, two naturopath students omitted their year of study. As naturopaths filled out the questionnaire during class time, these students' year was filled in based on the assumption that the time frame in which they completed the questionnaire matched their peers. The variable 'previous certification' was flagged as containing unusual responses. Of the 242 students, 52 omitted responding to the survey question 'previous certifications'. This variable was deemed inappropriate for imputing and deleted from further analysis.

### **Chapter 4: Results**

### 4.1 Population description

A total of 189 of a possible 1241 medical students and 137 naturopathy students clicked 'I agree' on the consent form. Sixty-three of the 189 medical students and 16 of the 137 naturopath students' responses to the questionnaire were flagged as 'incomplete' entries. Incomplete entries included any questionnaire that was not fully submitted. All incomplete entries were manually examined to determine if at least 50% of the questionnaire was completed. It was found that for almost every naturopath students' response flagged as incomplete resulted from students clicking 'I consent' but not completing any survey items.

Of the 63 medical students that were flagged as having incomplete responses, 44 students clicked consent and did not complete any survey questionnaire questions. Of the remaining 19 medical student responses, many students only completed the first page of the study (counselling self-efficacy questions). These responses could not be used in further analysis. Some medical students' responses were marked as 'complete' yet they did not complete at least 80% of the questionnaire. For example, a few students responded to only the first and last page of the questionnaire and as such were removed from further analysis. Finally, one student's response was exported from the FluidSurvey database as two separate response entries with identical identification numbers; this student was removed from further analyses.

In the final sample, 121 naturopath and 121 medical students' responses were included. A summary of study samples' sociodemographic and potential key correlates can

be found in Table 3. The naturopath students in this sample, compared to medical students, were more likely to be older, female and Caucasian. Medical and naturopath students were similar regarding which degree they completed prior to enrollment in their health professional program, the specialty they wished to practice in post-graduation, and their family history of cancer.

There were also differences in psychological beliefs. Naturopath students were more likely to agree that a family member or a close friend could have prevented a serious disease that afflicted them (74% naturopath students; 47% medical students). Significantly more naturopath students believed that more than 50% of cancers could be prevented (87%), compared to only 45% of medical students who believed this to be true. Furthermore, 89% of naturopath students expected that they would be spending at least 30 minutes with patients during consultations, compared to only 3% of medical students. The proportion of naturopath students who reported that they would spend at least 20% of their patient consultation time on cancer prevention was double that of medical students.

Naturopath students reported being more comfortable with cancer prevention counselling than medical students (58% naturopath students; 18% medical students), but both groups reported similar levels of comfort with cancer screening counselling with 32% of naturopath students and 21% of medical students indicating that they were either extremely or very comfortable.

| •                                       |                         | Medical Students |      | Naturopath<br>Students |      | Fishers P-<br>Value |
|---|-------------------------|------------------|------|------------------------|------|---------------------|
| Sociodemographics                       |                         |                  |      |                        |      |                     |
|   |                         | Frequency        | %    | Frequency              | %    |                     |
| Age                                     |                         |                  |      |                        |      | P=1.233e-           |
|   | <23                     | 41               | 34%  | 4                      | 3%   | 11                  |
|   | 24-26                   | 49               | 40%  | 42                     | 35%  |                     |
|   | 27-29                   | 21               | 17%  | 49                     | 40%  |                     |
|   | >30                     | 10               | 8%   | 26                     | 21%  |                     |
| Gender                                  | Male                    | 37               | 31%  | 18                     | 15%  | P=0.005             |
|   | Female                  | 84               | 69%  | 103                    | 85%  |                     |
| Recent Degree                           | Bachelors and 3 Years   | 106              | 88%  | 111                    | 92%  | P=0.53              |
|   | Masters/PhD             | 16               | 13%  | 12                     | 10%  |                     |
| Current Year of                         | 1                       | 34               | 28%  | 41                     | 34%  | P=0.0003            |
| Study                                   | 2                       | 35               | 29%  | 20                     | 17%  |                     |
|   | 3                       | 41               | 34%  | 27                     | 22%  |                     |
|   | 4                       | 11               | 9%   | 33                     | 27%  |                     |
| Specialty                               | Family/General/Oncology | 45               | 37%  | 46                     | 38%  | P=0.89              |
|   | Other                   | 77               | 64%  | 76                     | 63%  |                     |
| Ethnicity                               | Caucasian               | 69               | 57%  | 92                     | 76%  | P=0.004             |
|   | Other                   | 52               | 43%  | 29                     | 24%  |                     |
| Family History of                       | No                      | 96               | 79%  | 98                     | 81%  | P=0.87              |
| Cancer                                  | Yes                     | 25               | 21%  | 23                     | 19%  |                     |
| Potential Key Correlates                |                         |                  |      |                        |      |                     |
| Family History of<br>Disease That Could | No                      | 64               | 53%  | 32                     | 26%  | P =<br>4.131e-05    |
| Have Been<br>Prevented                  | Yes                     | 57               | 47%  | 89                     | 74%  |                     |
| Percent of Cancer                       | < <u>-</u> C00/         | (7               |      | 1(                     | 120/ | P =                 |
| Prevented                               | < <u>50%</u>            | 07<br>Г 4        | 450/ | 10                     | 070/ | 3.023e-12           |
| Expected Time                           | >50%                    | 54               | 45%  | 105                    | 87%  | P = 2.2e-           |
| Spent with Patient                      | <30 Mins                | 117              | 97%  | 12                     | 10%  | 16                  |
|   | >30 Mins                | 4                | 3%   | 109                    | 89%  |                     |
| Expected Time on<br>Cancer Prevention   | <20 %                   | 84               | 69%  | 37                     | 31%  | P =<br>2.137e-09    |
| Counselling                             | > 20 %                  | 37               | 31%  | 84                     | 69%  |                     |
|   | <20 %                   | 75               | 62%  | 73                     | 60%  | P = 0.90            |

# Table 3: Sociodemographic and potential key correlate summaries of medical and naturopath students

| Expected Time on   |                                    |    |      |    |       |           |
|--|------------------------------------|----|------|----|-------|-----------|
| <b>Cancer Prevention</b>   |                                    |    |      |    |       |           |
| Screening  | > 20 %                             | 46 | 38%  | 48 | 40%   |           |
| Comfort Level with   |                                    |    |      |    |       |           |
| <b>Counselling Future</b>  | Completely and Very                | 22 | 100/ | 70 | E 004 | P =       |
| Patients on Cancer   | Comfortable                        | 22 | 10%0 | 70 | 30%   | 2.385e-10 |
| Prevention   |                                    |    |      |    |       |           |
|  | Other                              | 99 | 82%  | 51 | 42%   |           |
| Comfort Level with<br>Counselling Future<br>Patients on Cancer<br>Screening<br>Practices | Completely and Very<br>Comfortable | 26 | 21%  | 39 | 32%   | P = 0.08  |
|  | Other                              | 95 | 79%  | 82 | 68%   |           |

### 4.2 Research question 1

The goal of the first research question was to examine *to what extent medical and naturopath students differed regarding perceived importance of cancer risk factors and early detection practices.* 

### 4.2.1 Research question 1.a

### 4.2.1.1 Specific cancer prevention practices

Students were asked 26 questions pertaining to specific cancer prevention practices. As seen in Figure 2, questions ranged from assessment of dietary practices to health professional referrals. The odds ratio describes the odds that a naturopath student rated a given practice as 'extremely or very important' to 'moderately, slightly or not important' compared to the odds of importance, as rated by medical students, for the same practice. Overall, naturopath students, compared to medical students, had higher odds of perceiving alternative therapies, such as hypnotherapy (OR: 4.77, 95% CI: 2.62-9.02) and acupuncture (OR: 19.6, 95% CI: 10.1-40.1) for smoking cessation, and hypnotherapy for problem drinking (OR: 3.00, 95% CI: 1.56-5.97), as being 'extremely/very important'. Over 99% percent of naturopath and 82% of medical students perceived advising patients to follow a healthy diet with adequate fruits and vegetable as an important practice for cancer prevention. Furthermore, naturopath students had higher odds of also perceiving the use of multivitamins (OR: 3.09, 95% CI: 1.77-5.52), organically grown (OR: 26.4, 95% CI: 13.2-56.6) and high antioxidant laden foods (OR: 106.8, 95% CI: 40.3 - 372) to be extremely/very important, than medical students. Naturopath students were also at higher odds of perceiving reductions in sedentary time, a relatively new cancer risk reduction intervention to be of higher importance than medical students (OR: 4.68, 95% CI: 2.05-12.1).

On the contrary, medical students, compared to naturopath students, were at higher odds of perceiving traditionally 'biomedical interventions' to be extremely/very important. This relationship existed for the perceived importance of nicotine replacement therapy (OR: 9.09, 95% CI: 5.00-16.7), HPV vaccination (OR female: 100, 95% CI: 33.3- 167; OR male: 16.7, 95% CI; 9.09-33.3), sunscreen use (OR: 1.89, 95% CI: 1.12- 3.23), and nutritionist referral (OR: 2.22, 95% CI: 1.33-3.70).

Many cancer prevention practices were perceived to be of high importance by both naturopath and medical students. For example, 87% of both medical and naturopath students thought that targeting teens for smoking cessation was 'extremely/very important'. This trend was also found for the perceived importance of targeting adults for smoking cessation, limiting sedentary time, advising obese patients to begin a physical activity program, advising normal weight patients to begin an exercise program, and peer and clinical alcohol counselling.

Students in both academic programs reported similar low perceived importance for certain cancer prevention practices. For example, approximately half of the students reported that reductions in red meat consumption was extremely/very important, whereas only 33% of medical students and 44% of naturopath students perceived referring obese patients to a self-help group as being extremely/very important.



### Figure 2: Naturopath and medical students' perceived importance of specific cancer prevention practices

<sup>a</sup> The OR describes the odds that naturopath students rated a given practice as "extremely or very important" to "other importance" compared to the odds of importance, as rated by medical students, for the same practice.

<sup>β</sup>Other Importance' refers to 'moderately important', 'somewhat important', 'slightly important', and 'not important'





<sup>a</sup> The OR describes the odds that naturopath students rated a given practice as "extremely or very important" to "other importance" compared to the odds of importance, as rated by medical students, for the same practice.

<sup>β</sup> 'Other Importance' refers to 'moderately important', 'somewhat important', 'slightly important', and 'not important'

### 4.2.1.2 General cancer prevention and screening questions

Students were then asked eight general questions regarding cancer prevention and nine general questions pertaining to cancer screening practices. Figure 3 displays the cancer prevention odds ratios and 95% confidence intervals for naturopath students compared to medical students.

Naturopath students, compared to medical students, had higher odds of perceiving a healthy diet (OR: 13.9, 95% CI: 7.47-27.1), increased physical activity (OR: 6.05, 95% CI: 3.51-10.7), maintaining a healthy body weight (OR: 4.12, 95% CI: 2.41-7.19), alcohol reduction (OR: 2.44, 95% CI: 1.42-4.26), reduction of environmental risk factors (OR: 4.61, 95% CI: 2.70-8.00) and safe sexual behavior (OR: 1.96, 95% CI: 1.18-3.29) to be of higher importance (extremely important compared to 'other' lesser levels of importance) for preventing cancer.

The odds of a medical or naturopath student perceiving smoking cessation, and safe sun practices to be extremely important was similar. Approximately three quarters of both student programs responded that these practices are extremely or very important.



# Figure 3: Naturopath and medical students' perceived importance of general cancer prevention practices

<sup>a</sup> The OR describes the odds that naturopath students rated a given practice as "extremely important" to "other importance" compared to the odds of importance, as rated by medical students, for the same practice.

<sup>β</sup> 'Other importance' refers to 'very important', 'moderately important', 'somewhat important', 'slightly important', and 'not important'

Figure 4 presents the perceived importance of general cancer screening practices for early detection of cancer. Naturopath students, compared to medical students, had higher odds of perceiving BSE, CBE, thermography, PSE, DRE, and Pap testing to be of higher importance (extremely important) than lesser importance (other).

A relatively small frequency of students indicated that they perceived cancer screening practices such as thermography (medical students: 5%, naturopath student: 15%) and PSA (medical students: 8%, naturopath student: 19%) to be extremely important.

Approximately 25% of all naturopath students perceived colorectal cancer screening procedures, such as the flexible sigmoidoscopy and the FOBT, to be of 'extreme' importance, whereas approximately 40% of medical students perceived these practices to be 'extremely important'.



## Figure 4: Naturopath and medical students' perceived importance of general cancer screening practices

<sup>a</sup> The OR describes the odds that naturopath students rated a given practice as "extremely important" to "other importance" compared to the odds of importance, as rated by medical students, for the same practice.

<sup>β</sup> 'Other Importance' refers to 'very important', 'moderately important', 'somewhat important', 'slightly important', and 'not important'
# 4.2.2 Research question 1.b

Research question 1b examined to what extent medical and naturopath students differ regarding their cancer beliefs, CAM beliefs, and prevention beliefs.

The cancer belief measure used in this question was taken from 'The Cancer Attitude Scale' by Lebovits in 1984. Four Likert-Items were used in this question and they focused on cancer beliefs. Prior to creating the 'Cancer Belief Score' the individual items' correlations were assessed (using r values) and a measure of internal consistency was calculated (Cronbach's alpha= 0.54) (Table 4). The items were not highly correlated with one another. For this scale, higher scores indicate more negative beliefs about cancer.

|   | Pessimistic about<br>cancer outcomes | Cancer and death<br>are synonymous | Optimistic<br>about cancer<br>control in the<br>future | Prefer to<br>die of heart<br>disease<br>than cancer |
|---|--------------------------------------|------------------------------------|--|---|
| Pessimistic about cancer outcomes             | Х                                    | 0.48                               | 0.17   | 0.19  |
| Cancer and death are synonymous               | Х                                    | Х                                  | 0.13   | 0.26  |
| Optimistic about cancer control in the future | X                                    | Х                                  | X  | 0.13  |
| Prefer to die of heart disease than cancer    | X                                    | Х                                  | X  | Х   |

 Table 4: Correlation coefficients of negative cancer belief score

Students were also asked to report on their prevention beliefs. The combination of four Likert-items from Frank's 2007 'Medical School Questionnaire' formed this Likert-scale. The Likert-items were tested for correlations and a measure of internal consistency was calculated (Cronbach's alpha= 0.59) as seen in Table 5, all items were used. Higher scores on this scale indicate that a health provider places higher value on prevention.

|  | Health<br>providers need<br>increased<br>training in<br>prevention | Prevention is<br>less<br>interesting<br>than<br>treatment | Patients are more<br>likely to adopt<br>healthy lifestyles if<br>health providers<br>counsel them to do<br>so | Health providers have a<br>responsibility to<br>promote prevention<br>with their patients |
|--|--|---|---|---|
| Health providers need<br>increased training in<br>prevention   | Х  | 0.37  | 0.37  | 0.39  |
| Prevention is less<br>interesting than<br>treatment  | Х  | Х   | 0.24  | 0.42  |
| Patients are more<br>likely to adopt healthy<br>lifestyles if health<br>providers counsel<br>them to do so | Х  | X   | X   | 0.37  |
| Health providers have<br>a responsibility to<br>promote prevention<br>with their patients                  | X  | Х   | X   | X   |

# Table 5: Correlation coefficients of prevention belief score

Finally, The CAM Belief Scale was constructed from The Complementary and Alternative Medicine Beliefs Inventory (Bishop 2005). This Likert-Scale was formed by combining eight Likert-Items. The Likert-Items were tested for correlation and a measure of internal consistency was calculated (Cronbach's alpha= 0.84) as seen in Table 6 and all items were used. A somewhat strong correlation was detected between the following questions 'Treatments should increase my natural ability to stay healthy' and 'Treatments should enable my body to heal itself' (r= 0.91). We kept this item in the Likert-scale as this scale has been tested in a variety of other populations and has shown to be valid (Bishop et al., 2005).

# Table 6: Correlation coefficients of complementary and alternative medicine belief score

|  | It is important<br>for treatments<br>to boost my<br>immune<br>system | Treatments<br>should enable<br>my body to<br>heal itself | Treatments<br>should<br>increase my<br>natural ability<br>to stay healthy | Treatment<br>providers<br>should treat<br>patients as<br>equal<br>partners | Patients<br>should take<br>an active<br>role in their<br>treatment | Treatment<br>providers should<br>help patients<br>make their own<br>decisions about<br>treatments | Health is about<br>harmonizing<br>your body,<br>mind and spirit | Imbalances in<br>a person's life<br>are a major<br>cause of<br>illness |
|--|--|--|---|--|--|---|---|--|
| It is important for<br>treatments to boost<br>my immune system                                 | Х  | 0.74   | 0.76  | 0.41   | 0.37   | 0.35  | 0.61  | 0.62   |
| Treatments should<br>enable my body to<br>heal itself  | Х  | Х  | 0.91  | 0.46   | 0.42   | 0.37  | 0.63  | 0.68   |
| Treatments should<br>increase my natural<br>ability to stay healthy                            | Х  | Х  | Х   | 0.41   | 0.43   | 0.38  | 0.67  | 0.68   |
| Treatment providers<br>should treat patients<br>as equal partners                              | Х  | Х  | Х   | Х  | 0.50   | 0.55  | 0.42  | 0.63   |
| Patients should take<br>an active role in their<br>treatment                                   | Х  | Х  | Х   | Х  | Х  | 0.61  | 0.38  | 0.38   |
| Treatment providers<br>should help patients<br>make their own<br>decisions about<br>treatments | Х  | Х  | X   | Х  | Х  | Х   | 0.41  | 0.39   |
| Health is about<br>harmonizing your<br>body, mind and spirit                                   | Х  | Х  | Х   | Х  | Х  | X   | Х   | 0.71   |
| Imbalances in a<br>person's life are a<br>major cause of illness                               | Х  | Х  | X   | X  | Х  | X   | X   | X  |

As can be seen in Figure 5, 75% of naturopath students, compared to 49% of medical students, 'strongly disagreed or disagreed' with the cancer belief scale. This indicates that naturopath students had more positive cancer beliefs than medical students. Regarding 'prevention beliefs', the data indicate that naturopath students, compared to medical students, were more likely to strongly agree with questions pertaining to positive cancer prevention practices by health care providers (OR: 10.14, 95% CI: 5.4-20.3). Finally, 78% of naturopath students, compared to 11% of medical students, strongly agreed with the Likert-scale assessing CAM beliefs.



# Figure 5: Naturopath and medical students' cancer beliefs, health provider beliefs and CAM beliefs

<sup>α</sup> The OR for the 'health providers' prevention belief' and 'CAM belief' measure describes the odds that naturopath students "strongly agreed" with the given belief measure vs "other agreement" compared to the odds of agreement, as rated by medical students, for the same practice.
 <sup>α</sup> The OR for the 'cancer belief' measure describes odds that naturopath students "strongly disagreed or disagreed" with the given belief measure vs "other agreement, as rated by medical students, for the same practice.

<sup>β</sup> 'Other Importance' for 'health providers' prevention beliefs' and 'CAM beliefs' refers to 'agree, undecided, disagree, and strongly disagree' <sup>δ</sup> 'Other Importance' for 'cancer beliefs' refers to 'strongly agree, agree, and undecided'

# 4.2.3 Research question 1.c

Research question 1c asks: *To what extent do medical and naturopath students differ regarding their counselling* self-efficacy *for cancer prevention and early detection practices?* 

Naturopath students indicated stronger agreement with perception of counselling self-efficacy for healthy diet (Nat: 82%, Med: 38%), (OR: 7.34; 95% CI: 4.13-13.5); increased physical activity (Nat: 60%, Med: 34%), (OR: 2.97, CI: 1.77-5.04); maintaining a healthy body weight, (Nat: 57%, Med: 33%), (OR: 2.67, 95% CI: 1.60-4.56); decreasing alcohol consumption (Nat: 42%, Med: 30%), (OR: 1.72, 95% CI: 1.01-2.94); and reducing environmental risk factors (Nat: 65%, Med: 25%), (OR: 5.71, 3.30- 10.1) (Figure 6).



# Figure 6: Naturopath and medical students' counselling self-efficacy regarding general cancer prevention practices

<sup>a</sup> The OR describes the odds that naturopath students "strongly agreed" with the given belief measure vs "other agreement" compared to the odds of agreement, as rated by medical students, for the same practice.

<sup>β</sup> 'Other Importance' for 'health providers' prevention beliefs' and 'CAM beliefs' refers to 'agree, undecided, disagree, and strongly disagree'

Figure 7 shows naturopath and medical students' counselling self-efficacy for certain cancer screening techniques. Naturopath students, compared to medical students, had higher odds of strongly agreeing that they were confident in their ability to counsel on the following screening procedures: BSE (OR: 6.95, 95% CI: 3.72-13.7), CBE (OR: 2.98, 95% CI: 1.74-5.19), thermography (OR: 6.86, 95% CI: 2.45-24.1), PSA (OR: 3.27, 95% CI: 1.63-6.95) and the DRE (OR: 2.18, 95% CI: 1.26-3.85). Even though the odds ratio expressed for thermography was 6.86, only a small portion of students (19% of naturopath students, and 3% of medical students) strongly agreed with counselling self-efficacy perceptions.

Naturopath and medical students had similar perceptions of counselling selfefficacy for three screening techniques, as demonstrated by the low odds ratios found in Figure 7. No statistically significant differences were observed for students' sense of counselling self-efficacy for mammography (for women between the ages of 50 and 69) for the early detection of breast cancer, the Pap test for cervical cancer, and the flexible sigmoidoscopy and FOBT for the early detection of colorectal cancer.

A high proportion of students (73% of medical students and 81% of naturopath students) strongly agreed that they were confident about their ability to counsel regarding the Pap test; whereas, many fewer students (35% of medical students and 24% of naturopath students) strongly agreed that they were confident about counselling regarding the flexible sigmoidoscopy.



# Figure 7: Naturopath and medical students' counselling self-efficacy regarding general cancer screening practices

<sup>a</sup> The OR describes the odds that naturopath students "strongly agreed" with the given belief measure vs "other agreement" compared to the odds of agreement, as rated by medical students, for the same practice.

<sup>β</sup> 'Other Importance' for 'health providers' prevention beliefs' and 'CAM beliefs' refers to 'agree, undecided, disagree, and strongly disagree'

### 4.3 Research question 2

Research question 2 assesses the sociodemographic and potential key correlates of the independent variables: perceived importance, cancer beliefs, CAM beliefs, prevention beliefs and counselling self-efficacy.

A large majority of correlates were determined a-priori through a thorough examination of the literature. The 'specific' cancer prevention practices in research question 1a were not examined, as they were not included in further analyses in research question 3. Table 7 presents the findings from the cross-tabulation matrix of statistically significant (p<0.05) correlates of general cancer prevention and early detection practices using the chi-square tests of association and Fisher's exact tests. A detailed version of Table 7 is found in Appendix C.

#### 4.3.1 Sociodemographic correlates:

Of six measured sociodemographic correlates (age, gender, recent degree, year of study, intended speciality, and ethnicity), students' age and year of study were correlated with the most study variables (perceived importance of cancer prevention and screening practices, global beliefs and counselling self-efficacy). Naturopath students had more statistically significant correlations than medical students and naturopath students' age and year of study were more highly correlated with cancer screening beliefs.

Medical students' cancer beliefs were associated with more sociodemographic variables than naturopath students' cancer beliefs (age, recent degree, speciality and ethnicity). Some sociodemographic variables were not related to any of the following variables (perceived importance of cancer prevention and screening practices, global beliefs and counselling self-efficacy), including naturopath students' ethnicity and recent degree.

# 4.3.2 Potential key correlates

For medical and naturopath students, the potential key correlate most often associated with the perceived importance of cancer prevention and screening practices, global beliefs and counselling self-efficacy was 'expected percentage of time spent on cancer prevention'. Slightly fewer independent variables were associated with the potential key correlate 'expected time spent on cancer screening'.

Interestingly, a medical student's 'comfort with cancer prevention counselling' and 'comfort with cancer screening counselling' were not related to any of the following variables: perceived importance, cancer beliefs, CAM beliefs, prevention beliefs and counselling self-efficacy. Naturopath students had many more statistically significant associations for the potential key correlate, 'comfort with cancer prevention counselling'. However, only one variable was associated with naturopath students' 'comfort with cancer screening counselling'.

A naturopath student's 'family history of cancer' was not associated with any of the variables (perceived importance, cancer beliefs, CAM beliefs, prevention beliefs and counselling self-efficacy); however, only medical students' perceived importance of one cancer prevention practice was related to their 'family history of cancer'. Another potential key correlate that had low statistically significant associations with the independent and outcome variables included 'family history of a disease that could have been prevented'.

The potential key correlate, 'percentage of cancer thought to be preventable' was associated many cancer prevention counselling self-efficacy outcome measures in medical students. Finally, no cancer beliefs, prevention beliefs or CAM beliefs were associated with any of the potential key correlates.

Table 7: Significant sociodemographic and potential key correlates of global beliefs, perceived importance of, and counselling self-efficacy regarding cancer prevention and screening practices.

|  | Medical Students |                    |                      | Naturopath Students |                    |                         |
|--|------------------|--------------------|----------------------|---------------------|--------------------|-------------------------|
|  | Perceived        | CAM beliefs        | Counselling self-    | Perceived           | CAM beliefs        | Counselling self-       |
|  | importance       | Cancer beliefs     | efficacy             | importance          | Cancer beliefs     | efficacy                |
|  |                  | Prevention beliefs |                      |                     | Prevention beliefs |                         |
| Sociodemographic Correlates                            |                  |                    |                      |                     |                    |                         |
| Age  | X                | Х                  | X                    | X, X                | None               | X, X, X, X              |
| Gender   | Х                | х                  | None                 | None                | х                  | None                    |
| Recent Degree  | Х, Х             | X                  | None                 | None                | None               | None                    |
| Year   | Х, Х             | Х                  | X                    | X, X, X, X          | ХХ                 | <b>X, X, X,</b> X, X, X |
| Specialty  | X                | Х                  | X                    | Х                   | None               | None                    |
| Ethnicity  | <b>Х</b> , Х     | Х                  | X                    | None                | None               | None                    |
| Potential Key Correlates                               |                  |                    |                      |                     |                    |                         |
| Family history of disease that                         | None             | None               | X                    | None                | х                  | None                    |
| could have been prevented                              |                  |                    |                      |                     |                    |                         |
| Family history of cancer                               | Х                | None               | None                 | None                | None               | None                    |
| Percent of cancer thought to be preventable            | Х                | None               | X, X, X, X, <b>X</b> | x                   | None               | X                       |
| Expected time spent with patients                      | <b>Х,</b> Х      | None               | None                 | X, X                | None               | X                       |
| Expected percentage of time spent on cancer prevention | X, X, X, X, X    | None               | Х, Х                 | X, X, X             | None               | X, X, X                 |
| Expected percentage of time spent on cancer screening  | X, X             | None               | X                    | X, X                | None               | X, X, X                 |
| Comfort with cancer prevention counselling             | None             | None               | None                 | X, X                | None               | X, X, X, X              |
| Comfort with cancer screening counselling              | None             | None               | None                 | X                   | None               | None                    |

X = A Statistically Significant Cancer Prevention Practice

X= A Statistically Significant Cancer Screening Practice

x = A Statistically Significant CAM, health care provider or cancer belief

\* Frequency of Xs, xs or **Xs** indicates the number of prevention, screening or belief measures associated with the sociodemographic or potential key correlates.

### 4.4 Research question 3

Research question 3 examines the relationship between students' beliefs (towards cancer, CAM and prevention beliefs) and perceived importance (of cancer risk factors and early detection practices) with counselling self-efficacy for cancer prevention and early detection practices?

To explore research question 3, an unadjusted and adjusted logistic regression model was fitted for each outcome variable (counselling self-efficacy for cancer prevention or early detection practices), presented in Table 9. The adjusted odds ratios were calculated controlling for a student's beliefs towards cancer, prevention, CAM, and the perceived importance of the relevant cancer prevention or screening practice. Additionally, sociodemographic and potential key correlates of the outcome variable for both student populations, identified in Appendix-D, were included in the adjusted model.

Among health care students, the perceived importance of, and perceptions of counselling self-efficacy towards many cancer prevention practices were associated. Students who perceived smoking cessation to be extremely important, compared to students who perceived smoking cessation to be of 'other' importance (moderately important, somewhat important and not important) were 17.4 (CI: 8.11-40) times more likely to report higher self-efficacy for counselling on smoking cessation.

Additionally, students' perceived importance of the following cancer screening practices was also significantly related to their perceived counselling efficacy for the following practices: safe sexual behaviour (OR: 11.8, 95% CI: 6.12-23.82), alcohol reduction (OR: 11.58, 95% CI: 5.73-24.69), environmental risk factor reduction (OR: 11.45, 95% CI: 5.33-26.12), maintaining a healthy body weight, (OR: 10.45, 95% CI: 5.13-22.41), sun

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protection, (OR: 8.10, 95% CI: 4.54-14.88), physical activity (OR: 7.18, 95% CI: 3.64-14.66) and healthy dietary practices (OR: 4.09, 95% CI: 1.91-8.93).

In the unadjusted model, students' prevention beliefs and their CAM beliefs were associated with some cancer prevention counselling self-efficacy outcomes. The association existed for smoking cessation, healthy diet, physical activity, healthy body weight, alcohol reduction, environmental risk factor reduction and safe sexual behaviour. In the adjusted model, all of these independent variables became non-significant.

As summarized in Table 8, a high frequency (66%) of students reported perceiving smoking cessation to be extremely important for cancer prevention while also strongly agreeing with their counselling self-efficacy for smoking cessation. In contrast, alcohol reduction for the prevention of cancer was only perceived by 24% of students to be extremely important and highly efficacious when counselled upon.

|   |           | Counselling self-e | fficacy |
|---|-----------|--------------------|---------|
|   |           | Strongly           | Othor   |
|   |           | agree              | other   |
| Importance of smoking cessation         | Extremely | 66%                | 6%      |
|   | Other     | 12%                | 16%     |
| Importance of diet                      | Extremely | 48%                | 10%     |
|   | Other     | 12%                | 30%     |
| Importance of physical activity         | Extremely | 36%                | 12%     |
|   | Other     | 11%                | 40%     |
| Importance of sup protection            | Extremely | 43%                | 15%     |
| importance of suit protection           | Other     | 12%                | 30%     |
| Importance of healthy hady weight       | Extremely | 33%                | 10%     |
|   | Other     | 12%                | 45%     |
| Importance of alcohol reduction         | Extremely | 24%                | 10%     |
|   | Other     | 12%                | 54%     |
| Importance of environmental risk factor | Extremely | 36%                | 12%     |
| reduction                               | Other     | 9%                 | 43%     |
| Importance of cafe coveral hebevieurs   | Extremely | 33%                | 12%     |
| importance of sale sexual bellaviours   | Other     | 11%                | 43%     |

 Table 8: Cross tabulation of student frequencies of perceived importance of cancer prevention practices and counselling self-efficacy.

# Table 9: Unadjusted and adjusted odds ratios associated with counselling self-efficacy regarding cancer prevention practices for both naturopath and medical students.

| Outcome Variable      | Independent Variables  |                            | Unadjusted Ratio (95% | Adjusted Odds Ratio (95% |  |
|-----------------------|--|----------------------------|-----------------------|--------------------------|--|
|                       | Importance of Smoking  | Extremely                  | 14.8 (7.32-31.38)     | 17.4 (8.11-40.0)         |  |
|                       | Cessation  | Other                      | Reference             | Reference                |  |
|                       |  | Other                      | 0.81 (0.46-1.44)      | 0.63 (0.30-1.28)         |  |
|                       | Cancer Bellefs   | Strongly Disagree/Disagree | Reference             | Reference                |  |
| Efficacy For          | Dravantian Daliafa   | Strongly Agree             | 2.33 (1.24-4.58)      | 1.15 (0.72-4.28)         |  |
| Smoking Cessation     | Prevention Beneis  | Other                      | Reference             | Reference                |  |
|                       | CAM Poliofa  | Strongly Agree             | 2.06 (1.16-3.76)      | 1.96 (0.49-2.76)         |  |
|                       | CAM Dellers  | Other                      | Reference             | Reference                |  |
|                       | * Adjusted Odds Ratio Controlled For (1) Percent of Cancer Thought to be Preventable, (2) Comfort With Cancer Prevention Counselling, (3) Importance of Smoking Cessation, (4) Cancer Beliefs, (5) Prevention Beliefs, (6) CAM Beliefs   |                            |                       |                          |  |
|                       | Importance of Diet   | Extremely                  | 11.5 (6.35-21.60)     | 4.09 (1.91-8.93)         |  |
|                       |  | Other                      | Reference             | Reference                |  |
|                       | Cancon Poliofa   | Other                      | 0.88 (0.52-1.50)      | 1.21 (0.58-2.58)         |  |
|                       | Calleer beliefs  | Strongly Disagree/Disagree | Reference             | Reference                |  |
| Counselling Self-     | Drossontion Doliofa  | Strongly Agree             | 5.38 (2.87- 10.69)    | 1.48 (0.62-3.54)         |  |
| Efficacy For Healthy  | Prevention benefs  | Other                      | Reference             | Reference                |  |
| Dict                  | CAM Poliofa  | Strongly Agree             | 7.70 (4.22-14.70)     | 1.66 (0.68-4.06)         |  |
|                       | CAM Delleis  | Other                      | Reference             | Reference                |  |
|                       | * Adjusted Odds Ratio Controlled For (1) Percent of Cancer Thought to be Preventable, (2) Comfort With Cancer Prevention<br>Counselling, (3) Expected Time With Patients, (4) Expected Time Spent On Cancer Prevention, (5) Age, (6) Ethnicity, (7)<br>Importance of Diet, (8) Cancer Beliefs, (9) Prevention Beliefs (10) CAM Beliefs |                            |                       |                          |  |
|                       | Importance of Physical   | Extremely                  | 10.53 (5.89-19.40)    | 7.18 (3.64-14.66)        |  |
| Counselling Self-     | Activity   | Other                      | Reference             | Reference                |  |
| Efficacy For Physical | Cancor Poliofa   | Other                      | 1.01 (0.60-1.70)      | 1.00 (0.50-2.02)         |  |
| Activity              |  | Strongly Disagree/Disagree | Reference             | Reference                |  |
|                       | Prevention Beliefs   | Strongly Agree             | 3.61 (2.08-6.40)      | 1.39 (0.63-3.04)         |  |

|                               |  | Other   | Reference   | Reference   |  |  |
|-------------------------------|--|---|---|---|--|--|
|                               | CAMP 1: C  | Strongly Agree  | 4.22 (2.48-7.31)  | 1.45 (0.61-3.37)  |  |  |
|                               | CAM Beliefs  | Other   | Reference   | Reference   |  |  |
|                               | * Adjusted Odds Ratio Contro<br>Comfort With Cancer Prevent<br>Cancer Prevention, (6) Impor  | lled For (1) Family History of Pre<br>ion Counselling, (4) Expected Tir<br>tance of Physical Activity, (7) Ca | evention, (2) Percent of Cancer The<br>ne With Patients, (5) Expected Per<br>ncer Beliefs, (8) Prevention Beliefs | ought to be Preventable, (3)<br>rcentage of Time Spent On<br>s, (9) CAM Beliefs |  |  |
|                               | Importance of Sun<br>Protection  | Extremely   | 7.60 (4.32-13.74)   | 8.10 (4.54-14.88)   |  |  |
|                               |  | Other   | Reference   | Reference   |  |  |
|                               | Cancer Beliefs   | Other   | 0.80 (0.48-1.35)  | 0.76 (0.41-1.37)  |  |  |
| Counselling Self-             |  | Strongly Disagree/Disagree  | Reference   | Reference   |  |  |
| Efficacy For Sun              | Prevention Beliefs   | Strongly Agree  | 1.39 (0.81-2.39)  | 1.73 (0.85-3.62)  |  |  |
| Protection                    |  | Other   | Reference   | Reference   |  |  |
|                               | CAM Beliefs  | Strongly Agree  | 1.08 (0.65-1.81)  | 0.66 (0.33-1.31)  |  |  |
|                               |  | Other   | Reference   | Reference   |  |  |
|                               | * Adjusted Odds Ratio Controlled For (1) Importance of Safe Sun Practices, (2) Cancer Beliefs, (3) Prevention Beliefs (4) CAM<br>Beliefs   |   |   |   |  |  |
|                               | Importance of Healthy Body<br>Weight   | Extremely   | 12.59 (6.92-23.76)  | 10.45 (5.13-22.41)  |  |  |
|                               |  | Other   | Reference   | Reference   |  |  |
|                               | Cancer Beliefs   | Other   | 1.25 (0.74-2.10)  | 1.72 (0.82-3.68)  |  |  |
| Counselling Self-             |  | Strongly Disagree/Disagree  | Reference   | Reference   |  |  |
| Efficacy For                  |  | Strongly Agree  | 3.82 (2.20-6.77)  | 1.91 (0.85-4.30)  |  |  |
| Maintaining A<br>Healthy Body | Flevention benefs  | Other   | Reference   | Reference   |  |  |
| Weight                        | CAM Poliofa  | Strongly Agree  | 2.98 (1.77-5.07)  | 0.73 (0.29-1.75)  |  |  |
|                               | CAM Delleis  | Other   | Reference   | Reference   |  |  |
|                               | * Adjusted Odds Ratio Controlled For (1) Percent of Cancer Thought to be Preventable, (2) Expected Time With Patients, (3)<br>Expected Percentage of Time Spent On Cancer Prevention, (4) Comfort With Counselling On Cancer Prevention, (5)<br>Importance of Healthy Body Weight For Cancer Prevention, (6) Cancer Beliefs, (7) Prevention Beliefs, (8) CAM Beliefs |   |   |   |  |  |
|                               | Importance of Alcohol  | Extremely   | 10.96 (5.98-20.75)  | 11.58 (5.73-24.69)  |  |  |
| Counselling Self-             |  | Other   | Reference   | Reference   |  |  |
| Reduction                     | Cancor Boliofs   | Other   | 0.97 (0.56-1.66)  | 0.77 (0.37-1.57)  |  |  |
| neudenon                      | Cancer Belleis   | Strongly Disagree/Disagree  | Reference   | Reference   |  |  |

|                                    | Dressontion Doliafa   | Strongly Agree   | 2.81 (1.62-4.91)   | 1.64 (0.75-3.59)  |  |
|------------------------------------|---|--|--|---|--|
|                                    | Prevention Bellels  | Other  | Reference  | Reference   |  |
|                                    | CAM Deliefe   | Strongly Agree   | 3.15 (1.84-5.48)   | 1.24 (0.52-2.97)  |  |
|                                    | CAM Bellels   | Other  | Reference  | Reference   |  |
|                                    | * Adjusted Odds Ratio Contro<br>Comfort With Counselling On<br>Beliefs, (6) Prevention Beliefs  | lled For (1) Percent of Cancer Th<br>Cancer Prevention, (4) Importar<br>s, (7) CAM Beliefs | ought to be Preventable, (2) Exped<br>nce of Alcohol Reduction For Cance | cted Time With Patients, (3)<br>er Prevention, (5) Cancer |  |
|                                    | Importance of   | Extremely  | 15.71 (8.51-30.25)   | 11.45 (5.33-26.12)  |  |
|                                    | Environmental Risk Factors  | Other  | Reference  | Reference   |  |
|                                    | Cancon Poliofa  | Other  | 0.82 (0.48-1.37)   | 0.81 (0.36-1.84)  |  |
|                                    | Cancer Beneis   | Strongly Disagree/Disagree   | Reference  | Reference   |  |
| Counselling Self-                  | Drovention Poliefa  | Strongly Agree   | 5.86 (3.30-10.70)  | 1.63 (0.70-3.75)  |  |
| Efficacy For<br>Environmental Risk | Prevention Bellels  | Other  | Reference  | Reference   |  |
| Factor Reduction                   |   | Strongly Agree   | 7.58 (4.32-13.63)  | 1.32 (0.54-3.15)  |  |
|                                    | CAM Dellers   | Other  | Reference  | Reference   |  |
|                                    | * Adjusted Odds Ratio Controlled For (1) Family History of Prevention, (2) Percent of Cancer Thought to be Preventable, (3)<br>Expected Time With Patients (4) Expected Time On Cancer Prevention, (5), Comfort With Counselling On Cancer Prevention,<br>(6) Age, (7) Gender, (8) Importance of Environmental Risk Factor Reduction For Cancer Prevention (9) Cancer Beliefs, (10)<br>Prevention Beliefs, (11) CAM Beliefs |  |  |   |  |
|                                    | Importance of Safe Sexual   | Extremely  | 10.37 (5.80-19.13)   | 11.78 (6.12-23.82)  |  |
|                                    | Behaviour   | Other  | Reference  | Reference   |  |
|                                    | Cancon Doliofa  | Other  | 1.06 (0.63-1.79)   | 0.79 (0.42-1.47)  |  |
| Courselling Colf                   | Calleer Dellers   | Strongly Disagree/Disagree   | Reference  | Reference   |  |
| Efficacy For Safe                  | Drovention Poliefa  | Strongly Agree   | 1.72 (1.01-2.95)   | 0.77 (0.37-1.63)  |  |
| Sexual Behaviour                   | Prevention benefs   | Other  | Reference  | Reference   |  |
|                                    | CAM Poliofa   | Strongly Agree   | 1.94 (1.16-3.26)   | 0.77 (0.36-1.67)  |  |
|                                    | CAM Delleis   | Other  | Reference  | Reference   |  |
|                                    | * Adjusted Odds Ratio Controlled For (1) Percent of Cancer Thought to be Preventable, (2) Expected Time With Patients, (3)<br>Importance of Safe Sexual behavior For Cancer Prevention, (4) Cancer Beliefs, (5) Prevention Beliefs, (6) CAM Beliefs   |  |  |   |  |

Table 11 displays the unadjusted, adjusted odds ratios and 95% confidence intervals for the relationships between the outcomes of interest (counselling self-efficacy for early detection practices), the independent variables (perceived importance of cancer screening practices, cancer beliefs, prevention beliefs and CAM beliefs) and the sociodemographic and potential key correlates associated with each program-specific outcome, identified in Appendix-D.

Overall, among the health care students, a higher perceived importance of cancer screening practices was associated with a stronger sense of counselling self-efficacy for cancer screening practices. For example, students who perceived the PSA test to be extremely vs. less important (moderately important, somewhat important and not important) had higher odds (OR: 45.7, 95% CI: 14.7-177.7) of strongly agreeing with self-efficacy of counselling regarding the PSA test. This trend is similar for BSE (OR: 34.3, 95% CI: 12.54-111.3), DRE (OR: 15.7, 95% CI: 7.73-34.1), FOBT (OR: 13.7, 95% CI: 7.03-27.7), flexible sigmoidoscopy (OR: 13.0, 95% CI: 6.58 – 27.1), mammography (OR: 11.6, 95% CI: 5.83-24.6) and CBE (OR: 9.80, 95% CI: 5.01-20.0).

The confidence intervals for many of these odds ratios are large and should be interpreted with caution. As summarized in Table 10, a large proportion of students perceived mammography, BSE, CBE, thermography, PSA, DRE and flexible sigmoidoscopy to be of lesser importance and also indicated less confidence about their counselling ability on the same early detection screening tools. Furthermore, the large confidence intervals can be explained, in part, as resulting from quasi separation of the cross-tabulation table. For example, over 85% of students indicated that they perceived thermography to be of 'other' importance and also had a lower sense of counselling self-efficacy for thermography.

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Thus, only 6% of students strongly agreed with perceptions of counselling self-efficacy for thermography while also perceiving thermography to be extremely important. This trend of high response rates of the 'other' category for perceived importance and counselling self-efficacy was also observed for PSA (79%), BSE (65%), the DRE (60%), and the flexible sigmoidoscopy (60%).

Table 10: Cross tabulation of student frequencies for the perceived importance of cancer screening practices and counselling self-efficacy.

|                            |           | Counselling self-effica | су    |
|----------------------------|-----------|-------------------------|-------|
|                            |           | Strongly agree          | Other |
| Importance of mammography  | Extremely | 24%                     | 5%    |
|                            | Other     | 21%                     | 49%   |
| Importance of Pap          | Extremely | 62%                     | 4%    |
|                            | Other     | 15%                     | 19%   |
| Importance of RSE          | Extremely | 20%                     | 4%    |
| Importance of BSE          | Other     | 11%                     | 65%   |
| Importance of CPE          | Extremely | 22%                     | 7%    |
|                            | Other     | 15%                     | 56%   |
| Importance of thermography | Extremely | 6%                      | 4%    |
| importance of thermography | Other     | 5%                      | 85%   |
| Importance of PSA          | Extremely | 11%                     | 2%    |
|                            | Other     | 7%                      | 79%   |
| Importance of DDF          | Extremely | 21%                     | 8%    |
| Importance of DRE          | Other     | 11%                     | 60%   |
| Importance of SIC          | Extremely | 20%                     | 10%   |
| Importance of SIG          | Other     | 10%                     | 60%   |
| Importance of EOPT         | Extremely | 31%                     | 35%   |
|                            | Other     | 7%                      | 27%   |

In the unadjusted model, students' prevention beliefs and their CAM beliefs were associated with their perceptions of counselling self-efficacy for certain cancer screening techniques. This association existed for the Pap test, BSE, CBE, thermography, PSA, and DRE. In the adjusted model, all of these independent variables became non-significant. Neither the unadjusted or adjusted models found that a student's prevention or CAM beliefs were associated with students' perceptions of counselling self-efficacy for mammography or the FOBT. However, in the adjusted model, students' prevention beliefs were significantly related to perceptions of counselling self-efficacy for the flexible sigmoidoscopy for colorectal cancer screening. In other words, students who had higher prevention beliefs were 2.67 (95% CI: 1.14-6.32) times more likely to strongly agree with perceptions of counselling self-efficacy regarding the flexible sigmoidoscopy.

| Outcome Variable                          | Independent<br>Variables  |   | Unadjusted Odds Ratio (95%<br>CI)  | Adjusted Odds Ratio (95%<br>CI)  |  |
|---|---|---|--|----------------------------------|--|
| Counselling Self-<br>Efficacy For The Pap | Importance of Pap   | Extremely   | 18.52 (8.87-42.13)   | 21.4 (9.52-53.3)                 |  |
| Test                                      |   | Other   | Reference  | Reference                        |  |
|   | Cancer Beliefs  | Other   | 0.71 (0.39-1.32)   | 0.72 (0.32-1.60)                 |  |
|   |   | Strongly<br>Disagree/Disagree                                     | Reference  | Reference                        |  |
|   | Prevention Beliefs  | Strongly Agree  | 2.26 (1.15-4.75)   | 1.31 (0.48-3.60)                 |  |
|   |   | Other   | Reference  | Reference                        |  |
|   | CAM Beliefs   | Strongly Agree  | 1.94 (1.04-3.70)   | 0.56 (0.20-1.52)                 |  |
|   |   | Other   | Reference  | Reference                        |  |
|   | * Adjusted Odds Ratio<br>Test For Cancer Scree  | Controlled For (1) Percent of<br>ning, (4) Cancer Beliefs, (5) Pa | Cancer Thought to be Preventable, (2) revention Beliefs, (6) CAM Beliefs | Ethnicity, (3) Importance of Pap |  |
| Counselling Self-<br>Efficacy For         | Importance of Mam   | Extremely   | 11.25 (5.76-23.61)   | 11.6 (5.83-24.6)                 |  |
| Mammography                               |   | Other   | Reference  | Reference                        |  |
|   | Cancer Beliefs  | Other   | 0.89 (0.53-1.50)   | 0.90 (0.48-1.67)                 |  |
|   |   | Strongly<br>Disagree/Disagree                                     | Reference  | Reference                        |  |
|   | <b>Prevention Beliefs</b>   | Strongly Agree  | 1.44 (0.84-2.46)   | 1.53 (0.48-1.67)                 |  |
|   |   | Other   | Reference  | Reference                        |  |
|   | CAM Beliefs   | Strongly Agree  | 1.30 (0.78-2.17)   | 0.90 (0.74-3.17)                 |  |
|   |   | Other   | Reference  | Reference                        |  |
|   | * Adjusted Odds Ratio Controlled For (1) Gender, (2) Importance of Mammography For Cancer Screening, (3) Cancer<br>Beliefs, (4) Prevention Beliefs, (5) CAM Beliefs |   |  |                                  |  |
| Counselling Self-<br>Efficacy For The BSE | Importance of BSE   | Extremely   | 33.1 (15.16-79.67)   | 34.3 (12.54-111.3)               |  |
|   |   | Other   | Reference  | Reference                        |  |
|   | Cancer Beliefs  | Other   | 0.79 (0.45-1.39)   | 2.18 (0.88-5.62)                 |  |

Table 11: Unadjusted and adjusted odds ratios associated with students' counselling self-efficacy regarding cancer screening services.

|   |   | Strongly<br>Disagree/Disagree | Reference         | Reference        |  |  |  |
|---|---|-------------------------------|-------------------|------------------|--|--|--|
|   | Prevention Beliefs  | Strongly Agree                | 3.03 (1.72-5.38)  | 0.85 (0.33-2.11) |  |  |  |
|   |   | Other                         | Reference         | Reference        |  |  |  |
|   | CAM Beliefs   | Strongly Agree                | 4.60 (2.59-8.40)  | 1.06 (0.39-2.87) |  |  |  |
|   |   | Other                         | Reference         | Reference        |  |  |  |
|   | * Adjusted Odds Ratio Controlled For (1) Percent of Cancer Thought to be Preventable, (2) Expected Time With Patients, (3) Age, (4) Year, (5) Importance of BSE For Cancer Screening, (6) Cancer Beliefs, (7) Prevention Beliefs, (8) CAM Beliefs |                               |                   |                  |  |  |  |
| Counselling Self-<br>Efficacy For The CBE | Importance of CBE   | Extremely                     | 12.18 (6.38-24.4) | 9.80 (5.01-20.0) |  |  |  |
|   |   | Other                         | Reference         | Reference        |  |  |  |
|   | Cancer Beliefs  | Other                         | 0.96 (0.56-1.63)  | 1.08 (0.54-2.14) |  |  |  |
|   |   | Strongly<br>Disagree/Disagree | Reference         | Reference        |  |  |  |
|   | <b>Prevention Beliefs</b>   | Strongly Agree                | 2.19 (1.27-3.80)  | 1.17 (0.55-2.48) |  |  |  |
|   |   | Other                         | Reference         | Reference        |  |  |  |
|   | CAM Beliefs   | Strongly Agree                | 2.60 (1.53-4.47)  | 1.37 (0.62-3.02) |  |  |  |
|   |   | Other                         | Reference         | Reference        |  |  |  |
|   | * Adjusted Odds Ratio Controlled For (1) Expected Time With Patients, (2) Importance of CBE For Cancer Screening, (3) Cancer Beliefs, (4) Prevention Beliefs, (5) CAM Beliefs   |                               |                   |                  |  |  |  |
| Counselling Self-<br>Efficacy For         | Importance of Therm   | Extremely                     | 28.6 (10.7-82.1)  | 26.3 (7.95-102)  |  |  |  |
| Thermography                              |   | Other                         | Reference         | Reference        |  |  |  |
|   | Cancer Beliefs  | Other                         | 1.11 (0.48-2.5)   | 1.26 (0.40-3.84) |  |  |  |
|   |   | Strongly<br>Disagree/Disagree | Reference         | Reference        |  |  |  |
|   | <b>Prevention Beliefs</b>   | Strongly Agree                | 3.21 (1.43-7.48)  | 0.70 (0.20-2.33) |  |  |  |
|   |   | Other                         | Reference         | Reference        |  |  |  |
|   | CAM Beliefs   | Strongly Agree                | 8.97 (3.31-31.40) | 1.84 (0.90-18.8) |  |  |  |
|   |   | Other                         | Reference         | Reference        |  |  |  |

|   | * Adjusted Odds Ratio Controlled For (1) Percent of Preventable Cancer, (2) Expected Time With Patients, (3) Expected Percentage of Cancer Screening Time, (4) Importance of Thermography For Cancer Screening, (5) Cancer Beliefs, (6) Prevention Beliefs, (7) CAM Beliefs |                               |                   |                   |  |  |
|---|---|-------------------------------|-------------------|-------------------|--|--|
| Counselling Self-<br>Efficacy For The PSA                                       | Importance of PSA   | Extremely                     | 50.0 (19.6-152.6) | 45.7 (14.7-177.7) |  |  |
|   |   | Other                         | Reference         | Reference         |  |  |
|   | Cancer Beliefs  | Other                         | 0.90 (0.45-1.75)  | 1.84 (0.64-5.35)  |  |  |
|   |   | Strongly<br>Disagree/Disagree | Reference         | Reference         |  |  |
|   | <b>Prevention Beliefs</b>   | Strongly Agree                | 2.83 (1.45-5.56)  | 1.34 (0.45-4.08)  |  |  |
|   |   | Other                         | Reference         | Reference         |  |  |
|   | CAM Beliefs   | Strongly Agree                | 5.82 (2.80-13.1)  | 2.87 (0.85-10.5)  |  |  |
|   |   | Other                         | Reference         | Reference         |  |  |
|   | * Adjusted Odds Ratio Controlled For (1) Percent of Preventable Cancer, (2) Expected Time With Patients, (3) Age, (4)<br>Year, (5) Importance of PSA Testing For Cancer Screening, (6) Cancer Beliefs, (7) Prevention Beliefs, (8) CAM Beliefs                              |                               |                   |                   |  |  |
| Counselling Self-Importance of DREExtremely14.0 (7.35-27.9)Efficacy For The DRE |   |                               |                   | 15.7 (7.73-34.1)  |  |  |
|   |   | Other                         | Reference         | Reference         |  |  |
|   | Cancer Beliefs  | Other                         | 0.71 (0.40-1.24)  | 0.89 (0.41-1.90)  |  |  |
|   |   | Strongly<br>Disagree/Disagree | Reference         | Reference         |  |  |
|   | Prevention Beliefs  | Strongly Agree                | 1.78 (1.01-3.13)  | 1.53 (0.66-3.59)  |  |  |
|   |   | Other                         | Reference         | Reference         |  |  |
|   | CAM Beliefs   | Strongly Agree                | 2.08 (1.20-3.62)  | 1.01 (0.41-2.45)  |  |  |
|   |   | Other                         | Reference         | Reference         |  |  |
|   | * Adjusted Odds Ratio Controlled For (1) Percent of Preventable Cancer, (2) Expected Time With Patients, (3) Age, (4)<br>Importance of DRE For Cancer Screening, (5) Cancer Beliefs, (6) Prevention Beliefs, (7) CAM Beliefs  |                               |                   |                   |  |  |
| Counselling Self-<br>Efficacy For The FOBT                                      | Importance of FOBT  | Extremely                     | 12.2 (6.53-23.7)  | 13.7 (7.03-27.7)  |  |  |
|   |   | Other                         | Reference         | Reference         |  |  |
|   | Cancer Beliefs  | Other                         | 1.08 (0.63-1.84)  | 0.97 (0.49-1.92)  |  |  |
|   |   | Strongly<br>Disagree/Disagree | Reference         | Reference         |  |  |

|                                       | Prevention Beliefs   | Strongly Agree                | 1.56 (0.91-2.70) | 2.23 (0.97-5.23) |  |  |  |
|---------------------------------------|--|-------------------------------|------------------|------------------|--|--|--|
|                                       |  | Other                         | Reference        | Reference        |  |  |  |
|                                       | CAM Beliefs  | Strongly Agree                | 1.06 (0.62-1.78) | 0.54 (0.23-1.23) |  |  |  |
|                                       |  | Other                         | Reference        | Reference        |  |  |  |
|                                       | * Adjusted Odds Ratio Controlled For (1) Age, (2) Importance of FOBT Testing For Cancer Screening, (3) Cancer Beliefs, (4) Prevention Beliefs, (5) CAM Beliefs   |                               |                  |                  |  |  |  |
| Counselling Self-<br>Efficacy For The | Importance of Sig  | Extremely                     | 12.2 (6.44-23.9) | 13.0 (6.58-27.1) |  |  |  |
| Flexible Sigmoidoscopy                |  | Other                         | Reference        | Reference        |  |  |  |
|                                       | Cancer Beliefs   | Other                         | 1.36 (0.77-2.39) | 1.15 (0.58-2.27) |  |  |  |
|                                       |  | Strongly<br>Disagree/Disagree | Reference        | Reference        |  |  |  |
|                                       | <b>Prevention Beliefs</b>  | Strongly Agree                | 1.50 (0.84-2.65) | 2.67 (1.14-6.32) |  |  |  |
|                                       |  | Other                         | Reference        | Reference        |  |  |  |
|                                       | CAM Beliefs  | Strongly Agree                | 1.34 (0.77-2.33) | 0.73 (0.34-1.61) |  |  |  |
|                                       |  | Other                         | Reference        | Reference        |  |  |  |
|                                       | * Adjusted Odds Ratio Controlled For (1) Expected Percentage of Time Spent On Cancer Screening, (2) Importance of Sig<br>Testing For Cancer Screening, (3) Cancer Beliefs, (4) Prevention Beliefs, (5) CAM Beliefs |                               |                  |                  |  |  |  |

#### 4.4.1 Research question 3.a

Research question 3.a. asked: *How do these relationships differ for medical students and naturopath students?* 

In order to address this research question, unadjusted and adjusted odds ratios were calculated separately for medical and naturopath students for the relationship between 1) the outcome variable: counselling self-efficacy for cancer prevention and screening techniques, 2) the independent variables: perceived importance of cancer prevention and screening practices, cancer beliefs, prevention beliefs and CAM beliefs, and 3) the sociodemographic and potential key correlates previously identified in research question 2. The odds ratios were interpreted separately for each cancer prevention and screening practice. Separate analyses were conducted between medical and naturopath students because high correlations were observed between student program and global belief variables. Table 12 illustrates the adjusted odds ratios for the outcome variable 'counselling self-efficacy' for cancer prevention practices.

# 4.4.1.1 Cancer prevention: perceived importance and counselling self-efficacy

In both the unadjusted and adjusted models, medical students who perceived a cancer prevention practice to be extremely important had higher odds of also strongly agreeing that they were confident about their ability to counsel regarding that cancer prevention strategy, compared to students who perceived the cancer prevention practice to be less important. In the adjusted model, this relationship existed for the following cancer prevention practices: smoking cessation (OR: 18.8, 95% CI: 5.88-73.7), healthy diet (OR:

5.40 95% CI: 2.19-14.0), physical activity (OR: 6.69, 95% CI: 2.63-18.1), safe sun protection (OR: 6.63, 95% CI: 2.60-18.4), healthy body weight (OR: 7.04, 95% CI: 2.76-19.2), alcohol reduction (OR: 7.63, 95% CI: 2.63-22.6), environmental risk factor reduction (OR: 17.2, 95% CI: 5.72-58.9), and safe sexual behaviour (OR: 12.1, 95% CI: 5.18-30.8).

Similarly, naturopath students who perceived a cancer prevention practice to be extremely important vs. less important were more confident in their ability to conduct counselling on the following cancer prevention practices: smoking cessation (OR: 12.0, 95% CI: 4.45-32.2), consuming a healthy diet (OR: 5.19, 1.42-20.3), physical activity (OR: 9.73, 95% CI: 3.41-31.1), safe sun exposure (OR: 8.69; 95% CI: 3.80-21.2), healthy body weight (OR: 11.2, 95% CI: 4.48-30.1), alcohol reduction (OR: 9.74, 95% CI: 4.10-24.7), environmental risk factor reduction (OR: 5.54, 95% CI: 2.06-15.8), and safe sexual behaviour (OR: 10.4, 95% CI: 4.51-25.6)

Although naturopath and medical students displayed similar odds ratios, more naturopath students perceived almost every cancer prevention practice to be more important and also reported stronger agreement with their perceived sense of counselling self-efficacy. This association remained true for the following cancer prevention practices: maintaining a healthy diet (NAT: 75%, MED: 21%), receiving adequate physical activity (NAT: 54%, MED: 18%), maintaining a healthy body weight (NAT: 48%, MED: 17%), alcohol reduction (NAT: 32%, MED: 17%), environmental risk factor reduction (NAT: 54%, MED: 19%), and safe sexual behaviour (NAT: 37%, MED: 29%). It should be mentioned that high rates of both medical and naturopath students (approximately 66%) reported perceiving smoking cessation to be highly important and also indicated having a stronger perceptions of counselling self-efficacy towards smoking cessation.

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# 4.4.1.2 Cancer prevention: global and counselling self-efficacy

### **Cancer Beliefs**

In the adjusted model, medical students' smoking cessation counselling self-efficacy perceptions were associated with the independent variable 'cancer beliefs'. Medical students who report more positive cancer beliefs (strongly disagreeing or disagreeing with negative cancer beliefs) were 2.23 (95% CI: 1.08-5) times more likely to strongly agree that they were confident in their ability to counselling on smoking cessation. Similarly, medical students with more positive cancer beliefs, compared to students with more negative cancer beliefs, had 3.13 (95% CI: 1.2-8.33) times the odds of strongly agreeing that counselling their future patients on sun protection was an important cancer prevention practice.

#### <u>CAM Beliefs</u>

In the adjusted analysis, naturopath students who had increasingly positive CAM beliefs, compared to those with less positive beliefs, had 3.8 (95% CI: 10.5-15.8) times the odds of strongly agreeing that they were confident with their ability to counselling on physical activity for cancer prevention. Furthermore, the odds that a medical student strongly agreed with perceptions of counselling self-efficacy for environmental risk factor reduction, and had increasingly positive CAM beliefs, was 9.50 (95% CI: 1.83-6.43) times that of a student who had less positive CAM beliefs.

### Prevention beliefs

In the adjusted analysis, medical students who strongly agreed with prevention beliefs, compared to having any 'other' belief, were 16 times more likely (95% CI: 2.01-365) to also indicate confidence that counselling their future patients on sun protection would be efficacious for the prevention of skin cancer. However, with the large confidence intervals associated with this odds ratio, cautious interpretation is necessary. The global belief variable 'prevention beliefs' was also correlated with a naturopath student's counselling self-efficacy for environmental risk factor reduction (OR: 2.70, 95% CI: 1.04-7.11).

No statistically significant associations were found for medical or naturopath students regarding the other global belief variables (cancer beliefs, prevention beliefs or CAM beliefs) in the adjusted logistic regression model for healthy diet, healthy body weight, alcohol reduction, and safe sexual behaviours.

# Table 12: Unadjusted and adjusted logistic regression for medical and naturopath students' counselling self-efficacy regarding cancer prevention

|   |  |                               | Medical Students                   |                                  | Naturopath Students                |                                  |  |  |
|---|--|-------------------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|--|--|
| Outcome Variable                                  | Independent<br>Variables   |                               | Unadjusted Odds<br>Ratio (95% CI)* | Adjusted Odds<br>Ratio (95% CI)* | Unadjusted Odds<br>Ratio (95% CI)* | Adjusted Odds<br>Ratio (95% CI)* |  |  |
| Counselling Self-                                 | Importance of<br>Smoking<br>Cessation  | Extremely                     | 18.6 (6.54-62.5)                   | 18.8 (5.88-73.7)                 | 13.0 (5.01-36.5)                   | 12.0 (4.45-35.2)                 |  |  |
| Cessation   |  | Other                         | Reference                          | Reference                        | Reference                          | Reference                        |  |  |
|   | Cancer Beliefs   | Other                         | 0.45 (0.20-0.93)                   | 0.26 (0.08-0.71)                 | 2.23 (0.83-7.13)                   | 1.25 (0.38-4.56)                 |  |  |
|   |  | Strongly<br>Disagree/Disagree | Reference                          | Reference                        | Reference                          | Reference                        |  |  |
|   | Prevention<br>Beliefs  | Strongly Agree                | 2.92 (0.74-19.4)                   | 2.31 (0.43-19.2)                 | 2.48 (1.10-5.77)                   | 2.07 (0.75-5.88)                 |  |  |
|   |  | Other                         | Reference                          | Reference                        | Reference                          | Reference                        |  |  |
|   | CAM Beliefs  | Strongly Agree                | 6 (1.12-111.4)                     | 3.28 (0.51-65.0)                 | 2.39 (0.95-5.92)                   | 1.53 (0.47-4.81)                 |  |  |
|   |  | Other                         | Reference                          | Reference                        | Reference                          | Reference                        |  |  |
|   | * Adjusted OR Model For Medical Students Controlled For: Importance of Smoking Cessation, Cancer Beliefs, Prevention Beliefs, CAM Beliefs, Percent of Cancer Thought to be Preventable |                               |                                    |                                  |                                    |                                  |  |  |
|   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Smoking Cessation, Cancer Beliefs, Prevention Beliefs, CAM Beliefs   |                               |                                    |                                  |                                    |                                  |  |  |
| Counselling Self-<br>Efficacy For Healthy<br>Diet | Importance of  | Extremely                     | 6.25 (2.74-15.0)                   | 5.40 (2.19-14.0)                 | 7.88 (2.59-24.8)                   | 5.19 (1.42-20.3)                 |  |  |
|   | Diet   | Other                         | Reference                          | Reference                        | Reference                          | Reference                        |  |  |
|   | Cancer Beliefs   | Other                         | 1.22 (0.59-2.57)                   | 0.74 (0.31-1.72)                 | 4.14 (1.11-27.0)                   | 3.60 (0.88-24.8)                 |  |  |
|   |  | Strongly<br>Disagree/Disagree | Reference                          | Reference                        | Reference                          | Reference                        |  |  |
|   | Prevention<br>Beliefs  | Strongly Agree                | 2.42 (0.79-7.85)                   | 1.84 (0.49-6.84)                 | 2.81 (1.10-7.63)                   | 1.37 (0.41-4.40)                 |  |  |
|   |  | Other                         | Reference                          | Reference                        | Reference                          | Reference                        |  |  |
|   | CAM Beliefs  | Strongly Agree                | 4.32 (1.31-16.8)                   | 1.75 (0.40-8.38)                 | 3.12 (1.13-8.40)                   | 1.56 (0.46-4.92)                 |  |  |

|   |   | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |  |
|---|---|-------------------------------|------------------|------------------|------------------|------------------|--|--|--|
|   | * Adjusted OR Model For Medical Students Controlled For: Importance of Diet, Cancer Beliefs, Prevention Beliefs, CAM Beliefs,<br>Percent of Cancer Thought to be Preventable  |                               |                  |                  |                  |                  |  |  |  |
|   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Smoking Cessation, Cancer Beliefs, Prevention<br>Beliefs, CAM Beliefs, Comfort With Cancer Prevention Counselling   |                               |                  |                  |                  |                  |  |  |  |
| Counselling Self-                                   | Importance of   | Extremely                     | 7.26 (3.07-18.2) | 6.69 (2.63-18.1) | 12.4 (5.07-33.4) | 9.73 (3.41-31.1) |  |  |  |
| Efficacy For Physical<br>Activity                   | Physical Activity   | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |  |
|   | Cancer Beliefs  | Other                         | 1.00 (0.47-2.13) | 0.59 (0.23-1.47) | 2.30 (0.96-5.99) | 3.80 (1.05-15.8) |  |  |  |
|   |   | Strongly<br>Disagree/Disagree | Reference        | Reference        | Reference        | Reference        |  |  |  |
|   | Prevention<br>Beliefs   | Strongly Agree                | 2.15 (0.68-6.75) | 1.79 (0.47-6.58) | 2.86 (1.36-6.15) | 1.23 (0.43-3.45) |  |  |  |
|   |   | Other                         | Reference        | Reference        | Reference        |                  |  |  |  |
|   | CAM Beliefs   | Strongly Agree                | 2.54 (0.79-8.44) | 1.07 (0.23-4.73) | 4.27 (1.76-11.0) | 4.02 (0.93-8.72) |  |  |  |
|   |   | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |  |
|   | * Adjusted OR Model For Medical Students Controlled For: Importance of Physical Activity, Cancer Beliefs, Prevention Beliefs, CAM Beliefs, Percent of Cancer Thought to be Preventable and Expected Time On Cancer Prevention                   |                               |                  |                  |                  |                  |  |  |  |
|   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Physical Activity, Cancer Beliefs, Prevention<br>Beliefs, CAM Beliefs, Expected Time Spent On Cancer Prevention, Comfort With Cancer Prevention Counselling, and Year |                               |                  |                  |                  |                  |  |  |  |
| Counselling Self-<br>Efficacy For Sun<br>Protection | Importance of   | Extremely                     | 6.40 (2.89-14.8) | 6.63 (2.60-18.4) | 8.86 (3.96-21.1) | 8.69 (3.80-21.2) |  |  |  |
|   | Sun   | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |  |
|   | Cancer Beliefs  | Other                         | 0.37 (0.17-0.79) | 0.32 (0.12-0.83) | 1.39 (0.61-3.19) | 0.90 (0.34-2.35) |  |  |  |
|   |   | Strongly<br>Disagree/Disagree | Reference        | Reference        | Reference        | Reference        |  |  |  |
|   | Prevention<br>Beliefs   | Strongly Agree                | 9.80 (1.85-181)  | 16.0 (2.01-365)  | 1.58 (0.77-3.28) | 1.48 (0.62-3.6)  |  |  |  |
|   |   | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |  |
|   | CAM Beliefs   | Strongly Agree                | 2.29 (0.66-10.7) | 1.54 (0.25-12.7) | 2.27 (0.95-5.79) | 1.44 (0.48-4.39) |  |  |  |
|   |   | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |  |
|   | * Adjusted OR Model For Medical Students Controlled For: Importance of Sun Protection, Cancer Beliefs, Prevention Beliefs, CAM Beliefs, Family History of Cancer  |                               |                  |                  |                  |                  |  |  |  |

|  | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Sun Protection, Cancer Beliefs, Prevention Beliefs, CAM Beliefs  |                               |                  |                  |                  |                  |  |  |
|--|--|-------------------------------|------------------|------------------|------------------|------------------|--|--|
| Counselling Self-<br>Efficacy For<br>Maintaining A Healthy | Importance of<br>Healthy Body<br>Weight  | Extremely                     | 7.85 (3.25-20.2) | 7.04 (2.76-19.2) | 15.8 (6.67-40.7) | 11.2 (4.48-30.1) |  |  |
|  |  | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |
| Body Weight  | Cancer Beliefs   | Other                         | 1.25 (0.59-2.70) | 1.18 (0.49-2.85) | 2.75 (1.15-7.15) | 1.77 (0.57-5.79) |  |  |
|  |  | Strongly<br>Disagree/Disagree | Reference        | Reference        | Reference        | Reference        |  |  |
|  | Prevention<br>Beliefs  | Strongly Agree                | 2.24 (0.71-7.06) | 2.16 (0.58-7.99) | 3.37 (1.60-7.29) | 2.04 (0.76-5.54) |  |  |
|  |  | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |
|  | CAM Beliefs  | Strongly Agree                | 1.87 (0.56-6.03) | 0.72 (0.17-2.94) | 2.34 (0.99-5.74) | 0.97 (0.29-3.16) |  |  |
|  |  | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |
|  | * Adjusted OR Model For Medical Students Controlled For: Importance of Maintaining A Healthy Body Weight, Cancer Beliefs,<br>Prevention Beliefs, CAM Beliefs and Expected Time Spent On Cancer Prevention    |                               |                  |                  |                  |                  |  |  |
|  | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Maintaining A Healthy Body Weight, Cancer<br>Beliefs, Prevention Beliefs, CAM Beliefs and Expected Time Spent On Cancer Prevention |                               |                  |                  |                  |                  |  |  |
| Counselling Self-  | Importance of  | Extremely                     | 9.38 (3.79-24.7) | 7.63 (2.75-22.6) | 11.9 (5.18-29.3) | 9.74 (4.10-24.7) |  |  |
| Efficacy For Alcohol<br>Reduction                          | Alcohol  | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |
|  | Cancer Beliefs   | Other                         | 0.93 (0.43-2.04) | 0.49 (0.17-1.26) | 1.40 (0.62-3.21) | 1.04 (0.37-2.92) |  |  |
|  |  | Strongly<br>Disagree/Disagree | Reference        | Reference        | Reference        | Reference        |  |  |
|  | Prevention<br>Beliefs  | Strongly Agree                | 2.69 (0.85-8.51) | 1.57 (0.37-6.22) | 2.69 (1.27-5.89) | 1.78 (0.69-4.62) |  |  |
|  |  | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |
|  | CAM Beliefs  | Strongly Agree                | 6.75 (2.03-26.6) | 2.52 (0.53-13.3) | 3.21 (1.25-9.41) | 1.61 (0.49-5.69) |  |  |
|  |  | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |
|  | * Adjusted OR Model For Medical Students Controlled For: Importance of Alcohol Reduction, Cancer Beliefs, Prevention<br>Beliefs, CAM Beliefs and Percent of Cancers Thought to be Preventable                |                               |                  |                  |                  |                  |  |  |
|  | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Alcohol Reduction, Cancer Beliefs, Prevention<br>Beliefs, CAM Beliefs and Comfort With Cancer Prevention Counselling               |                               |                  |                  |                  |                  |  |  |
| Counselling Self-  | Importance of  | Extremely                     | 19.7 (7.39-59.0) | 17.2 (5.72-58.9) | 8.36 (3.64-20.3) | 5.54 (2.06-15.8) |  |  |
| Lineacy i of   | Risk Factors   | Other                         | Reference        | Reference        | Reference        | Reference        |  |  |

| Environment Risk<br>Factor Reduction                             | Cancer Beliefs  | Other                         | 1.34 (0.58-3.11) | 0.52 (0.15-1.61) | 1.42 (0.60-3.57)  | 1.02 (0.34-3.17) |  |  |
|--|---|-------------------------------|------------------|------------------|-------------------|------------------|--|--|
|  |   | Strongly<br>Disagree/Disagree | Reference        | Reference        | Reference         | Reference        |  |  |
|  | Prevention<br>Beliefs   | Strongly Agree                | 2.59 (0.79-8.20) | 0.75 (0.13-3.58) | 3.89 (1.79-8.74)  | 2.70 (1.04-7.11) |  |  |
|  |   | Other                         | Reference        | Reference        | Reference         | Reference        |  |  |
|  | CAM Beliefs   | Strongly Agree                | 14.7 (4.07-70.0) | 9.50 (1.83-64.5) | 2.54 (1.06-6.16)  | 0.98 (0.30-3.09) |  |  |
|  |   | Other                         | Reference        | Reference        | Reference         | Reference        |  |  |
|  | * Adjusted OR Model For Medical Students Controlled For: Importance of Environmental Risk Factor Reduction, Cancer<br>Beliefs, Prevention Beliefs, CAM Beliefs  |                               |                  |                  |                   |                  |  |  |
|  | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Environmental Risk Factor Reduction, Cancer<br>Beliefs, Prevention Beliefs, CAM Beliefs and Expected Time Spent On Cancer Prevention, Comfort With Cancer Prevention<br>Counselling |                               |                  |                  |                   |                  |  |  |
| Counselling on Safe<br>Sexual Behaviour For<br>Cancer Prevention | Importance of   | Extremely                     | 12.1 (5.18-30.8) | 12.6 (4.91-36.4) | 10.4 (4.51-25.6)  | 12.2 (4.74-35.3) |  |  |
|  | Behaviour   | Other                         | Reference        | Reference        | Reference         | Reference        |  |  |
|  | Cancer Beliefs  | Other                         | 0.80 (0.39-1.65) | 0.46 (0.17-1.14) | 1.66 (0.73-3.83)  | 0.89 (0.33-2.37) |  |  |
|  |   | Strongly<br>Disagree/Disagree | Reference        | Reference        | Reference         | Reference        |  |  |
|  | Prevention<br>Beliefs   | Strongly Agree                | 5.90 (1.72-27.2) | 3.07 (0.65-17.4) | 1.25 (0.61-2.560) | 0.58 (0.21-1.46) |  |  |
|  |   | Other                         | Reference        | Reference        | Reference         | Reference        |  |  |
|  | CAM Beliefs   | Strongly Agree                | 5.24 (1.50-24.4) | 1.81 (0.36-11.2) | 2.38 (0.97-6.25)  | 1.14 (0.36-3.63) |  |  |
|  |   | Other                         | Reference        | Reference        | Reference         | Reference        |  |  |
|  | * Adjusted OR Model For Medical Students Controlled For: Importance of Safe Sexual Behaviour, Cancer Beliefs, Prevention Beliefs, CAM Beliefs, Percent of Cancer Thought to be Prevented  |                               |                  |                  |                   |                  |  |  |
|  | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Safe Sexual Behaviour, Cancer Beliefs,<br>Prevention Beliefs, CAM Beliefs   |                               |                  |                  |                   |                  |  |  |

Table 13 depicts the odds ratios for the outcome of cancer screening counselling self-efficacy for the early detection of cancer.

# 4.4.1.3 Cancer screening: perceived importance and counselling self-efficacy

In both the unadjusted and adjusted models, medical students who perceived a cancer screening practice to be extremely important had higher odds of also strongly agreeing that their counselling ability was efficacious regarding that cancer screening practice, compared to students who perceived the cancer prevention practice to be less important. In the adjusted model, this relationship existed for the following cancer early detection practices: Pap test (OR: 29.0, 95% CI: 7.67-132), mammography (OR: 9.74, 95% CI: 3.75-28.6), BSE (OR: 34.6, 95% CI: 7.97-194), CBE (OR: 23.9, 95% CI: 6.65-110), thermography (OR: 31.6, 95% CI: 2.9-381), PSA (OR: 118, 16.1- 2.55e3), DRE (OR: 14.9, 95% CI: 5.6-43.2), FOBT (OR: 13.3, 95% CI: 5.63-33.9) and the flexible sigmoidoscopy (OR: 16.2, 95% CI: 6.68-43.0).

Similarly, naturopath students who perceived a cancer screening practice to be extremely important were also more confident in their ability to conduct counselling on the following cancer prevention practices: Pap test (OR: 15.9, 95% CI: 5.57-51.3), mammography (OR: 12.5, 95% CI: 3.87-48.9), BSE (OR: 21.5, 95% CI: 6.84-84.2), CBE (OR: 7.80, 95% CI: 3.42-19.1), thermography (OR: 20.6, 95% CI: 5.23-102), PSA (OR: 42.1, 95% CI: 9.23-290), DRE (OR: 14.9, 95% CI: 5.96-41.5), FOBT (OR: 10.7, 95% CI: 4.33-30.3) and flexible sigmoidoscopy (OR: 9.01, 95% CI: 3.28-27.1).

Although naturopath and medical students both displayed high odds ratios for perceived importance and counselling self-efficacy, a higher proportion of naturopath students perceived the practice of- and counselling on almost every cancer screening

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practice to be more importance or of higher counselling self-efficacy. This association was found for the Pap test (NAT: 69%, MED: 54%), BSE (NAT: 34%, MED: 7%), CBE (NAT: 31%, MED: 12%), Thermography (NAT: 11%, MED: 2%), PSA (NAT: 16%, MED: 6%) and DRE (NAT: 21%, MED: 15%). In contrast, a higher frequency of medical students perceived the practice of- and counselling on mammography (NAT: 21%, MED: 27%), FOBT (NAT: 18%, MED: 30%) and flexible sigmoidoscopy (NAT: 13%, MED: 26%) to be of higher importance/efficacy.

## 4.4.1.4 Cancer screening: global and counselling self-efficacy

# **Cancer Beliefs**

In the adjusted model, a medical student's 'cancer beliefs' were also associated with their sense of counselling self-efficacy for the Pap test. Medical students with increasingly positive cancer beliefs (indicated by disagreeing with cancer beliefs), compared to those students with more negative cancer beliefs, had a 3.70 (95% CI: 1.10-14.3) higher odds of strongly agreeing that they were confident in their ability to counselling their future patients on the Pap test.

#### Prevention beliefs

Naturopath students' prevention beliefs were associated with their perceived counselling self-efficacy regarding mammography. Students who reported higher prevention beliefs, compared to students with less positive beliefs, were 2.71 (95% CI: 1.02-7.74) times more confident in their ability to conduct mammography screening. Furthermore, a naturopath student's prevention beliefs were associated with counselling self-efficacy regarding flexible sigmoidoscopy (OR: 4.19, 95% CI: 1.39-14.8).

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# CAM Beliefs

Naturopath students with higher CAM beliefs were 12.3 (95% CI: 1.47-284) times more likely to strongly agree that they were confident with their ability to counsel regarding the PSA test. This large confidence interval is due to only one naturopath student reporting lower CAM beliefs and strongly agreeing with counselling self-efficacy for PSA testing. No other independent variables were correlated to the outcome of counselling on PSA testing.

No statistically significant associations were found for medical or naturopath students regarding the other global belief variables (cancer beliefs, prevention beliefs or CAM beliefs) in the adjusted logistic regression model for healthy diet, healthy body weight, alcohol reduction, and safe sexual behaviours.
| 0 0               | 0   |  |                         |                      |                         |                        |  |  |  |
|-------------------|---|--|-------------------------|----------------------|-------------------------|------------------------|--|--|--|
|                   |   |  | Medical Students        |                      | Naturopath              |                        |  |  |  |
|                   |   |  |                         |                      | Students                |                        |  |  |  |
| Outcome Variable  | Independent   |  | Unadjusted Odds         | Adjusted Odds Ratio  | Unadjusted Odds         | Adjusted Odds Ratio    |  |  |  |
|                   | Variables   |  | Ratio (95% CI)          | (95% CI)             | Ratio (95% CI)          | (95% CI)               |  |  |  |
| Counselling Self- | Importance of   | Extremely  | 20.5 (97.15-74.8)       | 29.0 (8.47-132)      | 17.0 (6.01-54.4)        | 15.9 (5.57-51.25)      |  |  |  |
| Efficacy For The  | Рар   | Other  | Reference               | Reference            | Reference               | Reference              |  |  |  |
| Pap Test          | Cancer Beliefs  | Other  | 0.50 (0.21-1.12)        | 0.27 (0.07-0.91)     | 1.81 (0.61-6.66)        | 1.49 (0.40-6.44)       |  |  |  |
|                   |   | Strongly   | Reference               | Reference            | Reference               | Reference              |  |  |  |
|                   |   | Disagree/Disagree  |                         |                      |                         |                        |  |  |  |
|                   | Prevention  | Strongly Agree   | 2.45 (0.62-16.3)        | 1.64 (0.22-16.8)     | 1.97 (0.79-5.03)        | 1.41 (0.44-4.49)       |  |  |  |
|                   | Beliefs   | Other  | Reference               | Reference            | Reference               | Reference              |  |  |  |
|                   | CAM Beliefs   | Strongly Agree   | 2.21 (0.55-14.8)        | 1.39 (0.15-16.8)     | 1.71(0.59-4.60)         | 1.21(0.32.4.30)        |  |  |  |
|                   |   | Other  | Reference               | Reference            | Reference               | Reference              |  |  |  |
|                   | * Adjusted OR Mo  | * Adjusted OR Model For Medical Students Controlled For: Importance of The Pap Test, Cancer Beliefs, Prevention Beliefs, CAM |                         |                      |                         |                        |  |  |  |
|                   | Beliefs, Percent of Cancer Thought to be Preventable and Ethnicity  |  |                         |                      |                         |                        |  |  |  |
|                   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of The Pap Test, Cancer Beliefs, Prevention Beliefs, |  |                         |                      |                         |                        |  |  |  |
|                   | CAM Beliefs   |  |                         |                      |                         |                        |  |  |  |
| Counselling Self- | Importance of   | Extremely  | 9.43 (3.88-25.8)        | 9.74 (3.75-28.6)     | 13.5 (5.02-43.6)        | 12.5 (3.87-48.9)       |  |  |  |
| Efficacy For      | Mam   | Other  | Reference               | Reference            | Reference               | Reference              |  |  |  |
| Mammography       | Cancer Beliefs  | Other  | 0.53 (0.26-1.09)        | 0.47 (0.19-1.14)     | 1.41 (0.62-3.21)        | 1.11 (0.37-3.34)       |  |  |  |
|                   |   | Strongly   | Reference               | Reference            | Reference               | Reference              |  |  |  |
|                   |   | Disagree/Disag   |                         |                      |                         |                        |  |  |  |
|                   |   | ree  |                         |                      |                         |                        |  |  |  |
|                   | Prevention Belief   | s Strongly Agree   | 1.41 (0.46-4.54)        | 1.23 (0.31-4.84)     | 2.32 (1.10-5.01)        | 2.71 (1.02-7.74)       |  |  |  |
|                   |   | Other  | Reference               | Reference            | Reference               | Reference              |  |  |  |
|                   | CAM Beliefs   | Strongly Agree   | 1.72 (0.54-6.02)        | 1.00 (0.22-4.53)     | 3.21 (1.25-9.41)        | 2.90 (0.80-12.1)       |  |  |  |
|                   |   | Other  | Reference               | Reference            | Reference               | Reference              |  |  |  |
|                   | * Adjusted OR Mo  | del For Medical Stud   | ents Controlled For: In | portance of Mammogra | phy, Cancer Beliefs, Pr | evention Beliefs, CAM  |  |  |  |
|                   | Beliefs, Family Hi  | story of Cancer and (  | Gender                  |                      |                         |                        |  |  |  |
|                   | * Adjusted OR Mo  | del For Naturopath S   | Students Controlled For | : Importance of Mamm | ography, Cancer Beliefs | s, Prevention Beliefs, |  |  |  |
|                   | CAM Beliefs, Age  | and Year   |                         |                      |                         |                        |  |  |  |
| Counselling Self- | Importance of BS  | E Extremely  | 29.1 (7.44-134.8)       | 34.6 (7.97-194)      | 24.2 (9.00-78.2)        | 21.5 (6.84-84.2)       |  |  |  |
| Efficacy For The  |   | Other  | Reference               | Reference            | Reference               | Reference              |  |  |  |
| DCE               | Cancor Boliofs  | Other  | 150(051-475)            | 114(028.467)         | 1 33 (0 59-3 05)        | 265(084-900)           |  |  |  |

### Table 13: Unadjusted and adjusted logistic regression for medical and naturopath students' counselling self-efficacy regarding cancer screening.

|                   |  | Strongly<br>Disagree/Disag<br>ree  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|-------------------|--|--|---------------------------|---------------------------|---------------------------|-----------------------|--|--|--|
|                   | Prevention<br>Beliefs  | Strongly Agree   | 5.3e-8 (Na-<br>2.78e42)   | 1.88 (Na-2.71e43)         | 1.92 (0.93-4.02)          | 1.43 (0.51-4.08)      |  |  |  |
|                   |  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   | CAM Beliefs  | Strongly Agree   | 1.33 (0.19-5.71)          | 2.63 (0.24-18.1)          | 1.93 (0.82-4.80)          | 1.05 (0.29-3.69)      |  |  |  |
|                   |  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   | * Adjusted OR Mode   | l For Medical Stud   | ents Controlled For: Im   | portance of BSE, Cance    | er Beliefs, Prevention Be | eliefs, CAM Beliefs   |  |  |  |
|                   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of BSE, Cancer Beliefs, Prevention Beliefs, CAM Beliefs, Expected Time With Patients and Year |  |                           |                           |                           |                       |  |  |  |
| Counselling Self- | Importance of CBE  | Extremely  | 17.2 (5.77-59.7)          | 23.9 (6.65-110)           | 7.85 (3.49-18.8)          | 7.8 (3.42-19.1)       |  |  |  |
| Efficacy For The  | •  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
| CBE               | Cancer Beliefs   | Other  | 1.34 (0.58-3.11)          | 0.95 (0.32-2.80)          | 1.33 (0.59-3.05)          | 1.17 (0.45-3.06)      |  |  |  |
|                   |  | Strongly<br>Disagree/Disag   | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   |  | ree  |                           |                           |                           |                       |  |  |  |
|                   | Prevention Beliefs   | Strongly Agree   | 0.47 (0.07-1.87)          | 0.35 (0.03-2.26)          | 1.92 (0.93-4.03)          | 1.66 (0.70-4.02)      |  |  |  |
|                   |  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   | CAM Beliefs  | Strongly Agree   | 2.08 (0.58-6.80)          | 0.85 (0.13-4.85)          | 1.30 (0.55-3.13)          | 1.27 (0.44-3.74)      |  |  |  |
|                   |  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   | * Adjusted OR Model For Medical Students Controlled For: Importance of CBE, Cancer Beliefs, Prevention Beliefs, CAM Beliefs and Year                                 |  |                           |                           |                           |                       |  |  |  |
|                   | * Adjusted OR Mode   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of CBE, Cancer Beliefs, Prevention Beliefs, CAM Beliefs |                           |                           |                           |                       |  |  |  |
| Counselling Self- | Importance of  | Extremely  | 28.2 (2.84-295.1)         | 31.6 (2.9-3.81e2)         | 24.2 (7.56-89.7)          | 20.6 (5.23-102)       |  |  |  |
| Efficacy For      | Therm  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
| Thermography      | Cancer Beliefs   | Other  | 0.95 (0.11-8.13)          | 81.6 (0.07-8.38)          | 2.22 (0.83-5.78)          | 1.62 (0.45- 5.73)     |  |  |  |
|                   |  | Strongly<br>Disagree/Disag<br>ree  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   | Prevention Beliefs   | Strongly Agree   | 8.19e-8 (Na-<br>2.27e144) | 1.12e-7 (Na-<br>8.28e202) | 1.94 (0.76-5.4)           | 0.72 (0.19-2.77)      |  |  |  |
|                   |  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   | CAM Beliefs  | Strongly Agree   | 8.27e-8 (Na-              | 1.31e-7 (Na-              | 3.75e7 (5.84e-24-         | 7.83e7 (6.43e-35-     |  |  |  |
|                   |  |  | 1.25e150)                 | 1.11e208)                 | Na)                       | 5.33e247)             |  |  |  |
|                   |  | Other  | Reference                 | Reference                 | Reference                 | Reference             |  |  |  |
|                   | * Adjusted OR Mode<br>Beliefs and Specialty  | l For Medical Stud   | ents Controlled For: Im   | portance of Thermogra     | aphy, Cancer Beliefs, Pro | evention Beliefs, CAM |  |  |  |

|                   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Thermography, Cancer Beliefs, Prevention Beliefs, CAM Beliefs and Percentage of Time Spent On Cancer Screening |                                   |                         |                         |                          |                               |  |
|-------------------|--|-----------------------------------|-------------------------|-------------------------|--------------------------|-------------------------------|--|
| Counselling Self- | Importance of PSA  | Extremely                         | 107 (20.0-900)          | 118 (16.1-2.55e3)       | 31.1 (9.95-121)          | 42.1 (9.23-290)               |  |
| Efficacy For The  | 1  | Other                             | Reference               | Reference               | Reference                | Reference                     |  |
| PSA               | Cancer Beliefs   | Other                             | 1.37 (0.41-4.89)        | 1.50 (0.21-12.4)        | 1.19 (0.46-2.90)         | 2.24 (0.58-9.30)              |  |
|                   |  | Strongly<br>Disagree/Disag        | Reference               | Reference               | Reference                | Reference                     |  |
|                   | Provention Poliofe   | Strongly Agroo                    | 1 62 (0 22 7 12)        | 0.27 (0.008.2.68)       | 1 07 (0 85 4 78)         | 2 60 (0 60 12 7)              |  |
|                   | rievention beneis  | Other                             | Reference               | Reference               | Reference                | 2.09 (0.09-12.7)<br>Reference |  |
|                   | CAM Beliefs  | Strongly Agree                    | 3 30 (0 66-13 3)        | 2 24 (0 12-26 1)        | 12 8 (2 53-234)          | 12 3 (1 47-284)               |  |
|                   | GAIM Deficis   | Other                             | Reference               | Reference               | Reference                | Reference                     |  |
|                   | * Adjusted OR Mode<br>Age  | l For Medical Stud                | ents Controlled For: Im | portance of PSA, Cance  | r Beliefs, Prevention Be | eliefs, CAM Beliefs and       |  |
|                   | * Adjusted OR Mode<br>Age and Year   | l For Naturopath S                | tudents Controlled For  | : Importance of PSA, Ca | incer Beliefs, Preventio | n Beliefs, CAM Beliefs,       |  |
| Counselling Self- | Importance of DRE  | Extremely                         | 14.9 (5.6-43.2)         | 14.9 (5.51-43.9)        | 12.6 (5.31-32.3)         | 14.9 (5.96-41.5)              |  |
| Efficacy For The  |  | Other                             | Reference               | Reference               | Reference                | Reference                     |  |
| DRE               | Cancer Beliefs   | Other                             | 0.78 (0.33-1.82)        | 0.73 (0.25-2.06)        | 0.95 (0.40-2.17)         | 1.23 (0.42-3.52)              |  |
|                   |  | Strongly<br>Disagree/Disag<br>ree | Reference               | Reference               | Reference                | Reference                     |  |
|                   | Prevention Beliefs   | Strongly Agree                    | 0.89 (0.19-3.14)        | 0.94 (0.16-4.42)        | 1.45 (0.69-3.09)         | 2.00 (0.76-5.65)              |  |
|                   |  | Other                             | Reference               | Reference               | Reference                | Reference                     |  |
|                   | CAM Beliefs  | Strongly Agree                    | 1.56 (0.39-5.24)        | 1.09 (0.20-5.49)        | 1.42 (0.59-3.62)         | 1.21 (0.37-4.18)              |  |
|                   |  | Other                             | Reference               | Reference               | Reference                | Reference                     |  |
|                   | * Adjusted OR Model For Medical Students Controlled For: Importance of DRE, Cancer Beliefs, Prevention Beliefs, CAM Beliefs  |                                   |                         |                         |                          |                               |  |
|                   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of DRE, Cancer Beliefs, Prevention Beliefs, CAM   |                                   |                         |                         |                          |                               |  |
|                   | Beliefs, Comfort Wit   | h Cancer Screening                | g Counselling           | -                       |                          |                               |  |
| Counselling Self- | Importance of  | Extremely                         | 13.3 (5.63-33.9)        | 13.0 (5.21-36.0)        | 10.7 (4.08-30.5)         | 10.7 (4.08-30.53)             |  |
| Efficacy For The  | FOBT   | Other                             | Reference               | Reference               | Reference                | Reference                     |  |
| FOBT              | Cancer Beliefs   | Other                             | 0.92 (0.44-1.88)        | 1.00 (0.40-2.52)        | 0.93(0.38-2.71)          | 0.97 (0.33-2.71)              |  |
|                   |  | Strongly<br>Disagree/Disag<br>ree | Reference               | Reference               | Reference                | Reference                     |  |
|                   | Prevention Beliefs   | Strongly Agree                    | 5.90 (1.72-27.2)        | 3.89 (0.89-20.1)        | 2.07 (0.73-6.31)         | 2.08 (0.73-6.31)              |  |
|                   |  | Other                             | Reference               | Reference               | Reference                | Reference                     |  |
|                   | CAM Beliefs  | Strongly Agree                    | 2.33 (0.73-8.14)        | 0.56 (0.11-2.85)        | 1.15 (0.31-4.70)         | 1.14 (0.31-4.70)              |  |

|                   |   | Other  | Reference        | Reference        | Reference        | Reference        |  |
|-------------------|---|--|------------------|------------------|------------------|------------------|--|
|                   | * Adjusted OR Model For Medical Students Controlled For: Importance of FOBT, Cancer Beliefs, Prevention Beliefs, CAM Beliefs              |  |                  |                  |                  |                  |  |
|                   | * Adjusted OR Model For Naturopath Students Controlled For: Importance of FOBT, Cancer Beliefs, Prevention Beliefs, CAM Beliefs, and Year |  |                  |                  |                  |                  |  |
|                   |   |  |                  |                  |                  |                  |  |
| Counselling Self- | Importance of Sig   | Extremely  | 16.2 (6.68-43.0) | 16.7 (6.22-50.1) | 8.21 (3.23-21.9) | 9.01 (3.28-27.1) |  |
| Efficacy For The  |   | Other  | Reference        | Reference        | Reference        | Reference        |  |
| Flexible          | Cancer Beliefs  | Other  | 0.93 (0.44-1.96) | 0.68 (0.25-1.77) | 1.78 (0.70-4.37) | 1.61 (0.56-4.56) |  |
| Sigmoidoscopy     |   | Strongly   | Reference        | Reference        | Reference        | Reference        |  |
|                   |   | Disagree/Disag   |                  |                  |                  |                  |  |
|                   |   | ree  |                  |                  |                  |                  |  |
|                   | <b>Prevention Beliefs</b>   | Strongly Agree   | 1.48 (0.46-4.58) | 2.10 (0.46-8.90) | 3.83 (1.51-11.2) | 4.19 (1.39-14.8) |  |
|                   |   | Other  | Reference        | Reference        | Reference        | Reference        |  |
|                   | CAM Beliefs   | Strongly Agree   | 3.48 (1.08-12.3) | 0.88 (0.19-4.31) | 5.04 (1.37-32.7) | 2.41 (0.53-17.4) |  |
|                   |   | Other  | Reference        | Reference        | Reference        | Reference        |  |
|                   | * Adjusted OR Model For Medical Students Controlled For: Importance of Sig, Cancer Beliefs, Prevention Beliefs, CAM Beliefs, and          |  |                  |                  |                  |                  |  |
|                   | Percentage of Expec   | Percentage of Expected Time Spent On Cancer Screening  |                  |                  |                  |                  |  |
|                   | * Adjusted OR Mode  | * Adjusted OR Model For Naturopath Students Controlled For: Importance of Sig, Cancer Beliefs, Prevention Beliefs, CAM Beliefs |                  |                  |                  |                  |  |
|                   | and Percentage of Expected Time Spent On Cancer Screening   |  |                  |                  |                  |                  |  |

#### 4.5 Effect of program on counselling self-efficacy

Table 14 depicts the odds ratios for the outcome 'counselling self-efficacy' aimed at cancer prevention and screening practices for the early detection of cancer controlling for educational program. Data were analysed by backward stepwise logistic regression analysis. The variable 'program' was not removed in the backwards selection as it was the primary indicator/independent variable. Only significant sociodemographic and potential key correlates were included in the model. No global belief variables (cancer, prevention, and CAM beliefs) were included in the model because they were found in previous analyses to be highly correlated to the primary independent variable 'program'.

In the adjusted model, the only outcome variable that was significantly related to a student's academic program was perceived efficacy of counselling future patients on physical activity for cancer prevention. Medical students were 2.27 (95% CI: 1.02-5.56) times more likely to strongly agree that they were comfortable with their ability to counselling their future patients on physical activity.

No other counselling self-efficacy outcome variables were significantly associated with program after adjusting for potential confounders.

| Table 14: Adjusted odds ratios of effect of program on students' | counselling self- |
|--|-------------------|
| efficacy   |                   |

| OUTCOME VARIABLE          | PROGRAM                              | Adjusted Odds Ratios (95% CI)                   |
|---------------------------|--------------------------------------|---|
| COUNSELLING SELF-EFFICACY | Medical Students                     | Reference                                       |
| FOR SMOKING CESSATION     | Naturopath Students                  | 1.03 (0.49-2.14)                                |
|                           | * Adjusted Odds Ratio controlled for | r: program, comfort with cancer prevention      |
|                           | counselling, perceived importance of | of smoking cessation                            |
| COUNSELLING SELF-EFFICACY | Medical Students                     | Reference                                       |
| FOR A HEALTHY DIET        | Naturopath Students                  | 1.94 (0.91-4.09)                                |
|                           | * Adjusted Odds Ratio controlled for | r: percent of cancer thought to be preventable, |
|                           | comfort with cancer prevention cou   | inselling, importance of diet                   |
| COUNSELLING SELF-EFFICACY | Medical Students                     | Reference                                       |
| FOR PHYSICAL ACTIVITY     | Naturopath Students                  | 0.44 (0.18-0.98)                                |

|                           | * Adjusted Odds Ratio controlled for: program, comfort with cancer prevention        |   |  |  |
|---------------------------|--|---|--|--|
|                           | counselling, expected percentage of tim  | e spent on cancer prevention, importance of |  |  |
|                           | physical activity  |   |  |  |
| COUNSELLING SELF-EFFICACY | Medical Students   | Reference                                   |  |  |
| FOR SUN PROTECTION        | Naturopath Students  | 0.63 (0.35-1.12)                            |  |  |
|                           | * Adjusted Odds Ratio controlled for: pr   | rogram, importance of safe sun practices    |  |  |
| COUNSELLING SELF-EFFICACY | Medical Students   | Reference                                   |  |  |
| FOR MAINTAINING A         | Naturopath Students  | 0.32 (0.08-1.25)                            |  |  |
| HEALTHY BODY WEIGHT       | * Adjusted Odds Ratio controlled for: pr   | ogram, percent of cancer thought to be      |  |  |
|                           | preventable, expected time with patients, expected percentage of time spent on       |   |  |  |
|                           | cancer prevention, year importance of h  | nealthy body weight for cancer prevention   |  |  |
| COUNSELLING SELF-EFFICACY | Medical Students   | Reference                                   |  |  |
| FOR ALCOHOL REDUCTION     | Naturopath Students  | 0.50(0.22-1.08)                             |  |  |
|                           | * Adjusted Odds Ratio controlled for: program, percent of cancer thought to be       |   |  |  |
|                           | preventable, importance of alcohol redu  | uction for cancer prevention, age           |  |  |
| COUNSELLING SELF-EFFICACY | Medical Students   | Reference                                   |  |  |
| FOR ENVIRONMENT RISK      | Naturopath Students  | 0.38(0.09-1.47)                             |  |  |
| FACTORS REDUCTION         | * Adjusted odds ratio controlled for: program, family history of prevention, percent |   |  |  |
|                           | of cancer thought to be preventable, expected time with patients, comfort with       |   |  |  |
|                           | counselling on cancer prevention, importance of environmental risk factor reduction  |   |  |  |
|                           | for cancer prevention  |   |  |  |
| COUNSELLING SELF-EFFICACY | Medical Students   | Reference                                   |  |  |
| FOR SAFE SEXUAL           | Naturopath Students  | 0.50 (0.25-1.00)                            |  |  |
| BEHAVIOUR                 | * Adjusted Odds Ratio controlled for: program, percent of cancer thought to be       |   |  |  |
|                           | preventable, importance of safe sexual behavior for cancer prevention                |   |  |  |

| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
|---------------------------|--|---|--|--|
| EFFICACY FOR THE PAP TEST | Naturopath Students  | 0.68(0.37-1.22)                                   |  |  |
|                           | * Adjusted odds ratio controlled   | for: percent of cancer thought to be preventable, |  |  |
|                           | importance of Pap test for cance   | r screening                                       |  |  |
| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
| EFFICACY FOR              | Naturopath Students  | 0.72 (0.39-1.30)                                  |  |  |
| MAMMOGRAPHY               | * Adjusted odds ratio controlled for: program, importance of mammograp             |   |  |  |
|                           | cancer screening, gender   |   |  |  |
| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
| EFFICACY FOR THE BSE      | Naturopath Students  | 0.70 (0.11-3.55)                                  |  |  |
|                           | * Adjusted odds ratio controlled   | for: program, percent of cancer thought to be     |  |  |
|                           | preventable, expected time with  | patients, importance of BSE for cancer screening  |  |  |
| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
| EFFICACY FOR THE CBE      | Naturopath Students  | 1.12 (0.29-3.77)                                  |  |  |
|                           | * Adjusted odds ratio controlled for: program, expected time with patients,        |   |  |  |
|                           | importance of CBE for cancer scr   | eening  |  |  |
| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
| EFFICACY FOR              | Naturopath Students  | 1.51 (0.11-15.4)                                  |  |  |
| THERMOGRPAHY              | * Adjusted odds ratio controlled   | for: program, percent of preventable cancer,      |  |  |
|                           | expected time with patients, expected percentage of screening time, importance of  |   |  |  |
|                           | thermography   |   |  |  |
| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
| EFFICACY FOR THE PSA TEST | Naturopath Students  | 0.79 (0.10-5.54)                                  |  |  |
|                           | * Adjusted odds ratio controlled for: program, percent of preventable cancer,      |   |  |  |
|                           | expected time with patients, imp   | ortance of PSA testing for cancer screening       |  |  |
| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
| EFFICACY FOR THE DRE      | Naturopath Students  | 1.02 (0.46-2.30)                                  |  |  |
|                           | * Adjusted odds ratio controlled for: program, percent of preventable cancer, age, |   |  |  |
|                           | importance of DRE for cancer sci   | reening   |  |  |
| COUNSELLING SELF-         | Medical Students   | Reference   |  |  |
| EFFICACY FOR THE FOBT     | Naturopath Students  | 0.67 (0.32-1.38)                                  |  |  |

|                           | * Adjusted odds ratio controlled for: program, age, importance of FOBT testing for<br>cancer screening |                  |  |  |
|---------------------------|--|------------------|--|--|
| COUNSELLING SELF-         | Medical Students   | Reference        |  |  |
| EFFICACY FOR THE FLEXIBLE | Naturopath Students  | 0.77 (0.40-1.51) |  |  |
| SIGMOIDOSCOPY             | * Adjusted odds ratio controlled for: program, expected time spent on cancer                           |                  |  |  |
|                           | screening, importance of SIG testing for cancer screening  |                  |  |  |

#### 4.6 Medical school representativeness:

Data are published on the entering statistics of all medical school students and are freely available on the Faculty of Medicine's Webpage. The data for the 2016 graduating medical school class were not released and were omitted from the analysis. As can be seen in Table 15, our sample population was composed of more females than the general medical school population. Our sample of medical students had a similar mean age to that of the general UBC medical student population. The mean age of graduating UBC medical students, per year of study, was calculated by adding 4, 3, or 2 years to the mean age of entering students for the 2013, 2014 and 2015 graduating year. If the average age of the class of 2013 was 23.5 years old, 4 years were added to this age to account for 4 additional years of schooling. Finally, the sample that responded to our questionnaire had similar previous degrees to the general population of medical students. We were unable to capture ethnicity of students as the Faculty of Medicine classifies ethnicity as sensitive information not available for analysis.

### Table 15: Medical students' demographic comparisons between the sample and population data

| Variables             | Population<br>Data (Class<br>of 2013)                          | Population<br>Data (Class<br>of 2014)                        | Population<br>Data (Class<br>of 2015)                         | Sample<br>Data (Class<br>of 2013)                                   | Sample<br>Data (Class<br>of 2014)                                 | Sample<br>Data (Class<br>of 2015)                                   |
|-----------------------|--|--|---|---|---|---|
| Gender                | Female-<br>47.6%<br>Male –<br>52.4%                            | Female-<br>48.3%<br>Male –<br>51.7%                          | Female- 51%<br>Male – 49%                                     | Female-<br>71%<br>Male –29%   | Female-<br>78%<br>Male –<br>22%                                   | Female-<br>63%<br>Male –<br>36%                                     |
| Mean Age              | Entering<br>Year- 23.5 +<br>4<br>27                            | Entering<br>Year - 23.1 +<br>3<br>26                         | Entering<br>Year - 24.2 +<br>2<br>26                          | Median<br>Age-<br>Between<br>(27-29)                                | Median<br>Age-<br>Between<br>(24-26)                              | Median<br>Age-<br>Between<br>(24-26)                                |
| Recent Degree         | Bachelors or<br>< 3 Years =<br>88%%<br>Masters or<br>PhD = 12% | Bachelors or<br>< 3 Years =<br>90%<br>Masters or<br>PhD= 10% | Bachelors or<br>< 3 Years =<br>88%<br>Masters or<br>PhD = 12% | Bachelors<br>or < 3<br>Years =<br>73%<br>Masters or<br>PhD =<br>27% | Bachelors<br>or < 3<br>Years =<br>93%<br>Masters or<br>PhD=<br>7% | Bachelors<br>or < 3<br>Years =<br>89%<br>Masters or<br>PhD =<br>11% |
| Number of<br>Students | 258  | 300  | 347   | 11  | 41  | 35  |
| Year                  | 4  | 3  | 2   | 4   | 3   | 2   |

#### **Chapter 5: Discussion**

#### 5.1 Differences

#### 5.1.1 Specific cancer prevention practices

Research question 1a examined *to what extent medical and naturopath students differed regarding perceived importance of cancer risk factors and early detection practices.* Students were asked questions regarding the perceived importance of both specific and general cancer prevention and early detection practices. The study indicated that regarding specific cancer prevention practices, naturopath students were at higher odds of perceiving holistic forms of care to be of extreme importance, including practices such as acupuncture and hypnotherapy for smoking cessation.

Another important but not unexpected finding was that in contrast to medical students, naturopath students had higher odds of rating most dietary practices, biomedical or otherwise, as being extremely or very important. 'Advising patients to consume a multivitamin', 'advising patients to follow a diet containing a high intake of antioxidants' and 'advising patients to consume medicinal herbs' etc., were all perceived by naturopaths as being of higher relative importance. Currently, there is insufficient evidence to conclude that any of these practices prevent cancer (Bardia et al., 2008; Bjelakovic, Nikolova, Simonetti, & Gluud; Christen, Gaziano, & Hennekens, 2000; Greenwald, Anderson, Nelson, & Taylor, 2007; Huang, Caballero, Chang, & Alberg, 2006). The literature does suggest that extreme caution should be taken when advising patients to consume high levels of antioxidants or certain vitamins/minerals as they may have unexpected effects on preexisting, unidentified tumours (Greenwald et al., 2007).

It is somewhat surprising that naturopaths were at lower odds of strongly agreeing with referring patients to a nutritionist/dietician; however, there are several possible explanations for this finding. Previous literature suggests that the ultimate goal of naturopathic medicine is to encourage patient wellness through diet and lifestyle choices (S. Fleming & Gutknecht, 2010). Additionally, clinical nutrition counselling has been referred to as an integral part of a naturopath's holistic approach to patient care (Novak & Chapman, 2001). Thus, a naturopath may perceive patient referral to nutritionists/dieticians as unnecessary when dietary counselling falls within their scope of practice.

Naturopath students placed a limited importance on nicotine replacement for smoking cessation and the HPV vaccination for young girls and boys. This finding is in some degree disconcerting since hundreds of clinical trials have examined the effectiveness of nicotine replacement therapy on smoking cessation success. One such Cochrane review examined 103 trials directly comparing success rates of nicotine replacement with placebo to determine smoking abstinence after prolonged use. The pooled analyses suggested that nicotine replacement was associated with increased odds of quitting approximately equal to 1.5 to 2 (Silagy, Lancaster, Stead, Mant, & Fowler, 2004). The odds of success associated with nicotine intervention, albeit small, are important considering hypnotherapy and acupuncture trials for smoking cessation were found to be no better than sham placebo treatments (Lancaster, Stead, Silagy, & Sowden, 2000).

The finding that naturopath students do not perceive the HPV vaccination for cervical cancer prevention in young girls to be extremely or very important is also disconcerting. According to the Centers for Disease Control and Prevention, two

vaccinations currently available, Cervarix and Gardasil, have been shown to prevent two types of HPV (HPV-16 and 18) that cause 70% of all cervical cancers, while also reducing risk of anal and vaginal cancers. Furthermore, Gardasil has also been shown to protect males against most genital warts and anal cancers (Center For Disease Control, 2013).

Considering the high success rate of the vaccine, some researchers posit that varying beliefs and attitudes towards this screening practice may be hindering health care providers' willingness to counsel on the vaccine. For example, a US study examined the themes associated with physicians' willingness to provide the HPV vaccination and they found that, in addition to institutional/structural barriers (cost, policy, procedures, etc.), personal views were highly correlated with vaccination levels (Quinn, Murphy, Malo, Christie, & Vadaparampil, 2012). Personal vaccination objections cited by physicians included beliefs that the vaccination promoted promiscuity, reduced willingness to receive regular cervical cancer screening and would be unnecessary for girls under the age of 13 years old. These beliefs support the negative attitudes that some health providers had towards cervical cancer prevention using the HPV vaccine, which consequently could influence their ability to counsel on cervical cancer prevention using yaccines.

It is possible that naturopath students' perceived unimportance of the HPV vaccine results from negative beliefs in medical vaccination programs in general. There are distinct similarities between the views expressed in this study towards HPV vaccination, and those described by the Canadian Association of Naturopath Physicians towards the flu vaccine. For example, in a position paper, the flu vaccine was described as follows:

"The flu vaccination was developed by the allopathic health care system to decrease the risk of contracting the influenza virus. However, the best way of preventing any flu or

complications from any flu is through prevention. The main focus of prevention needs to be on daily healthy habits that ensure an optimum immune system and overall health"

(Canadian Association of Naturopathic Doctors, 2004). Understanding the beliefs underlying naturopath students' perceived unimportance of the HPV vaccine for cancer prevention is important since Canadians frequenting Naturopathic providers tend to be increasingly female and younger (Cherkin et al., 2002).

#### 5.1.2 General cancer prevention and early detection practices

## 5.1.2.1 Higher 'perceived importance' and 'counselling self-efficacy'- naturopaths5.1.2.1.1 Breast cancer detection tools

Thermography for breast cancer detection was least likely to be acknowledged by both medical and naturopath students as being an extremely important practice for the detection of breast cancer. Students were also not as confident in their ability to conduct counselling on thermography for cancer early detection. This finding is not surprising for medical students, since no thermography imaging machines are approved by Health Canada to screen for breast cancer (Health Canada, 2012a). Despite the fact that thermography had the lowest frequency of students reporting high perceptions of counselling self-efficacy and screening-importance, naturopath students still had much higher odds of maintaining positive beliefs towards this practice. Since thermography does not utilize radiation and has limited side effects, naturopath students may have had higher positive beliefs towards it.

Considering the high rates of CAM clinics offering thermography for breast cancer screening in Vancouver, it is unexpected that higher rates of perceived importance of

thermography were not observed. It is possible that the naturopath students had limited academic exposure to this procedure. After the students at BINM filled out the survey, one student approached me enquiring about thermography. She informed me that she had no idea what thermography was, and because the name 'thermography' seemed invasive and dangerous, she inherently rated it quite negatively. When I described that the procedure was thermal imaging of breast tissue, she became noticeably excited about the procedure and implied that she would have rated it much more positively given this knowledge. Perhaps she was not alone in her evaluation of this procedure. It would be an interesting follow up study, given thermography's apparent popularity, to inquire about the importance of and counselling beliefs towards thermography in practicing naturopaths and physicians who may have had more experience with the tool during their career.

Other breast screening tools examined here included mammography, BSE and CBE. The findings that CBE and BSE exams were perceived by naturopath students to be of significantly higher importance are slightly concerning. Current breast cancer screening guidelines from the Canadian Task Force on Preventive Health Care suggest that for women of average risk, health providers offer no routine CBEs, and no counselling on BSE (CTFPHC, 2013). These new guidelines reflect the latest scientific research that takes into account the screening procedure risks, including the notorious 'false-positive' results.

It could be hypothesized that naturopath students' general positive beliefs concerning CBE and BSE result from the notion that these procedures are non-invasive and have no side effects. Unfortunately, it is often forgotten that counselling on BSE, and performing CBE is associated with increased breast biopsies and diagnosis of more benign breast lesions (National Cancer Institute, 2013), increased anxiety and stress.

#### 5.1.2.1.2 Prostate cancer detection tools

Prostate cancer is the most common form of cancer in men (Canadian Cancer Statistics, 2013). The causes of prostate cancer are not well understood. The PSA blood test was originally developed to detect whether a confirmed case of treated prostate cancer was recurring. This test was never intended for prostate cancer screening in men without a confirmed case of the disease. Unfortunately, some health care providers perceive the PSA test to be a screening tool. Our findings suggest that naturopath students had higher odds of perceiving the PSA test to be more important. Furthermore, naturopath students also had higher odds of strongly agreeing that they were confident in their ability to counsel on the PSA test. In contrast, only approximately 8% of medical students perceived the PSA test to be of extreme importance.

The PSA test is a poor measure of prostate cancer development as many non-cancer related conditions, such as an enlarged prostate, can cause blood PSA levels to rise (Canadian Cancer Society, 2013); this can result in cancer-free men needlessly undergoing uncomfortable biopsies. Furthermore, clinical trials published from Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial of the National Cancer Institute shows limited survival benefit associated with PSA screening (Brenner & Arndt, 2005).

There is very limited literature associated with naturopath students' PSA and DRE counselling beliefs and as such, drawing conclusions on these findings is difficult. During Ms. Dale's visit to BINM, one student spoke about how she believed that medical professionals should be performing all of these cancer-screening practices, even if naturopaths have the ability to do so. Perhaps naturopath students with higher positive

perceptions of the PSA and DRE would encourage their patients to visit their medical physician and discuss their prostate cancer screening options with them. This scenario would encourage positive integrative professional relationships.

#### 5.1.2.1.3 Other general cancer prevention practices and screening procedures

Given the nature of the naturopathic profession, it is not surprising that the naturopath students were more likely than medical students to report that healthy dietary practices, maintaining a healthy body weight, increased levels of physical activity, reduced consumption of alcohol and decreased exposure to environmental risk factors were extremely important for cancer prevention.

If students were able to maintain these beliefs as they progressed into working professionals, patients of health providers with positive perceptions of cancer prevention would likely benefit. It is noteworthy to mention that the general population requires increased education on cancer prevention practices as people often misunderstand the true cancer prevention guidelines. For example, one American study found that only 9.9% of women who reported eating a healthy diet actually met the minimum fruit and vegetable recommendations for cancer prevention (Vidrine et al., 2013); furthermore, less than half of these same women who reported regular physical activity truly met the minimum requirements for cancer prevention (Vidrine et al., 2013). Although North Americans have greater access to free and reliable health information, there are still significant misunderstandings about modifiable lifestyle risk factors for cancer prevention.

Despite the positive finding that naturopath students believe that cancer prevention practices are more important, and have higher confidence in their ability to conduct this

counselling, there exist some major drawbacks for potential future patients. Much research documents the effects of low socioeconomic status on cancer prevention practices, and in the aforementioned study, women of low socioeconomic status were much less likely to reach the required amounts of physical activity and dietary requirements (Virdine, 2013; Goldstein, 2005). Naturopathic medicine is not currently covered by any of the provincial health plans and the average patient may pay between \$35 - \$180 per visit (CAND, 2013). Unfortunately, low socioeconomic status individuals who do not have extended health insurance plans that cover naturopathic treatments may not be able to receive higher rates of naturopathic counselling.

# 5.1.2.2 Higher 'perceived importance' and 'counselling self-efficacy' for medical students

Medical students were more likely to perceive colorectal cancer screening procedures to be important, and almost statistically more likely to be confident in their ability to conduct this counselling. According to the colorectal cancer screening guidelines developed by the Canadian Task Force on Preventive Health Care, there is 'good evidence to support the inclusion of an annual or biennial FOBT, and fair evidence to include the flexible sigmoidoscopy in the periodic health examinations of asymptomatic individuals over age 50 years' (CTFPHC, 2013).

The finding that naturopath students have lower odds of perceiving colorectal cancer screening procedures to be of 'extreme' importance offers an opportunity for improvement. As the literature suggests, one of the main reasons that patients visit naturopathic providers is to receive advice about health maintenance or enhancement (Boon, Stewart, Kennard, & Guimond, 2003). Both naturopath and medical students will have the opportunity to counsel future patients on the fecal immunochemical test because as of April 1<sup>st</sup> 2013, this newer version of the FOBT became publically funded in British Columbia as a colorectal cancer preventive measure. It will be interesting to see if increased education associated with this new screening service can influence future students' confidence about their ability to counsel regarding the FOBT.

## 5.1.3 Students' cancer beliefs, prevention beliefs and complementary and alternative beliefs

Students were queried on three main global beliefs assessing cancer, prevention, and CAM. In the bivariate analysis, significant differences were found between medical and naturopath students pertaining to these global beliefs. Medical students had much higher odds of agreeing with cancer beliefs that were pessimistic in nature, and naturopath students had a much higher agreement with professional prevention and CAM beliefs. However, during the multivariate analysis, these global beliefs rarely remained significantly related to students' cancer prevention and screening counselling self-efficacy.

The results concerning cancer beliefs were unexpected based on the findings from the literature, particularly from the evidence presented in a review of the literature conducted by Miller (2000). There is substantial evidence to suggest that the cancer beliefs and attitudes of a layperson can influence their cancer prevention practices. For example, in a study by Niederdeppe (2007) adults who held fatalistic beliefs about cancer were less likely to engage in preventive lifestyle behaviours. Perhaps the association between cancer beliefs and prevention counselling was not found in our study because students have not

yet had the time and experience to develop fully their cancer beliefs as only approximately one in five students had experienced a family member being diagnosed with the disease.

#### 5.1.4 Correlates of study variables

In research question 2 the correlates of the independent variables (perceived importance, and global beliefs) and outcome variables (counselling self-efficacy) were examined. Correlates of these variables were important to measure, not only for their inclusion in the multivariate models, but if and when interventions are developed, a strong understanding of these correlates will precede translation into practice.

Of interest are two psychological correlates that differ in medical and naturopath students: 'percent of cancer thought to be preventable' and 'comfort with cancer counselling'. These are modifiable beliefs that can potentially be changed with educational intervention. For example, 'comfort with cancer prevention counselling' could be changed through educational interventions (in medical school or during professional development) aimed at providing background knowledge, instruction and brief feedback (Costanza, Greene, McManus, Hoople, & Barth, 2009). Naturopath students were significantly more likely to have an association between comfort with cancer prevention counselling and cancer prevention related beliefs. Thus, it seems appropriate that prior to any educational interventions aimed at increasing students' cancer prevention self-efficacy, additional time should be taken to measure and increase students' counselling comfort levels.

#### 5.2 Similarities

#### 5.2.1 Specific cancer prevention practices

#### 5.2.1.1 Smoking related practices and physical activity levels

Fortunately, smoking cessation practices, including the importance of targeting teens and adults for smoking cessation counselling, and warning patients about the dangers of second hand smoke were perceived to be extremely/very important by both naturopath and medical students, with over approximately 70% of students perceiving these practices to be extremely important. Additionally, high frequencies of both medical and naturopath students perceived addressing the issue of physical activity during visits with obese and healthy weight patients to be extremely/very important.

Despite inconclusive evidence of counselling efficacy on improving physical activity levels (Eden, Orleans, Mulrow, Pender, & Teutsch, 2002), obesity remains a major public health issue as it increases a person's risk of many chronic diseases, including cancer. It is a positive finding that both naturopath and medical students perceived addressing the issue of physical activity during visits with healthy weight patients to be extremely/very important, as it would be a missed opportunity for primary prevention.

#### 5.2.1.2 Referral patterns

Medical and naturopath students responded quite positively to most questions querying 'referral' as a process of cancer prevention. Approximately 50% of students perceived the following practices to be extremely or very important: referring obese patients to self-help groups, referring obese patients to physical activity programs, referring obese patients to a fitness counselling specialist, referring inactive patients to a fitness specialist or appropriate physical activity, referring patients to receive peer support for problem drinking, and referring patients to receive clinical counselling for problem drinking.

These high rates of referral beliefs are intriguing, as the only available literature examining referral patterns of family physicians and naturopaths suggests low rates of referrals by naturopaths (Eden et al., 2002). Since this aforementioned study only examined 15 naturopaths, more expansive research should be conducted before any definitive conclusions are drawn. Regarding this study, high rates of positive referral beliefs suggest potential increased collaboration between future health care providers.

#### 5.2.2 General cancer prevention and early detection practices

#### 5.2.2.1 Similar 'perceived importance' and 'counselling self-efficacy'

Medical and naturopath students showed similar rates of perceived importance of and counselling self-efficacy regarding general cancer prevention and early detection practices for smoking cessation, mammography, the Pap test, sun protection and safe sexual behaviours. Smoking cessation, mammography and the Pap test will be described in further detail.

#### 5.2.2.1.1 Smoking cessation

Another important finding of this study includes the increased likelihood of both medical and naturopath students indicating that smoking cessation for cancer prevention was extremely important and that they were more confident in their ability to conduct this counselling. One of the most famous epidemiological advances in the 20<sup>th</sup> century was the discovery of the association between smoking and lung cancer. With over 60 years of clinical and epidemiological research providing sound evidence supporting the direct causal link between the carcinogens found in tobacco products and cancer in later life, health providers and laypersons alike would be hard pressed to find reliable evidence supporting the contrary.

#### 5.2.2.1.2 Mammography and Pap tests

This study found similar rates of perceived importance of, and counselling selfefficacy perceptions for the Pap test and mammography between medical and naturopath students. Even though more naturopath students reported a higher perceived importance of the Pap test, over 50% of both students strongly agreed that they were also confident in their ability to counsel on the Pap test. This is an important finding as the regular screening guidelines for British Columbia include Pap tests once a year for the first three years since sexual debut or turning 21 years old; if these results are normal, then screening can ensue every two years (BCCA, 2010). It is not surprising that naturopath students had positive Pap perceptions as BINM collaborates with the British Columbia Women's Hospital to offer a 'Naturopathic Doctor Reproductive Health Screening Workshop'. This course teaches the purpose and limitations of screening for cervical and breast cancer. Additionally, the Boucher Institute of Naturopathic Medical Clinic offers routine free Pap tests year-round. High rates of clinical and educational Pap related opportunities for naturopath students might have encouraged students to develop these prominent positive Pap perceptions.

#### 5.2.3 Correlates of study variables

Many correlates were related to students' perceived importance of certain cancer prevention and screening practices, and reported perceptions of counselling self-efficacy. The sociodemographic correlates included age and year in program. Key correlates included 'expected percentage of time spent on cancer prevention' and 'expected time spent on cancer screening'.

For both age and year in program, when students progress through their degree, they appear to be less likely to have higher odds of perceiving cancer prevention and early detection practices to be extremely important. Although this study cannot determine a causal link between educational progression and beliefs, a similar longitudinal study by Frank (2006) addressed this question. Frank found that as medical students progressed from first year to fourth year, there was a 26% decline in perceived relevancy of nutrition counselling in the students' intended practice. Perhaps our findings, in light of the previous study, could suggest that this relationship may exist for the perceived importance of cancer prevention and screening practices as well.

Some sociodemographic correlates, including a family history of cancer and gender, were not associated with many study variables. Furthermore, some potential key correlates, including a family history of disease preventability and comfort with cancer screening, also displayed limited associations. It was unanticipated that the sociodemographic correlate 'family history of cancer' showed little association with any of the independent variables. Based on findings from previous studies, it was expected that if a student experienced cancer-related suffering, they might perceive counselling patients on cancer prevention or early detection methods to be of higher importance as increased

screening rates in family members of people diagnosed with cancer has been observed previously (Murabito et al., 2000).

#### 5.2.4 Adjusted 'counselling self-efficacy'

When examining the relationship between a student's global beliefs (towards cancer, prevention and CAM) and perceived importance (of cancer risk factors and early detection practices), it became apparent that 'perceptions of importance' were strongly associated with students' counselling self-efficacy. We will cautiously interpret these findings, as the data displayed low cross-tabulation cell counts that resulted in large odds ratios and confidence intervals.

Regardless of educational program, if students perceived cancer screening and prevention practices to be more important, they also reported higher self-efficacy for counselling. The belief of 'perceived importance' of certain practices has been linked to objective behaviour in a number of health related studies. For example, researchers examining what factors contribute to fruit and vegetable consumption in children found that independent predictors included mothers' attitudinal conviction that increasing fruit and vegetable consumption by their children could reduce their risk of developing cancer and the mother's belief in the importance of disease prevention when choosing the child's food (Gibson, Wardle, & Watts, 1998). Agreeably, a mother-child relationship differs substantially from that between a patient and provider; however, there are well-defined similarities, including the dictation of advice and power dynamics. Perceived importance, as shown in our study, is an important cognitive process that could potentially influence students' future counselling.

It is interesting to note that in this study, higher rates of 'perceived importance' may not always have positive implications. When cancer-screening practices are not endorsed by major health organizations, due to limited evidence of the effectiveness of these practices, students' perceived importance of the practice was still related to feelings of counselling self-efficacy. For example, the PSA test, as mentioned previously, is not endorsed by any Canadian organization to be an appropriate screening tool for the early detection of prostate cancer; yet, students who hold the misconception that this is an important tool for prostate cancer screening also have higher confidence in their ability to conduct this counselling. From this, we can see that 'perceived importance' of inappropriate screening or prevention practices could ultimately have negative consequences for these students' future patients if counselling self-efficacy translated into future counselling behaviour.

This study did not find a significant difference between perceptions of 'counselling self-efficacy' when controlling for students' program and other potential confounding variables. In other words, there appear to be no major differences between medical and naturopath students' self-efficacy of cancer prevention and screening counselling that could not be explained by other belief measures. The only exception was the finding that medical students, but not naturopath students, reported higher confidence with their counselling ability for physical activity when controlling for comfort with cancer prevention counselling, expected percentage of time spent on cancer prevention and the importance of physical activity.

This finding, although preliminary, is extremely encouraging. This finding emphasizes the influential role of beliefs (e.g., cancer, prevention, perceived importance,

etc.) on students' counselling self-efficacy, beyond that of an educational program. If there were inherent differences between medical and naturopath students, the association between 'perceived importance' and 'counselling self-efficacy' would be minimized, and explained away as an un-modifiable variable. As we mentioned previously, many more naturopath students reported positive cancer prevention beliefs. Due to the cross-sectional nature of this research study, we cannot suggest that BINM is better at encouraging positive cancer prevention perceptions. Although this is a promising notion, it may be that the BINM attracts students with increasingly positive cancer prevention perceptions established before enrolling in the program.

In contrast, these findings suggest that a medical student with high 'perceived importance' of cancer prevention and screening practices is no different than a naturopath student with regards to their confidence in their ability to conduct this cancer prevention or early detection counselling. The findings that medical students had lower rates of 'perceived importance' of certain cancer prevention and screening procedures may have arisen, like naturopath students, before enrolling in the program or during their educational training.

#### **Chapter 6: Conclusion**

#### 6.1 Implications for training

In order for optimal cancer prevention, a patient-provider relationship requires cooperation. Patients should be open to health promotion and health care providers must constantly provide information on preventive health behaviours (Mahon, 2007). As suggested by Lewis (1986), a physician's personal beliefs and attitudes concerning disease prevention, among other beliefs and practices (personal health habits, clinical knowledge and barriers including financing systems policies) contribute to counselling attitudes and subsequently their counselling practices. As explored in this thesis, health professional students' beliefs are an important research opportunity for potentially influencing future counselling practice. Specifically, findings from this study have important implications for developing the association between beliefs regarding 'perceived importance' of, and 'counselling self-efficacy' towards certain cancer prevention or screening practices.

If optimal cancer prevention requires 'buy in' from both patients and providers, educational institutions owe it to their students to provide them with the necessary tools to foster positive prevention beliefs. Acknowledging the difficulty of changing pre-existing beliefs, education is one method commonly used to change students' beliefs. One study by Chamberlain (1987) examined the influence of a second-year cancer prevention course on students' beliefs and attitudes longitudinally. The findings of this study were compared against students who did not take this course. Students who enrolled in, and completed the cancer prevention course, intended to perform certain specific cancer prevention activities more than students who did not take this course. Furthermore, this course was able to improve students' positive beliefs towards cancer prevention. The authors of this study

concluded that this course had long lasting positive influences on students' attitudes, beliefs and practice of prevention in clinical rotations (Chamberlain, Lane, Weinberg, & Carbonari, 1987).

More recently, Scott (1992) examined medical students' attitudes about intention to provide preventive care. In this seven-year follow-up study, practicing physicians' positive attitudes towards preventive care services (not all related to cancer prevention) persisted in both primary and non-primary care physicians (Scott, Neighbor, & Brock, 1992). This suggests that encouragement of positive beliefs and attitudes in academia may have longterm effects.

With cancer remaining the number one killer of Canadian adults, it is imperative that we ensure that our future health care professionals have access to appropriate, evidence-based cancer prevention and early detection courses. This could encourage positive beliefs that they may take with them into their practice.

#### 6.2 Limitations

A number of important limitations need to be considered when interpreting the findings of this study.

#### 6.2.1 Cross sectional/causality

The most important limitation lies in the fact that this study is cross-sectional in nature. With all cross-sectional research projects, researchers cannot draw causal conclusions between their research outcome and independent variables. In this study, we cannot confidently conclude that a student's perceived importance of certain cancer prevention and early detection beliefs caused a direct increase in their reported counselling self-efficacy. We can only show the strength and direction of this association.

#### 6.2.2 Sample size

The current study was limited by the small sample size (n=242) and should be considered when interpreting the study's findings; however, we did reach our recruitment goal, and received sufficient power to detect an effect size of 0.4, using a power of 80% and an alpha of 0.05.

Naturopath students had a much higher response rate than medical students with almost 86% of students completing the survey fully. The same cannot be said for the medical students, as only 121 students' responses could be used from a population sample of over 1000. Consequently, we are limited in our ability to generalize our findings to the general UBC medical student body. Many of the statistical tests we utilized, including multiple logistic regression, required at least 5 observations per cross tabulation matrix when examining the bivariate relationship between variables. With a small sample size, some calculated odds ratios were extremely large due to the fact that some of the cells had zero cell counts.

We attempted to determine the representativeness of our medical student sample by comparing our sample to published demographic statistics from the Faculty of Medicine. Our sample was similar to the general student population in terms of age and previous degree, yet our sample of medical students comprised proportionally more women. It can be hypothesized that the medical students who responded to our survey may have been increasingly interested in cancer prevention. However, if our questionnaire did attract

increasingly preventive-oriented medical students, the significant difference observed between medical and naturopath students would be further strengthened in actuality.

#### 6.2.3 Lewis model adaptation

As discussed in the introduction, the Lewis model is a conceptual framework designed to understand how physicians' personal beliefs and attitudes concerning disease prevention, personal health habits, clinical knowledge and barriers including financing systems policies contribute to counselling behaviours (Lewis et al., 1986). The outcome measure used here, 'counselling self-efficacy' was comparable to Lewis' 'perceived (counselling) skills' construct and yielded interesting results. This construct is a promising outcome measure for use in other studies since it falls upstream of counselling behaviours. Other research studies examining counselling behaviours of practicing physicians have shown strong associations with physicians' sense of counselling self-efficacy and the amount of clinical counselling for smoking cessation and body weight reduction (Thompson, Schwankovsky, & Pitts, 1993).

Further adaptations of the Lewis model may be necessary for use future studies in student populations. Additional constructs should be considered including students' 'perceived importance' of the clinical practice, and distinguishing between the influences of beliefs formed prior to, or during an academic degree program.

#### 6.2.4 Prediction of clinical practice

This research project has sparked several research questions that require further investigation. One of the limitations of this study that requires future investigation includes the notion that students' positive cancer prevention or early detection beliefs may not

translate to increased cancer prevention or screening counselling in future practice. However, it is promising that other previous research studies examining counselling behaviours of practicing physicians have shown strong associations with physicians' sense of counselling self-efficacy and amount of clinical counselling provided for smoking cessation and body weight reduction (Thompson et al., 1993).

Whilst it was not the research objective of this study, it becomes apparent that health care providers will undoubtedly experience many barriers associated with counselling. Many of these barriers, institutional in nature, will limit cancer prevention counselling (Lewis et al., 1986) regardless of positive cancer prevention and screening beliefs. For example, the literature suggests barriers to health care providers adherence to clinical practice guidelines results from lack of awareness, familiarity, agreement, selfefficacy, outcome expectancy, inertia of previous practice, and external barriers (Cabana et al., 1999). Excluding external barriers, which include factors such as lack of time or money, many of these aforementioned barriers can be changed. For example, if students are taught well in advance about the importance of counselling on cancer prevention and early detection, they may be more likely to hold positive outcome expectancy beliefs.

It is possible that these barriers may not be the same across health professional programs. As the literature suggests, there are institutional differences between naturopath and medical professionals predicting future counselling success. For example, naturopath physicians have been found to have significantly longer patient visits than family physicians, have patients that were increasingly interested in health maintenance (Boon et al., 2003), and also were more likely to be suffering from a chronic disease (Boon et al., 2004). Given the nature of naturopathic practice, and the patients frequenting them,

naturopath providers seem to be predisposed to communicate higher rates of preventive advice.

Irrespective of whether students' beliefs correlate perfectly with their future counselling behaviours, the measurement of students' beliefs remains an important research effort as students are presented with many opportunities to impart their beliefs on others. As suggested by Busse (2008), the most appropriate time to change beliefs and viewpoints of health care providers is during their formative educational years. While Busse examined anti-vaccination attitudes of naturopathic and chiropractic students, it was suggested that beliefs may become solidified when students become practicing health care providers. This further supports the need to better understand students' cancer prevention and early detection beliefs.

#### 6.2.5 Measurement limitations

Another source of weakness in this study pertains to the self-report study design. A common flaw with self-report studies involves participants modifying their behaviour or responses because they are aware that they are being investigated.

In our study, we attempted to hide the comparative nature of the study design by indirectly assessing degree program. Two different versions of an identical questionnaire were sent out to the students. Students therefore were not encouraged to promote their own program in order to make the other program appear less attractive. Avoiding this potential bias is particularly important in studies such as this that compare CAM versus biomedical health systems.

With regards to the questionnaire used in this study, some of the scales proved to be less than optimal. For example, in the scale assessing CAM, there were many items that had high inter-item correlations. Although we chose to use this measure in our questionnaire, due to the limited questionnaire assessing CAM beliefs in varying populations, additional psychometric work is necessary in future studies.

#### 6.2.6 Investigator bias

Maintaining objectivity in comparative health research is a difficult task. L.Dale made attempts to remain unbiased in her interpretation of the findings. Nevertheless, it should be clearly noted that this thesis comes from an inherently biomedical institution (University of British Columbia, Faculty of Medicine) and prevention and screening guidelines are based on biomedical levels of evidence. It is possible that as a result of only examining this type of peer-reviewed literature that L.Dale missed some other explanatory forms of 'knowledge' used in the CAM system. Additionally, considerable efforts were made to include a naturopathic perspective by consulting with a variety of experts in naturopathic care. The importance of balanced, unbiased research is essential for comparative health systems research and future investigations should attempt to understand better ways to do this.

#### 6.3 Next steps

The findings from this study appear to encourage integrative health care, which is defined by Boon (2004) as consisting of "interdisciplinary, non-hierarchical blending of both conventional medicine and CAM health care that provides a seamless continuum of decision-making and patient-centered care and support". With the goals of interdisciplinary research primarily promoting health and the prevention of disease (Boon

et al., 2004), medical and naturopath students need to be aware of how they can better aid their future patients through increasingly team-oriented practices.

In order to increase collaborative efforts between health care providers, with varying strengths in cancer prevention and early detection practices, further research should be conducted investigating the role of beliefs in health care students and its influence on future counselling.

One such future investigation, made possible by our ability to re-contact these students in the future, could be to determine if the study's independent variable 'perceived importance of', or outcome variable 'counselling self-efficacy', truly predict counselling behaviours in this population. It is currently unknown if naturopath providers simply are able to counsel their future patients more often on cancer prevention practices because they have longer patient visits, or if there are additional factors influencing this relationship beyond those assessed in this study.

Furthermore, to strengthen any future research projects, we suggest building on the findings from this research project using direct observational measures. For example, medical school students are required to partake in observed structured clinical examinations through the duration of their degree. Similarly, these 'structured' examinations, using standardized patients, could be implemented for use in other health care professional programs as well. Direct observation of students' cancer prevention and counselling practices during these routine tests could provide much needed insight into the gap between beliefs, intentions, and behaviours.

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# Appendix A - Questionnaire

# **Cancer Prevention and Early Detection Questionnaire**

CONSENT FORM: Health Care Students' Perspectives on Cancer Prevention and Early Detection Methods

STUDY TEAM Principal Investigator: Dr. Carolyn Gotay School of Population and Public Health University of British Columbia

Co-Investigator: Laura Dale Epidemiology MSc student School of Population and Public Health University of British Columbia

This research project has been designed to meet the thesis requirements for a Masters of Science degree in the Faculty of Medicine at The University of British Columbia (UBC).

# INVITATION AND STUDY PURPOSE

We invite you to participate in a research project being conducted by Laura Dale, a master's student at UBC. This study aims to understand health care students' cancer prevention and early detection counselling beliefs. You have been invited to partake in this study because you are a health care student in British Columbia.

# STUDY PROCEDURES

If you agree to participate, you will be asked to complete an online survey. It is estimated that the survey will take approximately 15 minutes of your time. This survey can be completed at your convenience, using any computer or tablet with Internet access.

# STUDY RESULTS

The results of this study will be included in a graduate thesis and may be reported in journal publications or conference presentations. You may voluntarily enter in an e-mail address at the end of the questionnaire if you wish to have a findings report sent to you upon study completion.

# POSSIBLE RISKS OF THE STUDY

You should not experience any harm or discomfort from this research different than those encountered in daily life.

# POSSIBLE BENEFITS OF THE STUDY

The information you provide here will be given to the educational staff of your academic institution to inform them of your cancer prevention and early detection counselling intentions. This information may be used to influence the structure of educational courses.

# CONFIDENTIALITY

We will keep all of your personal information obtained from this study confidential. Any e-mail address you provide during the survey will <u>not</u> be linked to your survey responses and will <u>not</u> be used for any purpose other than for e-gift certificate distribution or if you wish to receive research-finding reports. The survey responses will be maintained in a password-protected web-based survey account at FluidSurvey, a Canadian survey company. Only the principal investigators will have access to your survey responses. Data extracted from the online survey will be kept on an external hard drive that will be kept encrypted and in a locked file cabinet.

# PAYMENT

To thank you for your participation in this research project, the first 40 respondents in each academic year will be remunerated with a five-dollar electronic gift certificate to a coffee shop. You will need to provide an e-mail address at the end of the questionnaire in order for the research team to send you the electronic gift card.

#### **CONTACT INFORMATION- QUESTIONS**

If you have any questions throughout the survey, please contact Laura Dale by email at

Laura would be glad to answer any questions or address any concerns that you may have including any inquiries concerning the study's procedures.

# **CONTACT INFORMATION- CONCERNS**

If you have any concerns about your rights as a research subject and/or your experiences while participating in this study, you may contact the Research Subject Information Line in the UBC Office of Research Services at **Services** at **Services** or if long distance e-mail or call toll free **Services**.

CONCLUSION

Thank you in advance for participating in this survey. The information you provide will be extremely beneficial in learning about students' perspectives on cancer prevention and early detection. Please select 'I agree' if you want to continue with the questionnaire - by filling out the questionnaire it will be assumed that consent has been given.

# \_ I agree

Please indicate to what extent you agree or disagree with the following statements concerning cancer prevention (Strongly Agree, Agree, Neither Agree Nor Disagree, Disagree or Strongly Disagree)

- Counselling my future patients on smoking cessation will be an effective strategy for cancer prevention
- Counselling my future patients on healthy dietary intake will be an effective strategy for cancer prevention
- Counselling my future patients on physical activity will be an effective strategy for cancer prevention
- Counselling my future patients on safe sun exposure will be an effective strategy for cancer prevention
- Counselling my future obese patients on maintaining a healthy body weight will be an effective strategy for cancer prevention
- Counselling my future patients on alcohol intake will be an effective strategy for cancer prevention
- Counselling my future patients on environmental risk factors will be an effective strategy for cancer prevention
- Counselling my future patients on safe sexual practices will be an effective strategy for cancer prevention

Please indicate to what extent you agree or disagree with the following statements concerning cancer screening (Strongly Agree, Agree, Neither Agree Nor Disagree, Disagree or Strongly Disagree)

- Counselling my future patients on the Papanicolaou test (PAP) will be an effective strategy for the early detection of cervical cancer
- Counselling my future patients (women 50-69 years old) on mammography will be an effective strategy for the early detection for breast cancer
- Counselling my future patients on Breast Self Examination (BSE) is an effective strategy for the early detection of breast cancer
- Counselling my future patients on Clinical Breast Examinations (CBE) is an effective strategy for the early detection of breast cancer
- Counselling my future patients on thermography is an effective strategy for the early detection of breast cancer
- Counselling my future patients on the Prostate Specific Antigen (PSA) test is an effective strategy for the early detection for prostate cancer
- Counselling my future patients on the Digital Rectal Exam (DRE) is an effective strategy for the early detection of prostate cancer
- Counselling my future patients on the Fecal Occult Blood Test (FOBT) t is an effective strategy for the early detection of colorectal cancer
- Counselling my future patients on the Flexible Sigmoidoscopy procedure is an effective strategy for the early detection of colorectal cancer

Have you been close to anyone who seriously suffered or died from a condition that you believe that they could have prevented?

\_\_\_Yes

\_\_\_ No

Have your biologic parents, siblings, or children ever have cancer?

\_\_\_Yes \_\_\_No

Given what we currently know, please indicate how preventable (Extremely Preventable, Very Preventable, Moderately Preventable, Slightly Preventable, or Not Preventable) you believe the following health conditions to be.

- Heart Disease
- Cancer
- Hepatitis B
- Type II Diabetes
- Seasonal Allergies
- Depression

What percentage of cancers can be prevented through healthy lifestyle choices?

- 0-5 %
- 5-10 %
- 10-15 %
- 15-20 %
- 20-25 %
- 25-30 %
- 30-35 %
- 35-40 %
- 40-45 %
- 45-50 %
- 50-55 %
- 55-60 %
- 60-65 %
- 65-70 %
- 70-75 %
- 75-80 %
- 80-85 %
- 85-90 %
- 90-95 %
- 95-100 %

How much time do you expect you will be able to spend with your patients in your practice?

- 0-5 minutes
- 5-10 minutes
- 10-15 minutes
- 15-20 minutes
- 20-25 minutes
- 25-30 minutes
- 30-35 minute

- 35-40 minutes
- 40-45 minutes
- 45-50 minutes
- 50-55 minutes
- 55-60 minutes
- >60 minutes

What percentage of your time do you expect you will devote to cancer prevention counselling in your practice?

- 0-5 %
- 5-10 %
- 10-15 %
- 15-20 %
- 20-25 %
- 25-30 %
- 30-35 %
- 35-40 %
- 40-45 %
- 45-50 %
- 50-55 %
- 55-60 %
- 60-65 %
- 65-70 %
- 70-75 %
- 75-80 %
- 80-85 %
- 85-90 %
- 90-95 %
- 95-100 %

What percentage of your time do you expect you will devote to screening methods for the early detection of cancer?

- 0-5 %
- 5-10 %
- 10-15 %
- 15-20 %
- 20-25 %
- 25-30 %
- 30-35 %
- 35-40 %
- 40-45 %
- 45-50 %
- 50-55 %
- 55-60 %

- 60-65 %
- 65-70 %
- 70-75 %
- 75-80 %
- 80-85 %
- 85-90 %
- 90-95 %
- 95-100 %

Please indicate to what extent you believe the following are important in the cancer prevention process (Extremely Important, Very Important, Moderately Important, Slightly Important, or Not Important)

- Prescribing nicotine replacement to patients to assist with smoking cessation
- Targeting teens for smoking cessation counselling
- Warning patients about the dangers of 2nd hand smoke
- Targeting adults for smoking cessation counselling
- Referring patients to receive hypnotherapy for smoking cessation
- Referring patients to receive acupuncture for smoking cessation
- Referring obese patients to self-help groups
- Advising patients to follow a healthy diet containing appropriate amounts of fruits and vegetables
- Referring patients to a nutritionist/dietitian
- Advising patients to consuming a diet low in red meats
- Advising patients to supplement their diets with a multivitamin
- Advising patients to follow a diet containing organic products
- Advising patients to follow a diet containing a high intake of antioxidants
- Advising patients to consume medicinal herbs that may have anticancer/antitumor properties in proper doses (e.g., cranberry, garlic, green tea, turmeric)
- Addressing the issue of physical activity during visits with obese patients
- Addressing the issue of physical activity during visits with healthy weight patients
- Addressing the issue of reducing sedentary time with patients
- Referring obese patients to physical activity programs
- Referring obese patients to a fitness counselling specialist
- Referring inactive patients to a fitness specialist or appropriate physical activity
- Enquiring about patients' use of sunscreen
- Referring patients to receive hypnotherapy for problem drinking
- Referring patients to receive peer support for problem drinking (e.g., Alcoholics Anonymous)
- Referring patients to receive clinical counselling for problem drinking
- Advising young females to receive the Human Papillomavirus (HPV) vaccine
- Advising young males to receive the Human Papillomavirus (HPV) vaccine

Please indicate to what extent you believe the following are important in the cancer prevention process (Extremely Important, Very Important, Moderately Important, Slightly

Important, or Not Important)

- Smoking cessation for cancer prevention
- Healthy diet for cancer prevention
- Physical activity for cancer prevention
- Safe sun exposure for cancer prevention
- Healthy body weight for cancer prevention
- Alcohol reduction for cancer prevention
- Environmental risk factor reduction for cancer prevention
- Safe sexual behaviour for cancer prevention

To what extent do you think the following screening methods are important for the early detection of cancer (Extremely Important, Very Important, Moderately Important, Slightly Important, or Not Important)

- Mammography (for women between the ages of 50 and 69) for the early detection of breast cancer
- Breast Self Examination (BSE) for the early detection of breast cancer
- Clinical Breast Examinations (CBE) for the early detection of breast cancer
- Thermography for the early detection of breast cancer
- Prostate Specific Antigen (PSA) test for the early detection of prostate cancer
- Digital Rectal Exam (DRE) for the early detection of prostate cancer
- The Papanicolaou test (PAP) for the early detection of cervical cancer
- The Flexible Sigmoidoscopy for the early detection of colorectal cancer
- The Fecal Occult Blood Test (FOBT) for the early detection of colorectal cancer

Please indicate how strongly you agree (Strongly Agree, Agree, Undecided, Disagree or Strongly Disagree) with the following statements regarding cancer.

- I tend to feel pessimistic about the outcome of cancer disease, given our present treatment methods
- At the "gut level", cancer and death seem almost synonymous to me
- I feel optimistic about our ability to control cancer in the foreseeable future
- I personally would prefer to die of heart disease than cancer

Please answer the following questions regarding the prevention of disease (Strongly Agree, Agree, Undecided, Disagree or Strongly Disagree)

- Health providers need more training in prevention
- Prevention is less interesting to me than treatment
- Patients are more likely to adopt healthier lifestyles if health providers counsel them to do so
- Health providers have a responsibility to promote prevention with their patients

Please indicate how strongly you agree or disagree with the following statements (Strongly Agree, Agree, Undecided, Disagree or Strongly Disagree)

- It is important for treatments to boost my immune system
- Treatments should enable my body to heal itself

- Treatments should increase my natural ability to stay healthy
- Treatment providers should treat patients as equal partners
- Patients should take an active role in their treatment
- Treatment providers should help patients make their own decisions about treatments
- Health is about harmonizing your body, mind and spirit
- Imbalances in a person's life are a major cause of illness

Please indicate how comfortable you are with your skills in counselling future patients about: (Completely Comfortable, Very Comfortable, Fairly Comfortable, Somewhat Uncomfortable, Very Uncomfortable)

- Cancer Prevention
- Cancer Screening Methods

Please briefly describe your definition of health

How old are you?

- 18-20
- 21-23
- 24-26
- 27-29
- 30-32
- 33-35
- 36-38
- 39+

What is your gender?

\_\_\_Male

\_\_\_Female

\_\_\_Other

What was your most recent degree prior to entering naturopathy school? Example: BSc- Pharmacy MA- Masters of Health Administration (Honors)- Politics

Do you also have certifications for any of the following?

- Massage Therapy
- Chiropractic Therapy
- Physical Therapy
- Traditional Chinese Medicine
- Acupuncture Therapy
- Herbalism
- Osteopathic Medicine

- Yoga Instruction
- Dietetics
- Other (Please Specify) \_\_\_\_\_\_
- No other certifications

Please indicate your current year of study

\_\_\_First Year

\_\_\_Second Year

\_\_\_\_Third Year

\_\_\_Fourth Year

Please indicate the area of specialty you wish to work in after graduating:

Do you identify with any of the following ethnicities?

- Caucasian
- Aboriginal
- Chinese
- South Asian
- Black
- Filipino
- Latin American
- Southeast Asian
- Arab
- West Asian
- Korean
- Japanese
- Other \_\_\_\_\_
- I prefer not to provide ethnicity information

THANK YOU FOR COMPLETING THIS SURVEY! You will receive a complementary \$5.00 Starbucks e-gift card for completing this questionnaire! You will be re-directed to a new survey that is unlinked to your previous responses to maintain confidentiality. The e-gift card will be sent to you within 2-weeks of completing this questionnaire.

# Appendix B - Missing data

| Variable Name  | Number of    | Variable Name            | Number of    | Variable Name       | Number of    |
|--|--------------|--------------------------|--------------|---------------------|--------------|
|  | Missing      |                          | Missing      |                     | Missing      |
|  | Observations |                          | Observations |                     | Observations |
| couns.smoke  | 0            | imp.hypno.smk            | 3            | imp.therm           | 5            |
| couns.diet   | 0            | imp.acup.smk             | 5            | imp.psa             | 2            |
| couns.phys   | 1            | imp.obese.help           | 2            | imp.dre             | 1            |
| couns.sun  | 1            | imp.hlth.diet            | 2            | imp.pap             | 2            |
| couns.obese  | 0            | imp.nutritionist         | 2            | imp.sig             | 2            |
| couns.alcohol  | 3            | imp.meat                 | 2            | imp.fobt            | 2            |
| couns.enviro   | 1            | imp.multivit             | 4            | att.can.pessimistic | 2            |
| couns.sex  | 0            | imp.organic              | 4            | att.can.gut         | 0            |
| couns.pap  | 0            | imp.antiox               | 2            | att.can.optimistic  | 2            |
| couns.mam  | 0            | imp.herbs                | 4            | att.can.die         | 1            |
| couns.bse  | 0            | imp.add.obese.pa         | 3            | att.prev.providers  | 0            |
| couns.cbe  | 1            | imp.add.normal.pa        | 3            | att.prev.treat      | 0            |
| couns.therm  | 2            | imp.sed                  | 3            | att.prev.counsel    | 1            |
| couns.psa  | 1            | imp.ref.obese.program    | 4            | att.prev.resp       | 0            |
| couns.dre  | 1            | imp.ref.obese.specialist | 2            | cam.immune          | 0            |
| couns.fobt   | 0            | imp.inact                | 3            | cam.heal            | 0            |
| couns.sig  | 2            | imp.sunscreen            | 3            | cam.healthy         | 1            |
| fam.prev   | 5            | imp.hypno.drink          | 4            | cam.equal           | 3            |
| fam.can  | 3            | imp.alcoh.peer           | 4            | cam.active          | 1            |
| prev.heart   | 1            | imp.alcoh.clinical       | 2            | cam.decision        | 1            |
| prev.cancer  | 2            | imp.hpv.f                | 2            | cam.harmony         | 2            |
| prev.hep   | 2            | imp.hpv.m                | 2            | cam.imbalance       | 1            |
| prev.diab  | 1            | imp.smk.cess             | 3            | comf.couns.prev     | 3            |
| prev.allerg  | 3            | imp.diet                 | 2            | comf.couns.screen   | 0            |
| prev.dep   | 1            | imp.pa                   | 2            | age                 | 1            |
| prev.cancer.percent  | 1            | imp.sun                  | 2            | gender              | 0            |
| time.patients  | 2            | imp.weight               | 3            | rec.deg             | 2            |
| time.cancer.prev   | 2            | imp.alcohol              | 2            | cert                | 52           |
| time.cancer.screen   | 1            | imp.enviro               | 2            | Year                | 2            |
| imp.nicotine   | 2            | imp.sex                  | 4            | speciality          | 10           |
| imp.teen.smk   | 2            | imp.mam                  | 2            | Ethnicity           | 3            |
| imp.2.smk  | 2            | imp.bse                  | 1            | program             | 0            |
| imp.adult.smk  | 3            | imp.cbe                  | 1            |                     |              |
| * Variables in <b>Bold</b> were missing more than ten observations |              |                          |              |                     |              |

|  | Medical Students  | Naturopath Students   |  |  |
|--|---|---|--|--|
| Sociodemographic Variables                                     |   |   |  |  |
| Age  | Importance – PSA*<br>Cancer beliefs**<br>Counselling- PSA*  | Importance - mammography *<br>Importance - DRE **<br>Counselling- mammography **<br>Counselling- PSA *<br>Counselling- DRE *<br>Counselling- the FOBT**   |  |  |
| Gender   | Importance - sun protection**<br>Cancer beliefs*  | Prevention beliefs*   |  |  |
| Recent degree  | Importance - smoking<br>cessation*<br>Importance – diet*<br>Cancer beliefs*                                   | None  |  |  |
| Year   | Importance - sun protection*<br>Importance - safe sexual<br>behavior*<br>Cancer beliefs*<br>Counselling- CBE* | Importance – mammography***<br>Importance – BSE***<br>Importance – CBE*<br>Importance - PSA **<br>Cancer beliefs**<br>CAM beliefs*<br>Counselling- mammography**<br>Counselling- BSE ***<br>Counselling- PSA**<br>Counselling- physical activity*<br>Counselling- healthy body weight** |  |  |
| Specialty  | Importance – PSA*<br>Prevention beliefs**<br>Counselling- thermography**                                      | Importance - alcohol reduction*   |  |  |
| Ethnicity  | Importance – CBE*<br>Importance - sun protection**<br>Cancer beliefs*<br>Counselling- the Pap test**          | None  |  |  |
| Potential Key Correlates                                       |   |   |  |  |
| Family history of disease<br>that could have been<br>prevented | Counselling- mammography**  | Importance - safe sexual<br>behavior**  |  |  |
| Family history of cancer                                       | Counselling- sun protection**   | None  |  |  |
| Percent of cancer thought to be preventable                    | Importance - smoking<br>cessation**<br>Counselling- the Pap test**  | Importance - the Pap test **<br>Counselling- thermography*  |  |  |

# Appendix C - The statistically significant sociodemographic and potential key correlates of the independent variables in research question 1a, 1b, and 1c.

| Expected percentage of time spent on cancer screening  | sigmoidoscopy**<br>Counselling- the<br>sigmoidoscopy test*  | Importance – CBE**<br>Counselling- BSE<br>Counselling- thermography **<br>Counselling- the sigmoidoscopy*   |
|--|---|---|
| Expected percentage of time                            | weight*<br>Importance – CBE**<br>Importance- flexible<br>sigmoidoscopy**<br>Courselling- the  | Importance - BSE *<br>Importance – CBE**<br>Counselling- BSE  |
| Expected percentage of time spent on cancer prevention | Importance - diet *<br>Importance - physical<br>activity**<br>Importance -healthy body<br>**weight<br>Importance - environmental<br>risk factor reduction**<br>Importance - safe sexual<br>behavior*<br>Counselling- physical<br>activity** | Importance - physical activity **<br>Importance - alcohol reduction*<br>Importance - environmental risk<br>factor reduction*<br>Counselling- physical activity ***<br>Counselling- healthy body weight<br>**<br>Counselling- environment risk<br>factors* |
| Expected time spent with patients                      | Importance –<br>mammography**<br>Importance - smoking<br>cessation**  | Importance - mammography *<br>Importance - BSE *<br>Counselling- BSE **   |
|  | Counselling- smoking<br>cessation*<br>Counselling- physical<br>activity**<br>Counselling- alcohol reduction<br>**<br>Counselling- safe sexual<br>behavior*  |   |

Fishers' Tests of Significance: \* P≤0.05; \*\* P≤0.011 \*\*\* P≤0.001

Green: Counselling Self-Efficacy for Screening Procedures; Red: Perceived Importance of Screening Procedures; Black: Perceived Importance of Cancer Prevention Practices; Blue: Counselling Self-Efficacy for Cancer Prevention Practices; Purple: Global Beliefs Regarding Cancer beliefs, prevention beliefs and CAM beliefs.

Appendix D - Students' sociodemographic and potential key correlates of counselling self-efficacy regarding cancer prevention and early detection practices

| Sociodemographic Variables |  |
|----------------------------|--|
| Age                        | <ul> <li>Counselling self-efficacy regarding healthy diet</li> <li>Alcohol reduction</li> <li>Environment risk factor reduction</li> </ul> |
| Gender                     | Environment risk factor reduction  |
| Recent degree              |  |
| Year                       | •Maintaining a healthy body weight   |
| Specialty                  | • None   |
| Ethnicity                  | <ul> <li>Healthy diet</li> <li>Environment risk factor reduction</li> </ul>  |
| Family history of cancer   | • None   |

| Potential Key Correlates                    |  |  |
|---|--|--|
| Family history of prevention                | <ul> <li>Counselling self-efficacy regarding a healthy diet</li> <li> Physical activity</li> <li> Environment risk factor reduction</li> </ul>   |  |
| Percent of cancer thought to be preventable | <ul> <li> Smoking cessation</li> <li>Healthy diet</li> <li> Physical activity</li> <li> Healthy body weight</li> <li> Alcohol reduction</li> <li> Environment risk factor reduction</li> <li> Safe sexual behaviour</li> </ul> |  |
| Expected time spent with patients           | <ul> <li>Healthy diet</li> <li> Physical activity</li> <li> Healthy body weight</li> <li> Environment risk factor reduction</li> <li> Safe sexual behaviour</li> </ul>   |  |

| Expected percentage of time spent on cancer prevention counselling | <ul> <li> Healthy diet</li> <li> Physical activity</li> <li> Healthy body weight</li> <li> Alcohol reduction</li> <li> Environment risk factor reduction</li> </ul>                             |
|--|---|
| Expected percentage of time spent on cancer screening              | • None  |
| Comfort with cancer prevention<br>counselling                      | <ul> <li> Smoking cessation</li> <li> Healthy diet</li> <li> Physical activity</li> <li> Healthy body weight</li> <li> Alcohol reduction</li> <li> Environment risk factor reduction</li> </ul> |
| Comfort with cancer screening counselling                          | • None  |