

**Registered Dietitians' Knowledge, Perceptions and  
Practices Regarding Physical Activity, Sedentary  
Behaviour, and Counselling in Both**

by

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**REGISTERED DIETITIANS' KNOWLEDGE, PERCEPTIONS AND PRACTICES  
REGARDING PHYSICAL ACTIVITY, SEDENTARY BEHAVIOUR, AND COUNSELLING IN  
BOTH**

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This study examined counselling behaviour, intentions, attitude, perceived norms, self-efficacy, facilitators/barriers, and knowledge regarding physical activity and sedentariness among 20 registered dietitians (RD) in family health teams (FHT) in Ontario. Qualitative interviews and self-report questionnaires were used. Thematic analysis indicated that all participants counselled patients on physical activity, and many on sedentariness, both with moderately high confidence. There were positive and negative attitudes regarding counselling effectiveness. Most participants perceived all health care professionals should counsel on both topics. Barriers included knowledge, scope of practice, and lack of physical activity expert on FHT, whereas facilitators were FHT dynamics and time. Participants had good knowledge of physical activity and sedentariness and a positive attitude toward physical activity and non-sedentariness. Quantitative analysis indicated they had moderate-to-high physical activity levels and were fairly sedentary. More education and increased collaboration across all HCPs is needed to further facilitate counselling on both topics.

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## Abbreviations

ACSM: American College of Sports Medicine

BMI: Body Mass Index

CCHS: Canadian Community Health Survey

CDC: Centre for Disease Control

CDA: Canadian Diabetes Association

CDO: College of Dietitians of Ontario

CFLRI: Canadian Fitness and Lifestyle Research Institute

CSEP: Canadian Society for Exercise Physiology

EIM: Exercise is Medicine

FHT: Family Health Team

FITT: Frequency, Intensity, Time, Type

HCP: Health Care Professional

HDL (cholesterol): High-density Lipoprotein (cholesterol)

IMBP: Integrative Model of Behavioural Prediction

IPAQ: International Physical Activity Questionnaire

IPAQ-SF: International Physical Activity Questionnaire – Short Form

KAP: Knowledge Attitude and Practices

LDL (cholesterol): Low-density Lipoprotein (cholesterol)

METs: Metabolic Equivalents

MVPA: Moderate-to-vigorous Physical Activity

NHANES: National Health and Nutrition Examination Survey

PAGA: Physical Activity Guidelines for Americans

RD: Registered Dietitian

SBQ: Sedentary Behaviour Questionnaire

SBRN: Sedentary Behaviour Research Network

SOP: Scope of Practice

VPA: Vigorous Physical Activity

WHO: World Health Organization

## Chapter 1.0 Literature Review

### 1.1 Physical Activity & Sedentary Behaviour Among Adults

#### 1.1.1 Definitions

**1.1.1.1 Physical Activity.** The Canadian Society for Exercise Physiology (CSEP, 2016a) defines physical activity as any movement of the body that expends energy and is produced by skeletal muscles. Physical activity is an umbrella term that encompasses both structured and unstructured activities. Exercise is a form of structured physical activity and is typically planned and performed with the intention to increase or maintain one's physical fitness (World Health Organization [WHO], 2015a). Unstructured physical activities include activities that are not planned or performed for the sake of achieving fitness goals. Examples of unstructured physical activity include occupational physical activity, such as construction work, and active transportation, such as biking to work (WHO, 2015a).

**1.1.1.2. Sedentary Behaviour.** Sedentary behaviour is defined as any waking activity in which energy expenditure is  $\leq 1.5$  Metabolic Equivalents (METs, a standardized unit for measuring the intensity of physical activity in research) and generally means sitting or lying down during waking hours (Sedentary Behaviour Research Network [SBRN], 2012). Examples of sedentary activities include driving, reading while seated, and screen time activities, such as using a computer or watching television while seated or in a reclining position (SBRN, 2012).

**1.1.1.3. Physical Inactivity.** Physical inactivity is defined as the absence of physical activity (WHO, 2015b). The term "physically inactive" is commonly used to describe individuals who do not meet the recommended amount of physical activity for their age group. The distinction between physical inactivity and sedentary behaviour is important. As mentioned, individuals who are classified as physically inactive have low levels of physical activity;

however, individuals who have high levels of sedentary time do not necessarily fall into the category of “physically inactive”. For example, an avid recreational runner who works at a sedentary “desk job” for 40 hours a week may meet or exceed the physical activity recommendations, thus being classified as “physically active” or “highly active”, but may also be highly sedentary due to his/her sedentary occupation. This is also described as the “active couch potato phenomenon”, in which high levels of physical activity and high levels of sedentary time co-exist (Owen, Healy, Matthews, & Dunstan, 2010).

**1.1.2 Benefits of Physical Activity.** The benefits of regular physical activity for the general population are indisputable. For the average adult, physical activity can increase energy, improve quality of life, aid in weight control, improve sleep patterns, decrease mortality, strengthen muscles and bones, and increase mobility (Centre for Disease Control [CDC], 2011). Current literature supports the notion that following the recommended Physical Activity Guidelines can also reduce incidence or risk of several chronic conditions, such as cardiovascular disease, stroke, hypertension, some cancers, type 2 diabetes and osteoporosis (CDC, 2011; Warburton, Charlesworth, Ivey, Nettlefield, & Bredin, 2010). Active individuals have a 31% lower risk of all-cause mortality when compared to their inactive counterparts (Warburton et al., 2010).

In addition to the many physical health benefits listed above, adequate levels of physical activity have been shown to improve mental health. Past research has indicated that physical activity, mostly in the form of structured exercise, may aid in the management and/or treatment of many mental health conditions (Knapen, Vancampfort, Morein, & Marchal, 2015; Mammen & Faulkner, 2013; Pedersen & Saltin, 2015). Engaging in regular physical activity has also been found to improve mood, reduce stress, and increase cognitive function (Pedersen & Saltin,

2015).

As well as the many benefits being physically active has for the general population, physical activity can also be beneficial for those who have chronic conditions. For example, for those with type 2 diabetes, regular physical activity can improve blood glucose control, lower the risk of diabetes-associated complications (e.g., eye, heart, and kidney disease), and improve overall quality of life (Canadian Diabetes Association, 2018).

### **1.1.3 Guidelines.**

**1.1.3.1 Physical Activity Guidelines.** To acquire the benefits of an active lifestyle, CSEP (2011a) recommends that adults (age 18-64) should engage in at least 150 minutes of moderate-to-vigorous physical activity (MVPA) per week, in bouts of at least 10 minutes each. MVPA is defined as any activity that causes some perspiration, increased rate of breathing, and a slight increase in heart rate (CSEP, 2011a). More specifically, physical activities that are between 3-6 METS are considered MVPA (WHO, 2015b). Some examples of MVPA are brisk walking or riding a bike. Strength training or bone-strengthening activities are also recommended at least twice a week (CSEP, 2011a; WHO, 2015b). The more physical activity that individuals participate in, the more benefits they will attain (CSEP, 2011a).

There are similar physical activity guidelines for Americans. In 2008, the U.S. Department of Health and Human Services released what is currently the most updated version of the Physical Activity Guidelines for Americans (PAGA). These guidelines are consistent with the Canadian guidelines, with one main difference. PAGA recommends that adults get 150 minutes of MVPA *or* 75 minutes of vigorous physical activity (VPA) per week in bouts of at least 10 minutes and over at least 3 separate days per week, rather than including only MVPA recommendations (U.S. Department of Health and Human Services, 2008). PAGA also suggests

that although adults gain most health benefits from the above recommendations, they can gain extensive health benefits from engaging in 300 minutes of MVPA per week or 150 minutes of VPA. Generally, the more physical activity that a person engages in, the more benefits that the person will receive. Furthermore, these guidelines also suggest to generally avoid inactivity (U.S. Department of Health and Human Services, 2008).

It is important to note that some individuals may have different recommendations due to their individual condition or limitations (CDC, 2011). The 2012 release of the Canadian Guidelines for Physical Activity also included a toolkit containing specific guidelines for adults with multiple sclerosis (CSEP, 2011b). Additionally, the 2019 Canadian Guideline for Physical Activity throughout pregnancy is now available (CSEP, 2018).

**1.1.3.2 Sedentary Behaviour Guidelines.** To date, there are no sedentary behaviour guidelines in place for adults in Canada; however, the 2011 release of the Canadian Physical Activity Guidelines included brief sedentary behaviour guidelines for children (ages 5-11) and youth (ages 12-17). In 2012, physical activity and sedentary behaviour guidelines were released for early years (ages 0-4) as well (Leblanc et al., 2015). The sedentary behaviour guidelines suggest guidelines for limiting recreational screen time in some age categories including early years (ages 0-4), children (ages 5-11), and youth (ages 12-17). It is recommended that recreational screen time be limited to no more than two hours per day for children and youth (CSEP, 2016b) and no more than one hour per day for children ages 2-4 years (CSEP, 2016c); screen time for children ages 0-2 years is not recommended (CSEP, 2016c). The screen time guidelines for these three age categories also include a note stating that lower sedentary time is associated with better health (CSEP, 2016b, 2016c).

In addition to the lack of sedentary behaviour guidelines for Canadian adults, there are

also no sedentary behaviour guidelines in place for American adults. The physical activity guidelines for Americans do not include sedentary behaviour or screen time information or recommendations (U.S. Department of Health and Human Services, 2008). Despite the lack of official recommendations, sedentary behaviour is a topic of concern and discussion within the scientific community, but primarily for children. In 2010, the American Academy of Pediatrics released a policy statement discussing children, adolescents and the media (i.e., television, social media, cell phones, etc.). This policy statement was intended to encourage pediatricians to inquire about the sedentary behaviours, namely screen time, of their patients, and to give recommendations on limiting screen time for children and adolescents. Similar to Canadian sedentary behaviour guidelines, these recommendations included suggestions such as limiting total entertainment screen time to less than 1 or 2 hours per day, discouraging screen time for children under 2 years of age, and keeping televisions out of children's bedrooms (American Academy of Pediatrics, 2010).

Despite the present and/or emerging sedentary behaviour guidelines among children and adolescents, sedentary behaviour recommendations continue to remain absent for adults in both Canada and the United States. However, increasing amounts of research and general interest in sedentary behaviour among the scientific community suggests that sedentary behaviour guidelines for adults may be emerging within the next few years.

#### **1.1.4 Prevalence & Health Consequences**

**1.1.4.1 *Physical Inactivity.*** Globally physical inactivity ranks fourth among the leading modifiable risk factors for premature mortality (WHO, 2015a). Despite the benefits of physical activity as well as the detrimental effects of physical inactivity, both Canadian and American adults remain largely inactive. According to accelerometry data collected in the Canadian Health

Measures Survey from 2007-2009, only 15% of adults (17% of men and 14% of women) met the physical activity recommendations of 150 minutes of MVPA per week (Colley et al., 2011). The CDC (2015) reports that long-term consequences of physical inactivity include overweight and obesity status, which in turn, can lead to diabetes, high blood pressure, high LDL cholesterol, asthma, and arthritis. Physical inactivity also increases the risk of all-cause and cardiovascular-disease-related mortality (CDC, 2015).

Using National Health and Nutrition Examination Survey (NHANES) data from 1988-2010, Ladabaum, Mannalithara, Parvathi, and Singh (2014) observed the trends in obesity, abdominal obesity, physical activity, and caloric intake among American adults. Over the 12-year period, the percentage of adults who reported no leisure-time physical activity increased from 19.1% to 51.7% (95% confidence interval [CI], 17.3-21.0 and 95% CI, 48.9-54.5, respectively) among women and 11.4% to 43.5% among men (95% CI, 10.0-12.8 and 95% CI, 40.7-46.3, respectively). Body mass index (BMI) increased by 0.37% per year in both women and men (95% CI, 0.30-0.44). Additionally, although there was no significant increase or change in caloric intake, a dramatic increase was seen in the prevalence of obesity and abdominal obesity among overweight adults. Trends indicated that BMI and waist circumference were associated with physical activity level, but were not significantly associated with caloric intake. This study highlights the importance of physical activity in weight maintenance and obesity prevention, as well as the significant effect of physical inactivity on body composition and health.

**1.1.4.2 Sedentary Behaviour.** Recent literature consistently reports high levels of sedentary behaviour among both Canadian and American adults. Bauman et al. (2011) used IPAQ sitting questions to assess sitting time among adults from 20 countries across the world,

including the USA and Canada. Median sitting times for Canadian and American adults were 300 minutes/day and 240 minutes/day, respectively (Bauman et al., 2011). These findings are relatively consistent with previously collected self-report data from the NHANES, which reported 7-8 hours (420-480 minutes) of sedentary time per day, on average, among American adults (Bauman et al., 2011). Other studies using objective measures of sedentary behaviour (accelerometry) showed an average of 400-500 minutes per day of sedentary time for American adults (Bauman et al., 2011) and 9.5 hours, or 570 minutes for Canadian adults (Colley et al., 2011). The higher values reported with objective measures of sedentary behaviour suggest that self-report data may underestimate sedentary time (Bauman et al., 2011). This discrepancy also highlights the possibility of social desirability bias among self-report values, which is common in this type of research.

Despite consistent findings of high levels of sedentary behaviour in adults, present evidence is still insufficient to determine a threshold level at which sedentary time begins to result in negative health consequences. Regardless of the lack of numerical recommendation, literature is consistently finding that the higher the levels of sedentary time, the more detrimental to health, even if physical activity recommendations are met (Thorp, Own, Neuhaus & Dunstan, 2011). In one study conducted on American adults, reducing sedentary time to 3 hours per day or less was found to increase life expectancy by approximately 2 years (Katzmarzyk & Lee, 2012).

Two recently conducted systematic reviews examined the relationship between TV viewing time and health outcomes among adults. These reviews looked at literature that was published prior to 2007 and all studies reviewed used a cross-sectional research design. With the exception of a few studies, results consistently showed a positive relationship between television

viewing time and negative health outcomes such as overweight/obesity, high cholesterol, hypertension, type 2 diabetes, and metabolic syndrome (Thorp et al., 2011). Following this review, Thorp et al. (2011) conducted a review of longitudinal studies published from 1996-2011. Articles included in this review examined the relationship between sedentary behaviours (both self-reported and device-measured) and chronic disease, mortality and health indicators in adults. A consistent association was seen between high levels of sedentary behaviour and increased risk of cardiovascular-disease-related and all-cause mortality, independent of BMI and physical activity levels. This association was found in all studies with the exception of one, which showed an association for males only (Thorp et al., 2011). After adjustment for physical activity, most studies showed a relationship between high sedentary times and weight gain as well as obesity risk. Some evidence was present to suggest that high levels of sedentary behaviour were also associated with an increased risk of cardiovascular disease, symptomatic gallstone disease and mental disorders, mostly independent of physical activity levels as well (Thorp et al., 2011). There was limited evidence to suggest a potential association between sedentary behaviours and diabetes as well as site-specific cancer risk, including colon, endometrial, and ovarian cancers. Evidence was insufficient to suggest a relationship between cardiometabolic biomarkers/metabolic conditions and sedentary time (Thorp et al., 2011).

**1.1.5 Health care costs.** As previously mentioned, there are many negative health consequences associated with low levels of physical activity and/or high levels of sedentary behaviours. Because of the high prevalence of both physical inactivity and sedentary behaviour, and therefore associated chronic conditions as well, it is predicted that if even 10% of the population increased their physical activity and decreased their sedentary time to recommended levels, healthcare costs could be reduced by up to \$2.6 billion per year (Conference Board of

Canada, 2014). In addition to this estimate, Janssen (2012) looked at the direct, indirect and total healthcare costs of physical inactivity among Canadian adults, including costs related to premature mortality and the treatment and care of physical inactivity-related chronic conditions. The estimated cost of physical inactivity in 2009 was \$2.4 billion in direct costs, \$4.3 billion in indirect costs, and \$6.8 billion in total costs (Janssen, 2012).

**1.1.6 Physical activity & sedentary behaviour knowledge among Canadian and American adults.** Past research has also shown that while most Canadians are aware of the benefits of physical activity, many do not know the minimum requirements in order to attain these benefits (Canadian Diabetes Association, 2018; Canadian Fitness and Lifestyle Research Institute [CFLRI], 2008). According to the 2008 Physical Activity Monitor, 86% of Canadians did not know all three dimensions (frequency, intensity, and time) of the current physical activity guidelines (CFLRI, 2008). In addition, a systematic review conducted by LeBlanc and colleagues (2015) found that with prompted questioning, only 37.7% of Canadians had heard of the physical activity guidelines for Canadians. Participant age was negatively related to awareness of the guidelines (Leblanc et al., 2015). Out of the 37.7% of Canadians who were aware of the guidelines, only 7.6% could recall the specifics of the guidelines (Leblanc et al., 2015). With the exception of this study, there has been little research conducted to assess the awareness of these guidelines among Canadians since the most recent release of CSEP's physical activity guidelines for adults (LeBlanc et al, 2015). The few other studies analyzed by Leblanc et al.'s (2015) review assessed awareness and knowledge of physical activity and sedentary behaviour guidelines for children.

In addition to a lack of knowledge of the physical activity guidelines, many North American adults have false perceptions of how much physical activity they are getting. A study

conducted on American adults found a large discrepancy between self-report and accelerometry data in measuring the physical activity levels. Self-reported results indicated that 62% of adults met the American physical activity guidelines while accelerometry data yielded only 9% meeting the guidelines (Tucker, Welk, & Beyler, 2011). Although social desirability bias is a constant validity concern with self-reported data, the magnitude of this discrepancy may suggest that many adults lack knowledge of how to decipher the level and intensity of their own physical activity. In order to take the first step in encouraging Canadians to increase their physical activity to the recommended level, it is important that adults be provided with the knowledge, resources and skills necessary to do so.

## **1.2 Physical activity & sedentary behaviour counselling among health care professionals**

**1.2.1 Overview.** Over time, the health care industry has modernized to address new causes of illness, disease and mortality in the general population (Joy, Blair, McBride, & Sallis, 2012; National Physical Activity Plan, 2016). An example of this is the discovery of the detrimental effects of smoking and the high incidence of death and disease that is linked to it. This led to smoking cessation counselling by physicians (Joy et al., 2012). Presently, low rates of physical activity and high rates of sedentary behaviour in the adult population are a large health concern and a common cause of several illnesses, chronic conditions, and mortality. It is important for the health care system to recognize physical activity and sedentary behaviour patterns as important modifiable risk factors and incorporate physical activity and sedentary behaviour counselling into daily practice.

Physicians and other health care professionals (HCPs) are in an ideal position to promote an increase in physical activity and decrease in sedentary behaviour among the general population through physical activity and sedentary behaviour counselling in their daily practice

(Vuori et al., 2013). Previous literature demonstrates that HCPs are the dominant source of health information for many adults (Loprinzi & Beets, 2014), particularly for those who do not meet the physical activity requirements (McPhail & Schippers, 2012). The opinions and advice that HCPs share with their patients are trusted and respected (Loprinzi & Beets, 2014; Shuval et al., 2012). Additionally, HCPs have the opportunity to reach the majority of the population (Coleman et al., 2012). Furthermore, it has been found that brief physical activity counselling is effective, cost-efficient and feasible in the health care setting (Vuori et al., 2013).

In summary, physical activity and sedentary behaviour counselling are integral components of comprehensive health care, and both play a large role in both the prevention and treatment of many chronic conditions (Vuori et al., 2013). Despite this, the literature demonstrates these types of counselling are not fully utilized in the health care system setting (Loprinzi & Beets, 2014; Shuval et al., 2012; Vuori et al., 2013).

### **1.2.2 Prevalence of Counselling.**

**1.2.2.1 Physical activity.** Despite overall low levels of physical activity counselling among HCPs, the prevalence of counselling seems to be increasing over time (Barnes & Schoenborn, 2012). A study by Barnes and Schoenborn (2012) showed that in 2000, only 22.6% of patients reported receiving physical activity counselling from their physicians. By 2010, this percentage had risen to 32.4% (Barnes & Schoenborn, 2012). This is relatively consistent with the results of a study conducted by Loprinzi and Beets (2014), which involved administering a questionnaire to a national sample of American adults to determine the degree to which patients had been encouraged by their HCPs to exercise in the past 12 months. Results of this study indicated that only 36.3% of American adults had been told by their physicians to increase their physical activity within the past 12 months. In addition, only 44.9% of adults who reported no

recreational, occupational or transportation-related physical activity were told by their HCPs to increase their physical activity in the last 12 months (Loprinzi & Beets, 2014). In a separate study, 53% reported receiving general physical activity counselling from their physicians in the past year (Shuval et al., 2012).

As well as patient reports of physical counselling by their physicians, there have also been studies that have questioned physicians directly about their physical activity counselling practices. In one study, 66% of physicians reported asking more than half of their patients about exercise and 43% reported counselling more than half their patients on exercise (Walsh, Swangard, Davis, & McPhee, 1999). However, only 14% of physicians reported actually prescribing exercise to more than half of their patients (Walsh et al., 1999).

In addition to physicians providing counselling on physical activity and sedentary behaviour, other HCPs are being encouraged to counsel patients on physical activity. In a study that assessed the counselling practices of both nurse practitioners and physicians' assistants, 75% of nurse practitioners and 64% of physicians' assistants reported counselling patients about physical activity in their daily practice (Grimstvedt et al., 2012). There is some evidence to suggest that physical activity counselling from multiple HCPs is more effective in changing patient behaviours than counselling from just a physician alone (Grimstvedt et al., 2012).

**1.2.2.2 Sedentary Behaviour.** To date, there have been few studies that have examined the sedentary behaviour counselling practices of HCPs. The little research that has been conducted in this area has shown that though the presence of physical activity counselling among health care providers is sparse (Loprinzi & Beets, 2014; Vuori et al., 2014), sedentary behaviour counselling is even less prevalent in these settings (Shuval et al., 2012).

A study by Shuval et al. (2012) examined the physical activity and sedentary behaviour

counselling practices of physicians using patient computer surveys in a primary care clinic in Dallas, Texas. This study utilized the 5A framework of counselling to guide their interview guide. The 5A framework consists of 5 steps that can be used to effectively structure sedentary behaviour counselling: ask, advise, agree, assist, and arrange. This framework begins with asking patients about their sedentary behaviour patterns and then advising them on the guidelines/recommendations for sedentary behaviour as well as the negative health outcomes associated with high sedentary behaviour. Next, it moves to agreeing on an action plan with patients, assisting them with creating goals and finding resources if necessary, and lastly, arranging a follow-up visit to assess progression towards the goal (Shuval et al., 2012). Despite high levels of sedentary time among participants (9 hours per day, on average), results showed that only 10% of patients had been instructed by their physicians to decrease sedentary time in the past year. In addition, only 4% of patients reported discussing strategies to overcome barriers related to decreasing sedentary time with their physicians and none received a written plan related to reducing their sedentary time (Shuval et al., 2012). In contrast, 14% of patients reported discussing strategies to overcome barriers related to physical activity with their physicians and were given a written action plan (Shuval et al, 2012).

**1.2.3 Determinants & barriers for physical activity and sedentary behaviour counselling.** Patient characteristics may play a role in whether or not a physician or HCP counsels a patient on physical activity and sedentary behaviour habits (Loprinzi & Beets, 2014; Shuval et al., 2012; Vuori et al., 2013). Unfortunately, there has been little research on the characteristics of patients who are more likely to receive sedentary behaviour counselling. However, a link between patients with obesity and a higher likelihood of being advised to decrease time spent in sedentary pursuits has been found (Shuval et al., 2012). In contrast, many

patient predictors have been linked to the likelihood of being counselled about physical activity by their physicians. These patient predictors include obesity, overweight, race, presence of co-morbidities, and frequency of receiving healthcare (Loprinzi & Beets, 2014). A qualitative study of general practitioners' views towards obesity revealed that physicians view obesity as predominantly a behavioural problem, largely caused by physical inactivity and poor diet (Teixeira, Pais-Ribeiro, & Maia, 2014). Results from a separate study on patient predictors found that smoking status of the patient was not a significant predictor of whether or not physicians would counsel the patient on physical activity (Shuval et al., 2012). Interestingly, although many physicians perceive physical activity promotion as important, many ranked it lower in importance than other health promotion activities, such as smoking cessation (Din, Moore, Murphy, Wilkinson, & Williams, 2015).

In addition to patient characteristics, HCP characteristics are determinants of whether or not physical activity counselling occurs. The perception that physical activity counselling would not be effective for their patients or that the patients would not stick to a plan was a common determinant of whether or not physicians and physicians' assistants would counsel on physical activity, though this determinant was less prominent among nurses (Grimstvedt et al., 2012; Vuori et al., 2013). For the most part, health care practitioners have been found to have positive attitudes towards physical activity counselling in their practice, and in general, these attitudes have improved over time (Vuori et al., 2013). In general, nurses held more positive perceptions and attitudes towards physical activity counselling when compared to other clinicians (Vuori et al., 2013). Another study conducted on a mix of Australian medical students and clinicians found that attitudes towards exercise counselling were mostly positive among all HCPs (Gnanendran, Pyne, Fallon, & Fricker, 2011). Interestingly, medical students/clinicians who

reported higher levels of physical activity during their childhood were more likely to have positive attitudes towards exercise counselling than those who did not. In addition, participants who had positive attitudes towards exercise counselling had higher levels of personal physical activity than those with a neutral or negative attitude towards exercise counselling (Gnanendran, Pyne, Fallon, & Fricker, 2011). It has also been found that some HCPs base their decision to counsel patients on physical activity on their own physical activity practices (Din et al., 2015).

In addition to determinants of whether or not HCPs counsel patients on physical activity/sedentary behaviour, there are several barriers that HCPs face. These barriers can prevent HCPs from counselling their patients on physical activity and/or sedentary behaviour.

Common barriers to physical activity counselling that HCPs face include lack of knowledge (Loprinzi & Beets, 2014; Tomasone, Martin Ginis, Estabrooks, & Domenicucci, 2014; Vuori et al., 2013), training information, materials/resources (Tomasone et al., 2014; Vuori et al., 2013), confidence (Loprinzi & Beets, 2014; Tomasone et al., 2014), incentives/reimbursements (Shuval et al., 2012; Vuori et al., 2013), time constraints (Loprinzi & Beets, 2014; Shuval et al., 2012; Vuori et al., 2013), the perception that physical activity counselling is secondary to other types of counselling (Vuori et al., 2013), and the perception that patients will often ignore the advice (Vuori et al., 2013). In countries other than Canada where healthcare is not covered by the government, confusion or concern about billing patients for time spent counselling about physical activity has also been identified as a barrier (Loprinzi & Beets, 2014). This concern is warranted because HCPs are typically not reimbursed for time spent educating patients primarily for prevention (Joy et al., 2012), leading clinicians to focus on more commonly used or accepted preventative measures such as cancer screening (Shuval et al., 2012).

Further, for nurses and physicians' assistants, lack of knowledge, lack of time and the perception that physical activity counselling is secondary to other health concerns were identified as prominent barriers to physical activity counselling in daily practice (Grimstvedt et al., 2012). Additionally, 22% of physicians' assistants felt that physical activity counselling was purposeless due to lack of patient response/behaviour change despite the counselling, while only 6% of nurses felt this way (Grimstvedt et al., 2012).

**1.2.4 Politics & Global Initiatives.** Awareness of the lack of utilization of physical activity counselling in a majority of healthcare settings has been increasing at the political level (Vuori et al., 2013). In their review, Vuori et al. (2013) identified the lack of priority that is given to physical activity within the health care system as a key barrier to implementing physical activity interventions in this setting. The recent increase in awareness at the political level has lead to the development of policies and global health initiatives aimed at addressing this issue (Vuori et al., 2013). As a result, over the past decade, several campaigns and group initiatives have emerged. These campaigns/initiatives aim to emphasize the benefits of physical activity on overall health as well as increase the promotion of physical activity within the healthcare setting.

Perhaps one of the largest and most widely known of these physical activity initiatives is Exercise is Medicine (EIM), which was launched in 2007 by the American College of Sports Medicine (ACSM). Since its launch, EIM now has a presence in several countries across the world, including Canada. EIM is a global health initiative that encourages all HCPs to include physical activity counselling in their everyday practice and in the development of their treatment plans. The initiative is based on the belief that physical activity is an essential aspect of both prevention and treatment of diseases and should be habitually evaluated as part of all medical care practices (ACSM, 2015).

In addition to the EIM initiative, in 2013, the US Department of Health and Human Sciences unveiled Healthy People 2020, which is a set of goals and objectives for the next 10 years in which the overall aim is health promotion and prevention of disease (Loprinzi & Beets, 2014). A primary objective of this initiative is to increase the percentage of physician visits that included physical activity counselling (Loprinzi & Beets, 2014). Healthy People 2020 is partnered with the National Physical Activity Plan (released in 2010 and updated in 2016), which includes programs, policies and initiatives for increasing physical activity among Americans. The National Physical Activity Plan is divided into several sectors, one of which is the health care sector, which contains four strategies to help increase physical activity counselling and promotion in the healthcare setting. These strategies include instituting physical inactivity as a preventable/treatable condition with extensive health complications and educating HCPs on physical activity and physical activity counselling (National Physical Activity Plan, 2016).

### **1.3 Physical Activity Counselling Among Registered Dietitians**

**1.3.1 Overview.** Although all HCPs should promote physical activity in their daily practice, RDs are in a particularly ideal position to counsel patients on both physical activity and sedentary behaviour (Johnson et al., 2007; Spidel, Paquette, Marshall, Bell, & McCargar, 2004). There are several reasons why RDs can and should include physical activity and sedentary behaviour counselling alongside their nutrition counselling.

First, nutrition and physical activity are synergistic concepts and they should be treated as such (Johnson et al., 2007). Both diet and physical activity/sedentary behaviour habits are important in managing weight, preventing disease, improving quality of life, and maintaining overall health (Johnson et al., 2007). Poor diet and lack of physical activity are among the top modifiable risk factors of chronic disease (WHO, 2018). Due to this, it is reasonable that RDs

would counsel not only on dietary habits, but on physical activity/sedentary behaviour habits as well, in order to have an effect on patients' overall health.

In addition to the practicality of counselling patients on physical activity and sedentary behaviour as well as nutrition, research indicates that RDs should use a lifestyle approach when counselling patients (Chapman et al., 2005). This lifestyle approach utilizes both nutrition and physical activity counselling, and it has been found to be effective in some patient populations, particularly those who are seeking weight management or weight loss advice (Chapman et al., 2005). When compared to counselling that focused on weight loss as a primary goal, patients responded more positively to comprehensive forms of counselling in which the primary goal was improving overall health through lifestyle changes such as healthy eating and increased exercise (Chapman et al., 2005). Other sources also suggest that having goals focused on weight loss alone can increase weight preoccupation and food obsession, decrease self-esteem, and promote body dissatisfaction (Salos, 2015; Tylka et al., 2014). These findings are congruent with the basis of the "Total Diet Approach" to communicating food and nutrition information (American Dietetic Association, 2007). This approach, which is encouraged by the American Dietetic Association, is based on the premise that food balance is the most important factor in nutrition management and that all foods can fit within an individual's diet when using moderation and proper portion sizing along with regular physical activity (American Dietetic Association, 2007). For RDs to counsel patients using this approach, they must also include physical activity and sedentary behaviour assessment and counselling techniques to promote energy balance. By focusing on complete lifestyle change with an overall goal of improving quality of life in these situations, RDs are able to engage patients more positively and promote sustainable and acceptable lifestyle changes (American Dietetic Association, 2007; Chapman et al., 2005).

Lastly, RDs have extensive knowledge of the prevention and management of chronic conditions (Spidel et al., 2004), and many RDs have physical activity knowledge as well. With the exception of registered kinesiologists who are now regulated health professionals (College of Kinesiologists of Ontario, 2018), there is a large amount of variation of qualifications, skills sets, and credibility within the various types of exercise professionals (Warburton et al., 2013). There is a lack of clarity related to the training and core competencies required for exercise professionals to counsel various patient populations (such as those with chronic conditions) on physical activity (Warburton et al., 2013). For example, many qualified exercise professionals may have the knowledge and skills necessary to effectively counsel otherwise healthy individuals (i.e., individuals without health conditions) but may have little knowledge of the needs and limitations associated with various chronic conditions (Warburton et al., 2013). In these situations, it is reasonable to suggest that RDs whom, as previously mentioned, have extensive knowledge about chronic conditions, can be trained to provide safe and effective physical activity and sedentary behaviour counselling.

**1.3.2 Scope of Practice.** In order to practice dietetics in Ontario, all RDs must be registered with the College of Dietitians of Ontario (CDO). The CDO is responsible for regulating and supporting RDs in Ontario, and therefore the CDO has its own set of regulations that all RDs must abide by within their practice. These regulations include ethics, assuring that all patients are treated with respect, quality of care standards, and more. These guidelines include the CDO's definition of practicing dietetics, which states that RDs must assess, promote, enhance and protect the health of their patients through health promotion as well as strategies that focus on the determinants of overall health and their interactions (CDO, 2015). Physical activity and sedentary behaviour assessment and physical activity promotion are aspects of

enhancing health and preventing common chronic diseases, especially cardiovascular-related diseases. Dietary habits and physical activity patterns could also fall under the category of interactions among determinants of health/overall health. With that being said, not only is it within RDs' scope of practice to counsel on physical activity and sedentary behaviour counselling, but it is part of their job description as well.

Although it is clear that it is within RDs' job descriptions to counsel on physical activity and sedentary behaviour habits, the extent to which RDs are able to do this within their scope of practice is more complicated. Recommending general exercise or increases in physical activity is within a RD's scope of practice, yet most forms of exercise prescription as well as fitness testing and assessments fall outside of the definition of dietetic practice (Cohen, 2013). The extent to which RDs can counsel their patients on physical activity and sedentary behaviour varies depending on their credentials (i.e., some RDs may have additional certifications related to physical activity or exercise).

**1.3.3 Previous Research.** To date, there has been limited research regarding physical activity counselling among RDs. To our knowledge, there has been no research on sedentary behaviour counselling practices among RDs, although in numerous studies across the literature, physical activity and sedentary behaviour are often grouped together as one concept.

Spidel et al. (2004) conducted a qualitative study (i.e., six focus groups) to understand RDs' knowledge and needs regarding physical activity/physical activity counselling. The participants in this study consisted of 42 individuals, 40 RDs and two dietetic interns from cities across Alberta, Canada. Three primary topics emerged from the data: perceived role in promoting active living, perceived barriers in promoting active living, and RDs' needs to facilitate active living counselling (Spidel et al., 2004). All participants agreed that RDs should

counsel on physical activity. RDs identified some common barriers, including lack of dietitians' knowledge of physical activity, concern about how other colleagues would perceive them if they were counselling on physical activity, and time constraints. RDs suggested that they need more access to active living resources and more knowledge, perhaps in the form of workshops.

Johnson et al. (2007) conducted a web-based survey about RDs' physical activity counselling practices as a six-month follow-up to a physical activity counselling workshop. Results indicated that 91% of dietitians who attended the workshop reported promoting physical activity in their daily practice (Johnson et al., 2007). In addition, RDs who did not attend the workshop were more likely to refer patients to physical activity professionals rather than counsel them on their own (Johnson et al., 2007), suggesting a possible lack of knowledge and/or self-efficacy related to physical activity counselling among RDs.

Lastly, Bleich, Bandara, Bennett, Cooper, and Gundzune (2015) conducted a study examining the perspectives of non-physician HCPs. This study looked at HCPs from sectors such as nutrition, nursing, mental health, exercise and pharmacy and their perspectives on the causes of obesity, their own training in weight management and their self-efficacy for providing obesity care (Bleich et al., 2015). Out of all participants, nutrition professionals were significantly more likely to report having acquired high-quality weight management training (78%) and having high confidence in helping obese individuals meet their weight-loss goals (88%). Nutrition professionals were also more likely to perceive a successful outcome from counselling patients in order to achieve significant weight loss (81%).

**1.3.4 Family Health Teams (FHTs).** Started in 2005, family health teams (FHTs) are defined as unique groups of primary health care organizations that work together to deliver optimal comprehensive care to patients in Ontario. Most FHTs consist of doctors, nurses, nurse

practitioners, dietitians, social workers, and various other HCPs. Each team is created based on the community health needs within the location in which they are stationed, and therefore each team varies in composition depending on location. In total, there are 184 FHTs in Ontario, which provide services to over 200 communities across the province (Ontario Ministry of Health and Long-Term Care, 2014).

With FHTs rapidly increasing in prevalence across Ontario in recent years, there has been emerging research focused on HCPs' perspectives of and experiences within FHTs. Goldman, Meuser, Rogers, Lawrie, and Reeves (2010) found that HCPs who were members of FHTs across Ontario felt that the interprofessional collaboration in FHTs was resulting in positive outcomes, yet there were some aspects of the FHT system that required attention and adjustment to improve the overall function and efficacy. HCPs within FHTs felt one of the largest challenges of being part of the team was understanding and defining their roles within the team, as well as educating other members about their expertise and qualifications (Goldman et al., 2010). They described knowing how to function within their job description separate from the team but not knowing how to adapt their function and roles to fit with the interprofessional, group-focused FHTs (Goldman et al., 2010). Overall, future research is needed in this area to better understand how HCPs adapt to the different roles and responsibilities of treating patients within this collaborative primary care setting (Goldman et al., 2010).

**1.3.4.1 Dietitians within FHTS.** As previously mentioned, FHTs are new, innovative, team-based approaches to primary care (Ontario Ministry of Health and Long-Term Care, 2014). In line with Goldman et al.'s (2010) findings, it is reasonable to assume that RDs may struggle to understand and accept their role within a FHT and that their roles would also vary depending on the patient population (e.g. elders, young families, low socioeconomic status), the composition of

the team (e.g., nurse practitioner, social worker, number of medical doctors), context (rural, urban, co-located or separate offices) and typical routines for completing daily work (e.g., group programs, clinics, etc.). To date, there has been no research on the roles of RDs in FHTs regarding physical activity and sedentary behaviour counselling. In FHTs that have registered kinesiologists or exercise professionals as part of their team, RDs may not feel the need to counsel patients on physical activity/sedentary behaviour but instead they may refer patients to the exercise professional in their team. However, in the more common situation where RDs are part of FHTs that do not have exercise professionals on staff, it is unknown whether RDs would accept the role of counselling patients on physical activity and sedentary behaviour themselves. There is a need for research in this area. The aim of this study is to examine RDs' knowledge, perceptions and experiences regarding physical activity/sedentary behaviour counselling and their counselling roles within the FHT setting.

## Chapter 2.0 Research Objectives

The research objectives for this study are as follows:

- 1) To examine RDs' knowledge of physical activity and sedentary behaviour, including the Canadian Physical Activity Guideline for Adults.
- 2) To examine RDs' injunctive and descriptive normative beliefs regarding their physical activity and sedentary behaviour counselling practices within FHTs.
- 3) To examine RDs' control beliefs and perceived power (self-efficacy) related to physical activity and sedentary behaviour counselling.
- 4) To examine RDs' behavioural beliefs and outcome evaluations regarding physical activity and sedentary behaviour counselling among RDs and their peers in FHT settings.
- 5) To explore the various environmental factors that influence RDs physical activity and sedentary behaviour counselling practices within FHT settings.
- 6) To examine RDs' intention to counsel patients on physical activity and sedentary behaviour in the future, within the FHT setting.
- 7) To examine RDs' practices regarding physical activity and sedentary behaviour counselling within FHTs.

## Chapter 3.0 Methods

### 3.1 Participants

The number of participants in this study was based on reaching theoretical saturation, which was 20 RDs. The researcher first conducted a pilot test with an additional two participants, though their data were not included in the analysis. This pilot test is described in the procedure section.

#### 3.1.1 Inclusion Criteria

As per the objectives of this study, RDs who were eligible to participate were those who are currently part of a FHT in Ontario. Due to the collaborative nature of FHTs, it can be reasonably assumed that RDs who have exercise professionals on their team would be less likely to counsel on physical activity and/or sedentary behaviour and would likely refer or offer programs with the exercise professional instead. For this reason, only RDs from FHTs that did *not* have an exercise professional on their team were eligible to participate. For the purpose of this study, the term “exercise professional” included registered kinesiologists, health promoters, health educators, exercise professionals, physical activity specialists, and/or any form of health care professional whose primary job was to promote, prescribe and/or evaluate exercise and/or physical activity habits of individuals. Another eligibility criterion was a minimum of a three-month employment within the FHT. The three-month minimum was selected because it can be reasonably assumed that RDs who have been working for less than three months in a FHT may not had the experiences necessary to participate in the study. In addition, although there is no set duration for probationary periods during new employment within Ontario, three months is the time-point after which employees must provide termination notice, etc., and thus is commonly considered the normal probationary period for jobs in Ontario (Ontario Ministry of Labour,

2015). The researcher's intention was to study RDs who have a sense of permanency in their role as a RD in the FHT and therefore have had the opportunity to reflect on their duties and job roles within the team.

In addition to the above requirements, only RDs within a 2-hour drive of the University of Guelph were invited to participate. This was for convenience and feasibility purposes for the researcher. Although this geographical limitation will affect the external validity of the study, it is necessary in order to make this study feasible for a thesis-based project, as the researcher travelled in order to meet participants in-person. It is also important to note that this study was exploratory in nature and may be used in the future as a stepping-stone to a larger scale study that could result in more generalizable results.

Lastly, RDs had to be fluent in English to participate in this study. It was necessary for participants to be able to both read and communicate orally in English in order to participate in all parts of the meeting.

In summary, to be eligible to participate, each participant had to (a) be a RD in Ontario, (b) be part of a FHT that does not have an exercise professional or physical activity specialist on the team, (c) have been part of the FHT for at least three months, (d) be located within a 2-hour radius of Guelph, and (e) be fluent in English.

### **3.1.2 Sampling**

Purposive sampling was used to recruit participants. Purposive sampling is a form of non-probability sampling in which the researcher chooses participants with the specific purpose of the study in mind (Neuman & Robson, 2014). This sampling technique is used widely in qualitative research, particularly in exploratory research (Neuman & Robson, 2014). Purposive sampling is appropriate when looking to select unique cases that are particularly informative

(Neuman & Robson, 2014), such as this study's focus on RDs in FHTs that lack exercise professionals.

## **3.2 Measures**

### **3.2.1 Quantitative Measures**

**3.2.1.1 Demographic Questionnaire.** A brief 10-question demographic questionnaire was administered to participants at the beginning of the interview to obtain contextual information (Appendix A). The researcher created this questionnaire by combining new questions designed specifically for this study and questions adapted from the 2015 Canadian Community Health Study (CCHS).

**3.2.1.2 International Physical Activity Questionnaire (IPAQ).** The IPAQ was used to collect information on participants' own physical activity level. The IPAQ comes in many forms, but the short, English, 7-day self-administered format was used for this study (Appendix B). Information on participants' physical activity level was collected for contextual purposes; therefore the long version of the IPAQ would be redundant and unnecessary.

The IPAQ is a physical activity questionnaire that was designed for use in the adult population (ages 15-59) (IPAQ, 2002). The short-form of the IPAQ asks about three types of physical activity (walking, moderate intensity activities and vigorous intensity activities) and sitting behaviours over the past seven days, inquiring about both frequency (measured in days per week) and duration (measured in time per day) (IPAQ, 2002). Based on Tudor-Locke's (2008) cut points, results of the IPAQ place participants in one of three categories based on their answers: low, moderate, or high active (IPAQ, 2005). In addition to their categorical score, participants also receive a continuous score, which is a computation of MET-minutes using MET values and equations that are provided within the IPAQ scoring tool (IPAQ, 2005). MET stands

for metabolic equivalent and one MET is equivalent to the amount of energy expended when the body is at rest (Jette, Sidney, & Blumchen, 1990). MET-minutes (MET-min) are calculated by multiplying the MET value of an activity by the number of minutes that the activity is performed (IPAQ, 2005). The researcher computed both of these scores using the IPAQ scoring tool (IPAQ, 2005).

The IPAQ has also been shown to be valid and reliable as a measure for physical activity for adults. Craig et al. (2003) found that IPAQ data were reliable (Spearman's  $\rho = .80$ ) and data from both long and short forms were comparable. Convergent validity, in terms of comparison to other self-report measures of physical activity, was found to be acceptable (median  $\rho = .30$ ) (Craig et al., 2003). The IPAQ was also chosen for this study because of its simplicity and short length.

**3.2.1.3 Sedentary Behaviour Questionnaire (SBQ).** The Sedentary Behaviour Questionnaire (SBQ) was used to collect information on participants' sedentary behaviour level (Appendix C). Although there is a need for valid and reliable sedentary behaviour measures in many areas of research (Clark et al., 2009; Rosenberg et al., 2010), to date there are very few validated self-report measures of sedentary behaviour (Rosenberg et al., 2010). The SBQ was developed as a measure for use among adults within Patient-centered Assessment and Counseling for Exercise (PACE) research (Sallis, 2011) and is an adapted form of a measure that was originally created by Robinson and Killen (1995) for use among children (Rosenberg et al., 2010).

The SBQ assesses the amount of time spent performing nine common sedentary behaviours (i.e., watching television, playing computer or video games, doing artwork or crafts, playing a musical instrument, and sitting while: listening to music, talking on the phone, doing

paperwork/office work, reading a book, driving or riding in a car, bus or train (Rosenberg et al., 2010). These behaviours are assessed separately for a “typical weekday” and a “typical weekend day” (Rosenberg et al., 2010).

As previously mentioned, there are few validated measures of sedentary behaviour for adults, as well as few validation studies available for current measures of sedentary behaviour. As for the SBQ, a study by Rosenberg et al. (2010) that assessed the validity and reliability of the SBQ for overweight adults is the only study that has looked at the reliability and validity of this measure. The two-week, test-retest reliability was examined for each individual item on the SBQ, with weekday and weekend day questions examined independently. The intraclass correlation coefficients (ICCs) for each item as well as the total score demonstrated moderate to excellent reliability for weekdays (ICCs = .64 – .90, CI = 95%) and weekend days (ICCs = .51 – .93, CI = 95%) (Rosenberg et al., 2010). Regarding criterion validity, the SBQ was compared to both Actigraph accelerometer readings as well as the two “sitting time” questions present on the long form of the IPAQ. Since the IPAQ has been found to be relatively valid and reliable (Rosenberg et al., 2010), it was used as a reference point to aid in determining the validity of the SBQ. For men, there was no significant relationship between SBQ scores and accelerometer findings (partial  $r = -.01$ ,  $p = 0.81$ ); however, a significant relationship was found between IPAQ results and some SBQ items (Rosenberg et al., 2010). For women, there was a significant relationship between accelerometer minutes with counts <100 and some of the SBQ items. In addition, IPAQ sitting scores were also significantly associated with overall weekday hours (partial  $r = .21$ ,  $p < .001$ ), overall weekend hours (partial  $r = .36$ ,  $p < .001$ ), and total hours per week (partial  $r = .28$ ,  $p < .001$ ) and some individual SBQ items.

In summary, the SBQ shows satisfactory measurement properties when used among

overweight adults (Rosenberg et al., 2010). Although more work needs to be done with the SBQ to improve validity, it is the best available option for this study. The SBQ is also simple and was designed to be brief (Sallis, 2011), making it an excellent choice for this study, since the goal is solely to gain contextual information about participants.

### **3.2.2 Qualitative Measures**

**3.2.2.1 Semi-structured Interview Guide.** Guided by Fishbein's (2009) Integrative Model of Behavioural Prediction, a semi-structured interview guide comprised of 11 questions was created for this study (Appendix D). This model is described below in section 4.2.3. Interview questions seek to examine RDs' attitude, norms, and self-efficacy towards their physical activity and sedentary behaviour counselling practices, as well as their overall intention to counsel patients on physical activity and sedentary behaviour. Also included in these 11 questions are those that address how environmental factors and RDs' skills and abilities affect RDs' physical activity and sedentary behaviour counselling practices and/or intention to counsel.

### **3.2.3 Research Design, Theory & Paradigm**

In this study, a cross-sectional research design was used to conduct semi-structured interviewing. Thematic analysis, a type of qualitative analysis that requires involvement and interpretation from the researcher in order to uncover meaning within textual data, was conducted to analyze the interview data (Guest, MacQueen, & Namey, 2012). The qualitative methodology used in this study stems from the social constructionist paradigm. Social constructionism is based on the premise that cultural, historical, and linguistic factors strongly influence human experience and perception (Willig, 2013). Social constructionism suggests that knowledge is acquired through exploring and understanding individuals' social world, as well as their interactions with the social world (Snape & Spencer, 2003). This paradigm fits well with

the purposed research as the researcher aims to uncover the social factors, among other factors, that influence RDs' physical activity and sedentary behaviour counselling and/or their choice to counsel.

In addition to the social constructionist paradigm, the guiding qualitative methodology that was used in this study was phenomenology. Phenomenology involves describing the meanings that people attribute to a particular phenomenon, concept, or idea (Snape & Spencer, 2003). The core focus of phenomenological research is participants' lived experiences, perceptions, and feelings (Guest, MacQueen, & Namey, 2012). When social phenomenology is coupled with thematic analysis, the themes identified in the data guide the researcher to make sense of participants' actions by capturing the meanings that they attribute to their experiences (Willig, 2013). For the purpose of this study, the researcher examined the concept of physical activity or sedentary behaviour counselling in RDs' daily practice and RDs' experiences and perceptions towards counselling on physical activity and sedentary behaviours.

As previously mentioned, the interview guide for this study was guided by Fishbein's (2009) Integrative Model of Behavioural Prediction. The Model of Behavioural Prediction, which is an updated version of Ajzen's (1991) Theory of Planned Behaviour, is based on the premise that although there can be an infinite number of factors that influence behaviour, only a select few need to be considered to predict or change behaviour (Yzer, 2011). According to this model, intention is the immediate precursor to behaviour, meaning that individuals' intention directly predicts their behaviour. Furthermore, individuals will act on their intentions (i.e., perform a behaviour) if (a) they have the necessary skills to do so and (b) environmental constraints or factors do not impede their performance (Yzer, 2011). The model suggests that an individual's intentions are influenced by three main factors: attitude, perceived norms, and self-

efficacy. In turn, attitudes are directly affected by an individual's behavioural beliefs and outcome evaluations, perceived norms are based on injunctive and descriptive normative beliefs, and self-efficacy is based on control beliefs and perceived power. Background influences, such as past behaviour, demographic/cultural knowledge, attitudes towards targets, intervention exposure, and personality, moods and emotions directly influence all three of the previously mentioned constructs, which in turn, influence attitudes, perceived norms, and self-efficacy (Fishbein, 2009).

### **3.3 Procedure**

#### **3.3.1 Recruitment**

Research ethics clearance from the University of Guelph Research Ethics Board was obtained prior to commencement of research (Appendix E). Following ethics clearance, a previously created list of FHTs within a 2-hour radius of Guelph was updated for use in this study. Other researchers (graduate student Carolina Bonilla, Anneli Kaethler and Martina Coady) in the Family Relations and Applied Nutrition department at the University of Guelph developed and updated the list for previous studies. The list included general information about each FHT, including the address/location of the FHT, website (if applicable), and contact information for the executive director of each FHT. The researcher reviewed the list, first using publicly available information on each FHT website, to determine if the team includes a RD and a registered kinesiologists/physical activity professional. If information about the FHT's composition was not readily available on the website, or the FHT did not have a website, then the researcher attempted to contact the executive director of the team to inquire about team composition. FHTs that did not have RDs on their team and those that had both exercise professionals and RDs on their team were deleted from the list. For teams that were eligible to

participate, the researcher added the names of the RD(s) for each team, creating an updated or modified FHT list. In addition to this, the researcher updated all address and other general FHT information on the new list. When the list was updated, the recruitment process began.

To recruit participants, the researcher sent email advertisements (Appendix F) to executive directors on the updated list of local FHTs. Each email was personalized to greet/address the executive director by name, and asked the director to kindly forward the email to the RD(s) on the team. It was expected that with the personalization of these emails, contacted directors would be more likely to read the advertisement and forward to RDs on the team. If few responses were received from the personalized emails, the researcher conducted follow-up calls to the executive directors (Appendix G, Appendix H). Individuals who were eligible then received emailed consent forms (Appendix I) to provide further information about the study, although actual written consent from participants were not obtained until the meeting. A meeting was scheduled for those who were interested in participating in the study. Participants were selected on a first-come, first-serve basis. The researcher organized meetings with the first 20 eligible participants. If RDs continued to respond with an interest in participating after the first block of 20 eligible participants was filled, the researcher responded via email thanking the RDs for their interest and informing them that the study is currently full, and that they would be contacted if more participants were needed. These RDs were put on a waitlist which was organized based on time of response, with participants who responded first at the top, and those that responded last at the bottom. If theoretical saturation was not reached after the first block of 20 participants, RDs on the waitlist were to be contacted, starting with the top of the list.

### **3.3.2 Data Collection**

Data collection occurred in the form of qualitative interviews. The interviews were approximately 75 minutes in length and took place in a quiet, private location of the participant's choosing. The researcher travelled to meet the participants for the interview.

Meetings/interviews and recruitment occurred simultaneously until the first block of 30 participants were interviewed. If theoretical saturation was not reached after the first block of participants, more participants were contacted from the waitlist until theoretical saturation was reached.

At each meeting, the researcher welcomed the participant and reviewed a brief itinerary of the 75-minute meeting. Although the participant previously viewed the consent form via email, written consent was obtained from each participant at the beginning of each interview. For confidentiality, participants were informed that only the researcher conducting the interviews (Jessica Huntington) and the research advisor (Dr. John Dwyer) would have access to the identity (i.e., name) of each participant. Prior to data analysis, a number was assigned to each participant by the primary researcher and participants' identities were not disclosed during the analysis or in the results and/or publication of the study. Following completion of the consent forms, participants were given a \$20 gift card for Loblaws as a token of appreciation for their participation, and initialed a form (see Appendix J) stating that they received compensation.

Prior to commencement of the interview, participants completed the paper-and-pencil demographic questionnaire. Then, the researcher verbally explained the IPAQ (Appendix B) and administered it. Next, the researcher explained and administered the SBQ (Appendix C). There was no time limit for the participants to complete the three questionnaires, however all instruments are brief and took a maximum of 5 minutes each. The researcher collected all questionnaires when they were completed.

When the quantitative measures (demographic questionnaire, IPAQ, and SBQ) were completed and collected, the interview started. Each interview was digitally audio-recorded on two devices to allow for transcription. The primary device was the researcher's laptop, which was encrypted to ensure confidentiality. The backup device was an iPad Mini. Once the recording devices were turned on, the researcher began the interview. The audio-recording devices was turned off when the last interview question was answered. Once the participant left the meeting room, the researcher transferred the back-up recording from the tablet to the encrypted laptop, and sent a copy to Dr. John Dwyer via Briefcase, a free file-sharing program that is associated with the University of Guelph's email system (Gryph Mail). John Dwyer saved the file on his office computer, and this copy was used as a backup copy. When the backup audio file was sent to Dr. John Dwyer and delivery was confirmed, the tablet audio recording was deleted permanently from the device. These steps ensured all audio-recordings were kept on an encrypted device and maintained confidentiality for the participants.

As a pilot test, two participants were interviewed before the main study (Appendix K, Appendix L). The pilot test data were not included in the main study analysis. This pilot test followed the same procedure as above and was used to identify any flaws in the procedure (e.g., timing, faulty equipment, flow of questions, etc.). After the pilot test, the researcher made necessary adjustments to the instruments and procedure used before commencing actual data collection with the main study participants.

### **3.3.3 Data Analysis**

**3.3.3.1 Qualitative data.** Following the completion of all interviews, the researcher transcribed each interview verbatim. The transcribed interviews were imported to NVivo for Mac. NVivo is a type of qualitative data analysis software that was be used to manage the

qualitative data and aid in coding. Thematic analysis, which is defined in section 4.2.3 in this chapter, was used to analyze the transcripts. Open, axial and selective coding was used to identify themes in the data. One undergraduate student who completed a research methods course was selected as a research volunteer and helped with transcribing interviews, coding and conducting the thematic analysis. This student signed a confidentiality agreement (Appendix M) prior to commencement of analysis.

First, open coding was performed. Open coding is described as an initial pass through data in order to locate information and ideas and assign themes (Neuman & Robson, 2014). During open coding, the researcher thoroughly read through the transcripts to identify and note critical themes, terms, and ideas and assigned preliminary themes in the margins of the transcript (Neuman & Robson, 2014). The researcher (Jessica Huntington) and the research volunteer independently performed open coding of the data. In creating these preliminary themes, a constant comparison approach was used in which researchers independently generated themes while continually referring to the themes that were already generated (Fram, 2013). Initial themes identified in open coding may change in subsequent analyses (Neuman & Robson, 2014). At this point in the coding process, surface themes were revealed, and those that have the most evidence (or those that are most prevalent) likely become the strongest themes (Neuman & Robson, 2014).

Once open coding was completed for all transcripts, both Jessica Huntington and the research volunteer worked together to perform axial coding. Unlike open coding, the main goal during axial coding is not to identify key themes, but to review, examine and create linkages or relationships between themes that have been previously identified during the open coding step of analysis (Neuman & Robson, 2014). New themes may also emerge during this step, but for the

most part the researchers will examine causes and consequences, conditions and interactions, and strategies and processes, as well as make connections and group concepts together (Neuman & Robson, 2014). Some themes may become irrelevant and be dropped during this stage, and some themes may be expanded on as well (Neuman & Robson, 2014). During this step, Jessica Huntington and the research volunteer agreed on a master list of themes and definitions for the themes. When the master list was completed and agreed on, Jessica Huntington created a code name to reflect each theme.

Finally, after Jessica Huntington and the research volunteer carefully examined the data through open and axial coding and developed the master list of themes and corresponding codes, selective coding was performed as the final step in the analysis. Selective coding involves grouping themes together as well as making connections between some themes to facilitate overall analysis (Neuman & Robson, 2015). Jessica Huntington completed selective coding independently by reading through each transcript and applying the master list of codes to segments of text (Neuman & Robson, 2014).

**3.3.3.2 Quantitative data.** As previously mentioned, the quantitative data collected was primarily used for and reported as contextual information. To analyze the quantitative data, Statistical Package for the Social Sciences (SPSS version 22.0.0.0) was used to perform descriptive statistics (means, medians, and frequencies) on the data from the IPAQ, SBQ and demographic questionnaire.

## **Chapter 4.0**

### **Manuscript 1**

#### **Registered Dietitians' Beliefs and Behaviours Related to Counselling Patients on Physical Activity and Sedentariness: An Integrative Model of Behavioural Prediction Perspective**

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## Abstract

Physical inactivity and sedentariness are major health concerns. Registered dietitians (RDs) working in team-based primary care settings are ideally positioned provide counselling on physical activity and sedentariness. This study, guided by the integrative model of behavioural prediction, used qualitative interviews to examine RDs' counselling behaviour, behavioural intentions, attitude, perceived norms, self-efficacy, and facilitators/barriers. Family health team (FHT) RDs in Ontario (n = 20) were recruited. All participants counselled patients on physical activity, and many on sedentariness, both with moderately high confidence. There were positive and negative attitudes regarding counselling effectiveness. Most participants perceived that all health care professionals should counsel on both topics. Barriers included knowledge, scope of practice, and lack of physical activity expert on FHT. Facilitators were FHT dynamics and time. Many participants intended to pursue further education in both areas. More education and increased collaboration across all HCPs are needed to further facilitate counselling on both topics.

Keywords: physical activity, sedentary, dietitians, counselling, integrative model of behavioural prediction

## Introduction

Physical inactivity is an epidemic in western society today. The World Health Organization (WHO, 2018) defines physical activity as any movement of the body that expends energy and is produced by skeletal muscles. Physical activity is an umbrella term that encompasses both structured activities (i.e., exercise) and unstructured activities (i.e., active transportation, occupational physical activity, etc.) (WHO, 2018). The most recent guidelines state that Canadian adults should be participating in at least 150 minutes of moderate-to-vigorous intensity aerobic physical activity per week (Canadian Society for Exercise Physiology [CSEP], 2011). Physical inactivity, as defined by Tremblay et al. (2017) in a consensus study by the Sedentary Behaviour Research Network (SBRN), is defined as the absence of physical activity, and the term “physically inactive” is typically used to describe individuals who fail to meet the minimum recommendations for physical activity. Conversely, sedentary behaviour is any waking activity in which energy expenditure is  $\leq 1.5$  Metabolic Equivalents (METs, a standardized unit for measuring the intensity of physical activity in research) and generally means sitting or lying down during waking hours (Tremblay et al., 2017). The distinction between physical inactivity and sedentary behaviour is important as it is possible for one to have sufficient levels of physical activity but also have high levels of sedentary behaviour (Owen, Healy, Matthews, & Dunstan, 2010; Van der Ploeg & Hillsdon, 2017), which is commonly referred to as the “active couch potato phenomenon” (Owen et al., 2010). At the present time, there are no set guidelines for sedentary behaviour for adults, however CSEP’s recent 24-hour movement guidelines suggest limiting sedentary time to 1 hour per day for toddlers (or “early years”, ages 0-4 years) (CSEP, 2016a) and 2 hours per day for children (ages 5-17 years) (CSEP, 2016b).

In the past few decades, it has become clear that physical inactivity is a problem in our

society with mounting consequences. Current data suggest that less than 25% of Canadian adults are meeting the Canadian Physical Activity Guidelines (Statistics Canada, 2017; WHO, 2016). Globally, 1.6 million deaths can be attributed to physical inactivity, making physical inactivity rank fourth in leading modifiable risk factors for premature mortality (WHO, 2018). A recent systematic review of past systematic reviews found that regular physical activity reduces the risk of at least 25 chronic medical conditions and it can be beneficial for both primary and secondary prevention of these conditions (Warburton & Bredin, 2017). Inactive individuals are at a higher risk of developing obesity (Reiner, Niermann, Jekauc, & Woll, 2013), hypertension (Warburton & Bredin, 2017), cardiovascular disease (Reiner et al., 2013; Wahid et al., 2016; Warburton & Bredin, 2017), type 2 diabetes (Reiner et al., 2013; Tunajji, Davis, Mackey, & Khan, 2014; Wahid et al., 2016; Warburton & Bredin, 2017), and some types of cancers (Pedersen & Saltin, 2015; Warburton & Bredin, 2017). Furthermore, regular physical activity may improve mental health and be helpful in the treatment and/or prevention of depression (Knapen, Vancampfort, Morein, & Marchal, 2015; Mammen & Faulkner, 2013) and other mental illnesses (Pedersen & Saltin, 2015).

In addition to the detrimental effects of physical inactivity, high levels of sedentary behaviour are becoming a major health concern as well, with recent data suggesting that the average Canadian adult is sedentary for approximately 9.5 waking hours per day (Statistics Canada, 2017). High levels of sedentary behaviour have been shown to increase the risk of cardiovascular disease-related mortality (Biswas et al., 2015; De Rezende et al., 2014; Patterson et al., 2018) as well as all-cause mortality (Biswas et al., 2015; De Rezende et al., 2014; Owen et al., 2010; Patterson et al., 2018). A recent systematic review of past systematic reviews has shown an association between high levels of sedentary time among adults and increased risk of

cardiovascular disease, metabolic syndrome, hypertension, depression, type 2 diabetes, and some cancers (ovarian, colon and endometrial) (De Rezende et al., 2014). Some studies have found that sedentary behaviour may also be associated with unhealthy eating habits among adults, adolescents, and children (De Rezende et al., 2014). Further, increased levels of sedentary time can have negative health outcomes even in the presence of adequate levels of physical activity (Biswas et al., 2015; Gonzalez, Fuentes, & Marquez, 2017; Patterson et al., 2018).

Although most Canadians are aware of the benefits of physical activity, many do not know the minimum requirements to attain these benefits (Canadian Diabetes Association, 2018). Studies have found that less than 15% of Canadians are aware of the physical activity guidelines (Dale et al., 2016). There is evidence, however, that Canadians are receptive to health behaviour change and may be receptive to advice to increase their physical activity, as shown by an analysis of CCHS data (Haberman, Brauer, Dwyer, & Edwards, 2014). This analysis showed that exercise was the most preferred health behaviour change among those who made a health behaviour change in the past year. Furthermore, an inverse relationship has been observed between levels of sedentary behaviour and physical activity, indicating that individuals who are highly sedentary are more likely to have low levels of physical activity (Bauman et al., 2011; Mansoubi, Pearson, Biddle, & Clemes, 2014). Also, a significant positive relationship has been observed between awareness of the guidelines and meeting the physical activity guidelines (Dale et al., 2016), indicating a need for increased awareness.

Physicians and other health care professionals (HCPs) are in an ideal position to increase physical activity and sedentary behaviour awareness and improve lifestyle behaviours by incorporating physical activity and sedentary behaviour counselling into their daily practice (Lobelo & de Quevedo, 2016; Vuori, Lavie, & Blair, 2013). Previous literature demonstrates

that HCPs are the dominant source of health information for many adults (Loprinzi & Beets, 2014), particularly for those who do not meet the physical activity guidelines (McPhail & Schippers, 2012). Physical activity counselling by HCPs has also been found to be effective in creating behaviour change (Lobelo & de Quevedo, 2016). Despite this, physical activity counselling remains underutilized by many HCPs (Huijg et al., 2015; Lobelo & de Quevedo, 2016; Loprinzi & Beets, 2014).

Although all HCPs should promote physical activity in their daily practice, registered dietitians (RDs) are in a particularly ideal position to counsel patients on both physical activity and sedentary behaviour (Johnson et al., 2007; Slawson, Fitzgerald & Morgan, 2013; Spidel, Paquette, Marshall, Bell, & McCargar, 2004). As previously mentioned, physical inactivity is associated with increased risk of several chronic conditions, most of which are associated with nutrition-related factors as well (George et al., 2016). In addition, research indicates that RDs should use a lifestyle approach when counselling patients (Chapman et al., 2005; Dietitians of Canada, 2016), which includes counselling on all lifestyle behaviours including nutrition, sleep hygiene, physical activity, and sedentary behaviour. Further, RDs have extensive knowledge of the prevention and management of chronic conditions (Dietitians of Canada, 2015; Spidel et al., 2004), and many RDs have specific physical activity knowledge as well.

Past research suggests that HCPs' physical activity attitude (Gnanendran, Pyne, Fallon & Fricker, 2011; Huijg et al., 2015) and HCPs' own physical activity practices (Lobelo & de Quevedo, 2016; Huijg et al., 2015; Stanford et al., 2014) influence HCPs' physical activity counselling. HCPs who have a positive attitude toward exercise counselling, compared to those with a neutral or negative attitude toward physical activity counselling, are more likely to have higher levels of personal physical activity (Gnanendran et al., 2011; Huijg et al., 2015). In turn,

HCPs who meet the physical activity guidelines (i.e., have higher levels of personal physical activity) are more likely to feel confident counselling patients on physical activity (Stanford et al., 2014).

To date, there have been few studies that have examined HCPs' physical activity attitude and/or counselling behaviours and most have focused on physicians, nurses, medical students or a mix of HCPs (Florindo et al., 2013; Holtz, Kokotilo, Fitzgerald, & Frank, 2013; Lobelo & Quevedo, 2016; Stanford et al., 2014). To our knowledge, there have been few studies to date that have looked at physical activity counselling among RDs, most of which are now outdated (George, Fineberg, Marin, & Rosen, 2016; Johnsen et al., 2007; McKenna, Henderson, & Baic, 2004). Furthermore, there have been no studies that have looked at sedentary behaviour counselling among RDs, and only one study has examined sedentary behaviour counselling among HCPs (Shuval et al., 2014). In addition, while most studies related to HCPs' physical activity counselling practices have used a quantitative approach (George et al., 2016; Gnanedran et al., 2011; Holtz et al., 2013; Johnson et al., 2007; McKenna et al., 2004), the current study is unique in that it utilizes a qualitative approach, which improves depth of data collected and breadth of understanding.

## **Methods**

Ethics clearance was obtained from the researchers' university and written consent was obtained from participants.

### **Study Design**

The guiding methodology used in this qualitative, cross-sectional study was phenomenology. Phenomenology involves describing the meaning that people attribute to a

particular phenomenon, concept, or idea (Snape & Spencer, 2003), which in this study was RDs' experience of physical activity and sedentary behaviour counselling. When phenomenology is coupled with thematic analysis, the themes identified in the data guide the researcher to make sense of participants' actions by capturing the meanings that they attribute to their experiences (Willig, 2013).

## **Sampling**

Purposive sampling was used to recruit participants. Purposive sampling is appropriate for selecting unique cases that are particularly informative (Neuman & Robson, 2014), such as this study's focus on RDs in family health teams (FHTs) that lack exercise professionals. Potential participants were RDs who met the following inclusion criteria: (a) RD in Ontario, (b) on a FHT that does not have an "exercise professional", (c) FHT member for at least three months, (d) RD is located within a 2-hour driving radius of Guelph (this made it feasible for the first author to travel to interview participants), and (e) RD is fluent in English. For the purpose of this study, exercise professional included registered kinesiologists, health promoters, health educators, physical activity specialists, and any form of health care professional whose primary job is to promote, prescribe, and/or evaluate exercise and/or physical activity habits of individuals.

FHTs are a new, innovative, team-based model of primary care (Ontario Ministry of Health and Long-Term Care, 2014). FHT RDs were chosen for this study for two reasons. First, RDs work in many areas of healthcare and due to the small scale of this study, limiting participants to only FHTs allows for more detailed understanding of the roles of RDs in that particular setting (i.e., FHT). Second, since FHTs are a relatively new concept, there is little research about the roles of FHT members with respect to physical activity. Due to the

collaborative nature of FHTs, it can be reasonably assumed that RDs who have exercise professionals on their team would be less likely to counsel on physical activity and sedentary behaviour and would be more likely to refer patients to the exercise professional on the team instead, and therefore these RDs were excluded from the study.

### **Semi-structured Interview Guide**

The interview questions were developed to examine constructs from Fishbein's (2009) Integrative Model of Behavioural Prediction (IMBP), which is an updated version of Ajzen's (1991) Theory of Planned Behaviour (Table 1). According to IMBP, an individual's intention directly predicts behaviour whereas intentions are influenced by attitude, perceived norms, and self-efficacy. Interview questions examined RDs' attitude, perceived norms (injunctive normative beliefs, which are perceptions of what significant others expect you to do regarding the behaviour; descriptive normative beliefs, which are perceptions of what significant others do regarding the behaviour; Fishbein, 2009), and self-efficacy toward physical activity and sedentary behaviour counselling, as well as their intention to counsel patients on physical activity and sedentary behaviour. This article (part 1 of this study) focuses on 12 questions related to IMBP, whereas another article (part 2 of this study) deals with questions examining RDs' knowledge, attitude, and behaviour related to their own physical activity and sedentariness (Huntington et al., manuscript 2) (i.e., as opposed to counselling in these areas).

### **Self-administered Background Questionnaire**

The questionnaire to assess participants' background characteristics included questions about participants' gender, age, self-identified racial/cultural group, education, and duration of employment in the FHT.

### **Procedure**

Following ethics clearance, a list of FHTs within a 2-hour driving radius of Guelph was created. The list included general information about each FHT, including the FHT address, website, and contact information for the FHT executive director. Recruitment information about the study was emailed to the FHT executive directors to be forwarded to RDs. These emails were sent in randomly selected blocks, and RDs who responded to forwarded emails with an interest in participating were responded to promptly. The first author organized in-person interviews with the first 20 eligible participants, which subsequently yielded theoretical saturation. At the start of the session, participants completed the background questionnaire and two measures that are not the focus of this article (i.e., quantitative measures of physical activity and sedentary behaviour levels; part 2 of this study). Then the interview was conducted and audio-recorded. This main study procedure was previously pilot tested with two RDs.

Braun and Clarke's (2013) 7-step thematic analysis approach was used. First, the first author transcribed the interviews verbatim in Microsoft Word and then imported them into NVivo for Mac (Qualitative Solutions and Research [QSR] International, 2015), a software program used for qualitative data analysis. Second, the first author and third author (research assistant) familiarized themselves with the data by reading the transcripts multiple times and taking notes on preliminary ideas (e.g., making comments in the margins of the transcripts). Third, they identified themes relevant to the research objectives, from all the transcripts. Fourth, they identified broader patterns/themes by combining themes. Fifth, they reviewed these themes for the purpose of exploring relationships between themes and possible sub-themes. Sixth, they defined and named themes and sub-themes in a codebook that included illustrative quotes. Seventh, the thematic analysis results were written up. Conversely, Statistical Package for the Social Sciences (SPSS version 24) was used to perform descriptive statistics on the background

questionnaire data.

## Results

### Participants

Table 2 shows participants' (n = 20) background characteristics. Participants were predominantly female (95%), 65% of participants were between the ages of 25-34 years, and 70% of them self-identified as Caucasian/white. All participants had at least an undergraduate degree in nutrition/dietetics (as is required to become a RD in Canada), while many participants obtained higher levels of education as well (Master's degree, 40%; post-graduate diploma, 5%). Ninety percent of participants were employed in their FHT for 6 months or longer.

### Behaviour

**RDs' physical activity counselling practices.** All (20) participants reported counselling patients on physical activity to varying extents.

***Motivational interviewing.*** An overarching theme for participants' physical activity counselling behaviour was the use of motivational interviewing. Motivational interviewing is described as a multi-faceted, patient-centered and goal-oriented form of counselling that is used to increase intrinsic motivation in patients and create sustainable behaviour change (Rubak, Sandbaek, Lauritzen, & Christensen, 2005). This approach to counselling includes working with patients to assess their readiness to change, resolve their uncertainties, and ultimately allow the ideas for change to come from the patient and not the counselor (Rubak et al., 2005). Although only some (8) participants explicitly mentioned using motivational interviewing in their counselling, all (20) participants discussed using aspects of motivational interviewing without specifically labeling it as motivational interviewing.

*"I find that motivational counselling is the only way to approach most healthy lifestyle*

*changes.” – P10*

This theme included the following sub-themes: patient-centered counselling, assessing readiness to change, discussing patient barriers, and goal setting. All (20) participants discussed the importance of and their adherence to patient-centered counselling in their practice, including during physical activity counselling. Patient-centered counselling is defined as providing optimal care for patients that is based on patients’ personal values, needs, and preferences and stresses the importance of involving patients in all decision-making processes regarding their care (Epstein et al., 2005).

*“I cannot put my goals in somebody else’s head. They have to come up with it themselves. That’s crucial with any kind of counselling including nutrition. So definitely my experience in this whole area [of physical activity counselling] is motivational counselling and getting people to move forward from wherever they’re at and doing that in a positive manner.... It comes from them. You’re basically pulling out positives from their conversation and making them see what they’re doing that’s good.” – P10*

Illustrative quotes for the remaining sub-themes for motivational interviewing are shown in Table 3.

In addition to motivational interviewing, nine other themes for physical activity counselling behaviour were identified.

***Physical activity versus sedentary behaviour focus to counselling.*** Over half (12) of participants discussed focusing predominantly on physical activity counselling instead of sedentary behaviour counselling. Reasons for this included the perceived higher level of patient acceptance of physical activity counselling versus sedentary behaviour counselling and participants’ desire to focus on adding positive lifestyle behaviour rather than eliminating

negative lifestyle behaviour.

*“I don’t usually address screen time or reducing [sedentary behaviour] because focusing on adding something is usually a lot easier than focusing on removing something.... It’s the same thing as saying cut your food portions back. Usually, we don’t find that as successful as when we say, ‘Could you add one more vegetable on the plate?’... The focus is on ways we can get [the patient moving] more, as opposed to reducing [sedentary behaviour].” – P8*

*“For me, it makes more sense to just talk about physical activity.... It almost seems like the positive versus the negative side of it.... It’s the more proactive approach that we want to take and not say ‘You shouldn’t do this.’” – P15*

***Establishing a physical activity baseline.*** Almost all (17) participants discussed establishing a baseline level of physical activity with each patient before counselling on the topic, which involved participants asking patients about their current physical activity habits.

*“I ask all of my patients what physical activity they engage in because I like to get a baseline of how active or sedentary they are.... I’ll ask what their physical activity routine is, what their days look like, if they engage in any regular physical activity or exercise, if they go to the gym, if they wear pedometers, and things like that.” – P3*

***General physical activity education.*** Over half (13) of participants talked about providing general education on physical activity to their patients as a form of physical activity counselling. This theme included several sub-themes. The first sub-theme was dispelling myths about physical activity/exercise (identified by 12 participants). Participants discussed clarifying patients’ misconceptions about physical activity and/or exercise, including emphasizing that

going to the gym or other forms of structured exercise was not the only form of physical activity.

*“I think one role we can have as dietitians is just to help them realize that you don’t have to exercise an hour every day to get benefits. You don’t have to join a gym or do a gruelling boot camp. You can swim or you can do [an exercise] video at home. There are a whole bunch of different things that you can do and still get benefits out of it.” – P20*

As the second sub-theme, almost half (9) of participants discussed educating patients on the benefits of physical activity and the physical activity guidelines as part of their counselling.

*“I’ll cite the [Canadian physical activity] guidelines and explain what moderate-to-vigorous means.... I explain to them it doesn’t have to be 150 minutes all at [one time].... It doesn’t even have to be 30 minutes a day. It can be 20-minute and 10-minute bundles, five days a week.” – P15*

Further, nearly half (9) of participants promoted walking as a safe and free activity that most people can do to achieve health benefits.

*“I consider walking a form of exercise. [It’s] good for the bones and heart.... I am comfortable with telling them [to walk] because I know it doesn’t cost anything to do it and from a health standpoint, both a heart [health] and a weight [loss] standpoint, walking will help.” – P7*

**Guiding patients to physical activity resources.** Some (8) participants discussed guiding patients to physical activity resources such as information about local exercise classes or examples of places to obtain affordable exercise equipment.

*“I lead them to the arthritis society for warm water pools. I’ll tell them to check the activity list of all the different programs that are running through the town for various*

*forms of physical activity. I have a couple of resources such as books that I have referred to for 15-minute exercise programs for the person that says, 'I don't have time.' I try to figure out what that barrier is and then lead them to different resources for where they could go for credible information.” – P6*

***Use of health biomarkers for patient motivation.*** This theme was identified by 7 participants. Participants discussed showing some patients who had increased their physical activity level the improvements in their HDL cholesterol (or “good cholesterol”) and other health biomarkers.

*“[For diabetes], we also talk to people who are testing their blood sugars and say, 'If you want to test your blood sugar before your walk and then 10 minutes after you go for your walk, you can see what the change is in your blood sugar. You might be surprised after that walk, even if it was only 15 minutes. It had an effect on your sugars.’... So we try to encourage people to look at physical activity that way.” – P14*

***Encouraging patient self-monitoring.*** Some (6) participants encouraged patients to monitor their physical activity level independently as they felt this was a helpful tool for patients who are trying to increase their physical activity levels. This included recording physical activity minutes per day and using fitness trackers or pedometers.

*“I have food journals that patients will complete and ... on the side, it will have physical activity... so they can write down every day how much activity they did.... That gives you an idea of how much activity they're doing weekly,... and I have had a few clients use a pedometer.... They found it helpful just seeing which days they have more steps and what they were doing that day.” – P9*

***Lack of physical activity counselling depending on patient's circumstances.*** Participants

mentioned two particular situations in which they would not discuss physical activity with a patient. This included (a) if physical activity was entirely unrelated to the patient's situation (e.g., purpose of patient visit was food allergies or picky eating) and (b) if other pressing or acute medical issues were the priority of the visit. Six participants discussed the former theme and three participants mentioned the latter theme.

*“Physical activity is good for anybody really, but especially for chronic disease management. If they want to work on losing weight, we talk about physical activity. But we talk about physical activity less for acute conditions such as upset stomach, gas, and diarrhea.” – P18*

*“For someone with diabetes whose blood sugars are out-of-control and they're swinging high and low, ... [blood sugar control] is our primary focus. We'll definitely talk about physical activity just to figure out if it's playing a role but we wouldn't necessarily counsel on physical activity. When the medical issues come up, they kind of block the lifestyle management, and [the medical issues] tend to take precedence.” – P14*

**Referral to other HCPs.** Half (10) of participants discussed the importance of referring to other HCPs when they felt the level of counselling necessary for a patient was outside their scope of practice (SOP). For example, they mentioned referring patients to a doctor if the patients had medical conditions that could affect their safety when participating in physical activity or referring to a physiotherapist when patients needed or desired more advanced counselling.

*“I just stick to what the general physical activity guidelines are and then anything beyond that I would refer to someone else.” – P2*

**RDs' sedentary behaviour counselling practices.** Although all (20) participants

discussed counselling patients on physical activity, most (16) participants discussed counselling patients on sedentary behaviour. Those who discussed sedentary behaviour counselling addressed it in much less depth than physical activity counselling during the interview. Three prominent themes are described below.

***Increasing sedentary behaviour awareness.*** Some (6) participants discussed increasing patients' awareness of patients' own sedentary behaviour level as a counselling strategy.

Participants felt that this is a critical first step to reducing this behaviour.

*"I think its self-awareness that we need to get at. I don't think people realize how much they sit, so a chart where they write every half hour that they're sitting, whether they're eating, reading, or watching TV, is actually an eye-opener for people."* – P13

*"Just by asking [patients] questions about sedentary behaviour, I think it can [get patients to] start thinking about it more and that might inspire some change for some patients."* – P17

***Sedentary behaviour counselling prompted by high levels of sedentary behaviour.*** More than half (13) of participants discussed counselling patients on sedentary behaviour only if high levels of sedentary behaviour were mentioned by the patient or derived from patient information. An example of this is patients who mentioned they had a "desk job" where they were seated at a desk for most of their day.

*"[If they are highly sedentary], that would often trigger a conversation.... A lot of times, the patients themselves will say 'Yes, I'm at a desk [all day]. I know that's bad.' A lot of times they know, but is [sedentary behaviour] a topic that I'm always covering? No."* – P20

***Sedentary behaviour reduction strategies.*** Participants who counselled patients on sedentary behaviour stated that their counselling focused predominantly on small sedentary behaviour reduction strategies. These strategies included adding physical activity during times that were normally sedentary (e.g., walking at lunch instead of sitting at the desk) and discussing the reduction of sedentary behaviour overall (e.g., decreasing or breaking up periods of screen time).

*“I might make suggestions, like just getting up during commercial breaks, [which] can help, but we don’t necessarily talk about sedentary behaviour a lot.” – P4*

### **Behavioural Intentions**

Five themes were identified from participants’ discussion of intentions, if any, to counsel patients on physical activity and sedentary behaviour in the future.

**Maintain current practices.** Many (14) participants felt that unless something changes in their SOP or available resources, they will likely continue their current practices with physical activity and sedentary behaviour counselling.

*“My intention is to continue bringing physical activity up and having people include physical activity in their lives as much as they can to help manage health conditions or prevent any kind of chronic health concerns.” – P1*

**Increase sedentary behaviour counselling.** Almost all (16) participants intend to increase their sedentary behaviour counselling in the future.

*“I would like to see what other HCPs have found impactful in terms of their sedentary behaviour counselling.... I hope to find innovative ways of incorporating sedentary behaviour into an assessment and counselling.” – P14*

Participants stated that by participating in the study, they were prompted to think about sedentary

behaviour and are now contemplating discussing it more when counselling patients. Some participants also stated that they intend to increase their sedentary behaviour counselling due to recent research about the harmful effects of sedentary behaviour.

*“I think with that new big study about how harmful sedentary behaviour is, it would be great for me to incorporate a discussion about sedentary behaviour in some shape or form into my assessment and go in a little bit more depth rather than it just being a roundabout kind of conversation. If I had clear guidelines [about sedentary behaviour] or I knew what they were, I could definitely incorporate that in.” – P20*

**Increase confidence in SOP for physical activity and sedentary behaviour counselling.**

Two participants discussed this theme. They deemed practicing within their SOP to be important and therefore felt that an increase in confidence in their SOP would increase their likelihood to counsel in these areas.

*“I’ve always wanted to be more confident with specific ideas for increasing physical activity that I can offer patients within my scope of practice.” – P1*

**Interest in pursuing further education.** Nearly half (9) of participants expressed interest in pursuing further education in physical activity, sedentary behaviour, and counselling in these areas. Some of these participants stated that many continuing education opportunities in this area are available to them, while others commented that such opportunities have been unavailable.

*“I would like to seek more continuing education in physical activity and see how that can still fit into my scope of practice. For example, I’ll often tell people to go swimming when they have arthritis but maybe I should look more at why that helps people with arthritis and that could be something I educate people on a bit more.... That does interest me and I*

*just need to find those opportunities to get more of the skill development in terms of teaching.” – P15*

*“I haven’t [pursued further education in physical activity or sedentary behaviour counselling] so far. But if I see something pop up through the Nutrition Resource Center or Dietitians of Canada, I would definitely do it. It is an interest of mine, but I don’t think I’ve seen much available.” – P18*

**Uncertainty with intentions.** One participant expressed uncertainty about intentions. This participant’s FHT was in the process of hiring a physiotherapist and therefore this participant was unsure of how the RD’s role would change, if at all, when a physical activity expert became part of the team.

*“My FHT is hiring a physiotherapist, so that may impact on what I do. I’m really only talking about basic things like walking and sometimes it’s just a mention in the appointment. Is that going to change? I don’t know. Once the physiotherapist is hired, we would be able to talk about our additional resource and refer patients for specific advice. In the future, that might be something that will change my behaviour.” – P17*

### **Attitude**

Over half (12) of participants discussed their beliefs toward physical activity and sedentary behaviour counselling, stating that they felt their own values (e.g., the importance of physical activity in their own lives) were reflected in their counselling. These participants discussed personal experiences that heightened their understanding of the struggles of incorporating physical activity into their lives and how these experiences influenced their counselling.

*“I think that even if a dietitian is sedentary and [physically inactive], it’s part of her*

*protocol and her assessment to look at activity and recommend more. But I think she's more apt to be good at it and know ways to promote it if she's active herself.” – P10*

**Mixed views about effectiveness of counselling.** Participants discussed their beliefs about whether counselling patients on physical activity or sedentary behaviour was an effective way to improve these behaviours. Participants predominantly grouped physical activity and sedentary behaviour counselling together when discussing the effectiveness.

Nearly half (9) of participants felt that RDs' counselling on physical activity and sedentary behaviour was effective, but that the effectiveness depends on a number of factors.

*“I think it's effective. Patients who do the walking that I recommend find they have more energy.... They may not incorporate my food changes but they incorporate the walking and they really like how it increases their energy level. So I know that it does something for them and it's definitely effective because it helps that patient recognize that a lifestyle change has provided them with tangible benefits.” – P7*

Conversely, one participant felt that physical activity counselling by RDs was ineffective at creating behaviour change in patients. This participant discussed how most patients were aware that exercise is important and that having RDs reiterate this to them was not going to change their behaviour.

*“I've always felt like it is a little bit ineffective. I think when we use some of the motivational interviewing techniques then it can be a bit more effective. But I often get the sense that patients feel like they know they're supposed to exercise more, so us just telling them is something they've heard it before so they're just not really internalizing it and thinking about how they can actually do it.” – P2*

A few (3) participants, including the participant above who felt that physical activity

counselling was not effective, stated that sedentary behaviour counselling was possibly more effective than physical activity counselling. These participants felt that reducing sedentary behaviour may be an easier change for some patients to incorporate into their lives. One of these participants also discussed how patients were more interested in hearing about reducing sedentary behaviour, as it was something that many patients had not heard before. Therefore, patients seemed to be more receptive to information and messages about sedentary behaviour as opposed to physical activity.

*“I think sedentary behaviour counselling may be a little more effective [than physical activity counselling]. I’ve just started incorporating it more into my counselling and talking about it more in my group sessions. The other day, I did a diabetes group session and I talked about it and I could tell it was new information for the patients and they [were surprised that even] breaking up sitting time can be beneficial. It was interesting for me to see that, and I think that’s something that’s more doable for people and that they would be more willing to incorporate this into their daily life, versus starting a more structured exercise or physical activity plan.” – P2*

The remaining half of participants (10) were unsure of the effectiveness of RDs counselling on physical activity and sedentary behaviour or they felt that the effectiveness varied greatly depending on a variety of factors.

*“I think effectiveness really depends on number one, the patient’s motivation, and number two, the dietitian’s ability to respect that patient and do proper motivational counselling. There are so many factors involved like the patients and where they’re at, so you can’t expect that every dietitian will be effective with every patient, but if you have*

*the right circumstances in place, absolutely it will be extremely effective.” – P10*

Sub-themes discussed regarding the effectiveness of RDs’ counselling on physical activity and sedentary behaviour were short-term effectiveness, reiteration, and patient interest.

Some (5) participants believed that their counselling would help patients change their physical activity or sedentary behaviour, but the participants did not think that the change would necessarily be sustained, and therefore counselling may not have long-term health benefits. Participants stated that they were often unable to follow their patients over time and assess the long-term effectiveness or provide additional counselling to patients at a later date.

*“I think it can be effective in getting them to think about physical activity or to learn things that they didn’t know about physical activity. In terms of actually creating change, depending on how long we’re able to follow a patient, it might have limited effectiveness because if we only see them twice, we can’t really follow up on if they did their physical activity for the past three weeks, for example.” – P15*

Reiteration for creating behaviour change was a theme discussed by nearly half (9) of participants. They felt that physical activity and sedentary behaviour counselling by RDs was effective because it reiterated important messages related to the importance and benefits of being physically active.

*“For effectiveness, I think the more they hear a consistent message, the better. So, if they’re hearing the message from their doctor, diabetes educator, or occupational therapist, then RDs are one more profession that’s reinforcing the benefits and the importance of physical activity.” – P16*

Some (5) participants felt that the effectiveness of their counselling depends on the patients themselves and how interested the patients are in creating change in their life in regards

to physical activity or sedentary behaviour. Participants felt that patients' interest in the topic of physical activity or sedentary behaviour greatly influences whether RD counselling results in behaviour change.

*“If patients are here and they're willing and ready to learn, then it's effective. If they come here thinking they already know what to do because they've heard it before or they keep asking themselves ‘why should I do it?’, then it's not effective.” – P11*

### **Perceived Norms**

When examining participants' normative beliefs regarding their physical activity and sedentary behaviour counselling practices, they discussed two general themes: HCP counselling on physical activity and sedentary behaviour and aspects of this counselling that fit into SOP as a RD. Subsequently, participants discussed themes related to injunctive and descriptive normative beliefs.

**HCP counselling on physical activity and sedentary behaviour.** Two sub-themes regarding this were identified. The first sub-theme was general physical activity or sedentary behaviour counselling among all HCPs. Most (18) participants felt that all HCPs should provide general counselling on physical activity or sedentary behaviour. Some of these participants commented that it is important for HCPs to capitalize on any opportunities to counsel patients on physical activity or sedentary behaviour. Participants described general counselling as explaining the benefits of physical activity, goal setting for physical activity or sedentary behaviour, encouraging low-intensity physical activity (e.g., walking), and sharing the physical activity guidelines.

*“With physical activity [counselling], everybody should be doing it because every contact point within a clinic setting is also an access point for that patient to make a behavioural*

*change, get some knowledge, or enrich one's understanding of why [physical activity] is important.... The more you hear it, the more you understand it; and the more you understand it, the higher the probability that you will try to do some physical activity.” – P12*

*“I think we all should [counsel patients on physical activity]. I think it's a treatment and it's a way of life. They say for [behaviour] change, you have to hear it from three different people at three different times, so I think the more people who are able to coach patients on that, the better.” – P13*

The second sub-theme was RDs' physical activity counselling. Some (8) participants specifically asserted that all RDs should counsel patients on physical activity and sedentary behaviour. Reasons for this included the amount of time that RDs have with patients in comparison to the time that other HCPs have and the synergistic nature of physical activity, sedentary behaviour, and nutrition.

*“I think dietitians are definitely in a good position to do [physical activity and sedentary behaviour counselling] because we have the time. Usually we have an hour set aside for our appointments, so we have time to go into more detail with people about things, and we're focusing on lifestyle changes anyway, so it often goes hand-in-hand with making diet changes.” – P2*

**RDs' SOP in relation to physical activity and sedentary behaviour counselling.** Six sub-themes regarding this were identified.

The first sub-theme was general physical activity counselling. Most (18) participants contended that general physical activity counselling is specifically within their SOP.

*“I’ve always felt that providing general recommendations [about physical activity] is within our scope of practice.” – P2*

*“I would say within my scope of practice would be education about the health benefits, the recommendation for general physical activity, and what they should be doing, or what their general goals are, but the actual specifics for each individual would be outside of my scope of practice.” – P6*

The second sub-theme was physical activity assessment. Some (5) participants felt that assessing patients’ physical activity is outside of RDs’ SOP. Participants felt that it is also inappropriate to recommend or counsel patients on vigorous physical activity because they felt as RDs, they do not have the knowledge or ability to assess the fitness level of their patients or to safely make recommendations for high-intensity physical activity.

*“Anything where you’re discussing resistance training or even more higher-intensity physical activity, I don’t know their physical state of fitness in a way that I can make those recommendations safely. So I would say that’s out of my scope.” – P16*

The third sub-theme was exercise demonstrations. Some (7) participants stated that demonstrating exercises is outside of their SOP, referring to liability issues. They were not trained in demonstrating the proper form and technique for exercises, and they noted restrictions set by the College of Dietitians of Ontario (CDO), which is the regulatory body that governs the SOP of RDs in Ontario.

*“I think that we can basically advise patients on how much activity [to do] and do the motivational counselling around planning what activities they’re going to be doing. But I think it’s out of our scope of practice to demonstrate activities. I guess [there is a] risk or*

*liability for injury. We're not trained to know how to do exercises. We're trained to counsel people on how to lead a healthy lifestyle and to encourage them to be more active but no, we're not trained to show them how to do planks and push-ups."* – P10

Conversely, one participant was unclear about the SOP of a RD in relation to demonstrating exercises, and another participant stated that basic demonstrations (e.g., chair exercises) are likely acceptable and safe for RDs to do.

The fourth sub-theme was exercise prescription. Over half (12) of participants said that providing detailed exercise prescriptions is outside of their SOP. They noted liability issues and increased risk of patient injury as a result of improperly prescribed exercises as concerns.

*"I think counselling in both [physical activity and sedentary behaviour] is within the scope of practice of a dietitian as long as we're not very prescriptive because there would be the liability issue with that."* – P5

The fifth sub-theme was RDs researched SOP. A few (3) participants discussed having researched how physical activity counselling fits into their SOP.

*"We can [instruct patients on physical activity], it's just that we wouldn't be covered under any type of liability if someone were to get hurt. So it's not that we can't, but it's outside dietitians' scope of practice because we're technically not practicing dietetics while doing it. I have called the College of Dietitians of Ontario about this to clarify and that's pretty much it... unless you have additional coverage for being an exercise instructor."* – P15

The sixth sub-theme was sedentary behaviour counselling versus physical activity counselling. A few (4) participants discussed how sedentary behaviour counselling fits into SOP more than does physical activity counselling. They commented that sedentary behaviour

counselling is easier to do and felt that there is very little risk associated with counselling in this area.

*“Talking about sedentary behaviour and giving some strategies on how to reduce it or brainstorming with patients to see what is workable for them would do no harm to anybody. You’re just talking about it. So sedentary behaviour would be a lot easier when it comes to scope of practice compared to physical activity counselling.” – P12*

**Injunctive normative beliefs.** Four themes regarding this were identified.

**Mixed HCP expectations.** Over half (12) of participant felt that other HCPs expected them to do general physical activity or sedentary behaviour counselling only, but not going into depth on these topics.

*“I think they [other HCPs] expect us to be promoting it. They don’t expect us to be telling them how to do the exercises or anything, but it’s definitely part of our assessment [and] part of our counselling.” – P10*

Some (8) participants felt that HCPs had little-to-no expectation for RDs to counsel patients on physical activity or sedentary behaviour. These participants stated that other HCPs thought of RDs as diet experts only and therefore did not expect them to counsel on physical activity or sedentary behaviour. They asserted that other HCPs might not fully understand or utilize RDs’ ability to counsel patients on lifestyle factors beyond nutrition, such as physical activity and sedentary behaviour.

*“They don’t expect anything of me. A lot of physicians, and sometimes the nurses, just think I talk about food. They wouldn’t necessarily come to me and think that I could do [physical activity or sedentary behaviour counselling] because they just think my education is in food and nutrition.” – P6*

*“I think the expectations that we’d be talking about physical activity are not even there. I think it’s maybe just a function of our job title, having ‘diet’ in the word. It doesn’t necessarily encompass the rest of the lifestyle things that we also talk about on a regular basis.” – P14*

**Composition of FHT.** In terms of the extent of physical activity or sedentary behaviour counselling that RDs were expected to do, one participant felt that this expectation changed depending on the composition of the FHT that the participant was part of. This participant stated that if there were other members of the FHT who were more qualified to counsel patients on physical activity or sedentary behaviour, there was less responsibility for the RD to counsel on these topics.

*“I think it depends on where you work. If there is another specialist already who deals with physical activity in your [FHT], then there’s less responsibility on you. If there is no one taking that lead, then you might get more of that responsibility.” – P4*

**Comprehensive healthy lifestyle counselling.** Some (8) participants felt that HCPs expected them to counsel on physical activity or sedentary behaviour because it was expected that RDs counsel on healthy lifestyle as a whole and encourage healthy behaviour in all aspects of life. This included counselling patients on not only nutrition but also counselling on physical activity, sedentary behaviour, sleep hygiene, and other health behaviours.

*“I think they know that healthy eating and physical activity go hand-in-hand, so I think they expect me to at least address [physical activity] to the best of my ability. Often, if I do get a request to see [a patient], the doctor will say, ‘Please discuss lifestyle strategies,’ so it’s not just diet.” – P1*

**Assumptions based on RDs' activity level.** Three participants said that HCPs assumed they would counsel patients on physical activity or sedentary behaviour because the participants themselves were physically active.

*“When physicians make a referral, they’ll say to the patient, ‘[Our registered dietitian is] really physically active.’ So even though that doesn’t mean that I can give them specific exercise advice or plans, that will be something that they’ll tell the patient.” – P2*

**Descriptive normative beliefs.** Four themes regarding this were identified.

**Presumption that other RDs counsel on physical activity and sedentary behaviour.** Most (17) participants thought that other RDs in FHTs were likely counselling patients on physical activity.

*“I think in terms of discussing [physical activity], everybody would be doing that. It’s easy to link food with activity. It’s always part of it. It’s part of being a dietitian.” – P18*

The remaining few (3) participants were entirely unsure of other FHT RDs' physical activity counselling practices.

Over half (13) of participants thought that other RDs in FHTs were likely counselling patients on sedentary behaviour. Of these participants, three presumed that RDs were only touching on sedentary behaviour indirectly in their counselling.

*“I think [other dietitians are counselling on sedentary behaviour] but I think indirectly. I think counselling on sedentary behaviour is a way of getting to people who don’t want to do physical activity. So if we talk about 30 minutes of physical activity 5 days a week and they say ‘I just can’t do that’, I think that’s when most dietitians shift to, ‘Okay, so where can we add movement? And where can we reduce sitting?’” – P13*

Conversely, a few (3) participants felt that other RDs were not counselling patients on

sedentary behaviour. Two of these participants assumed that RDs were likely counselling on physical activity instead of sedentary behaviour. The remaining participant thought that others did not counsel patients on sedentary behaviour because she did not counsel patients on sedentary behaviour either.

*“I don’t think dietitians are counselling on sedentary behaviour as much because I’m not talking about sedentary behaviour as much. I think when we talk about physical activity, sedentary behaviour [counselling] is implied.” – P18*

The remaining four participants were largely unsure of other RDs’ sedentary behaviour counselling practices because it was not a topic of conversation among RDs.

***Curiosity about other RDs’ practices.*** Some (5) participants expressed interest in and curiosity about other RDs’ physical activity and sedentary behaviour counselling practices.

*“I actually have no idea what other RDs’ practices are. That’s why I thought this study was cool, because I want to know what other dietitians are doing.” – P4*

***RDs’ knowledge of the benefits of both behaviours.*** Half (10) of participants suggested that other RDs were counselling patients on physical activity and sedentary behaviour because most RDs have the knowledge that both behaviours, in addition to proper nutrition, are important to overall health. Therefore, participants felt that most RDs were using an overall healthy lifestyle approach in their counselling.

*“I’d say across the board, dietitians know the importance of exercise and how that goes along with nutrition in terms of the healthy lifestyle. So I think it’s mentioned by most dietitians.” – P4*

***Communication among RDs.*** Some (6) participants stated that they acquired their understanding of the norms regarding other RDs’ physical activity and sedentary behaviour

counselling from communicating with other RDs. This communication included conversations with friends who are RDs, discussions with RDs at conferences and events, and online communication through social media outlets and online networks.

*“I think other RDs are counselling on physical activity just because I talk to my friends who are dietitians and it does come up with a lot of them. And I go to meetings with dietitians and we’re all on a network, and physical activity might not always be the topic, but it still is a topic.” – P14*

Conversely, other (6) participants stated that they had limited opportunities to discuss physical activity and sedentary behaviour counselling practices with other RDs.

*“I haven’t really asked them [about their physical activity counselling practices]. I haven’t shared that [conversation] with them but from the few discussions we’ve had, it seems like they are [counselling on physical activity].” – P1*

### **Self-efficacy**

**Level of self-efficacy.** Participants’ self-efficacy ratings for both physical activity and sedentary behaviour counselling were normally distributed. They reported a moderately high level of self-efficacy for physical activity counselling (mean = 7.8; SD = 1.0; scores ranged from 5 to 10) [mean was calculated based on 19 participants’ ratings, as 1 participant did not provide a rating] and sedentary behaviour counselling (mean = 6.9; SD = 2.1; scores ranged from 3 to 10) [mean was calculated based on 15 participants’ ratings, as 5 participants did not provide a rating].

**Self-efficacy in specific areas.** Almost all (18) participants stated that their confidence was predominantly in basic physical activity counselling only (i.e., educating patients about benefits of and guidelines for physical activity and helping patients set goals). These participants

stressed that they were less or not at all confident in more complex counselling (e.g., recommending vigorous activities; making recommendations for those with complex health conditions or health history).

*“I feel comfortable explaining the theory to people. I feel comfortable and confident in explaining how it [physical activity] can help benefit chronic disease management and prevention. In terms of more specific instruction, that’s when I don’t feel as confident. Again, it falls outside the scope of practice or I’m not trained in it.” – P14*

Some (8) participants expressed a lack of confidence in sedentary behaviour counselling and attributed this to a mix of lack of knowledge, skills, and experience in counselling patients on this topic.

*“I don’t feel very confident in talking about [sedentary behaviour]. I don’t know too much about it. I wouldn’t be able to think of studies that suggest decreasing sedentary behaviour would improve whatever condition.” – P18*

*“[With sedentary behaviour counselling], the question I have is this... am I competent to then take it to the next step? If [patients] say ‘I have 10 hours of sedentary behaviour a day’, I don’t feel that competent that I can then say ‘Okay, here’s what to do about it.’” – P20*

Conversely, some (5) participants who expressed confidence in counselling patients on sedentary behaviour posited that (a) it is easier to provide guidance about sedentary behaviour because it is a simpler concept than physical activity and (b) most, if not all, aspects of sedentary behaviour counselling (unlike physical activity counselling) fit within their SOP.

*“[Sedentary behaviour counselling] seems to be less complex than counselling around*

*physical activity, so I feel it's a little bit more straightforward. I feel pretty comfortable talking to patients about that [sedentary behaviour]. I feel it's within our scope to talk about it, and I would not really refer them to someone else to talk about it.” – P2*

Some (8) participants were confident in discussing physical activity and sedentary behaviour because it felt natural to integrate it with their discussion of healthy eating during sessions with patients due to the synergistic nature of physical activity and nutrition. Participants stated that a patient's nutrition needs are often influenced by how active they are and therefore participants felt it can be important to counsel patients on physical activity in relation to nutrient/calorie intake.

*“It [counselling on physical activity] is really beneficial because you're talking about nutrition and setting goals [and] that often goes along with physical activity. It's a really natural part of the discussion. I think clients feel comfortable with that as well.” – P4*

Some confusion and concern about counselling patients on physical activity and sedentary behaviour negatively impacted participants' confidence. Nearly half (9) of participants identified a lack of clarity in their SOP regarding physical activity and sedentary behaviour counselling. Participants were sure that some aspects of counselling are within RDs' SOP (e.g., educating patients about benefits of physical activity or detriments of high levels of sedentary behaviour) but were unclear about how other aspects of counselling fit into their SOP (e.g., more detailed discussion about types of physical activity and exercise demonstrations). Participants emphasized the importance of keeping within their SOP and expressed concern about liability and potential ramifications that could result from going outside of their SOP.

*“I'm sort of capped or limited to what I can offer to patients. Even if I had the knowledge, would I go outside of the scope of my practice, knowing that dietitians may do meal plans*

*but don't give people a personal training exercise plan because that would not be appropriate for a dietitian? And I worry about being sued as a dietitian.” – P6*

**Facilitators and barriers.** Participants reported factors or circumstances that make it easy or difficult to counsel patients on physical activity and sedentary behaviour. In this section, factors discussed as (a) only facilitators, (b) both facilitators and barriers, and (c) only barriers will be sequentially presented.

***Only facilitators.***

*Dynamics of the FHT.* This was the only factor that participants discussed as a facilitator exclusively. Five sub-themes regarding this were identified.

As the first sub-theme, some (8) participants discussed how various types of access that they have as a FHT member facilitates their counselling. For example, some (4) participants explained how they have access to patients' interdisciplinary health care charts that provide a fuller picture of their health, which helps in catering counselling to each patient's individual needs. Also, some (4) participants explained that FHT RDs in Ontario are put on a listserv, which facilitates networking and sharing information about physical activity and sedentary behaviour.

*“We have a listserv for [FHT] dietitians in Ontario, so some of the [physical activity] resources have been shared in that database.... We've been able to pull them [from there] and make use of them in our daily practice.” – P12*

Regarding the second sub-theme, many (13) participants discussed physical activity programs both in their FHT (e.g., Nordic pole walking classes) and the community (e.g., exercise class at the local recreation center that patients of the FHT can join for free) as facilitators to counselling.

*“[Our FHT] is pretty connected with a lot of other professionals in the community. While it’s challenging that we don’t have [a physical activity expert] here, we are pretty connected with other resources. So when we run programs, we can get people to come in to help do physical activity.... We have also partnered with the [local recreation centre]... [and] patients here can get a one-month free membership if the doctor signs an exercise prescription.” – P15*

As the third sub-theme, a few (3) participants discussed how the focus of FHTs to prevent chronic disease facilitates their counselling on physical activity and sedentary behaviour. They elaborated on the unique and relatively new role of RDs in the community setting, as opposed to the hospital or clinical setting.

*“There’s a whole switch to where dietitians are in the community now as health promoters keeping people out of the hospital.... Maybe that’s part of the whole dietitian’s role now, to encourage less sedentary behaviour and be more physically active as part of the [goal of] keeping people out of the hospital, keeping them healthy, [and allowing them to] live longer and have a better quality of life.” – P6*

Regarding the fourth sub-theme, some (8) participants felt supported because all HCPs in their FHT provided consistent positive messages about increasing physical activity and decreasing sedentary behaviour.

*“I think a lot of the doctors here are very [focused on] diet and exercise first, so I think that helps a lot too with their mindset.... They would rather not prescribe [medication] first.” – P8*

As the fifth sub-theme, a few (4) participants discussed how the relationship they are able to form with their patients because patients see the same RD multiple times facilitates their

physical activity and sedentary behaviour counselling.

*“I feel comfortable discussing [physical activity] as long as we have that relationship and it’s something that I know they would be receptive to hearing if I brought it up.... I think it’s really nice that you can have follow-up appointments and continue to build on that [relationship].” – P4*

**Both facilitators and barriers.** Participants discussed five factors that are both facilitators and barriers.

*Time with patients.* Over half (15) of participants discussed having ample time during appointments to counsel patients about physical activity and sedentary behaviour as a facilitator. Participants explained that their patient appointments are typically 30-60 minutes whereas most doctors have only 10-15 minutes.

*“It’s important that we’ve got the time to do motivational interviewing and find out what’s important to them and understand the barriers.” – P16*

In contrast, 3 of these 15 participants also discussed time as a barrier to their counselling. They stated that although they have more time than most other HCPs to counsel patients on various lifestyle factors, there is still insufficient time to cover physical activity and sedentary behaviour with some patients, especially those who have many diet-related issues.

*“Patients have a lot of questions about their diet when they come in and so we spend most of the visit talking about that.... For example, I had a person today who had a list of 20 questions to cover and it was like ‘Okay, I think we can get through that.’... Then at the end, they leave and I think ‘Yeah, we didn’t really touch on exercise’ but I answered all the questions they had.” – P20*

*RD expertise.* Participants expressed having general knowledge of physical activity such

as the benefits and guidelines. However, over half (12) of participants discussed lack of expertise as a barrier, which included lacking knowledge, skills, and/or training to go in more depth with physical activity counselling. In terms of formal training to become a RD, participants discussed receiving a limited amount of physical activity education. They acquired most of their physical activity knowledge independently.

*“A barrier was the lack of education for dietitians, in terms of physical activity. We really need to go out there and seek [the knowledge] ourselves.” – P9*

Conversely, a few (3) participants stated that their own expertise in physical activity counselling, which was acquired from additional training, is a facilitator.

*“About a year ago, I got my older adult fitness specialist training.... I started classes last July for adults 50 years old and up.... It has definitely helped me be able to provide more recommendations in terms of physical activity to my clients.” – P9*

*Space in FHT.* As a barrier, four participants stated that there was very limited physical space in the FHT to run exercise classes or demonstrate exercises to patients. One of these participants discussed lack of space to conduct “walking meetings” (i.e., counselling sessions where the patient and RD go for a walk instead of sitting in the office).

*“My education room in the clinic is in a circle [with other offices]. Privacy-wise, you wouldn’t want to walk around [with patients].... Our rooms are always so cramped that there’s not really room to do anything but sit and talk to someone.” – P19*

In contrast, one participant discussed space to run programs with patients as a facilitator to counselling.

*“We have an activity room that we can use. We purchased some chairs without arms so that it is easy enough for patients to sit and do some exercises.” – P6*

*Funding.* Some (5) participants identified limited or lack of FHT funding for physical activity equipment (e.g., resistance bands; pedometers) and programs as a barrier.

*“Something that I would love to think about for the summer especially is a walking program.... The barrier is ministry funding. They expect me to do certain things, so every program that we run needs to be funded by the ministry ... and they may say no because it’s not a priority program.” – P10*

Conversely, one participant discussed funding as a facilitator to counselling.

*“I had funding to get [a physical activity certification]. We saw that the need is high for an exercise program [for older adults] here so I was able to get the training and provide those exercise classes at the FHT.” – P9*

*Physical activity expert in FHT.* Over half (14) of participants identified not having a physical activity expert in the FHT as a barrier. Participants discussed the challenges of not having a professional to refer patients to for physical activity and sedentary behaviour counselling. Thus, participants felt responsible to do physical activity counselling themselves.

*“The difficulty is not having someone more specialized in exercise. It kind of falls on us [RDs] a lot of the time so that can make it a little more challenging.... [Other HCPs will say], ‘If you have a question about exercise, you can see the dietitian’, even though I don’t have any additional training in [physical activity counselling].” – P2*

*“I think there’s certainly a huge gap in primary care around physical activity and sedentary [behaviour counselling].... Physiotherapists and kinesiologists. That’s a huge piece that our interdisciplinary teams don’t have.” – P16*

In contrast, a few (4) participants mentioned being able to refer patients to other team members

who are more knowledgeable about physical activity and sedentary behaviour and counselling in these areas.

*“I think that having the occupational therapist [on the team], I learned a lot about their scope of practice and what they can do. They’re great with knowing specific guidelines for osteoarthritis or osteoporosis.... So that has definitely helped.” – P20*

**Only barriers.** Participants discussed five factors that are a barrier exclusively.

*RDs’ SOP.* Some (6) participants discussed how they felt their SOP limited their physical activity counselling (e.g., being unable to recommend or demonstrate specific exercises).

*“For our diabetes prevention programs, ... we’ll follow along to an exercise video together. That’s where it becomes more tricky because as a dietitian, in our scope of practice, you can’t show people how to do exercises but we can follow along a video together.” – P15*

*Lack of sedentary behaviour knowledge.* Some (7) participants elaborated specifically on their limited knowledge about sedentary behaviour and sedentary behaviour counselling.

*“For adults, I was never aware of any strategies [for reducing sedentary behaviour] .... I don’t have a toolbox of strategies to tell people how to reduce their sedentary behaviour.” – P5*

*“I don’t know too much about sedentary behaviour. I wouldn’t be able to think of studies that suggest decreasing sedentary behaviour would improve whatever condition. All I know is that physical activity is better and we should be limiting sedentary behaviour as much as possible.” – P18*

*Focus of sedentary behaviour counselling resources on children only.* Two participants

stated that most of the sedentary behaviour reduction strategies and resources available to them are focused on children.

*“The [sedentary behaviour] guidelines are really only for the young. The guidelines are more focused on screen time than exercise time because if [children] are not on the screen, then they’re going to be playing.” – P7*

*Lack of communication among HCPs in the FHT.* Two participants discussed lack of communication among HCPs, yielding uncertainty regarding other HCPs’ counselling messages about physical activity and sedentary behaviour.

*“Maybe we don’t have a consistent message across the board. Is everybody telling people that a way to manage your blood pressure is to be physically active?... If that’s the message I’m giving them, I need the other HCPs to do that as well.” – P6*

*Lack of patient participation in physical activity programs.* One participant discussed lack of patient participation in physical activity programs as a barrier. The participant stated that when exercise classes were suggested and/or offered, patient participation was low.

*“I ended up teaching a yoga class one time and I had four or five people attend.... So that’s a barrier, getting people to buy-in.” – P10*

## **Discussion**

Guided by Fishbein’s (2009) IMBP, the purpose of this study was to examine RDs’ behaviour, behavioural intentions, attitude, normative beliefs (injunctive and descriptive), self-efficacy, and both facilitators and barriers regarding physical activity and sedentary behaviour counselling. Using phenomenology as the guiding qualitative methodology, we explored the lived experiences of RDs in FHTs in their physical activity and sedentary behaviour counselling.

To summarize the findings, for behaviour, all participants counselled patients on physical

activity. Motivational interviewing was the main theme, which included maintaining a patient-centered focus when counselling, assessing readiness to change, discussing patient barriers, and goal setting with patients. Some other themes included establishing a physical activity baseline, general physical activity education, guiding patients to physical activity resources, encouraging patient self-monitoring, and referring patients to other HCPs. Also, many participants discussed counselling patients on sedentariness. For behavioural intentions, many participants intended to continue their current physical activity counselling practices and increase their sedentary behaviour counselling. Many participants also expressed the intention of pursuing further education in physical activity and sedentary behaviour counselling.

Some participants had a positive attitude about the effectiveness of RD counselling on physical activity and sedentary behaviour, but their beliefs about effectiveness were contingent on a number of factors such as the time frame for behaviour change and patient interest. Some other participants were unsure of the effectiveness of their physical activity and sedentary behaviour counselling.

Regarding perceived norms, most participants felt that all HCPs should counsel patients on physical activity or sedentary behaviour, and some participants specifically contended that RDs should counsel in these areas. Most participants felt that general physical activity counselling fits within their SOP, though some participants suggested aspects of physical activity counselling that fall outside of their SOP (namely physical activity assessment, demonstrations, and prescription). A few participants suggested that sedentariness counselling fits within their SOP more than does physical activity counselling. For injunctive norms, slightly over half of participants postulated that other HCPs expected RDs to provide general physical activity or sedentary behaviour counselling, whereas the remainder of participants felt that HCPs had little-

to-no expectations regarding RDs' counselling in these areas. For descriptive norms, almost all participants believed that other RDs were counselling on physical activity, and many felt that other RDs were providing sedentariness counselling.

For self-efficacy, on average, participants reported a moderately high confidence level in both physical activity and sedentary behaviour counselling. Almost all participants mentioned that their confidence in physical activity counselling pertained to basic physical activity counselling only. Some participants described how limited knowledge and expertise negatively impacted their confidence in sedentary behaviour counselling, and some participants discussed that a lack of clarity about physical activity counselling in their SOP negatively impacted their confidence in this area.

Participants discussed how the dynamics of the FHT (for example, increased access to patients and patients' health information, and support from other HCPs) and time with patients facilitated their counselling on physical activity and sedentary behaviour. Predominant barriers to counselling included not having a physical activity expert on the team, RDs' lack of physical activity and sedentary behaviour knowledge, and RDs' SOP.

In terms of comparison to past findings, first, for counselling behaviour, the current body of research available on physical activity counselling behaviour among RDs is limited. A recent quantitative study that looked at physical activity counselling by RDs in the USA found similar findings to the current study, with just over 80% of RDs counselling patients on physical activity (George et al., 2016). Similar to the current study, the participants in the aforementioned study were mainly female, however, most participants were clinical RDs, as opposed to those working in a community health setting such as FHTs. Two other survey-based, quantitative studies that assessed RDs' physical activity counselling also found that nearly all RDs counsel patients on

physical activity (Johnson et al., 2007; McKenna et al., 2004). Regarding counselling strategies, George et al. (2016) found that only 30% of RDs assessed patient readiness when counselling patients on physical activity, a theme that was more prevalent in the current study (9 of the 20 participants addressed readiness; 8 of the 20 participants specifically discussed motivational interviewing, but all participants discussed aspects of motivational interviewing without using the term). Furthermore, though other studies regarding RDs did not specifically discuss the prevalence of motivational interviewing for physical activity counselling, George et al. (2016) and McKenna et al. (2004) found that the majority of RDs had training in motivational interviewing (75% and 62%, respectively). Previous literature indicates that motivational interviewing can be effective when used in physical activity counselling or other health behaviour counselling (Gagliardi, Faulkner, Ciliska, & Hicks, 2015; Magill et al., 2018; O'Halloran et al., 2014; VanBuskirk & Wetherell, 2014) including dietary counselling by RDs (Resnicow et al., 2015). In addition to motivational interviewing, based on the main themes, one could posit that many participants in the current study are partly utilizing the 5A framework (ask, advise, assess, assist, and arrange) (Goldstein, DePue, & Kazara, 1998) for physical activity counselling even though they are not using that term. Each construct of this framework with possible corresponding themes from the present study is as follows: ask (establishing a physical activity baseline), advise (general physical activity education), assess (assessing readiness to change), assist (goal setting; guiding patients to resources), and arrange (referring to other HCPs). This framework is widely used for counselling for other health behaviours, such as smoking cessation (Verbiest et al., 2017), and it is emerging as a popular counselling strategy for weight-loss counselling (Sherson, Yakes-Jimenez, & Katalanos, 2014).

Also, in past studies, it was found that out of the four domains of exercise prescription

(FITT- frequency, intensity, time, and type), RDs addressed frequency most often and intensity least often (George et al., 2016; McKenna et al., 2004). Though the present study did not address these domains, participants discussed that they were less comfortable counselling patients about higher intensity exercises, but counselled patients using the physical activity guidelines, which includes intensity (i.e., 150 minutes of moderate-to-vigorous activity per week in at least 10-minute bouts). The guidelines were used by all participants in the present study and thus intensity and duration of aerobic activity would be the most common domains discussed. However, some participants in the present study discussed type in the context of incorporating cardiovascular activities as well as weight-training, and some participants also discussed frequency (e.g., breaking activity up to ensure that you are being active every few days).

To our knowledge, this is the first study of its kind to assess sedentary behaviour counselling among RDs. To date, only one study assessed sedentary behaviour counselling among HCPs (i.e., physicians), which found that based on patients' reports, only 10% of patients were counselled by their physician to reduce sitting time (Shuval et al., 2014). In contrast, in the present study, the majority of participants (16 of the 20) indicated that they counsel on sedentary behaviour. More research is needed in this area to further understand the prevalence and counselling behaviours surrounding sedentary behaviour.

For behavioural intentions, the present study was the first to our knowledge to specifically address RDs' behavioural intentions (i.e., what RDs intend to do) regarding their physical activity and sedentary behaviour counselling. However, there was some related past research in this area (i.e., RDs' perceived needs to facilitate further physical activity counselling). First, in a UK-based, qualitative (survey) study, McKenna et al. (2004) found that

almost all RDs wanted further education in physical activity and counselling in this area, preferably in the form of a day course. Similarly, Spidel et al. (2004) used focus groups to address the perceived needs for facilitating counselling, as well as perceived role and perceived barriers to physical activity counselling among RDs in all practice settings in cities throughout Alberta, Canada. Spidel et al. (2004) found that RDs wanted more education about exercise physiology, ways to monitor physical activity, and physical activity assessment. Though there are some resources available for dietitians in other countries (Schwartz, Carpenter, Manore & Kruskall, 2014), more resources on active living as well as additional training in general counselling skills were suggested by some RDs in the aforementioned study. More research in the area of behavioural intentions, particularly for sedentary behaviour counselling, is needed.

Next, for attitude, the present study examined whether participants believe that their physical activity and sedentary behaviour counselling could yield positive behaviour change. Focus group findings in the Spidel et al. (2004) study noted strong support from RDs for incorporating physical activity counselling into RDs' daily practice, but RDs' views on the effectiveness of their counselling were not discussed (Spidel et al., 2004). There is limited research regarding RDs' attitude about the effectiveness of their physical activity counselling, and RDs' attitude toward sedentary behaviour counselling has not been researched. In contrast to the findings in the present study, a systematic review found that primary care providers (including nurses, nurse practitioners, physicians, and physicians' assistants) were unsure of the effectiveness of their physical activity counselling (Hebert, O'Caughy, & Shuval, 2012). It is possible that since RDs are already providing a form of lifestyle counselling to their patients (i.e., nutrition counselling), RDs may have more positive attitudes regarding the effectiveness of other forms of lifestyle counselling, such as physical activity or sedentary behaviour counselling.

However, ultimately more research is needed to further understand physical activity and sedentary behaviour attitude among RDs.

Next, for perceived normative beliefs, there is no previous research regarding RDs' opinion on which HCPs, if any, should provide physical activity or sedentary behaviour counselling to patients. RDs in past studies consistently agreed that physical activity counselling or promoting active living is part of their role as a RD (George et al., 2016; McKenna et al., 2004; Spidel et al., 2004), which is consistent with the present study. Additionally, not only did participants in the current study feel that RDs should be counselling patients on physical activity or sedentary behaviour, they also felt that all HCPs should be counselling on these topics.

While discussing normative beliefs in the present study, participants were prompted about their SOP in relation to physical activity and sedentary behaviour counselling. Similar to Spidel et al.'s (2004) findings, participants in the present study felt that they should be providing general counselling about physical activity only, and they felt that prescription was outside of their SOP. Adding to the current body of knowledge, the current study also found that some participants felt physical activity assessment and exercise demonstration were also outside of their SOP. While past studies cited physical activity monitoring as outside of their SOP or "role" (Spidel et al., 2004), this was not mentioned by participants in the present study; however, what specifically classified as "physical activity monitoring" was not specified by RDs in the Spidel et al. (2004) study. Overall, findings from past studies and the present study indicate that RDs believe that general physical activity counselling is within their SOP, with some forms of more specific physical activity counselling falling outside their SOP. In terms of sedentary behaviour counselling and RDs' SOP, though participants in the present study felt that most aspects of sedentary behaviour counselling fit within their SOP, there is no past research in this area to

compare these findings to.

For injunctive normative beliefs, while many participants in the present study felt that other HCPs expected them to counsel on physical activity, Spidel et al. (2004) found that RDs had concerns over how other HCPs (as well as the public) would perceive their counselling in this area. Since the Spidel et al. (2004) study was conducted over a decade ago, it is possible that physical activity counselling among RDs has become more widely accepted over time, as awareness of the importance of lifestyle factors in overall health and subsequent promotion of healthy lifestyles has increased. There are no other known studies to date that have addressed RDs' perceptions of what other HCPs expect of them in terms of physical activity or sedentary behaviour counselling. However, in terms of normative beliefs of other HCPs, a recent study of primary care residents found that residents rated obesity, nutrition and physical activity counselling norms, including what was expected of them and the importance their peers and profession placed on obesity, nutrition and physical activity counselling, as low (Smith, Seeholzer, Gullet & Jackson, 2015).

For descriptive normative beliefs, an interesting and seemingly new finding from the current study is that some participants were both curious and interested in what other RDs' physical activity and sedentary behaviour counselling practices are. Despite this curiosity, less than half of participants discussed having the opportunity to discuss their physical activity or sedentary behaviour counselling practices with other RDs. Although many participants had not asked other RDs about their practices, the majority felt other RDs were counselling on physical activity, and many felt the same was true for sedentary behaviour. Though past studies have not addressed communication among RDs regarding physical activity and sedentary behaviour counselling, past research suggested a need for increased communication and collaboration

between RDs and physical activity specialists (Spidel et al., 2004). Similarly, the current study results suggest greater communication among RDs about counselling in these areas is warranted.

Further, true to the theoretical model used to direct the constructs assessed in the present study, past research among primary HCPs revealed that subjective norms can have a meaningful influence on behavioural intentions, and subsequently, behaviour (Crisford et al., 2018). Since participants in the current study were divided on their opinions of what is expected from them from other HCPs, and many were curious about the practices among other RDs regarding physical activity and sedentary behaviour counselling, perhaps communication between HCPs is an area of necessary improvement. If RDs have a clear picture of what is expected of them in terms of physical activity and sedentary behaviour counselling, and also have clear ideas of what their professional peers' (i.e., other RDs') counselling practices are in this area, it is likely they would feel better supported in their role regarding physical activity and sedentary behaviour counselling.

Next, for self-efficacy, participants in the present study had moderately high confidence in physical activity counselling, but many stressed that their confidence pertained to basic counselling only. In contrast, a previous study suggested that self-efficacy related to physical activity counselling is relatively low among RDs (Spidel et al., 2004), and a recent review found this to be true for other HCPs as well (Crisford et al., 2018). There is no known research regarding HCPs' self-efficacy related to sedentary behaviour counselling at this time. Furthermore, a few participants in the present study discussed how lack of clarity in their SOP as it relates to physical activity counselling affected their confidence in counselling patients. George et al. (2016) found that RDs felt that a lack of protocols surrounding specifically physical activity counselling negatively affected their counselling. Although protocols can differ from

SOP, if RDs were to have a clear protocol to follow when counselling patients on physical activity, they may feel more confident that they are counselling patients within their SOP. Increased HCP self-efficacy has also been found to have a positive influence on level of physical activity counselling among RDs (Crisford et al., 2018), and the same may be true for sedentary behaviour counselling.

Next, in terms of facilitators and barriers, past studies addressing RDs' physical activity counselling found that the main barriers to counselling included lack of protocols surrounding RDs' physical activity counselling (George et al. 2016), time constraints (George et al., 2016; Spidel et al., 2004), concerns about public or other HCPs' perceptions of RDs counselling on physical activity (Spidel et al., 2004), and lack of knowledge or training in physical activity counselling (McKenna et al., 2004; Spidel et al., 2004). There are no past studies addressing facilitators and barriers that influence HCPs' sedentary behaviour counselling. Although participants in the present study did not discuss lack of protocols, RDs' SOP was one of the predominant barriers to physical activity counselling discussed in the present study. As mentioned earlier, if protocols were in place for RDs' physical activity counselling, this may reduce concerns about SOP and practicing within their role as a RD. Again, participants felt that most aspects of sedentary behaviour counselling fit within their SOP, therefore there was less concern regarding sedentary behaviour counselling and SOP.

In addition to SOP and protocols, time was also discussed as a barrier in both the present study and previous studies (George et al., 2016; Spidel et al., 2004). However, in contrast to past studies, participants in the present study were divided on whether they felt time was a facilitator or a barrier to their counselling. In fact, the majority of participants discussed time as a facilitator and stated that they had ample time (approximately one hour total for most

participants) with patients during appointments to cover physical activity counselling. The difference in these findings could be attributed to the practice setting variations among participants in the present study versus past studies. In the studies that found time to be a barrier, RDs were working in a variety of practice settings (Spidel et al., 2004) or in mostly clinical settings (George et al., 2016). One could assume that RDs working in clinical settings may have less time to counsel patients on physical activity, as these RDs are often dealing with more acute nutrition-related issues that would take precedence over physical activity counselling. RDs in other practice settings may also not have the allotted one-hour time slot that most participants had with their patients in the present study. Along the same notion, since this study was the first of its kind to address RDs specifically in FHTs, participants in the present study were able to outline additional facilitators that were likely unique to the FHT and articulate how, in many ways, the FHT setting (with increased access to patients and patients' health information, and support from other HCPs) was particularly ideal for physical activity counselling.

In terms of knowledge of physical activity and sedentariness, past studies consistently cited knowledge as a barrier to physical activity counselling among RDs (McKenna et al., 2004; Spidel et al., 2004) and other HCPs (Crisford et al., 2018). In a recent study on physical activity counselling among RDs (George et al., 2016), knowledge was not explicitly stated as a barrier but nonetheless only a third of RDs interviewed received physical activity or physical activity counselling education in the last 5 years. In contrast, in the present study, participants discussed lack of physical activity knowledge as well as limited sedentary behaviour knowledge, and they described how these influenced their counselling. Interestingly, a few participants in the present study discussed knowledge and expertise as a facilitator to their counselling, suggesting that some RDs may be starting to feel knowledgeable in the area of physical activity and

sedentariness. In a recent review, knowledge and training were facilitators to physical activity counselling among some HCPs (Crisford et al., 2018).

As with any study, there are some notable limitations. Although theoretical saturation was reached in the present study, the small sample size (20 participants), as well as the heterogeneity of participants (mostly female, mostly well-educated, and all residing in southern Ontario), limits the external validity of the findings. Furthermore, all participants were RDs in FHTs and therefore these findings might not apply to RDs in other practice settings. Also, during interviews, participants sometimes integrated physical activity and sedentary behaviour in their responses, therefore reducing the depth of data collected specifically about sedentary behaviour. The present study also has some notable strengths. First, the context of this study itself is a strength, as there is little research regarding RDs' physical activity counselling and no research (to our knowledge) exploring sedentary behaviour counselling among RDs. To our knowledge, this research was the first study conducted on RDs in Ontario, and it expands on previous research about physical activity counselling among RDs in Canada approximately a decade ago (Johnson et al., 2007; Spidel et al., 2004). Other strengths of the current study include its theory-driven, qualitative design. Of the few studies conducted on RDs' physical activity counselling to date, most have been quantitative and used surveys (George et al., 2016; Johnson et al., 2007; McKenna et al., 2004). Though data from a large number of participants can be collected in survey studies, the qualitative semi-structured interview approach used in the present study increased the depth of data collected and allowed for a more detailed analysis. Also, one-on-one, in-person interviews allowed the researcher to understand both verbal and non-verbal cues during the interview and to probe participants accordingly, thereby allowing for higher quality data to be collected. Further, having two researchers work together when

conducting thematic analysis enhanced the credibility of the study.

This exploratory study can provide direction for further research in the area of physical activity and sedentary behaviour counselling among RDs. This study covered a wide array of themes related to the IMBP and therefore the findings could be used to guide further studies in examining specific topics related to these themes. The current study could also be used to develop a needs assessment aimed to understand the specific needs of RDs in terms of their physical activity and sedentary behaviour counselling. In addition, given that most participants counselled patients on sedentary behaviour in addition to physical activity, conducting further research on sedentary behaviour counselling among RDs is warranted.

As for practical implications for RDs, first, this study as well as past findings indicate a strong and persistent interest in and need for RDs to receive increased education about physical activity and sedentary behaviour, as well as counselling in these areas. Although RDs (especially those having a one-on-one counselling role such as RDs in FHTs) likely have the necessary counselling skills, additional training in utilizing these skills for physical activity and sedentary behaviour counselling could be helpful. Furthermore, education and training that combines the use of motivational interviewing and/or the 5A framework for physical activity and sedentary behaviour counselling may be well suited for RDs, considering their current counselling practices. Past research has suggested that training, as well as increased self-efficacy and knowledge about physical activity counselling, may increase counselling in this area (Crisford et al., 2018), and it may be reasonable to assume the same would apply for sedentary behaviour counselling. Though the present study showed that most participants are counselling on both sedentary behaviour and physical activity, further education and training could enhance and advance their counselling in this area, as well as improve their self-efficacy.

Second, in addition to participants' interest in further education, the present study indicated that some participants were also interested in the physical activity and sedentary behaviour counselling practices of other RDs. Though the results of this study cannot be generalized to all RDs, RDs in FHTs in Ontario can use the findings to begin to understand the counselling practices of those in their particular practice setting. Since some participants were also unclear on what other HCPs expect of them in terms of their counselling in these areas, more communication between RDs, perhaps across practice settings or across FHTs, would likely reduce this confusion. Though participants discussed collaboration between themselves and members of their FHT, most teams in Ontario include only one RD, thus reducing RDs' contact and communication with other RDs. In addition to Spidel et al.'s (2004) indication of a need for increased collaboration among RDs and physical activity specialists, a recent study on the promotion of healthy eating among exercise specialists suggested that there was a need for increased collaboration for RDs and exercise specialists so that RDs could support exercise specialists in their role as healthy eating promoters as well (Johnson et al., 2015). These findings suggest that perhaps there is an overall need for collaboration among HCPs so that they can provide support to one another, within their disciplines, to aid in the overall healthy lifestyle counselling of patients. While RDs and HCPs in some settings, such as acute care, may not be able to offer physical activity and sedentary behaviour counselling to the same extent, RDs in FHTs are in a particularly ideal and unique position and one that is new to the healthcare system. RDs and other HCPs will need continued support (including education and training opportunities) as their role as physical activity and sedentary behaviour counselors continues to evolve. Research in this area is crucial to ensure that not only RDs, but all HCPs who want to incorporate physical activity and sedentary behaviour counselling into their practice, are

supported and feel confident in their role as physical activity and sedentary behaviour counselors.

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Table 1. Interview Guide Questions

Question	Theoretical construct
Can you share with me your experiences, if any, on counselling patients on physical activity in the FHT setting?	Behaviour
What are your experiences, if any, on counselling patients on sedentary behaviour in the FHT setting?	
Can you share with me your intentions, if any, to counsel patients on physical activity in the future?	Intentions
Can you share with me your intentions, if any, to counsel patients on sedentary behaviour in the future?	
Overall, do you feel that RDs counselling patients on physical activity and sedentary behaviour is an effective or ineffective way to improve these behaviours? Why?	Attitude
In your mind, which health care professionals, if any, should be counselling patients on physical activity and sedentary behaviour?	Perceived norms
As a RD, what do you feel other health care professionals expect of you in terms of physical activity and sedentary behaviour counselling?	(a) Injunctive normative beliefs
Do you think that other RDs in FHTs counsel patients regularly on physical activity, and why or why not?	(b) Descriptive normative beliefs
Do you think that other RDs in FHTs counsel patients on sedentary behaviour, and why or why not?	

On a scale of 0-10, with 0 being not at all confident and 10 being extremely confident, how confident do you feel about counselling patients on physical activity? Self-efficacy

On a scale of 0-10, with 0 being not at all confident and 10 being extremely confident, how confident do you feel about counselling patients on sedentary behaviour?

What are the circumstances or things in the FHT setting that make it easy or difficult for you to counsel patients on physical activity or sedentary behaviour? (To explore these facilitators and barriers, participants were probed about why they provided the previous ratings.)

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Note. Before asking these questions, physical activity and sedentary behaviour were defined as follows: (a) Physical activity is any movement of the body that expends energy and is produced by skeletal muscles (Canadian Society for Exercise Physiology, 2012). Physical activity can include structured activities such as exercise as well as unstructured activities during work, recreation, household chores, and active transportation (World Health Organization, 2015a). (b) Sedentary behaviour is the act of being seated or in a reclining position during waking hours. Examples of this include reading a book, watching television, and doing office work while sitting (Sedentary Behaviour Research Network, 2012).

Table 2. Participants' (n = 20) Background Characteristics

Characteristic	%
<b>Gender</b>	
Female	95
Male	5
<b>Age</b>	
25-34 years	65
35-44 years	15
45-54 years	5
55-64 years	15
<b>Racial/cultural group</b>	
Caucasian/white	70
Chinese	10
Japanese	10
Latin American	10
<b>Education</b>	
Undergraduate degree	100
Master's degree	40
Post-graduate diploma	5
<b>Province in which undergraduate degree in nutrition/dietetics was obtained</b>	
Ontario	85
Nova Scotia	5
Quebec	10

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Duration of employment in the FHT

Less than 6 months	10
6 months to 24 months	40
25 months to 4 years	20
5 or more years	30

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Table 3. Illustrative quotes for additional motivational interviewing sub-themes

Sub-theme	# of participants who discussed it	Quote
Assessing readiness to change	9	<p><i>“It’s really about their readiness to change. If they come to you and they think they’re only coming to talk about nutrition and then we talk about exercise, they may not be ready to hear that. Maybe if they continue to come and see me, we can talk about exercise and kind of massage it so that they’re able to get used to the idea that [nutrition and exercise] might be more co-related than we think.” – P8</i></p> <p><i>“We discuss where they’re at in terms of motivation and stage of change. From there, I figure out what would be the best strategy for them to move forward.... If they’re basically at pre-contemplation and they haven’t even thought about exercise, then I would probably start talking about the pros and the cons of exercise to increase their motivation.” – P10</i></p>
Discussing patient	14	<p><i>“There are a lot of patients who have chronic pain or mobility issues with joints, and things like that,</i></p>

barriers

*or a lot of respiratory conditions too where they have problems breathing, so that is often the biggest thing,... those barriers to physical activity that they have and working around that.” – P3*

*“If they’re not [doing] any physical activity at the moment, what are some barriers? So from my perspective, I would like to hear a story from every single client before I make an assumption or before I make any recommendations on increasing their physical activity level.” – P12*

Goal-setting 20

*“At each appointment, we would set very concrete goals, typically about three goals. Maybe a couple related to food, menu planning or shopping, and then one related to activity. When they come back the next time, we would re-visit those goals. We’d talk about how successful they were and if they weren’t successful, then what were the barriers.” – P16*

*“We set a goal [for physical activity] sometimes.... We set a goal like going for a walk three times a*

*week for 20 minutes at a time and make it specific to: What days are you going to go? What time is most convenient? How would you be able to fit this into your lifestyle?” – P18*

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## **Chapter 5.0**

### **Manuscript 2**

#### **RDs' knowledge, attitude and behaviour related to physical activity and sedentariness**

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## Abstract

**Purpose:** To explore knowledge, attitude, and behaviour related to physical activity and sedentariness among registered dietitians (RDs) in family health teams (FHTs) in Ontario.

**Methods:** This cross-sectional, mixed-methods study utilized a semi-structured interview guide to conduct qualitative interviews with 20 RDs. Self-administered questionnaires were used to assess personal physical activity and sedentary behaviour.

**Results:** Thematic analysis indicated that participants had good knowledge of physical activity and sedentariness, however they discussed knowledge for counselling as a barrier. Identified themes suggested a positive attitude toward physical activity and non-sedentariness.

Quantitative analysis indicated they had moderate-to-high physical activity levels and were fairly sedentary.

**Conclusions:** This study supports the position that RDs can serve as excellent role models for physical activity. Though participants had basic knowledge, RDs may benefit from additional education regarding physical activity, as well as sedentary behaviour in counselling.

Keywords: physical activity, sedentary, dietitians, knowledge, attitude, behaviour

## Introduction

Being physically active and limiting sedentary behaviour are important aspects of a healthy lifestyle. Physical activity is defined as any energy-expending bodily movement that is created by the skeletal muscles (World Health Organization [WHO], 2018), whereas sedentary behaviour is defined as the act of sitting or reclining during waking hours (Tremblay et al., 2017). Current guidelines suggest that Canadian adults achieve a minimum of 150 minutes of moderate-to-vigorous aerobic physical activity per week in order to gain health benefits (Canadian Society for Exercise Physiology [CSEP], 2011), however there are no current sedentary behaviour guidelines for adults in Canada (Canadian Society for Exercise Physiology [CSEP], 2011) or the United States (U.S. Department of Health and Human Services, 2008). Some countries, such as the UK and Australia, have sedentary behaviour suggestions with their physical activity guidelines, indicating that adults should aim to keep sedentary behaviour to a “minimum” and break up prolonged periods of sedentary behaviour, but set guidelines are not present at this time (Australian Government Department of Health, 2014; Department of Health and Social Care, 2011). Despite physical activity guidelines, many Canadian adults are physically inactive (WHO, 2017) and highly sedentary (Statistics Canada, 2017), the consequences of which are severe. A recent review found that physical inactivity increases the risk of at least 25 chronic conditions, including cardiovascular disease, obesity, type 2 diabetes, cancer, and more (Warburton & Bredin, 2017). Similarly, a review of the effects of high levels of sedentary behaviour found an increased risk of developing several chronic conditions (de Rezende et al., 2014).

Health care professionals (HCPs) have been cited as ideal promoters of physical activity (Loprinzi & Beets, 2014; Shuval et al., 2012; Vuori et al., 2013). The opinions and advice that

HCPs share with their patients are trusted and respected (Loprinzi & Beets, 2014; Shuval et al., 2012), and brief physical activity counselling is effective, cost-efficient, and feasible in the health care setting (Vuori et al., 2013). Furthermore, registered dietitians (RDs) may be in a particularly model position to counsel patients on physical activity and sedentary behaviour (Johnson et al., 2007; Slawson, Fitzgerald, & Morgan, 2013; Spidel, Paquette, Marshall, Bell, & McCargar, 2004). Not only is physical inactivity associated with an increased risk of several chronic conditions, most of which are associated with nutrition-related factors as well (George, Fineberg, Marin, & Rosen, 2016), but RDs also have broad knowledge of the lifestyle management and prevention of chronic diseases (Dietitians of Canada, 2015; Spidel et al., 2004), which could include physical activity counselling.

A recent review found that HCPs' knowledge, attitude, and personal physical activity behaviour could influence their counselling practices (Crisford et al., 2018). First, for knowledge, HCPs who have higher levels of physical activity knowledge are more likely to counsel patients on physical activity (Crisford et al., 2018). This result is consistent with other findings that suggest that some HCPs feel that limited physical activity knowledge is a barrier to their counselling in this area (Lobelo & de Quevedo, 2016; Pojednic et al., 2017; Shirazipour, Tomasone, & Martin Ginis, 2018). In addition, the relationship between knowledge and counselling practices has also been observed among other health behaviours, such as fruit and vegetable consumption (Florindo et al., 2015). Based on past studies, knowledge of physical activity guidelines is generally low among HCPs (Burdick et al., 2015; Florindo et al., 2015; Lobelo & de Quevedo, 2016; Oyeyemi et al., 2017) and medical students (Gusemen, Whipps, Howe, & Beverly, 2018; Mandic, Wilson, Clark-Grill, & O'Neill, 2017). HCPs' sedentary behaviour knowledge remains a largely unexplored area of research, as does both physical

activity and sedentary behaviour knowledge among RDs.

Next, regarding HCPs' attitude, HCPs with positive attitude about physical activity are more likely to promote physical activity to their patients (Crisford et al., 2018). It has also been suggested that HCPs with positive attitude towards physical activity may have higher levels of physical activity than those with negative or neutral attitude towards physical activity (Gnanendran, Pyne, Fallon, & Fricker, 2011). Studies that have assessed HCPs' attitude regarding physical activity have found that most HCPs (as well as medical students) have positive attitude about physical activity and the benefits of being physically active (Bock, Diem, & Schneider, 2012; Gnanendran et al., 2011; Keogh et al., 2017; Lobelo & de Quevedo, 2016). Although there is limited research on RDs' attitude towards physical activity and sedentariness, past studies have found that RDs feel that physical activity is important in the prevention and treatment of chronic diseases (George et al., 2016; Spidel et al., 2004).

Lastly, in terms of the effect of HCPs' personal physical activity levels on their counselling, HCPs with higher levels of physical activity counsel patients on physical activity more often (Crisford et al., 2018). Associations between behaviour and counselling practices have also been observed among other health behaviours, such as smoking (Meshefedjian, Gervais, Tremblay, Villeneuve, & O'Loughlin, 2010) and fruit and vegetable consumption (Florindo et al., 2015). HCPs who meet the physical activity guidelines themselves are also more likely to feel confident counselling patients on physical activity (Stanford et al., 2014) and to be more empathetic towards the struggles that their patients may face while attempting to increase their physical activity (Lobelo & Quevedo, 2016). Previous findings regarding levels of physical activity among HCPs are varied, with a recent review indicating that between 45% to 90% of physicians and 39% to 70% of other HCPs met the physical activity guidelines (Lobelo & Quevedo, 2016).

Another study found that the majority of medical students were both physically active and intrinsically motivated to exercise (Mahony, Blake, Matthews, O'Donnoghue, & Cunningham, 2018). A small number of studies have looked at sedentary behaviour or sitting time among HCPs, specifically nurses and nurse educators (Prince, Reid, Cotie, & Reed, 2016; Sturgeon, Garrett-Wright, Main, Blackburn, & Jones, 2017), but this topic, like some areas of sedentary behaviour research, remains largely unexplored. In general, research regarding physical activity habits of some types of HCPs, including RDs, is limited. To our knowledge, only three studies have addressed physical activity levels among RDs (George et al., 2016; Johnson et al., 2007; McKenna, Henderson, & Baic, 2004), and they yielded similar findings as studies of physicians, with 46% to 97% of RDs meeting or exceeding the physical activity guidelines. Further research is needed in this area to better understand how HCPs' behaviours affect their counselling practices.

In conclusion, there is evidence to suggest HCPs' knowledge, attitude, and behaviours influence their counselling practices; however past studies in this area have focused predominantly on physicians, psychologists, nurses, physiotherapists, and medical students (Crisford et al., 2018; Gusemen et al., 2018; Mahony et al., 2018; Mandic et al., 2017).

Additionally, no studies to date have looked at HCPs' sedentary behaviour knowledge or attitude in exclusivity, though sedentary behaviour is often grouped with physical activity or other health behaviours. Also, most studies used a quantitative approach to assess knowledge and attitude, and few have taken place in Canada (Crisford et al., 2018; Lobelo & Quevedo, 2016). To our knowledge, there have been no studies to date that have assessed RDs' knowledge, attitude, and behaviours together regarding physical activity and sedentary behaviour. Due to the important role that RDs can play as physical activity promoters and sources of health information, it is

important to understand the factors that may influence their counselling practices in this area. The current study is unique as it utilizes a mixed-methods approach to examine participants' knowledge, attitude, and behaviours. A mixed-methods approach helps offset some of the common weaknesses that arise from using qualitative or quantitative research exclusively, and the addition of qualitative research in this area provides a deeper understanding of RDs' own knowledge, attitude, and behaviour related to physical activity and sedentariness.

### **Methods**

Ethics clearance was obtained from the researchers' university and written consent was obtained from participants. The methods for this qualitative, cross-sectional study are described in detail elsewhere (Huntington et al., 2018, manuscript 1) and thus the methods for part 2 of this study (current article) are briefly summarized below.

#### **Sampling**

Purposive sampling was used to recruit participants. RDs in Ontario who were in a FHT that does not have an "exercise professional" and were FHT members for at least three months were potential participants. It was assumed that RDs who have exercise professionals on their team would more likely refer patients to the exercise professional rather than counsel on physical activity and sedentary behaviour.

#### **Semi-structured Interview Guide**

In this article (part 2 of this study), four interview questions were developed to examine RDs' knowledge and attitude related to physical activity and sedentariness (Table 1) (i.e., as opposed to counselling in these areas; Huntington et al., 2018).

#### **Self-administered Questionnaires**

The questionnaire to assess participants' background characteristics included questions

about participants' gender, age, self-identified racial/cultural group, highest level of education, education background, and duration of employment in a FHT.

The short version of the International Physical Activity Questionnaire (IPAQ), a physical activity questionnaire for the adult population (ages 15-59), was used to collect information on participants' level of physical activity behaviour. The IPAQ examines the frequency and duration of three types of physical activity (i.e., walking, moderate-intensity activities, and vigorous-intensity activities) as well as sitting behaviours over the past seven days (IPAQ, 2002). The IPAQ is a valid and reliable measure of physical activity among adults (Craig et al., 2003).

The Sedentary Behaviour Questionnaire (SBQ) was used to collect information about participants' level of sedentary behaviour. The SBQ assesses the amount of time spent performing nine common sedentary behaviours (e.g., watching television) on a typical weekday and weekend day (Rosenberg et al., 2010). The SBQ has satisfactory measurement properties when used with overweight adults (Rosenberg et al., 2010), and although the SBQ is yet to be validated among adults in other weight categories, it was the best option for the current study given the limited selection of valid sedentary behaviour measures available at the time of the study.

## **Procedure**

A list of FHTs within a 2-hour driving radius of Guelph was created. Recruitment information about the study was emailed to the FHT executive directors who forwarded it to RDs. The first author organized in-person interviews with the first 20 eligible participants who responded, which subsequently yielded theoretical saturation. At the start of the session, participants completed the background questionnaire, IPAQ, and SBQ. Then the interview was conducted and audio-recorded.

Braun and Clarke's (2013) thematic analysis approach was used. First, the first author transcribed the interviews and imported them into NVivo for Mac (Qualitative Solutions and Research [QSR] International, 2015). Second, the first author and research assistant familiarized themselves with the data by reading the transcripts and taking notes on preliminary ideas. Third, they identified themes relevant to the research objectives. Fourth, they identified broader patterns/themes by combining themes. Fifth, they reviewed these themes to explore relationships between themes and possible sub-themes. Sixth, they defined and named themes and possible sub-themes and identified illustrative quotes. Seventh, the thematic analysis results were written up. Conversely, Statistical Package for the Social Sciences (SPSS version 24) was used to perform descriptive statistics on data from the background questionnaire, IPAQ, and SBQ.

## **Results**

### **Participants**

Participants ( $n = 20$ ) were mainly female (95%) and 65% of participants were between the ages of 25-34 years. All participants had an undergraduate degree in nutrition/dietetics (a requirement to become a RD in Canada), while many participants achieved higher education also (Master's degree, 40%; post-graduate diploma, 5%). Ninety percent of participants were employed in their FHT for 6 months or longer. Further details are presented elsewhere (Huntington et al., 2018).

### **Knowledge**

This section will discuss participants' knowledge about physical activity and sedentary behaviour, as well as the physical activity guidelines.

### ***Physical Activity***

Almost all (18) participants expressed clear understanding of the definition of physical activity.

*“Physical activity is any kind of movement throughout the day, whether it’s part of your activities of daily living, deliberate activity [exercise], transportation, or leisure activities.” – P1*

*“Physical activity involves activities where your body is moving, so where you’re using your heart more and using your muscles. There are different kinds of physical activity such as vigorous, moderate, resistance activity, and more.” – P9*

*“Physical activity is anything that isn’t sitting. It may be planned such as purposeful walking or exercise. I consider physical activity and exercise to be similar. Maybe physical activity is just more movement whereas exercise is just more planned.” – P17*

A few (2) participants had an unclear understanding of physical activity. Their descriptions seem to focus only on exercise or sports.

*“Physical activity is exercise that’s above and beyond what your normal everyday activities would be.” – P7*

*“Physical activity is moving your body in a way that’s enjoyable, such as dancing, yoga,*

*walking, jogging, or sports.” – P10*

Whereas some (4) participants gave only brief definitions of physical activity by stating that it is simply body movement, many (11) participants elaborated on various physical activity domains such as leisure-time physical activity, transportation physical activity, and household physical activity. However, none of the 20 participants specifically discussed occupational physical activity.

*“Physical activity is doing anything besides sitting or sleeping. It could be walking the dog or playing sports that you enjoy. It could be just going around the corner to pick up your mail, as well as obvious things like going to the gym or organized sports.” – P6*

*“Physical activity obviously includes exercising or going to the gym, but I’d even consider walking and doing housework as physical activity.” – P18*

*Physical activity is just daily movement, like walking, climbing stairs, vacuuming, and house chores.” – P3*

### ***Sedentariness***

Most (15) participants expressed clear understanding of the term “sedentary behaviour.”

*“I define sedentary behaviour as any time you’re sitting, whether it be on the computer,*

*watching television, or those types of things.” – P2*

*“Sitting at a desk, in a chair, or on the couch, without any physical exertion.” – P10*

*“Sedentary behaviour is the act of sitting or lying down or reclining. So just being in a position where you’re not increasing your cardiovascular activity at all beyond baseline.” – P14*

Further, a few (3) participants commented that a person could be very sedentary while also obtaining sufficient physical activity, thus highlighting that both behaviours can co-exist. These participants discussed how high levels of sedentary behaviour are harmful to health, even in the presence of sufficient activity. One of these participants cited the active couch potato phenomenon, a term used to describe the co-existence of sufficient levels of physical activity alongside high levels of sedentary behaviour.

*“Recent studies are saying that if you sit for 8 hours but you’re still active for a half an hour, the sitting [kind of] undoes anything else.” – P5*

*“In the group setting, we have that handout from the program package. It talks about the active couch potato and they have to fill out that chart.” – P13*

An additional two participants discussed the reverse concept, stating that it is possible to have low levels of sedentary behaviour but still have insufficient levels of physical activity. The

concept of increasing intensity rather than duration of physical activity while maintaining high levels of sedentary time was also discussed.

*“There are definitely times when you get people who are not highly sedentary, but they’re just not doing enough physical activity.” – P19*

*“Typically, if you are increasing your physical activity, you are at the same time reducing your sedentary behaviour to some extent. However, if for example, you are spending time in physical activity at a lower intensity, now you’re increasing intensity but you can still keep the same amount of screen time, so that way, my argument would not be valid. But if somebody has been couch potato for 8 hours a day but now is breaking or interrupting the sitting time, that would also be a good starting point in reducing sedentary time but at the same time, you are not increasing your physical activity.” – P12*

Despite widespread understanding, some (5) participants did not clearly understand sedentary behaviour. They incorrectly equated sedentary behaviour with overall daily inactivity. Of these five participants, four described sedentary behaviour as being seated for a majority of the day or week rather than just being seated or in a reclining position in general. The fifth participant defined sedentary behaviour in terms of step count and stated that reaching less than 5,000 steps per day or also not reaching the physical activity guideline of 150 minutes per week is considered sedentary. Among all of the 5 participants, it was unclear whether they understood the distinction between sedentary behaviour and physical inactivity.

*“Sedentary behaviour is if you’re sitting or standing for most of the day, not a lot of*

*movement, not getting your heart rate up much, and not having at least 10 minutes of exercise activities through the day. So usually, being sedentary is sitting in front of the TV or when you're really not moving a lot for most hours of the day.” – P4*

*“I define sedentary behaviour as having a lack of activity throughout the week, so basically sitting a lot.” – P9*

While some (12) participants gave only brief definitions of sedentary behaviour by stating that it is simply sitting or reclining, other (8) participants elaborated on various sedentary domains such as leisure-time sedentary behaviour (e.g., watching television and reading), transportation-related sedentary behaviour (e.g., *“Sedentary behaviour is basically not allowing your body to move enough during the day. So a lot of sitting or driving.” – P3*), and occupational sedentary behaviour (e.g., *“Sedentary behaviour is the fact that you're sitting down, such as sitting in a chair, reading, watching TV, and sitting at work.” – P5*).

In addition, two participants commented that sedentary behaviour includes standing (e.g., *“I would define sedentary behaviour as sitting, like my kind of work. Sitting or standing in the same position for the 7 or 8 hours that you work in a day.” – P7*), and another participant stated that sedentary behaviour includes sleeping (e.g., *“Sedentary behaviour would be times where you're not active; so sitting, sleeping, and not standing and being active.” – P11*).

### ***Physical Activity Guidelines***

All (20) participants were able to state the recommended number of minutes per week from the physical activity guidelines for Canadian adults (i.e., 150 minutes per week). In discussing the guidelines, some participants were more detailed in their description than other participants. Many (8) participants discussed intensity when expressing their understanding of the guidelines, stating that the intensity of aerobic activity should be moderate or moderate-to-vigorous. One of these participants discussed describing to clients what physical activity of a moderate-to-vigorous intensity should feel like. Another participant did not specify the recommended intensity, but felt that the guidelines depended on the intensity of the activity.

*“The guidelines that I use are 150 minutes of moderate-to-vigorous physical activity.” –*

P6

*“The recommendation is 150 minutes a week.... I usually recommend somebody be on a 7 to 8 intensity scale, with 1 being sitting and 10 being chased by a pack of wolves or something.” – P8*

*“I know there’s the general guideline of 150 minutes of weekly physical activity, but I think it also depends on how vigorous that activity is.” – P9*

One participant also mentioned 10,000 steps as a recommended step count when discussing the physical activity guidelines.

Some (4) participants discussed spreading physical activity throughout the week or

leaving no more than two consecutive days without activity.

*“[The guidelines are] 150 minutes but ... what I’ll say is that if you can at least try 5 days a week and not leave two days without any exercise, then this is the better way for you to do it.” – P7*

*“[The guidelines are] 30 minutes, 5 days of the week, or 150 minutes per week.” – P13*

Some (6) participants cited the importance of at least 10-minute bouts of physical activity. While only two participants mentioned the 10-minute bouts as part of the guidelines, the remaining participants discussed recommending 10-minute bouts when describing their counselling practices later in the interview.

*“[The guidelines are] 150 minutes a week, and my understanding is that it’s spread out over at least 3 days and in chunks of at least 10 minutes.” – P20*

*“[I tell my clients] going for a walk for even just 10 minutes counts. Anything less than 10 minutes, I don’t usually advise. I say 10-minute bursts sort of throughout the day is better than nothing.” – P8*

*“I always tell them that it doesn’t have to be going to the gym for an hour straight. It could be walking at least for 10 minutes at a time.” – P18*

Only a few (3) participants discussed the recommendation for muscle-strengthening activities for adults when asked about the guidelines for physical activity, although participants were not provided with prompts specifically about this type of activity. All three of these participants expressed accurate understanding of the recommended frequency of muscle-strengthening activities.

*“[The guidelines are] 150 minutes of aerobic, moderate-intensity activity and resistance exercise at least 2 times per week.” – P18*

*“[When counselling], I follow the minimum recommendation of 150 minutes of aerobic activity plus additional resistance activities a few times a week.” – P14*

Participants were also prompted about the source of their knowledge of the physical activity guidelines. Over half (11) of participants cited the Canadian Physical Activity Guidelines (i.e., from the Canadian Society for Exercise Physiology [CSEP]) as their source of knowledge, while others sourced the Canadian Diabetes Association ([CDA]; three participants), Health Canada (two participants), and Canada’s Food Guide (one participant). Three participants were unsure or did not state a source of their knowledge of the guidelines. As for when participants were first introduced to the guidelines, over half (11) stated that they were first introduced during their schooling. Some (4) participants stated that they were first introduced to the guidelines during practice, while another cited the dietetic internship as the point of introduction. Lastly, some (4) other participants were unsure of where they were first introduced to the guidelines.

## **Attitude**

In terms of attitude, participants discussed their view of the role of physical activity and sedentary behaviour in the prevention and treatment of chronic conditions. Participants discussed their views on sedentary behaviour separate from physical activity in the interview as they were prompted about each separately.

## ***Physical Activity***

All (20) participants strongly felt that physical activity plays an important role in the prevention and treatment of chronic conditions.

*“Just like diet, I think physical activity is a huge component [of a healthy lifestyle]. I think 90% of the chronic conditions could be prevented, managed, or reduced by increasing physical activity because our society today is very inactive. I think inactivity itself causes a lot of the chronic conditions.” – P9*

*“Physical activity is the best medication on earth.” – P12*

*“I think physical activity is probably one of the most important things people could be doing for their health but they aren’t doing. We talk about physical activity like the ‘magic pill’. The magic pill that everybody is looking for to lose weight, give you energy,*

*make you feel amazing, and manage your diabetes, high blood pressure and high cholesterol. The magic pill is exercise.” – P19*

Participants also stated that they have personally observed a large difference in the health of patients who report being physically active versus those who report being physically inactive, especially in older populations. Participants shared this information with other patients in order to motivate them to be active.

*“From my own observations, I see that people who are more physically active are usually the healthier people when they are older, so I believe physical activity is important.” – P17*

*“Physical activity is a big part of chronic disease management.... I always tell my patients that every time I see seniors here or in any setting that I work in, the active seniors still look great. They’re still [mobile] and they’re taking less pills even if they’re 90, versus someone who’s inactive.” – P18*

### ***Sedentariness***

Most (15) participants felt that reducing sedentary behaviour plays an important role in the prevention and treatment of chronic conditions. Although some participants were not counselling patients on sedentary behaviour as much as physical activity, they emphasized that reducing sedentary behaviour is important.

*“I know physical activity and sedentary behaviour are two different things but I think we’re more used to focusing on [physical activity]. But I know there’s a lot of evidence that shows that sedentary behaviour has a lot of negative health consequences. I think sedentary behaviour often worsens chronic disease.” – P15*

*“Sedentary behaviour absolutely plays a role in the treatment and prevention of chronic conditions. Some of the recent research I have seen is that ‘sitting is the new smoking’ and the research discusses the damage that it is doing.” – P16*

A few (3) participants were unsure of the role of sedentary behaviour in the prevention and treatment of chronic conditions. They felt that decreasing sedentary behaviour likely has health benefits, but they were unsure of the magnitude or significance of those benefits.

*“Decreasing sedentary behaviour is probably going to have some benefit. Whether it’s statistically or clinically significant, I don’t know if the research has shown that or not.”  
– P6*

A few (2) other participants felt that there are likely no benefits to decreasing sedentary behaviour unless physical activity is increased. One of these participants stated that reducing sedentary behaviour is likely not necessary if physical activity guidelines are met. The other participant suggested that taking short breaks to interrupt sitting time does not provide a health benefit.

*“Do I really believe that the five minutes it takes to go upstairs to get a cup of coffee and come back down to your desk makes a difference? No, I don’t really believe that five minutes here or there will provide benefits because it doesn’t really do anything for the heart in five minutes. I don’t really suggest things like that, but I do encourage my patients to get up during their lunch-time.... I don’t think cutting out the sedentary behaviour is going to provide them with a health benefit but increasing their physical activity will.” – P7*

When discussing health benefits of decreasing sedentary behaviour, a few (2) participants felt that if their patients were to decrease their sedentary behaviour, their patients’ physical activity would subsequently increase and therefore health benefits would be achieved. However, their comments reveal their confusion regarding the distinction between sedentary behaviour and physical inactivity.

*“I think decreasing sedentary behaviour would be beneficial because that would be increasing activity, right? It may not necessarily be up to the vigorous activity level but it’s definitely still movement.” – P9*

*“If sedentary behaviour is reduced, then you would be more active on the other hand, so it would improve your health. However, there’s not much or at least I haven’t seen much research that clearly states sedentary behaviour reduces this and that. It’s always for physical activity, so I don’t know. But I’m sure it [sedentary behaviour] does have a*

*benefit because sedentary behaviour is the opposite of physical activity.” – P18*

Some (6) participants discussed that research in the area of sedentary behaviour and its negative health effects is a relatively recent and growing focus.

*“Based on some of the reading I’ve done, it seems decreasing sedentary behaviour has quite a big role in terms of reducing insulin resistance, improving metabolic syndrome, and those sorts of things. From my understanding, it’s more of a newer area of research so there is still a lot of research coming out about it, but I think there seems to be a big impact on health.” – P2*

*“I did hear on the radio a few months ago that recent studies are finding that if you sit for eight hours but you’re still active for half an hour every day, the sitting mainly counterbalances anything else in terms of activity.” – P5*

## **RDs’ physical activity and sedentary behaviours**

### **Physical Activity Behaviour**

The IPAQ scoring protocol for continuous scores, which calculated MET-min/week for each participant, was used. One participant’s score was excluded as an outlier (as per IPAQ scoring protocol; IPAQ, 2005) and therefore data from 19 participants were analyzed. Table 2 shows the participants’ IPAQ scores. The median MET-min/week was 1,935 (lower quartile =

1,324; upper quartile = 2,594; interquartile range = 1,270.0). There was a large variation of scores, with scores ranging from 396 to 5,976 MET-min/week. Also, based on the IPAQ scoring protocol for categorical scores, most (14) participants were in the moderate activity category, some (3) were in the high activity category, and a few (2) were in the low activity category.

As previously mentioned, the physical activity guidelines for Canadians recommend 150 minutes of moderate-to-vigorous activity per week. Using the IPAQ scoring protocol for continuous scores, this guideline translates to 600 – 1200 MET-min/week (moderate activity: 4 METs per min x 150 mins/week = 600 MET-min/week; vigorous activity: 8 METs per min x 150 mins/week = 1200 MET-min/week). Thus, most (17) participants met or exceeded the physical activity guidelines, with only two participants not meeting the guidelines (i.e., 393 and 459.2 MET-min/week).

### **Sedentary Behaviour**

When answering the IPAQ sitting question, participants reported how much time they usually spend sitting on a weekday, using the last 7 days as a frame of reference. The median hours of sitting per weekday was 8.5 (lower quartile = 7.0; upper quartile = 10.0; interquartile range = 3.0). Hours of sitting per weekday ranged from 1.5 to 13.0 (see Table 2).

Analysis of the SBQ data indicated the amount of time that participants spend doing sedentary behaviours on a typical weekday, on a typical weekend day, and as total hours per week. In terms of a typical weekday, the median hours of sedentariness was 8.0 (lower quartile = 4.9; upper quartile = 9.2; interquartile range = 4.3), which is similar to the median hours of sitting per weekday for the IPAQ. Sedentary time on a typical weekday ranged from 2.5 to 12.0

hours (see Table 2). In terms of a typical weekend day, the median hours of sedentariness was 4.6 (lower quartile = 3.3; upper quartile = 6.1; interquartile range = 2.8). Sedentary time on a typical weekend day ranged from 2.0 to 11.0 hours. In terms of total hours per week, the median hours of sedentariness was 46.6 (lower quartile = 35.3; upper quartile = 56.3; interquartile range = 21.0). When divided by 7 days of the week, this equates to 6.7 hours of sedentariness per day. Total hours of sedentary time per week ranged from 20.5 to 80.0 hours.

### **Discussion**

This study used the KAP (knowledge, attitude and practices) model to assess three constructs that past studies have suggested may influence HCPs' physical activity counselling: HCPs' own knowledge, attitude, and practices related to physical activity. This study is unique for two reasons. First, to our knowledge, it is the first study to assess physical activity KAP together among RDs, as there is limited research in this area. Secondly, this study also looks at KAP regarding sedentary behaviour, an area in which research is limited for not only RDs, but for all HCPs.

A summary of the main results of this study is as follows. First, in terms of knowledge, a majority of participants were able to accurately define physical activity and sedentary behaviour, and all participants were able to recite the physical activity guidelines. As mentioned, currently, there are no guidelines for sedentary behaviour among adults (CSEP, 2011). Secondly, regarding attitude, all participants strongly believed that physical activity plays a large role in the prevention and management of chronic disease. Although the majority of participants believed that sedentary behaviour also plays an important role in chronic disease prevention and management, a few participants were unsure about the effects of sedentariness in this area or felt that reducing sedentary behaviour does not yield health benefits. Thirdly, for personal physical

activity behaviours, almost all participants met or exceeded the physical activity guidelines. Levels of sedentary behaviour on weekdays were comparable to the average for Canadian adults (i.e., 8.5 hours/weekday in the present study; 9.5 hours/day for the average Canadian adult) (Statistics Canada, 2017) and participants' weekend levels varied.

As previously mentioned, past studies in the area of physical activity KAP among HCPs have yielded mixed findings. First, for knowledge, though past studies have found that physical activity knowledge (particularly, knowledge of physical activity guidelines) is relatively low among HCPs (Burdick et al., 2015; Florindo et al., 2015; Lobelo & de Quevedo, 2016; Oyeyemi et al., 2017), all participants in the present study were able to recite the physical activity guidelines and most were able to define physical activity accurately. Past research regarding RDs' physical activity knowledge is limited, and most studies are not recent. In a quantitative survey-based study in the UK, McKenna et al. (2004) found that only approximately half of RDs interviewed reported recommending a frequency (days per week) to exercise that was consistent with the recommendations at the time of the study. Furthermore, it was also found that less than 1 in 4 RDs in that study received formal physical activity training (McKenna et al., 2004). RDs in another study consisting of focus groups in Alberta, Canada identified physical activity knowledge or training as a barrier to their counselling (Spidel et al., 2004), a finding which is consistent with part 1 of the current study (Huntington et al., 2018). In addition, most participants were able to accurately define sedentary behaviour. However, there was some confusion about the definition of sedentary behaviour among a few participants (i.e., incorrectly equated sedentary behaviour with physical inactivity). The present study is the first, to our knowledge, to address sedentary behaviour knowledge among RDs (and therefore among a HCP group).

Next, for attitude, findings related to participants' attitude about physical activity are consistent with past research results, suggesting that both HCPs and specifically RDs have a positive attitude about the benefits of physical activity (Bock, Diem, & Schneider, 2012; George et al., 2016; Gnanendran et al., 2011; Keogh et al., 2017; Lobelo & de Quevedo, 2016; Spidel et al., 2004). As previously mentioned, all participants in the present study felt that physical activity plays an important role in chronic disease prevention and management and most participants felt that sedentary behaviour habits are also important. Some participants did not deem sedentary behaviour to be important but this may be because they incorrectly viewed sedentary behaviour and physical inactivity as the same concept. They felt that if patients are meeting the physical activity guidelines, then sedentary behaviour is not a concern; however, there is emerging research to dispute this (Biswas et al., 2015; Gonzalez, Fuentes, & Marquez, 2017; Patterson et al., 2018). Three recent systematic reviews found that sedentary behaviour was associated with an increased risk of all-cause mortality (Biswas et al., 2015; Patterson et al., 2018), cardiovascular disease (Biswas et al., 2015) and cardiovascular disease mortality (Biswas et al., 2015; Patterson et al., 2018), cancer incidence and cancer mortality (Biswas et al., 2015), obesity (Gonzalez et al., 2017) and type 2 diabetes (Biswas et al., 2015; Gonzalez et al., 2017; Patterson et al., 2018). Also, while discussing their attitude, participants mentioned that they felt research on the effects of sedentary behaviour is an emerging area. The present study is the first of its kind to assess RDs' attitude about sedentary behaviour, and research regarding other HCPs' attitude about physical activity is also limited.

Lastly, for personal physical activity behaviours, previous research regarding physical activity level among both HCPs and RDs has yielded mixed results (George et al., 2016; Johnson et al., 2007; Lobelo & Quevedo, 2016; McKenna et al., 2004). Some past studies that used self-

report measures to assess RDs' physical activity have shown high levels of physical activity (Johnson et al., 2007; McKenna et al., 2004), which is consistent with the findings in the present study. In contrast, a recent study that assessed RDs' physical activity level (also via self-report) found that less than half of RDs met the physical activity guidelines (George et al., 2016). It is important to note that RDs in the George et al. (2016) study were working in a variety of settings, with a large majority working in a clinical setting, whereas all participants in the present study were working in a community setting. Interestingly, George et al. (2016) found that a significantly higher percentage of RDs working in a community setting met the physical activity requirements, compared to those working in a clinical setting, which may help explain the contrast in findings between the mostly clinical RDs in the George et al. (2016) study and the community RDs in the present study. Regarding sedentariness, the current study was the first, to our knowledge, to assess sedentary behaviour levels among RDs, and research among other HCPs is limited. One previous study that used accelerometers as well as two self-report measures (SBQ and short form of the IPAQ [SF-IPAQ]) to assess sedentary time among nurses found that nurses spent an average of 301 minutes (approximately 5 hours/day; SBQ) or 365 minutes (approximately 6 hours/day; SF-IPAQ) according to self-report measures (Prince, Reid, Bernick, Clarke, & Reed, 2018). Based on accelerometer data, nurses were sedentary 49.5% of the 15 waking hours in which the device was worn (approximately 7.5 hours/day) (Prince et al., 2018), a value similar to the self-reported sedentary behaviour level of 8.5 hours/day among the participants in the present study. More research in this area is needed to more accurately assess physical activity and sedentary behaviour levels among RDs across settings. Additionally, utilizing direct measures, such as accelerometers, to measure sedentary behaviour among RDs is needed.

The current study has some limitations and strengths. In terms of limitations, the generalizability of the findings is restricted in that all participants were RDs in FHTs in Ontario. Also, to address participants' physical activity and sedentary behaviour knowledge in this study addressing multiple constructs, we examined basic knowledge related to definitions and guidelines only (to not burden participants) and thus knowledge was not assessed comprehensively (e.g., information about physical activity intensities, types of physical activity, and associated benefits). In addition, although information about participants' physical activity and sedentary behaviour levels was collected using valid measures, self-reported data in this area are susceptible to social desirability bias. Similarly, participants may have been inclined to express a positive attitude in this area because, as health professionals, they are expected to promote healthy lifestyle behaviours. This study is also vulnerable to selection bias, as participants who elected to participate in the study are more likely to be those that have an interest in physical activity and sedentariness, which could also contribute to higher than normal levels of self-reported physical activity. Several strengths of this study are worth noting. First, as mentioned earlier, this study fills a gap in the literature because there is limited-to-no research on some of the important topics examined in this study. Secondly, a well-established approach to systematically conduct thematic analysis was used (Braun & Clarke, 2013) and the credibility of the study was increased by having two researchers do thematic analysis together. Thirdly, valid quantitative measures of physical activity and sedentary behaviour were used (Craig et al., 2003; Rosenberg et al., 2010). Further, the mixed-methods approach in this study provided a more comprehensive assessment of participants' KAP by collecting both qualitative and quantitative data.

Though this study was exploratory in nature, the results have some practical implications.

The results are not generalizable to all RDs but nonetheless the findings provide insight into the population studied (i.e., FHT RDs within a 2-hour driving radius of Guelph, Ontario). First, RDs may need more education about the detrimental effects of sedentariness, even in the presence of adequate physical activity. Second, considering that this study only addressed basic knowledge (i.e., definitions and guidelines) and RDs reported physical activity knowledge as a barrier to counselling (Spidel et al., 2004), perhaps further education about physical activity, sedentary behaviour, and counselling in both areas is warranted. Third, regarding practices, findings from both the present study and past studies suggest that many RDs (particularly community RDs) are achieving adequate levels of physical activity, which further solidifies the notion that RDs (as well as other HCPs) can serve as excellent role models for physical activity (Lobelo & Quevedo, 2016). However, for participants in the present study, levels of sedentary behaviour could still be considered high on weekdays even though levels are slightly below that of the average Canadian (Statistics Canada, 2017). Since a majority of the participants worked full-time during the week as a FHT RD, their occupation (sedentary “desk job”) may have had a large influence on their high level of sedentary behaviour. It is possible that RDs could benefit from workplace programs aimed at reducing RDs’ sedentary behaviour while at work.

In conclusion, in general, participants had good knowledge of physical activity and sedentariness, had a positive attitude toward both behaviours, had high physical activity levels, and were fairly sedentary. The findings can be used to guide further studies in this area. More Canada-wide research is needed in this area to better understand physical activity and sedentary behaviour KAP among RDs. In addition, though this study did not link KAP to counselling behaviour, it provided insight into RDs’ KAP and this could be used as a yardstick for future studies to look at the relationship between RDs’ KAP and their physical activity and sedentary

behaviour counselling. It would also be helpful to understand the physical activity and sedentary behaviour KAP of RDs in other settings aside from FHTs. As physical activity and sedentary behaviour research continues to grow, and the focus on HCPs (including RDs) as promoters of healthy lifestyles continues to increase, RDs' KAP regarding health behaviours and how these influence counselling practices will likely be of paramount interest.

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<http://www.who.int/en/news-room/fact-sheets/detail/physical-activity>

Table 1. Interview Guide Questions

Question	Construct
<p>I would like to discuss some terms with you. From your perspective, what is “physical activity”? How do you personally define the term “sedentary behaviour”?</p>	<p>Knowledge</p>
<p>What is your understanding of how many minutes of physical activity per week an adult should participate in? Do you recall where you learned this? If so, please share.</p>	
<p>What is your view on the role of physical activity, if any, in the prevention and/or treatment of chronic conditions?</p>	<p>Attitude</p>
<p>What is your view on the role of sedentary behaviour, if any, in the prevention and/or treatment of chronic conditions?</p>	

Note: After asking the knowledge questions, physical activity and sedentary behaviour were defined (CSEP, 2016; Sedentary Behaviour Research Network, 2012; WHO, 2015a).

Table 2. Participants' Physical Activity and Sedentariness Levels

Participant number	IPAQ score (MET-mins/week)	IPAQ sitting question score (hrs/day)	SBQ score		
			Weekday hrs	Weekend hrs	Total hours/week
1	1935	9.0	2.5	3.5	20.5
2	3636	11.0	9.0	3.2	51.5
3	2594	1.5	9.2	5.5	57.2
4	1370	10.0	4.8	8.0	39.8
5	2175	8.0	7.5	4.8	46.8
6	1953	8.0	3.2	5.8	27.8
7	396	10.0	10.8	7.5	68.8
8	5976	7.0	8.2	4.5	50.2
9	984	6.0	5.2	3.8	33.8
10	3186	5.0	12.0	11.0	80.0
11	1455	10.0	4.5	2.2	30.0
12	2299	5.0	4.8	4.8	31.8
13	6759*	10.0	8.5	2.0	46.5
14	1626	8.0	8.0	3.5	47.0
15	959	13.0	10.5	8.0	68.5
16	693	7.0	7.0	3.5	42.0
17	1325	9.0	7.2	2.0	40.2
18	2268	8.0	8.8	4.8	53.2
19	2799	10.0	10.2	6.2	63.8
20	1817.5	10.0	8.0	2.8	45.5

\*Note: As per IPAQ scoring protocol, this participant was labelled as an outlier and excluded from analysis.

## Chapter 6.0 Appendices

### Appendix A: Self-Administered Demographic & Background Information Questionnaire for Face-to-Face Interviews



#### Demographic Questionnaire

Participant code: \_\_\_\_\_

Please answer all questions below.

1. What is your gender?

- Female
- Male
- Other

2. You may belong to one or more racial/cultural groups on the following list. Are you...?

(Check all that apply)<sup>1</sup>

- White
- South Asian (e.g., East Indian, Pakistani, Sri Lankan)
- Chinese
- Black
- Filipino
- Latin American
- Arab
- Southeast Asian (ex. Vietnamese, Cambodian, Malaysian, Laotian)
- West Asian (ex. Iranian, Afghan)
- Korean
- Japanese
- Other (please specify): \_\_\_\_\_

3. Which category best describes your age?

- 24 years or younger
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55-64 years old
- 75 years or older
- Prefer not to say

<sup>1</sup>Adapted from the Canadian Community Health Survey

4. Please select your highest level of education:

- Undergraduate Degree
- Master's Degree
- PhD
- Other (please specify): \_\_\_\_\_

5. Do you have any degrees/diplomas/certifications in other areas of study apart from nutrition/dietetics?

- Yes
- No

If yes, please specify \_\_\_\_\_

6. In what country did you receive the majority of your post-secondary education in nutrition/dietetics?

- Canada
- USA
- Other (please specify): \_\_\_\_\_

If Canada, please specify the province:

- Ontario
- British Columbia
- Alberta
- Saskatchewan
- Manitoba
- New Brunswick
- Nova Scotia
- Prince Edward Island
- Newfoundland & Labrador
- Yukon Territory
- Nunavut
- Northwest Territories

7. Please state the number of months that you have been a part the Family Health Team for which you are currently employed \_\_\_\_\_

8. Have you ever been part of another Family Health Team?

- Yes
- No

If yes, state duration of employment: \_\_\_\_\_

## Appendix B: IPAQ: Short Last 7 Days Self-Administered Format for Face-to Face Interviews

### INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

\_\_\_\_\_ **days per week**  
 No vigorous physical activities      **→** *Skip to question 3*

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**  
 Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

\_\_\_\_\_ **days per week**  
 No moderate physical activities      **→** *Skip to question 5*

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

\_\_\_\_\_ **hours per day**  
\_\_\_\_\_ **minutes per day**  
 Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

\_\_\_\_\_ **days per week**

No walking → *Skip to question 7*

6. How much time did you usually spend **walking** on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

**This is the end of the questionnaire, thank you for participating.**

## Appendix C: Sedentary Behaviour Questionnaire (SBQ)

<b>SEDENTARY BEHAVIOR: Weekday</b>									
<b>On a typical WEEKDAY, how much time do you spend (from when you wake up until you go to bed) doing the following?</b>									
	<b>None</b>	<b>15 min. or less</b>	<b>30 min.</b>	<b>1 hr</b>	<b>2 hrs</b>	<b>3 hrs</b>	<b>4 hrs</b>	<b>5 hrs</b>	<b>6 hrs or more</b>
1. Watching television (including videos on VCR/DVD).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Playing computer or video games.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Sitting listening to music on the radio, tapes, or CDs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Sitting and talking on the phone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Doing paperwork or computer work (office work, emails, paying bills, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Sitting reading a book or magazine.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Playing a musical instrument.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Doing artwork or crafts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Sitting and driving in a car, bus, or train.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### SEDENTARY BEHAVIOR: Weekend Day

**On a typical WEEKEND DAY, how much time do you spend (from when you wake up until you go to bed) doing the following?**

	None	15 min. or less	30 min	1 hr	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs or more
1. Watching television (including videos on VCR/DVD).	<input type="radio"/>								
2. Playing computer or video games.	<input type="radio"/>								
3. Sitting listening to music on the radio, tapes, or CDs.	<input type="radio"/>								
4. Sitting and talking on the phone.	<input type="radio"/>								
5. Doing paperwork or computer work (office work, emails, paying bills, etc.)	<input type="radio"/>								
6. Sitting reading a book or magazine.	<input type="radio"/>								
7. Playing a musical instrument.	<input type="radio"/>								
8. Doing artwork or crafts.	<input type="radio"/>								
9. Sitting and driving in a car, bus, or train.	<input type="radio"/>								

## Appendix D: Interview Guide (Full)

Research Objective	Questions	Probes & Prompts
<p><i>To examine RDs' knowledge of physical activity and sedentary behaviour, including the Canadian Physical Activity Guidelines for Adults.</i></p>	<p>1a. First, I would like to discuss some terms with you. From your perspective, what is "physical activity"?</p> <p>1b. How do you personally define the term "sedentary behaviour"?</p> <p>2a. What is your understanding of how many minutes of physical activity per week an adult should participate in?</p> <p>2b. Do you recall where you learned this? If so, please share.</p>	
<p><b><i>The researcher will then define physical activity and sedentary behaviour in order to ensure complete understanding of the interview questions among the participant:</i></b></p> <p>During this interview, I will be asking you questions pertaining to physical activity and sedentary behaviour, as well as physical activity and sedentary behaviour counselling. For reference, when I say physical activity I will be referring to any movement of the body that expends energy and is produced by skeletal muscles. Physical activity can include structured activities such as exercise but can also include other activities which involve bodily movement and are done as part of playing, working, recreational activities, household chores and active transportation.<sup>1</sup> When I say sedentary behaviour I will be referring to the act of being seated or in a reclining position during waking hours. Examples of this could include reading a book or watching television while seated, or sitting while doing office. Does that make sense?</p> <p><sup>1</sup> Definition source: <a href="http://www.who.int/dietphysicalactivity/pa/en/">http://www.who.int/dietphysicalactivity/pa/en/</a></p>		
<p><i>To examine RDs' practices regarding physical activity and sedentary behaviour counselling within FHTs.</i></p>	<p>3a. Can you share with me your experiences, if any, on counselling patients on physical activity within the FHT setting?</p> <p>3b. What are your experiences, if any, on counselling patients on</p>	<p>3. What types of patients, if any, do you counsel on physical activity?</p> <p>What type of patients, if any, do you counsel on sedentary behaviours? How often and for approximately how long would</p>

	sedentary behaviour within the FHT setting?	you counsel these types of patients on physical activity/sedentary behaviour? What does counselling consist of? What types of resources, if any, are used in your counselling of these patients on physical activity /sedentary behaviour?
<i>To examine RDs' injunctive and descriptive normative beliefs regarding their physical activity and sedentary behaviour counselling practices within FHTs.</i>	<p>4. In your mind, which health care professionals, if any, should be counselling patients on physical activity and sedentary behaviours?</p> <p><i>For injunctive norms:</i> 5. As an RD, what do you feel other health care professionals expect of you in terms of physical activity and sedentary behaviour counselling patients?</p> <p><i>For descriptive norms:</i> 6a. Do you think that other RDs within FHTs counsel patients regularly on physical activity, and why or why not?</p> <p>6b. Do you think that other RDs within FHTs counsel patients on sedentary behaviours and why or why not?</p>	<p>4.</p> <p><i>If participant states that RDs play a role in physical activity and/or sedentary behaviour counselling:</i> Which aspects of physical activity and sedentary behaviour counselling, do you feel are within the scope of practice for RDs? And, if any, which aspects are not?</p> <p><i>If participant only talks about one of physical activity or sedentary behaviour:</i> How about physical activity counselling?</p> <p>OR</p> <p>How about sedentary behaviour counselling?</p>
<i>To examine RDs' behavioural beliefs and outcome evaluations regarding physical activity and sedentary behaviour counselling among RDs in FHT settings.</i>	<i>For behavioural beliefs:</i> 7. Overall, do you feel that RDs counselling patients on physical activity and sedentary behaviour is an effective or ineffective way to improve these behaviours? Why?	<p>7.</p> <p><i>If participant only talks about one of physical activity or sedentary behaviour:</i> How about physical activity counselling?</p> <p>OR</p>

	<p><i>For outcome evaluations:</i></p> <p>8a. What is your view on the role of physical activity, if any, in the prevention and/or treatment of chronic conditions?</p> <p>8b. What is your view on the role of sedentary behaviour, if any, in the prevention and/or treatment of chronic conditions?</p>	<p>How about sedentary behaviour counselling?</p>
<p><i>To examine RDs' control beliefs and perceived power (self-efficacy) related to physical activity and sedentary behaviour counselling in FHT settings.</i></p> <p>These questions will also address the following objective:</p> <p><i>To explore various environmental factors that influence RDs' physical activity and sedentary behaviour counselling practices within FHT settings.</i></p>	<p><i>For self-efficacy:</i></p> <p>9a. On a scale of 0-10, with 0 being not at all confident and 10 being extremely confident, how confident do you feel about counselling patients on physical activity?</p> <p>9b. On a scale of 0-10, with 0 being not at all confident and 10 being extremely confident, how confident do you feel about counselling patients on sedentary behaviour?</p> <p><i>For control beliefs &amp; perceived power:</i></p> <p>10. What are the circumstances or things within the FHT setting that make it easy or difficult for you to counsel patients on physical activity or sedentary behaviour?</p>	<p>9. &amp; 10.</p> <p><i>Note: If the participant's answer to question 10 does not match their rating of their self-efficacy to counsel, researcher will remind participant about their rating and probe about barriers/facilitators (e.g., if participant rates self-efficacy to counsel as 10, and later discusses many barriers, researcher will refer participant to their rating and probe into reasoning for that rating)</i></p> <p>10.</p> <p><i>If participant only talks about one of physical activity or sedentary behaviour:</i></p> <p>How about physical activity counselling?</p> <p>OR</p> <p>How about sedentary behaviour counselling?</p>
<p><i>To examine RDs' intention to counsel patients on physical activity and sedentary behaviour in the future, within the FHT setting.</i></p>	<p>11a. Can you share with me your intentions, if any, to counsel patients on physical activity in the future? Do you see any changes that are likely to occur that might affect your intention?</p>	<p>11.</p> <p><i>For participants who currently counsel patients on physical activity/sedentary behaviours:</i></p> <p>Do you plan to change any aspects of your physical activity</p>

	<p>11b. Can you share with me your intentions, if any, counsel patients on sedentary behaviours in the future?</p>	<p>counselling practices in the future? Why or why not?</p> <p><i>OR</i></p> <p>Do you plan to change any aspects of your sedentary behaviour counselling practices in the future? Why or why not?</p>
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## Appendix E: Research Ethics Board Certification



### RESEARCH ETHICS BOARDS

*Certification of Ethical Acceptability of Research  
Involving Human Participants*

**APPROVAL PERIOD:** December 21, 2015  
**EXPIRY DATE:** December 20, 2018  
**REB:** G  
**REB NUMBER:** 16-12-560  
**TYPE OF REVIEW:** Delegated  
**PRINCIPAL INVESTIGATOR:** Dwyer, John (dwyer@uoguelph.ca)  
**DEPARTMENT:** Family Relations & Applied Nutrition  
**SPONSOR(S):**  
**TITLE OF PROJECT:** Physical Activity and Sedentary Behaviour Counselling among Registered Dietitians

#### CHANGES:

Type	Date
Annual Renewal	2017-11-20

The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human participants in the above-named research project and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement, 2<sup>nd</sup> Edition.

The REB requires that researchers:

- Adhere to the protocol as last reviewed and **approved** by the REB.
- Receive approval from the REB for any **modifications** before they can be implemented.
- Report any **change in the source of funding**.
- Report **unexpected events or incidental findings** to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants, and the continuation of the protocol.
- Are responsible for **ascertaining and complying with all applicable legal and regulatory requirements** with respect to consent and the protection of privacy of participants in the jurisdiction of the research project.

The Principal Investigator must:

- Ensure that the ethical guidelines and approvals of facilities or institutions involved in the research are obtained and filed with the REB prior to the initiation of any research protocols.
- Submit an **Annual Renewal** to the REB upon completion of the project. If the research is a multi-year project, a status report must be submitted annually prior to the expiry date. Failure to submit an annual status report will lead to your study being suspended and potentially terminated.

The approval for this protocol terminates on the **EXPIRY DATE**, or the term of your appointment or employment at the University of Guelph whichever comes first.

Signature:

Date: November 20, 2017

Stephen P. Lewis  
Chair, Research Ethics Board-General

## Appendix F: Email Advertisement/Recruitment Email



Hello (insert executive director's name here),

Please see attached below on study re: physical activity and sedentary behaviour knowledge, perceptions and practices among registered dietitians. If you could please forward this email to the registered dietitian on your family health team at your earliest convenience it would be greatly appreciated.

### **ATTENTION REGISTERED DIETITIANS!**

Are you interested in sharing your opinions and experiences with **physical activity and sedentary behaviour counselling as a registered dietitian**? We are currently seeking participants for a 75-minute in-person or telephone interview.

I am completing my **MSc in Applied Human Nutrition** under direction of **Dr. John Dwyer**, a specialist in physical activity promotion in many settings.

You are invited to participate in this study of **physical activity and sedentary behaviour counselling perceptions and practices among Registered Dietitians**.

**We are currently seeking participants who fit the following criteria:**

- Currently a Registered Dietitian in Ontario
- Part of a Family Health Team that lacks an exercise professional/physical activity specialist/Registered Kinesiologist
- Have been part of the FHT for a minimum of three months
- Fluent in English

### **What your participation entails:**

- A 75-minute in-person or telephone interview
- To be completed at your convenience at a preferred location. **I will travel to meet you.** A quiet, private location for the meeting will be agreed upon for each interview.
- You will also be asked if you would like to be re-contacted after the study to review/comment on the study findings. If you choose to do this, it will take approximately 20 minutes to complete the review/comments.

As a token of appreciation, you will receive a **\$20 grocery voucher**. Please contact me at the email address below to set up an interview as soon as possible if interested. **There are only 20 spots available for participants, and spots will be filled based on a first-come, first-serve basis.**

This project has been reviewed by the Research Ethics Board for compliance with federal guidelines for research involving human participants (REB #15DC002).

For more information, please contact:

**Jessica Huntington**  
BAsc, MSc Candidate  
[jhunting@uoguelph.ca](mailto:jhunting@uoguelph.ca)



## Appendix G: Follow-up Calls to Executive Director Phone Script



“Hi, my name is Jessica Huntington and I am a Masters of Science candidate in the Family Relations and Applied Nutrition (FRAN) department at the University of Guelph. I am following up on an email I sent last week regarding my research study on registered dietitians’ knowledge, perceptions and practices regarding physical activity and sedentary behaviour counselling. I would like to get in touch with \_\_\_\_\_ at your clinic to inquire about participating in the study. I was wondering if you received my email and if so, if you were able to forward it to \_\_\_\_\_. If so, is there an email or number I could call to get in contact with him/her? My phone number is 519-994-3182 and my email is [jhunting@uoguelph.ca](mailto:jhunting@uoguelph.ca). Thank you for your time.”

## Appendix H: Follow-up Calls to Registered Dietitians Phone Script



“Hi \_\_\_\_\_, my name is Jessica Huntington and I am a Masters of Science candidate in the Family Relations and Applied Nutrition (FRAN) department at the University of Guelph. I am following up on an email I sent last week regarding my research study on registered dietitians’ knowledge, perceptions and practices regarding physical activity and sedentary behaviour counselling. I was wondering if you received my email? If you get a chance to read the email and find that you are interested in participating, my phone number is 519-994-3182 and my email is [jhunting@uoguelph.ca](mailto:jhunting@uoguelph.ca). Thank you for your time and consideration in this.”

## Appendix I: Consent to Participate in Main Research Study



### CONSENT TO PARTICIPATE IN RESEARCH

#### **“Physical Activity and Sedentary Behaviour Counselling Among Registered Dietitians”**

You are invited to participate in a research study conducted by Jessica Huntington (Master of Science Candidate), and Dr. John Dwyer from the Department of Family Relations and Applied Nutrition (FRAN) at the University of Guelph. This study (including the interview) will be conducted by Jessica Huntington in partial completion of a Master of Science degree.

#### **If you have any questions or concerns about the research, please feel free to contact:**

Jessica Huntington (MSc Candidate)

John Dwyer (Principle Investigator)

FRAN department, University of Guelph

FRAN department, University of Guelph

Email: [jhunting@uoguelph.ca](mailto:jhunting@uoguelph.ca)

Email: [dwyer@uoguelph.ca](mailto:dwyer@uoguelph.ca)

Phone: 519-994-3182

Phone: 519-824-4120 ext. 52210

#### **PURPOSE OF THE STUDY**

The purpose of this study is to examine registered dietitians' knowledge, perceptions and practices regarding physical activity and sedentary behaviour counselling.

#### **PROCEDURES**

#### **If you volunteer to participate in this study, we will ask you to do the following things:**

1. Arrange a meeting time with Jessica Huntington. Meetings will take place in quiet, private location of your choosing. Jessica Huntington is willing to travel to meet you in a convenient location. Meetings will be approximately 75 minutes (total) in length.

During the 75-minute meeting, you will:

2. Complete a consent form and two brief questionnaires on your own sedentary behaviour and physical activity patterns. You will complete a brief demographic/background information questionnaire. This will take approximately 15 minutes.
3. Participate in an in-depth interview. This will take approximately 60 minutes.

After the interview, you will:

4. Be asked whether you would like to provide feedback on the main results of the study. If you chose to, you will then be emailed the main results of the research. Upon receipt of the email, you will have the opportunity to provide your feedback via email. It will take approximately 15 minutes to review/comment on the study findings.

To make sure the researcher keeps an accurate account of the interview results, interviews will be audio-recorded and will be typed up by Jessica Huntington and/or an undergraduate research assistant at a later time for analysis.

## **POTENTIAL RISKS AND DISCOMFORTS**

There are no foreseen risks or discomforts for this study. However, if at any point during the study you feel uncomfortable answering questions, the researcher will pause and provide you with the opportunity to skip the question. If necessary, you may also withdraw from the interview at any point during the meeting.

## **POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY**

You will get the opportunity to share your perceptions and experiences related to physical activity and sedentary behaviour counselling in your field. Discussing this information may allow you to reflect on your own physical activity/sedentary behaviour counselling practices, and may also increase your awareness in this area. This information will also provide rich, qualitative data to further understand the perceptions and practices regarding physical activity and sedentary behaviour counselling among Registered Dietitians. Findings could also be used to create interventions aimed at increasing physical activity and sedentary behaviour counselling among RDs, as well as RD knowledge in these areas. This may help to improve the health of the general population through increasing physical activity, decreasing sedentary behaviour, and increasing general knowledge of both (i.e., guidelines, health effects, and more). This study will add qualitative Canadian information to the current literature.

## **PAYMENT FOR PARTICIPATION**

You will receive a token of appreciation in the form of a \$20 grocery voucher (Loblaw's gift card) for participating in this research. You will receive this compensation even if you decide to withdraw from the study. You will be required to initial a form confirming that you have received the \$20 voucher from the interviewer.

## **CONFIDENTIALITY**

Every effort will be made to ensure confidentiality of any identifying information that is obtained in connection with this study. To ensure confidentiality:

- No identifying personal information needed for this study will be available to anyone other than Jessica Huntington and Dr. John Dwyer.
- Contact information will be required for the purpose of setting up a meeting time and so that you can be sent a summary of overall research findings. However, this information will not be directly attached to recorded interviews or interview transcripts and at no time will this contact information be available anyone other than Jessica Huntington and Dr. John Dwyer. Direct quotes from interviews will be used in publications, but will be linked only to unidentifiable ID codes or pseudonyms. Your name and any other identifying information will be altered in the interview transcripts to ensure confidentiality.
- Written records and questionnaires will be kept in a secured and locked cabinet in the Department of Family Relations and Applied Nutrition at the University of Guelph.

- Digital voice recordings will be kept on Jessica Huntington and one undergraduate research assistant’s encrypted laptops as well as John Dwyer’s secure office computer, and will be deleted from the back-up audio recorder (iPad). At no time will these recordings be available to anyone other than Jessica Huntington, John Dwyer, and/or the undergraduate research assistant.
- Interview data on the hard-drives (including audio files and transcripts) will be kept for 5 years after the publication of this research and then it will be destroyed by permanently erasing computer documents (audio files and transcriptions) and shredding all hard copies of transcripts/data.

**DISSEMINATION**

The results of this study will be published in Jessica Huntington’s Master’s Thesis and submitted for possible publication in journals. Dr. John Dwyer may also use the data for teaching purposes.

**PARTICIPATION AND WITHDRAWAL**

**You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw without consequences of any kind. You may exercise the option of removing your data from the study. You may also refuse to answer any questions you do not want to answer and still remain in the study. The researcher may withdraw you from this research if circumstances arise that warrant doing so.**

**NOTE: If you complete the interview, you may withdraw from the study up until one week after the interview. If you do so, your recorded interview will be permanently destroyed.**

**RIGHTS OF RESEARCH PARTICIPANTS**

You do not waive any legal rights by agreeing to take part in this study. This project has been reviewed by the Research Ethics Board for compliance with federal guidelines for research involving human participants. If you have any questions regarding your rights and welfare as a research participant in this study (REB# 15DC002), please contact: Director, Research Ethics; University of Guelph; [reb@uoguelph.ca](mailto:reb@uoguelph.ca); 519-824-4120 ext. 56606.

**SIGNATURE OF RESEARCH PARTICIPANT**

I have read the information provided for the study “Physical Activity and Sedentary Behaviour Counselling Among Registered Dietitians” as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

\_\_\_\_\_  
Name of Participant (please print)

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

**SIGNATURE OF WITNESS**

\_\_\_\_\_  
Name of Witness (please print)

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Date

## Appendix J: Participant Compensation Form for Interviews



Please initial this section to confirm that you have received a \$20 grocery voucher (Loblaw's gift card) as appreciation for participating in this study.

Participant # \_\_\_\_\_

My initials on this page indicate that I have received a \$20 grocery voucher (Loblaw's gift card) for participating in the study "Physical Activity and Sedentary Behaviour Counselling Among Registered Dietitians" conducted by Jessica Huntington

Initial \_\_\_\_\_

Thank you very much for your participation!

## Appendix K: Consent to Participate in Pilot Study



### CONSENT TO PARTICIPATE IN RESEARCH

#### **“Pilot Study: Physical Activity and Sedentary Behaviour Counselling Among Registered Dietitians”**

You are invited to participate in a research study conducted by Jessica Huntington (Master of Science Candidate) and Dr. John Dwyer from the Department of Family Relations and Applied Nutrition (FRAN) at the University of Guelph. This study (including the interview) will be conducted by Jessica Huntington in partial completion of a Master of Science degree.

#### **If you have any questions or concerns about the research, please feel free to contact:**

Jessica Huntington (MSc Candidate)  
FRAN department, University of Guelph  
Email: [jhunting@uoguelph.ca](mailto:jhunting@uoguelph.ca)  
Phone: 519-994-3182

John Dwyer (Principle Investigator)  
FRAN department, University of Guelph  
Email: [dwyer@uoguelph.ca](mailto:dwyer@uoguelph.ca)  
Phone: 519-824-4120 ext. 52210

#### **PURPOSE OF THE STUDY**

The purpose of this study is to get your feedback on interview questions for a study designed to examine registered dietitians’ perceptions and practices regarding physical activity and sedentary behaviour counselling. These interview questions will then be revised based on this feedback.

#### **PROCEDURES**

##### **If you volunteer to participate in this study, we will ask you to do the following things:**

1. Arrange a meeting time with Jessica Huntington. Meetings will take place in quiet, private location of your choosing. Jessica Huntington is willing to travel to meet you in a convenient location. Meetings will be approximately 75 minutes (total) in length.

During the 75-minute meeting, you will:

2. Complete a consent form and two brief questionnaires on your own sedentary behaviour and physical activity patterns. You will also complete a brief demographic/background information questionnaire. This will take approximately 15 minutes.
3. Participate in an in-depth interview. This will take approximately 60 minutes.

After the interview, you will:

4. Be asked to share your thoughts about the interview questions. This will take approximately 10 minutes, and will involve sharing any concerns or ideas you may have about the questions to improve them.

To make sure the researcher keeps an accurate account of the interview results, interviews will be audio-recorded and will be typed up by Jessica Huntington and/or an undergraduate research

assistant at a later time for analysis.

## **POTENTIAL RISKS AND DISCOMFORTS**

There are no foreseen risks or discomforts for this study. However, if at any point during the study you feel uncomfortable answering questions, the researcher will pause and provide you with the opportunity to skip the question. If necessary, you may also withdraw from the interview at any point during the meeting.

## **POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY**

You will get the opportunity to share your perceptions and experiences related to physical activity and sedentary behaviour counselling in your field. Discussing this information may allow you to reflect on your own physical activity/sedentary behaviour counselling practices, and may also increase your awareness in this area. Your feedback will be used to revise interview questions to conduct the main study. Information from the main study will provide rich, qualitative data to further understand the perceptions and practices regarding physical activity and sedentary behaviour counselling among Registered Dietitians. Main study findings could also be used to create interventions aimed at increasing physical activity and sedentary behaviour counselling among RDs, as well as RD knowledge in these areas. This may help to improve the health of the general population through increasing physical activity, decreasing sedentary behaviour, and increasing general knowledge of both (i.e., guidelines, health effects, and more). The main study will add qualitative Canadian information to the current literature.

## **PAYMENT FOR PARTICIPATION**

You will receive a token of appreciation in the form of a \$20 grocery voucher (Loblaws gift card) for participating in this research. You will receive this compensation even if you decide to withdraw from the study. You will be required to initial a form confirming that you have received the \$20 voucher from the interviewer.

## **CONFIDENTIALITY**

Every effort will be made to ensure confidentiality of any identifying information that is obtained in connection with this study. To ensure confidentiality:

- No identifying personal information needed for this study will be available to anyone other than Jessica Huntington and Dr. John Dwyer.
- Contact information will be required for the purpose of setting up a meeting time and so that you can be sent a summary of overall research findings. However, this information will not be directly attached to recorded interviews or interview transcripts and at no time will this contact information be available anyone other than Jessica Huntington and Dr. John Dwyer. Direct quotes from interviews will be used in publications, but will be linked only to unidentifiable ID codes or pseudonyms. Your name and any other identifying information will be altered in the interview transcripts to ensure confidentiality.

- Written records and questionnaires will be kept in a secured and locked cabinet in the Department of Family Relations and Applied Nutrition at the University of Guelph.
- Digital voice recordings will be kept on Jessica Huntington and one undergraduate research assistant's encrypted laptops as well as John Dwyer's secure office computer, and will be deleted from the back-up audio recorder (iPad). At no time will these recordings be available to anyone other than Jessica Huntington, John Dwyer, and/or the undergraduate research assistant.
- Interview data on the hard-drives (including audio files and transcripts) will be kept for 5 years after the publication of this research and then it will be destroyed by permanently erasing computer documents (audio files and transcriptions) and shredding all hard copies of transcripts/data.

### **DISSEMINATION**

The results of this study will be published in Jessica Huntington's Master's Thesis and submitted for possible publication in journals. Dr. John Dwyer may also use the data for teaching purposes.

### **PARTICIPATION AND WITHDRAWAL**

**You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw without consequences of any kind. You may exercise the option of removing your data from the study. You may also refuse to answer any questions you do not want to answer and still remain in the study. The researcher may withdraw you from this research if circumstances arise that warrant doing so.**

**NOTE: If you complete the interview, you may withdraw from the study up until one week after the interview. If you do so, your recorded interview will be permanently destroyed.**

### **RIGHTS OF RESEARCH PARTICIPANTS**

You do not waive any legal rights by agreeing to take part in this study. This project has been reviewed by the Research Ethics Board for compliance with federal guidelines for research involving human participants. If you have any questions regarding your rights and welfare as a research participant in this study (REB# 15DC002), please contact: Director, Research Ethics; University of Guelph; [reb@uoguelph.ca](mailto:reb@uoguelph.ca); 519-824-4120 ext. 56606.

### **SIGNATURE OF RESEARCH PARTICIPANT**

I have read the information provided for the study "Physical Activity and Sedentary Behaviour Counselling Among Registered Dietitians" as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

---

Name of Participant (please print)

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

**SIGNATURE OF WITNESS**

\_\_\_\_\_  
Name of Witness (please print)

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Date

## Appendix L: Pilot Study Feedback



“Thank you very much for your participation in this pilot study.

1. Were there any questions that seemed unclear in this interview?
  - a. Can you tell me which questions these are?
  - b. Do you have any thoughts on how to improve these questions?
  - c. Are there any additional questions you felt were unclear in this interview?
2. Do you have any additional feedback on the interview questions?
3. Do you have any additional feedback on the interview process?

Thank you again for your time. Your participation in this pilot study is greatly appreciated.”

## Appendix M: Undergraduate Research Assistant Confidentiality Agreement



### Guiding Principles:

1. Confidentiality acknowledges respect for an individual's right to privacy.
2. Confidentiality is the foundation to ensuring that privileged information is accessible only to those authorized to have access.
3. Confidentiality is essential in successful data collection, analysis, and completion of the study.
4. Confidentiality assumes that those who pledge to safeguard confidential information will do so.
5. When using open/shared space (offices, rooms, hallways, etc.), privileged information that may be inadvertently shared or overheard is respected and kept confidential.
6. I will not make copies of confidential information in any form or format unless requested to do so by the Principal Investigator.
7. I will delete, destroy or return to the Principal Investigator (John Dwyer) all data (including copies), in any form or format (e.g. disks, tapes, or transcripts), once I have completed my work on the project.
8. I agree to notify the Principal Investigator immediately if any unexpected or adverse events occur in the conduct of the work that can have a possible negative impact for the participants.

As an undergraduate research assistant, I will receive and have access to confidential information about the participants in this study.

This information will be kept in the strictest confidence.

I understand that the discussion of personal information about the participants in this study without authorized consent is unethical.

I will abide by this Confidentiality Agreement to ensure respect for the privacy of the participants in the study "Physical Activity and Sedentary Behaviour Counselling Among Registered Dietitians."

---

Name of Undergraduate Research Assistant (Please print)

\_\_\_\_\_  
Signature of Undergraduate Research Assistant

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Date (DD/MM/YYYY)

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