Understanding the Barriers and Facilitators to Engaging in a Physical Activity Prescription Program from the Perspectives of Health Care Providers and Recipients Using the Capability, Opportunity, and Motivation (COM-B) Framework

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Abstract

Background: Prescription-based physical activity, a method in which healthcare providers write specified movement recommendations to patients, is an emerging health promotion strategy being applied to combat systematic healthcare crises. This approach, deemed effective for increasing physical activity adherence, is especially vital due to declining activity rates seen since the emergence of the COVID-19 pandemic. Prescription-to-Get-Active (RxTGA) is an Alberta-based, not-for-profit physical activity prescription program that seeks to increase movement among Canadians and attenuate the risk for adverse health effects associated with not meeting national guidelines. While RxTGA has been in operation since 2011 and is well regarded in Alberta as a viable program to promote physical activity and health among recipients, its effectiveness to date has not been determined empirically. A reduction in prescriptions written and redeemed since the pandemic's onset has been observed making a formal evaluation timely. Because physical activity is an important strategy to promote physical, mental, and social health, an investigation into the barriers and facilitators to prescription physical activity is needed to optimize engagement in the RxTGA program. Limited studies have sought to understand this phenomenon in a Canadian context and no studies have investigated these constructs from the perspectives of both the healthcare providers who write the prescriptions, and those who receive them. Similarly, no studies have assessed factors that impede or promote participation specific to RxTGA and done so through the lens of the Capability, Opportunity, and Motivation Model for Behaviour Change (COM-B): a behaviour analysis tool that allows researchers to break down complex decisions into smaller ones that can be more efficiently studied.

Purpose: The main purpose of this study was to assess the barriers and facilitators to RxTGA involvement experienced among healthcare providers and prescription recipients using quantitative and qualitative approaches. Using a COM-B lens, this was achieved in two ways: 1) Perceived barriers and facilitators to engaging in conversations with patients and writing physical activity prescriptions were assessed among RxTGA prescribers using a series of validated surveys and open questions; and 2) One-on-one semi-structured interviews were used to explore the barriers and facilitators to obtaining, redeeming, and engaging in prescription-based physical activity among RxTGA recipients. To gain a comprehensive understanding of RxTGA engagement across both groups, data were examined in isolation and comparatively. Additionally, relationships between variables were examined to further discern prescribing behaviours among RxTGA healthcare providers.

Methods: A case study design was used to enable an in-depth exploration of these experiences within a real-life community-based setting, while allowing for insights gleaned from each participant group independently. Healthcare providers registered with RxTGA were recruited directly via a personalized email and asked to complete a brief demographic questionnaire followed by a 30-item survey to assess barriers and facilitators to prescribing physical activity, a 17-item COM-B survey to assess prescribing behaviour, and a 10-item RxTGA-specific survey to glean views on the organization. Open questions were embedded as part of this survey to allow participants to expand upon their responses. Quantitative data were analyzed using descriptive statistics including means, standard deviations, and frequencies. Additionally, Spearman's Rho correlations were used to assess the strength of relationships between COM- B subscales (Capability, Opportunity, and Motivation) and demographic variables. Open questions were summarized based on common sentiments shared.

Recipients of physical activity prescriptions were recruited via multiple methods including a study poster posted on the RxTGA website and social media, and emails sent directly to registered RxTGA recipients. Participants completed a brief demographic questionnaire, followed by a 30–40-minute semi-structured interview, facilitated by a guide created for this population and informed by the COM-B model. Interview data were analyzed using both deductive and inductive thematic approaches.

Results: In total, 35 healthcare providers (77.1% female; mean age = 38.83) representing an array of health disciplines completed at least one part of the quantitative survey. Most reported spending more than 30 minutes with each patient, and the majority reported prescribing physical activity to less than 10% of their patients. Competing variables (weather, finances, etc.), a lack of patient interest in physical activity, and a lack of resources were the most commonly cited barriers to prescribing activity. Conversely, having physical activity programs to refer patients to, and having personal comfort and confidence in the subject were the most commonly reported facilitators to administering activity prescriptions. Significant positive relationships were found between having the perceived capability to write physical activity prescriptions, having sufficient opportunities to write physical activity prescriptions, and being motivated to write physical activity prescriptions. Overall, healthcare providers were very satisfied with their RxTGA experience.

Findings: In total, 16 prescription recipients (56% female; mean age = 41.81) were interviewed. Themes of feeling as if everyone is looking at them and discomfort in a gym setting were identified as barriers to one's capability to use their prescription. Financial obstacles and competing responsibilities impeded one's opportunity to use their prescription and struggling to get out of their "comfort zone" was discussed as the main motivational barrier to engaging with

their RxTGA prescription. Conversely, having relationships with allied healthcare providers and seeing progress over time helped facilitate one's capability to use their prescription, while social support and positive body changes were discussed as motivational facilitators. Opportunity was enhanced through technology and having a variety of activities available. Many also acknowledged RxTGA as a good starting point for becoming more active.

Conclusion: This study was the first to assess barriers and facilitators to writing, redeeming, and engaging with physical activity prescriptions from the perspectives of health care providers and recipients as part of an established community-based program: RxTGA. In sum, the results underscore the importance of addressing both structural and psychological barriers to enhance the effectiveness of physical activity prescription programs. Given the interconnectedness of Capability, Opportunity, and Motivation, programs should be multi-faceted, aiming to boost healthcare providers' confidence in prescribing physical activity while simultaneously ensuring that recipients have the necessary support and resources to boost ability and follow through. For healthcare providers, training that enhances their capability and opportunity to prescribe physical activity, along with the provision of adequate resources, could mitigate some of the barriers identified. Similarly, patient-centred approaches that address individual concerns about starting a program and promote gradual progress might improve adherence to prescribed physical activity among recipients. Future studies could build upon these findings by exploring interventions that specifically target the interrelated aspects of the COM-B model. This study contributes to a growing body of literature on physical activity prescription, emphasizing the need for a holistic approach that considers the complex interplay of factors influencing both healthcare providers and recipients. By addressing these barriers and leveraging facilitators, physical activity

prescription programs can be better tailored to meet the needs of diverse populations, ultimately promoting greater health and well-being.

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Understanding the Barriers and Facilitators to Engaging in a Physical Activity Prescription Program from the Perspectives of Health Care Providers and Recipients Using the Capability, Opportunity, and Motivation (COM-B) Framework

Introduction

There are many benefits associated with regular physical activity engagement including the improvement and maintenance of cardiovascular health (Arija et al., 2017; Liu et al., 2020; ParticipACTION, 2023), increased longevity (Brown et al., 2011), as well as the reduction and prevention of mental health conditions such as depression (Harvey et al., 2018), anxiety (Broman-Fuchs & Storey, 2008), and stress (Lipert et al., 2021): all of which saw increases worldwide during the COVID-19 pandemic (Keisari et al., 2022; Sameer et al., 2020). Yet, it has been shown that many Canadian adults do not meet physical activity guidelines which recommend 150 minutes of moderate-to-vigorous physical activity (MVPA) a week (Canadian Society for Exercise Physiology [CSEP], 2021). This is of concern given the negative physical (Arija et al., 2017; Brown et al., 2011; CSEP, 2021; Liu et al., 2020; ParticipACTION, 2023), and mental (Harvey et al., 2018; Lipert et al., 2021; Sharma et al., 2006; Sowislo & Orth, 2013) health outcomes that can result. Additionally, low physical activity participation and sedentariness are associated with the development of chronic diseases, higher risk for early mortality, and low quality of life (Gill et al., 2013; Puciato et al., 2023), not to mention the related national and global financial implications (Janssen et al., 2012; World Health Organization, 2023). Research has shown that individuals face a myriad of barriers to engaging in physical activity including time, lack of knowledge regarding the benefits, limited external resources, and inadequate self-efficacy to be active (Gavarkovs et al., 2017; Herazo-Beltran et

al., 2017; Koh et al., 2022). Taken together, these trends suggest that innovative interventions to boost participation rates are needed.

Prescription-based physical activity, in which healthcare providers assess health and write specified movement recommendations for patients to complete independently, is an emerging health-promotion method being used increasingly to combat systematic healthcare crises (Onerup et al., 2018; Sallis, 2008, 2009; Sorenson et al., 2006). This approach has been deemed effective for increasing physical activity adherence in both the short- (Babwah et al., 2018) and long-term (Hamlin et al., 2016). This is especially the case since the emergence of the COVID-19 pandemic: a time when physical activity rates declined substantially while strain on the healthcare system intensified concurrently (Detsky & Bogoch, 2020; ParticipACTION, 2021).

Prescription to Get Active (RxTGA) is an Alberta-based, not-for-profit physical activity prescription program that seeks to increase movement among Canadians and attenuate risk for adverse health effects associated with not meeting national guidelines (RxTGA, 2021). By partnering with recreation and fitness facilities to support individuals who receive prescriptions, RxTGA essentially strives to reduce sedentary behaviour and get Canadians moving (RxTGA, 2021). While RxTGA has been in operation since 2011 and is well regarded in Alberta as a viable avenue to promote physical activity and health among recipients, the evidence collected to support its effectiveness to date has been largely anecdotal in nature. Moreover, the COVID-19 pandemic led to a reduction in prescriptions written and redeemed (J. Tareta, personal communication, 2023). As societal recovery from this worldwide crisis continues (McClelland et al., 2022), it is vital to uncover ways to help Canadians restore their health and engage in positive health behaviours (Atkinson & Norris, 2023). Given physical activity is an effective,

accessible strategy known to promote many dimensions of wellness including physical, mental, and social domains (An et al., 2020; Broman-Fuchs & Storey, 2008; Harvey et al., 2018; ParticipACTION, 2023), it would seem that a thorough investigation into the barriers and facilitators to prescription writing and redemption is timely and needed to optimize engagement in this important program. The following includes a detailed description of physical activity facets and empirical studies in the physical activity prescription literature, followed by an account of the COM-B Model (Capability, Opportunity, and Motivation Model for Behaviour Change; Michie et al., 2011; The Decision Lab, 2023) and its association to RxTGA.

Background

Types of Physical Activity

Physical activity is defined as bodily movement produced by skeletal muscles requiring energy expenditure, resulting in increased heart rate and breathing (Caspersen et al., 1985; ParticipACTION, 2023; World Health Organization, 2022). The National Heart, Lung, and Blood Institute categorize physical activity into three broad categories: aerobic, muscle strengthening, and bone strengthening (U.S. Department of Health and Human Services, 2022). The first category is aerobic activity which is defined as moving your larger muscles, typically found in your arms or legs, to elevate your heart rate (U.S. Department of Health and Human Services, 2022). Common examples of related activities are jogging, cycling, and rowing. The second category is muscle-strengthening activities which are designed to improve the power, strength, and endurance of the muscles (Bennie et al., 2020). Common examples include stair climbing, lifting weights, push-ups, and sit-ups, and can incorporate household chores such as digging in the garden (Bennie et al., 2020). The third category is bone strengthening activities where one's limbs (feet, legs, and arms) act in support of the body's

weight, while the muscles provide resistance to promote bone growth and strength (Bull et al., 2020; U.S. Department of Health and Human Services, 2022). Common examples of bone-strengthening activities are running/jogging, jumping rope, and lifting weights (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2023). There is generally a great deal of overlap between the three main categories of physical activity, depending on whether the activity causes one's heart and lungs to work harder. For example, certain activities such as running and weightlifting can be considered both aerobic and bone/muscle strengthening (U.S. Department of Health and Human Services, 2022).

Beyond these three broad categories, physical activity can also include balance activities that improve one's ability to resist the forces that cause falls (ParticipACTION, 2021; U.S. Department of Health and Human Services, 2022). These activities are extremely important for older adults who may be susceptible to balance loss (Stevens et al., 2014). Results from a study looking at the circumstances and outcomes of falls in 328 older adults found that being over the age of 85 increased the likelihood of sustaining a fall and doubled the chances of that fall leading to injury (Lajoie & Gallagher, 2004). The researchers concluded that balance-specific activities (e.g., heel-to-toe walk, cross-over stepping, static heel touches; Liang et al., 2020) are of importance to help prevent the occurrence and severity of falls in older adults (Lajoie & Gallagher, 2004). Flexibility activities have similarly been identified as one way to reduce falls (Thomas et al., 2019) and improve the ability to move one's joints (U.S. Department of Health and Human Services, 2022). Examples of flexibility activities can include simple side stretches, reaching for one's toes, and yoga (U.S. Department of Health and Human Services, 2022). According to national recommendations, it is important to integrate a variety of activities

into one's routine. In addition, the intensity in which one is active is also an important consideration for health (Wang et al., 2021).

Physical Activity Intensity

Physical activity intensity is measured in Metabolic Equivalent of Tasks (METS) whereby one MET is the energy output required to sit quietly without movement (Bull et al., 2020). The lightest intensity physical activity, coined Light-Intensity Physical Activity (LPA), has a METS score of 1.5-2.9 (Bull et al., 2020: ParticipACTION 2021). Light intensity physical activity is generally self-rated to be between 2-4 on a perceived exertion scale out of 10, and usually includes incidental activities such as slow walking, standing, showering, and household chores like gardening and cleaning that do not cause a substantial increase in breathing or heart rate (Bull et al., 2020; ParticipACTION 2021; Ross et al., 2020). The next intensity is MVPA which denotes a METS score of 3-6 and requires 3-6 times the physical exertion of sitting on a couch (Bull et al., 2020; ParticipACTION 2021). Moderate-vigorous physical activity is generally self-rated to be a five or above on a perceived exertion scale out of 10. In layman's terms, MVPA is experienced as increasing one's heart rate and causing them to breathe heavier, exceeding the ability to maintain a normal conversation (Bull et al., 2020; ParticipACTION 2021). Within physical activity, exercise is a subset, categorized by planning, structure, and repetitiveness, with a final or intermediate objective of maintaining physical fitness (Caspersen et al., 1985).

Canadian 24-Hour Movement Guidelines

In 2021, the CSEP released new Canadian 24-hour movement guidelines for adults aged 18-64 using available evidence, expert consensus, stakeholders' meetings, and the consideration of values, feasibility, and equity as a guide. For example, these guidelines are designed to be

suitable irrespective of one's cultural background, socio-economic status, gender, or sex (CSEP, 2021). The CSEP (2021) posits that following these physical activity guidelines, in conjunction with sedentary behaviour and sleep recommendations, is beneficial for experiencing numerous positive health outcomes. It is also highlighted that following these guidelines can improve and maintain an individual's bone health, cognition, as well as overall quality of life and physical function. The guidelines encourage individuals to partake in a wide variety of intensities and types of physical activity weekly, including at least 150 minutes of MVPA, muscle-strengthening activities focused on major muscle groups at least twice a week, as well as several hours of LPA (CSEP, 2021). Embedded within these movement guidelines, it is noted that getting seven to nine hours of sleep consistently and limiting sedentary time to less than eight hours daily, including less than three hours of recreational screen time, are important to maximize health benefits (CSEP, 2021).

Benefits of Physical Activity

Engaging in physical activity has been shown to lead to a variety of positive health outcomes, both mental and physical (Penedo & Dhan, 2005). Previous literature has shown that engaging in the recommended 150 minutes of MVPA per week can aid in preventing and treating a number of chronic conditions including but not limited to a lower risk of all-cause mortality, cardiovascular disease (CVD), hypertension, many types of cancer, type-2 diabetes, as well as obesity (CSEP, 2021: ParticipACTION, 2023: Sothern et al., 1999). Engaging in regular physical activity has also been shown to have a strong effect in the treatment of anxiety and depression (Mutrie, 2000). In fact, it has been suggested that regular physical activity may act as a feasible mental health promotion strategy (Carless & Faulkner, 2003). A more detailed account of the physical and mental health benefits of physical activity is included below.

Physical health benefits of physical activity. A recent large-scale longitudinal cohort study examining the health benefits of engaging in 150 minutes of MVPA per week on the risk of developing CVD was conducted in China (Liu et al., 2020). Participants were assessed twice, once between 1998 - 2001 and again between 2012 - 2015. After excluding participants who had been previously diagnosed with CVD and those who did not complete the follow-up survey, 100,560 participants were included in the final analysis. Participants had a mean age of 51.5 (Standard Deviation [SD] =12.2), 40.1% identified as male, and 22.1% and 18.5% identified themselves as current smokers and alcohol drinkers, respectively (Liu et al., 2020). Results were collected using a validated survey (Ainsworth et al., 2011) with a question asking approximately how many hours per day during the previous year an individual spent doing various activities on weekdays and weekends (Liu et al., 2020). The activities included vigorous activities greater than six METS, moderate activities between 3-5.9 METS and light activities between 1.5-2.9 METS (Liu et al., 2020). For each intensity level, the survey provided examples of common activities that would fall into each category: for example, running and heavy farming work were labelled as vigorous; brisk walking and yard work beyond one's ability to withstand a conversation were labelled as moderate; and walking slowly and standing work were labelled as light (Liu et al., 2020). The main outcomes in the study pertaining to CVD were coronary heart disease, heart failure (fatal or non-fatal), stroke (fatal or non-fatal), and death. Results showed that participants who met recommended MVPA guidelines had significant reductions in all outcomes including a 26% reduction in cardiovascular disease risk, a 50% reduction in heart failure risk, a 10% reduction in stroke risk, a 41% decrease in coronary heart disease risk, and a 35% reduction in risk of death related to CVD compared to individuals who failed to meet guidelines (Liu et al., 2020). Results remained significant even when controlling for meditating

variables such as body mass index (BMI), hypertension, and diabetes (Liu et al., 2020). Overall, this study demonstrated the inverse associations between meeting recommended MVPA guidelines and risk of cardiovascular outcomes (Liu et al., 2020) and highlights the importance of regular physical activity for the health of the cardiovascular system.

Similarly, another study looked at the effectiveness of a nine-month MVPA and LPA physical activity program and its effects on cardiovascular health and the associated risks among adults in primary healthcare (Arija et al., 2017). The study was a randomized controlled community intervention involving 364 participants residing in four primary care centers in Spain who were assigned to either a control (n = 104) or an intervention group (n = 260). The intervention group's physical activity consisted of two 60-minute supervised walking sessions per week for a total of 396 METS/week; the control group was not required to engage in any walking behaviour beyond their baseline assessment. Participants had a mean age of 65.19 years and were predominantly women (76.8%). The two main outcomes for this study were level of adherence to physical activity as well as cardiovascular biomarkers (e.g., systolic and diastolic blood pressure; total, LDL, and HDL cholesterol) measured at baseline, at the end of the intervention, as well as two years post study (Arija et al., 2017). Results demonstrated that intervention group participants had a significant decrease of 6.3 mmHG in systolic blood pressure, a decrease of 10.12 mg/dL of total cholesterol, and a decrease of 9.05 mg/dL of LDL cholesterol, thereby indicating a healthier cardiovascular system (Arija et al., 2017). Results also showed that compared to the control group, individuals in the intervention group had a significantly lower incidence of cardiovascular events, 10.5% versus 2.5% respectively, as well as a higher adherence to physical activity: 27.2% versus 72.8% respectively (Arija et al., 2017). Taken together, these two studies demonstrate that both MVPA and LPA are suitable for the

prevention and reduction of adverse cardiovascular events, and both demonstrate a strong dose-response relationship suggesting that increases in physical activity levels generally lead to improved cardiovascular health.

Another study looked at physical health more broadly by investigating the effects of physical activity on all-cause mortality among 7080 women and 11,688 men from two cohorts (i.e., the Australian Longitudinal Study on Women's Health and the Health in Men study; Brown et al., 2011). The participants were older adults born between 1921-1926, making the women aged 70-75 and men aged 65-83 at the baseline assessment (Brown et al., 2011). Levels of physical activity were measured using a self-report assessment based on duration of time spent doing vigorous physical activity during the previous week. The results demonstrated a strong dose-response between physical activity frequency and mortality, indicating that higher-intensity physical activity levels resulted in fewer deaths even when adjusted for age, education, alcohol, and smoking. Overall, the dose-response was deemed to be clinically significant with a p-value of less than 0.0001, and the decline in mortality attenuated by physical activity was more significant in women compared to men. Overall, this study demonstrated that in addition to the cardiovascular benefits and reduction in cardiovascular events, physical activity is vital for the prevention of death, especially in older adults (Brown et al., 2011).

Mental health benefits of physical activity. In addition to the physical benefits, there is also an abundance of mental health benefits associated with more movement (Sharma et al., 2006). Engaging in the recommended dose of physical activity has been shown to improve overall mental health as well as reduce symptoms of depression, stress, and anxiety, and alleviate mood (Sharma et al., 2006). In addition, physical activity can improve low self-esteem, which is of particular importance as previous literature suggests that self-esteem has a strong bidirectional

relationship with both anxiety and depression (Sharma et al., 2006; Sowislo & Orth, 2013): salient mental health concerns that have seen an increase among Canadian adults throughout the COVID-19 pandemic (Dozois, 2021; Pongou et al., 2022).

A large-scale, longitudinal study looked at the effects of engaging in exercise and the prevention of depression. The Health Study of Nord-Trøndelag County (HUNT) cohort study involved assessing physical activity, depression, and anxiety twice over 11 years and was completed among 22,564 adults who were considered "healthy." That is, they demonstrated no symptoms of common mental disorders or diminished physical health at baseline (Harvey et al., 2018). This study was completed over two phases: the first took place between 1984 and 1986 and exercise behaviours and depression and anxiety were assessed. Participants were asked how often they engaged in physical activity and were provided with five options: never, less than once a week, once a week, two to three times per week, and nearly every day. The length of an average session of exercise was also measured. Participants were asked to report on the intensity of an exercise session using three options: exercise without becoming breathless or sweating; exercise resulting in excess breathing and sweating; or exercise resulting in total exhaustion. Symptoms of depression and anxiety were measured at baseline using the 12-item Anxiety and Depression Index which has been deemed valid and shown to have good test-retest reliability. Phase two was completed again approximately 10 years later using the same participants. Results from this study demonstrated that 66.5% of participants completed both phases of the study. Of those participants, 7% developed diagnosed depression and 8.7% developed diagnosed anxiety throughout the duration of the study. Using logistical regression analysis, it was found that participants who reported no exercise had 44% increased odds of developing depression compared to those who completed at least one to two hours per week (Harvey et al., 2018).

However, this finding was not consistent with anxiety. Overall, a dose-response relationship was found suggesting that even one to two hours of exercise per week provides strong protection from depression but not anxiety. The authors of this study recognized that there may be other factors influencing the relationship between exercise and depression such as personal support, family life, education, and socioeconomic status that should be considered in this context (Harvey et al., 2018; Schlax et al., 2009).

Similarly, another study looked at physical activity as a predictor of stress level and sleep quality during the COVID-19 lockdown using a series of validated surveys (Lipert et al., 2021). This study involved 1959 participants with most being female (85%), employed (59%), and in lockdown due to government restrictions (78.5%). The IPAQ-SF was used to estimate the level of physical activity over the previous seven days taking into account the frequency, duration, and intensity: vigorous (eight METS), moderate (four METS), and low (three METS). Sleep was assessed using the Pittsburgh Sleep Index (PSQI) which includes seven subjective components: sleep quality, sleep latency, sleep duration, number of sleep disturbances, usage of sleep-promoting medication, daytime dysfunction as a result of sleep, and habitual sleep. Levels of stress were assessed using the Perceived Stress Scale (PSS; Baik et al., 2019; Lipert et al., 2021). Results demonstrated that individuals with higher levels of physical activity during the lockdown had significantly reduced levels of stress ($p<0.001$) compared to individuals who had lower levels or no physical activity engagement. In addition, individuals who engaged in moderate physical activity had better sleep quality; however too much physical activity was associated with reduced quality of sleep. Overall, this study posited that engaging in physical activity has strong benefits for reducing stress. The researchers found that 70 minutes of physical activity per

day with alternating levels of intensity was the optimal dose to alleviate stress and improve overall sleep quality (Lipert et al., 2021).

Lastly, a study was completed that looked at the effects of a brief, two-week aerobic physical activity intervention on anxiety sensitivity in 24 (female = 19) undergraduate students at Appalachian State University (Broman-Fuchs & Storey, 2008). All participants were registered in the program of Psychology, aged 18-27, and diagnosed with high anxiety sensitivity at baseline. Anxiety and anxiety sensitivity were assessed using the Anxiety Sensitivity Index-Revised (ASI-R) which consists of 36 questions using a five-point Likert scale ranging from zero (indicating very little) to four (indicating very much). Participants were randomly assigned to either a high-intensity aerobic exercise group or a no-exercise control group. Those assigned to the exercise condition completed six 20-minute exercise sessions over a period of two weeks. All participants were equipped with a heart rate monitor and asked to briskly walk or run on a treadmill in order to maintain 60-90% of their maximum heart rate for 20 minutes. Using a two-by-eight analysis of variance (ANOVA) between exercise and all symptoms of anxiety, results demonstrated that individuals assigned to the physical activity intervention had significantly reduced anxiety sensitivity compared to the control group. Over the duration of the study, results also demonstrated that individuals in the physical activity group had reduced anxiety sensitivity over time, whereas the control group had no changes and maintained consistent high levels of anxiety. Overall, this study suggests that even short durations of physical activity have meaningful effects on anxiety and anxiety sensitivity (Broman-Fuchs & Storey, 2008). Taken together, these studies highlight the importance of physical activity regarding physical and mental health; however, the societal benefits of engaging in adequate physical activity in the healthcare system cannot be overlooked.

Financial benefits of physical activity on healthcare system. In order to determine the projected direct worldwide cost of physical inactivity between 2020 and 2030, researchers recently applied a population-attributable fraction formula using non-communicable disease outcomes including heart disease and hypertension, cancer, dementia, depression, and type two diabetes (Santos et al., 2023). Data were collected using the most recent economic and health evidence that was available for 194 countries. Findings revealed that amongst 499.2 million preventable non-communicable disease cases directly associated with physical inactivity, the estimated treatment cost will be $520 billion dollars internationally over 10 years with the annual cost reaching approximately $47.6 billion (Santos et al., 2023). A projected 74% of non-communicable disease cases will occur in lower-middle income countries with higher income countries bearing 63% of the associated economic costs (Santos et al., 2023). Overall, this study posits that an estimated $520 billion dollars could be allocated internationally towards other important issues if every individual were to meet physical activity guidelines (Santos et al., 2023). This study also revealed that the health and economic burden of not engaging in physical activity is largely avoidable (Santos et al., 2023).

On a national level, the risk of chronic conditions in individuals who are not active, the associated direct and indirect costs, and the overall prevalence of physical activity in the general population were used in order to provide an estimate of the total health care costs allocated to physically inactive individuals in Canada (Janssen et al., 2012). Overall, results showed that in 2009, the direct cost of physical inactivity was $2.4 billion, the indirect cost was $4.3 billion, for a total of $6.8 billion (Janssen et al., 2012). This study posits that the Canadian healthcare system could avoid spending these dollars per year by getting Canadians to be more physically active, thereby enabling the allocation of funds to other issues. Based on these alarming statistics, it is

clear that large-scale, innovative physical activity interventions are needed to address physical activity.

Canadian Physical Activity Trends

Despite widespread information pertaining to the mental and physical benefits of physical activity, adult adherence to physical activity guidelines worldwide remains low (WHO, 2023). Unfortunately, Canada is not immune to the troubling trends of increased physical inactivity and associated detriment to public health (CSEP, 2021; Hallal et al., 2012; Mutrie, 2000). A study by Colley and colleagues (2011) using accelerometry data among a nationally representative sample of Canadian adults aged 20-79 was conducted to estimate the amount of time spent being sedentary, as well as engaging in light, moderate, and vigorous physical activity. Results demonstrated that only 15% of Canadian adults accumulated the recommended 150 minutes of MVPA per week, and only 5% accumulated 30 minutes per week of MVPA on five days or more days a week. It was also shown that men are generally more active than women, and MVPA decreases with age (Colley et al., 2011).

More recently, another Canadian study was published in 2022 and involved 8,297 Canadian adults aged 18 to 79 (Rollo et al., 2022). The Canadian Health Measures Survey as well as device-based physical activity measures were used to assess adherence to three recommendations from the 2020 Canadian 24-Hour Movement Guidelines (Rollo et al., 2022): engaging in MVPA for at least 150 minutes per week; keeping sedentary behaviour to less than three hours per day; and sleeping for seven to nine hours per night (Rollo et al., 2022). The results demonstrated that 19.1% of the participants met none of these recommendations, 43.9% met one of three, 29.8% met two of three, and only 7.1 % met all three (Rollo et al., 2022). Overall, these findings suggest that less than one in 10 Canadian adults between the ages of 18 to

79 meets all of the Canadian 24-Hour Movement Guidelines (Rollo et al., 2022). This is important as failure to meet these guidelines is contributing to the significant rise in chronic disease in Canada (Stats Canada, 2023) putting further pressure on the healthcare system (Public Health Ontario, 2019).

ParticipACTION is a non-profit organization designed to assess and report on the physical activity trends in Canada (ParticipACTION, 2021). The team regularly releases a report card indicating letter grades and statistics based on adherence to CSEP's Canadian 24-hour movement guidelines (ParticipACTION, 2021). Often included is a comprehensive summary of relevant literature as well as national survey data to provide a current picture of physical activity, recreation, and sport for both adults and children (ParticipACTION, 2021). According to the 2021 report card, using accelerometer data, it was reported that 56% of adults aged 18 to 79 get the recommended three hours per day of LPA, resulting in a grade of C+ (ParticipACTION, 2021; Statistics Canada, 2019). With respect to MVPA, only 49% of adults aged 18 to 79 engaged in the recommended 150 minutes per week resulting in a grade of C (ParticipACTION, 2021; Statistics Canada, 2019). It was reported that adults aged 18 to 64 engaged in more MVPA (53%) than adults aged 65 to 79 (28%) highlighting an age-related decline over time (ParticipACTION, 2021, Statistics Canada, 2019). This is a particular concern as MVPA has been shown to reduce all-cause mortality, cancer, and CVD, as well as mental health outcomes such as depression and anxiety (ParticipACTION, 2021). With respect to muscle-strengthening activities, only 25% of adults aged 18 to 79 met the recommended muscle-strengthening guidelines of two times per week (ParticipACTION, 2021, Statistics Canada, 2019). Taken together, these trends suggest that there are barriers individuals face regarding physical activity

participation. Thus, further studies are warranted to better understand the factors that may inhibit involvement.

Perceived Barriers to Physical Activity

In order to design future effective health-promoting interventions to increase physical activity, it is important to understand the perceived barriers individuals face regarding engagement (Pate et al., 2011). A national, large-scale (n = 2687) quantitative cross-sectional study was conducted in Singapore to assess perceived barriers to engaging in physical activity, as well as perceived facilitators to overcoming barriers (Koh et al., 2022). The majority of participants were 18 to 34 years of age (29.9%), female (51.6%), and possessed a post-secondary education. Twelve barriers to physical activity participation were measured on a three-point Likert scale and separated into two categories: internal, which included barriers more personal to the individual such as disability or injury, family matters, work, perceived lack of time, age, and tiredness; and external barriers such as pollution, safety, weather, accessibility, financial cost, and lack of parks (Koh et al., 2022). Overall, results demonstrated that a perceived lack of time (65.3% cited as a barrier), fatigue (64.7% cited as a barrier), and pollution (56.1% cited as a barrier) were seen as the three most common barriers individuals faced regarding participating in physical activity (Koh et al., 2022). Alternatively, it was found that social support and an emphasis on the benefits of physical activity were perceived as motivation for individuals to overcome internal barriers, while possessing an awareness of resources and facilities helped reduce external barriers (Koh et al., 2022). Based on these results, the researchers concluded that social support and an understanding of physical activity benefits can help individuals overcome personal internal barriers (Koh et al., 2022).

Similarly, another quantitative cross-sectional study involving 1066 women and 1036 men aged 18-69 was conducted to assess perceived barriers to physical activity (Herazo-Beltran et al., 2017). Participants were recruited using probabilistic, random sampling. Two variables of interest were assessed: 1) level of current physical activity which involved using the IPAQ short form to determine adherence to the guidelines of 150 minutes per week of MVPA, or 75 minutes of vigorous physical activity; and 2) perceived barriers to physical activity whereby participants were provided seven options (motivation, lack of skills, lack of energy, access to resources, perceived lack of time, lack of social support, and fear of injury) and asked to answer yes or no to determine whether they perceived each barrier as being relevant to them. Demographic information including gender, age, socioeconomic status, and highest level of education was also collected. Results demonstrated that individuals who were from a lower socioeconomic background perceived a lack of motivation and resources as common barriers; individuals who did not have a significant other perceived a lack of social support and motivation as common barriers; and individuals who possessed a lower level of education perceived injury anxiety and a lack of social support and resources as common barriers to physical activity (Herazo-Beltran et al., 2017).

Lastly, a study looked at the barriers to physical activity among men living in rural Southwestern Ontario communities in Canada (Gavarkovs et al., 2017). The rationale for this study was that physical activity has been shown to provide strong protection against chronic disease, and men in rural communities experience chronic disease at a higher rate than the general population (Gavarkovs et al., 2017). In order to address this issue, developing an understanding of the barriers to physical activity perceived by this population was deemed vital. In total, 149 men between the ages of 18-55 (mean age = 50.3) completed a survey that included

the question “What gets in the way of you being physically active?” followed by 10 response options in which participants were asked to indicate which ones were relevant to them. Participants were also given the option to identify perceived barriers beyond what was indicated on the survey. Results indicated that the top three perceived barriers to physical activity were: “I’m too tired” which was identified by 35.6% of participants; “I don’t have enough time” which was perceived by 30.9% of participants; and “I get enough exercise at work” which was perceived by 12.8% of participants. In addition, pain, and injury (12 times) as well as child-related responsibilities (two times) were mentioned as barriers (Gavarkovs et al., 2017). Taken together, these quantitative studies suggest that perceived barriers to physical activity differ on an individual basis, highlighting the importance of creating a tailored program for physical activity.

Perceived Facilitators to Physical Activity

In the same study by Gavarkovs and colleagues (2017) noted above, the perceived facilitators to physical activity participation were also explored among the sample of men from Southwestern Ontario. Results showed that the most commonly cited perceived facilitators were “personal motivation to be healthy” (61.1% of participants), “I enjoy it” (47.7% of participants), and “support from family and friends” (45.6% of participants). Beyond the options provided on the survey, five participants added “additional time” as a facilitator, and two participants indicated the “availability of organized sports” as another (Gavarkovs et al., 2017).

During the COVID-19 pandemic, physical activity was greatly reduced (Roche et al., 2022). In order to assess the facilitators to engaging in physical activity during this time, researchers interviewed 116 participants aged 18-24 and 70 plus from the United Kingdom (Roche et al., 2022). Interviews were conducted one-on-one via telephone using a semi-

structured interview guide designed to assess the impact of the mental health and social isolation associated with the COVID-19 pandemic and associated effects on the facilitators to engaging in physical activity. Findings demonstrated that using physical activity as a method of socializing, as a means to establish a routine, and to maintain or protect mental health were perceived as the strongest facilitators of engaging in physical activity during the COVID-19 pandemic (Roche et al., 2022). Overall, this study concluded that individuals are physically active for different and personal reasons, and thus standardized interventions designed to increase adherence may not be as beneficial as tailored and personalized interventions (Roche et al., 2022; Thornton et al., 2016).

Lastly, qualitative interviews were conducted recently in urban areas in Sri Lanka among 20–60-year-old participants in order to gauge the perceived facilitators to engaging in physical activity (Perera et al., 2022). Participants were recruited from various socioeconomic backgrounds in order to obtain a more diverse population. Face-to-face interviews lasted 25 minutes and were semi-structured in order to explore the facilitators to engaging in physical activity. A total of 35 participants were recruited, with data saturation occurring at 28 participants. Findings demonstrated that participants reported facilitators such as using physical activity to maintain health and prevent disease. Also, a common theme emerged pertaining to using physical activity to increase physical appearance and fitness. A few participants also mentioned engaging in physical activity as being inherently enjoyable and using it to “feel good” (Perera et al., 2022). In sum, the results of these studies suggest that an individual’s engagement in physical activity is facilitated by different motivators thereby reinforcing the importance of tailoring programs towards individual needs, thus increasing adherence.

Physical Activity Prescription

Physical activity prescription is an individualized behaviour change tool designed to help increase engagement and adherence while simultaneously enabling individuals to experience the many benefits that physical activity provides (Fremont et al., 2014; Sorenson et al., 2006). Physical activity prescriptions can be used by physicians and healthcare providers to recommend behavioural changes to patients who exhibit signs of lifestyle disease (Sorenson et al., 2006). Prescribing physical activity requires a more intensive intervention and extends beyond general advice given to the patient (Sorenson et al., 2006). Historically, this tool was designed for implementation through consultation with members from six health fields including family medicine, clinical exercise science, behavioural science, nutrition, rehabilitation, and sports medicine (Fremont et al., 2014). Sallis (2008) noted a limitation in the healthcare industry system whereby physical activity is undervalued as a means to reduce health chronic disease and pharmaceuticals and procedures are favoured instead. Sallis (2008) also noted that healthcare providers' knowledge of the benefits of physical activity may be the "key" to getting patients to engage in physical activity. This led to a call to action for healthcare systems to make a commitment to prioritize getting patients active, similar to how they promote medications (Sallis, 2008).

Physical activity prescription as a behaviour change model has been implemented in many European countries (Onerup et al., 2018). For example, Sweden has developed its own model entitled Physical Activity on Prescription (PAP) that has been in implementation for nearly 20 years with tremendous success (Onerup et al., 2018). Physical activity prescription has been effective at increasing exercise adherence by following three steps: 1) developing a patient-centred dialogue; 2) individually tailoring the physical activity recommendation with a written

prescription; and 3) having an extensive follow-up (Onerup et al., 2018). While physical activity prescriptions written by healthcare providers have been deemed effective for increasing adherence to physical activity, it has been noted as an under-utilized model in non-Scandinavian countries (Onerup et al., 2018).

Exercise is Medicine is a physical activity prescription program that was developed in the United States in 2009 (Sallis, 2009), and integrated into the Canadian healthcare system by the CSEP in 2012 (Exercise is Medicine, 2015). Exercise is Medicine Canada strives to help Canadians meet sedentary and physical activity guidelines by increasing the number of healthcare providers providing physical activity counselling and collaborating with exercise professionals to treat and prevent the incidence of chronic disease (Exercise is Medicine Canada, 2015). Exercise is Medicine revolves around the tenet that physical activity should be treated as a vital sign (Sallis, 2014). This means highlighting the importance of assessing physical activity levels during routine medical checkups to address the incidence of chronic disease (Sallis, 2014). Indeed, it has been suggested that viewing physical activity and exercise through a medical lens and providing healthcare-endorsed prescriptions may be integral to decreasing the rate of chronic disease prevalence (Onerup et al., 2018; Sallis, 2014).

Efficacy of Physical Activity Prescription for Behaviour Change

Physical activity prescriptions tailored to an individual's current physical activity level and motivators have been deemed effective for increasing adherence in certain contexts; however, whether these benefits can be replicated in other contexts while increasing health outcomes is an understudied area of health research (Onerup et al., 2018; Sallis, 2014). A 12-month intervention in which a physical activity prescription program designed to increase adherence was conducted in Sweden using patients recruited from 37 primary healthcare centers

across the country (*n* = 13,440; Leijon et al., 2010). Baseline physical activity was collected via a seven-day self-report recall asking how many days in the previous week they were physically active for at least 30 minutes (Leijon et al., 2010). Using these data, participants were placed into four groups: regularly active participants who reported five to seven days of 30 minutes of moderate-intensity physical activity; moderately active participants who reported three to four days of 30 minutes of moderate-intensity physical activity; somewhat active participants who reported one to two days of 30 minutes of moderate-intensity physical activity; and inactive participants who reported zero days of 30 minutes of moderate-intensity physical activity. Physical activity prescriptions were patient-centred, meaning they took into consideration the patient's current physical activity level, motivation, interests, and history of previous physical activity (Leijon et al., 2010). Results showed that at three months, 56% of participants adhered to the prescribed physical activity, with an additional 18% partly adhering. At 12 months, a slight drop-off occurred with 50% adhering to their prescription and an additional 21% partly adhering. This study demonstrated that amongst those who adhered at three months, adherence remained consistent with only a 6% drop off from three to 12 months. This suggests that the first three months may be critical in developing long-term adherence. The authors noted that there were no differences in adherence based on age or sex of the patients or referring professionals, suggesting that other factors may be of greater importance when predicting the overall effectiveness of a prescription-based physical activity intervention (Leijon et al., 2010), warranting further exploration.

Another study investigating the short-term effects of general practitioners prescribing a brief three-month physical activity regimen on sedentary adults was conducted in five hospitals across Trinidad, West Indies (Babwah et al., 2018). A total of 106 participants were recruited for

this intervention study. Participants were either allocated to: 1) an intervention group in which they underwent a brief one to two minute session with a physician assessing their current physical activity and were then provided a prescription (20 minutes, at least twice per week at a moderate intensity); or 2) a control group involving standard care, meaning no doctor prescribed physical activity recommendations (Babwah et al., 2018). Data were collected quantitatively via a survey assessing self-reported physical activity at both one month and 3 months post-prescription. Results indicated that at one-month post-prescription, 79.2% of physical activity prescription group participants were physically active compared to only 34% in the standard care group. At three months post-prescription, 74% of the prescription group was physically active compared to only 17.4% for the control group (Babwah et al., 2018). These results were statistically significant. Also of importance, 90% of the physically active patients reported that doctor's advice and prescription were important in them becoming active (Babwah et al., 2018). Overall, this study suggests that even brief physical activity prescription sessions with physicians can be effective for increasing a patient's physical activity in the short term for up to three months.

Another retroactive comparative study using telephone interviewing assessed the long-term effectiveness of the Green Prescription Exercise program: a New Zealand-based program that was implemented two to three years prior in which primary care physicians prescribed physical activity to individuals (Hamlin et al., 2016). The overall goal of the study was to compare long-term adherence to physical activity guidelines (30 minutes of exercise on five or more days per week) at two to three years post-prescription between individuals who self-reported adhering to the original prescription (adherence group) and individuals who self-reported not adhering to original prescription (non-adherence group; Hamlin et al., 2016).

Participants (*n*= 147) were recruited; 97% had received their prescription 24-36 months prior to the interview and 68% were female (Hamlin et al., 2016). Ethnicity and income were similar between groups (Hamlin et al., 2016). Participants completed the IPAQ-Short Form to assess their current physical activity levels. Results indicated that two to three years post-program, participants in the adherence group had an additional 64 minutes of physical activity per week compared to the non-adherence group, and 48.4% of participants in the adherence group reported improved self-reported health over the past two years compared to only 28.5% of the non-adherence group (Hamlin et al., 2016). Overall, this study suggests that physical activity prescriptions are effective in maintaining long-term adherence to physical activity as well as increasing overall health outcomes, both of which are of great importance to societal health. It is also important to note that many participants did not adhere to their prescriptions, suggesting that more research is warranted to better understand why that is the case from both prescriber and recipient standpoints.

Overall, these studies demonstrate the effectiveness of prescription-based physical activity on short- and long-term adherence. While these results highlight the potential value of prescription physical activity for increasing societal health and reducing chronic disease, their use is not universal suggesting that more studies are needed to assess factors related to implementation (Hamlin et al., 2016; Kuchnow & Workman, 2021; Leijon et al., 2010; Obrien et al., 2016).

Perceived Barriers to Physical Activity Prescription for Healthcare Providers

Despite the demonstrated effectiveness of physical activity prescriptions regarding adherence, physical health outcomes, and overall quality of life (Hamlin et al., 2016; Leijon et al., 2010; Rodjer et al., 2016), there still seem to be barriers to prescribing physical activity

among healthcare providers. In order to determine the effectiveness of a workshop designed to increase physical activity prescribing behaviour among healthcare providers, a pre-post study was completed using a sample of 25 physicians registered to clinics in Abbotsford or Mission British Columbia, Canada (Windt et al., 2015). The physicians were primarily male (84%) and averaged 51.3 years of age with 23.3 years spent in practice. Participants attended a three-hour education-based workshop on the importance and benefits of providing prescriptions for physical activity; the necessary tools to integrate physical activity prescriptions into their practices were also provided. The workshop included a three-step guide designed to facilitate prescription writing including: assessing the patient's current physical activity level; utilizing motivational interviewing techniques in a patient centred manner; and providing a prescription in appropriate scenarios (Wind et al. 2015). Data were collected prior to the workshop and one month post workshop completion. It was reported that of the 158 physicians who were invited to attend, 33 participated, meaning that only 21% of physicians chose to be involved despite an understanding of the potential benefits physical activity can afford (Windt et al., 2015). Overall, results demonstrated that there was a significant increase among physicians who reported engaging in prescribing physical activity from 10 (40%) at baseline to 17 (68%) at four weeks post workshop (Windt et al., 2015). Despite this significant increase, more than one quarter of physicians at four weeks post workshop did not engage in writing prescriptions. Physicians reported that the most common barriers to writing physical activity prescriptions were lack of time, education, and financial incentives. The study authors noted that there were significant limitations to this study. The first was a small sample size that fell below the power calculation of 29, making the external validity low. Another was a large self-selection bias, suggesting that physicians who were already motivated to engage with prescription writing for physical activity were more likely to

participate in this study (Windt et al., 2015). This could have skewed the results in more a positive direction. Overall, this study suggests lack of knowledge regarding how to prescribe physical activity may have initially served as a barrier to change in prescription behaviour, and overcoming this barrier was effective at increasing the number of prescriptions written by physicians to some degree. Given the sizeable proportion of invitees who did not engage in the intervention suggests that additional strategies are needed to better understand the barriers to integrating this health promotion tool into practice.

Similarly, another quantitative study investigating perceived barriers and facilitators to prescribing physical activity was completed in Nova Scotia among 108 Internal Medicine physicians (57.8% = male; 100% were $\geq$ 30 years of age); results revealed that only 60.2% of physicians reported regularly prescribing physical activity (Kuchnow & Workman, 2021). The main barriers to prescribing physical activity identified through a validated survey (Burns et al., 2008; Kuchnow & Workman 2021) included a lack of training, time, and resources. In addition, the researchers noted that despite an understanding of the importance of physical activity to prevent chronic disease, 40% of physicians chose to not regularly prescribe it (Kuchnow & Workman, 2021). In sum, this body of research suggests further that there is a knowledge-behaviour gap between understanding the value of physical activity and related health outcomes and regularly prescribing it in practice. Thus, further investigation is warranted to better understand this discrepancy.

Perceived Barriers to Physical Activity Prescription for Recipients

Despite studies exploring barriers to engaging in physical activity and related experiences among healthcare professionals who write prescriptions, to date, there appears to be a dearth of research looking directly at the perspectives of prescription recipients. This is important as the

effectiveness of prescription physical activity prescriptions is dependent on both the prescriber of prescriptions as well as the recipients (Andersen et al., 2019).

In a study investigating the role of expectations and self-efficacy on adherence to a physical activity prescription, 152 prescription recipients (64 males and 88 females; 47% over the age of 55, and 5% under the age of 34) were referred if they were diagnosed with hypertension (42%), weight problems (5%) or a stress-related disorder (15%). Participants were given a course related to physical activity prescription designed to increase their physical activity involvement. Results indicated that self-efficacy to engage in the prescribed physical activity was increased as a result of the course and less program dropout was evident among individuals with higher self-efficacy compared to those with lower self-efficacy (Jones et al., 2005). Additionally, when the prescription was more achievable, meaning participants felt as if they were physically able to complete prescribed physical activity, recipients reported that the changes they experienced were close to the expected changes set prior to the study. Conversely, recipients who had expectations that were too optimistic tended to experience less self-efficacy to engage in prescribed physical activity leading to higher dropout, and disappointment. Overall, this study suggested that prescriptions that are too ambitious and unreasonable can serve as a barrier to engagement for recipients, and that generic physical activity prescriptions can have inconsistent results on adherence based on individual participants' self-efficacy (Jones et al., 2005). Thus, having healthcare providers tailor physical activity to an individual's capability and self-efficacy is important to consider.

In a similar study focused on determining the impact of an exercise prescription intensity and frequency on adherence over two years, 379 sedentary females (less than one hour of leisure time physical activity per week) with a mean age of 49.8, a mean Body Mass Index (BMI) of

28.6 kg/m^2, 78% white, and possessing high levels of education (mean of 15.9 years ; Perri et al., 2002) were assigned to one of four groups. Each received a daily walking prescription which differed by frequency (i.e., 30 minutes per day for either 3-4 or 5-7 days per week) and intensity (i.e., either 45% - 55% or 65% - 75% of their maximum heart rate; Perri et al., 2002). Results showed that prescribed moderate-intensity physical activity was more adhered to than that of a higher intensity. In addition, prescribing a higher frequency of physical activity resulted in higher total amounts of physical activity; prescribing higher intensity physical activity also reduced total physical activity (Perri et al., 2002). Overall, this study suggested that the intensity and frequency of prescribed physical activity can act as either a barrier or facilitator to engagement; however, the reasons weren't inherently provided given this was a quantitative study. Further exploration into the reasons for this trend using a qualitative approach is warranted.

Another cross-sectional study examined the intention to increase physical activity on prescribed physical activity adherence, as well as assess recipient views on the degree to which increasing physical activity was their own responsibility or their health care provider's. The population was 6966 Swedish adults (3802 = female; 3400 had a BMI > than 25kg/m^2; 30.6% were aged 65-84). A population survey was used to assess adherence to physical activity based on Swedish guidelines for MVPA at least five days a week or 150 minutes per week. Results revealed that 25% of the study population was deemed physically active, 38% was moderately active, 27% was somewhat active, and 11% were inactive (Leijon et al., 2010). Additionally, 36% of participants indicated that they had pondered increasing their physical activity, 27% were willing to change, and 37% of participants indicated no intention to increase their physical activity. The researchers concluded that implementing complex procedures associated with

translating clinical and community-level services into routine practice can lead to what is referred to as a "translational gap," which can decrease the overall effectiveness of an intervention (e.g., prescription-based physical activity; Leijon et al., 2010). This notion lends itself to the importance of a study aimed at understanding how to prevent this gap and optimize adherence. Of particular importance, 76% of these study participants reported that they believed healthcare providers bear the responsibility for increasing patient physical activity, while 15% indicated that they wanted support from healthcare providers in changing their physical activity behaviour (Leijon et al., 2010). Uncovering reasons for such views may aid in the development of future initiatives aimed at enhancing physical activity rates. Moreover, the large heterogeneity in population samples reviewed to this point suggests that barriers and facilitators to engaging with physical activity prescriptions may be specific to certain contexts. Thus, an in-depth investigation of reasons for and degree of involvement among prescribers and recipients alike is important to better understand unique prescription-based programs.

Prescription to Get Active (RxTGA)

Prescription to Get Active is an Alberta-based not-for-profit organization that serves to promote physical activity participation through health care provider endorsed prescriptions and related discussions on the value of movement (RxTGA, 2020). As part of this process, RxTGA focuses on building an alliance with healthcare professionals to help support the relationship between physical activity prescribers and their patients (RxTGA, 2021). Essentially, RxTGA serves as a conduit between the healthcare system and fitness industry by brokering physical activity prescriptions which are written by healthcare partners registered with the organization.

The process for receiving a physical activity prescription is as follows. First, a patient receiving routine medical care is asked by their healthcare provider about their current physical

activity habits. Alternatively, a patient interested in receiving a prescription may ask the health care provider about the process. Through brief consultation, if deemed to not be meeting CSEP activity guidelines or the patient is at risk for chronic disease, the healthcare provider then provides a written physical activity prescription and advises them to then "redeem" it through registering on the RxTGA website so that they can create a personalized physical activity plan using the free and subsidized activity options listed. The RxTGA team has partnered with more than 150 organizations in Alberta (e.g., gyms, community centres, municipal groups) resulting in an array of in-person and remote options to choose from ranging from walking trails, yoga, and swimming, to trial gym memberships (RxTGA, 2020).

The RxTGA team believes that as healthcare professionals encourage patients to be more physically active by prescribing movement, related adverse healthcare outcomes can be prevented or mitigated, thus reducing societal healthcare costs and related system pressure (RxTGA, 2021).

Until recently, the utility of RxTGA as a behaviour change model has been determined anecdotally or through in-house evaluations. In an effort to enhance its' credibility from a scientific standpoint, a randomized controlled pilot trial was recently conducted in a group of RxTGA prescription recipients who fell below CSEP guidelines (Pearson et al., 2023). The purpose of this study was to compare the effectiveness of a traditional RxTGA offering versus RxTGA plus activity coaching on physical activity adherence as well as health and psychological indices over a 12-week intervention period with a 3- and 6-month follow-up (Pearson et al., 2023). Several dependent measures were collected at baseline, 6- and 12-weeks, and at the two follow-up timepoints. The activity coaching component, based on motivational interviewing strategies and other theoretically grounded behaviour change models (Irwin & Morrow, 2005;

Kimsey-House et al., 2018; Miller & Rollnick, 2013) was added in an effort to boost RxTGA prescription redemption rates to pre-pandemic levels as they fell dramatically during its tenure (J. Tareta, personal communication, November 30, 2023). Of the 269 individuals who expressed interest in joining, 77 were randomized to one of the two conditions (traditional = 39; coaching = 38), and 42 completed both the intervention and follow-up period (traditional = 18; coaching = 24). Preliminary results revealed a statistically significant increase in mental health and physical activity participation for all participants during this timeframe suggesting that the RxTGA program is useful for evoking improvements to these constructs. However, only 30% of those who expressed interest were enrolled in the program and 46% of those who did enroll were lost to follow-up. This suggests that barriers to engagement do exist and warrant additional exploration in service of identifying strategies to enhance uptake and sustain involvement in this context. Moreover, demographics for those who completed the 12-week intervention (n = 46) revealed a mean age of 54.02 years (range = 32-74) in a predominantly female (n = 34), white (95.7%), and well-educated population, thereby highlighting the importance of understanding accessibility challenges in service of diversifying involvement.

COM-B Model for Behaviour Change

Prescription to Get Active approaches behaviour change using the COM-B model which focuses on three key factors: Capability, Opportunity, and Motivation (Michie et al., 2011; The Decision Lab, 2023). The COM-B method was designed by behavioural scientists Susan Michie, Maartje van Stralen, and Robert West in 2011 and allows researchers to break down complex decisions into smaller, everyday ones that can be more efficiently studied (The Decision Lab, 2023). *Capability* refers to an individual's physical and psychological ability to engage in an activity. The ability to engage is dependent on whether an individual possesses the skills,

knowledge, as well as mental state to begin behaviour change. *Opportunity* refers to factors external to the individual that may prevent or encourage a behaviour (Michie et al., 2011; The Decision Lab, 2023). Opportunity is dependent on the individual's physical, environmental, and social environment, all of which are components that can influence a behaviour positively and negatively. Finally, *motivation* refers to both the unconscious and conscious mental processes that inspire behaviour and is dependent on the internal processes that an individual undergoes that inform related decisions (Michie et al., 2011; The Decision Lab, 2023). Given their relevance to physical activity behaviour, using these facets as a guiding framework to explore barriers and facilitators could prove useful for identifying avenues to optimize engagement in service of future behaviour change interventions.

Gaps in the Literature and Study Purpose

Physical activity has been shown to lead to a variety of positive health outcomes, both mental and physical (ParticipACTION, 2021). It is well established that engaging in the recommended 150 minutes of MVPA per week can aid in preventing and treating several chronic conditions including type-2 diabetes, osteoporosis, CVD, as well as obesity (CSEP, 2021; ParticipACTION, 2023; Sothern et al., 1999). Regular physical activity can also have a strong effect in the prevention and treatment of anxiety and depression (Harvey et al., 2018; Lipert et al., 2021; Mutrie, 2000), and has been coined a feasible mental health promotion strategy (Carless & Faulkner, 2003). While some evidence supports prescription-based physical activity as an effective strategy to increase adherence, it appears that the barriers and facilitators to involvement are unique to the individual recipient (Leijon et al., 2010) and prescribing healthcare provider (Obrien et al., 2016). To date, limited studies have sought to understand engagement-related barriers and facilitators of prescription physical activity in a Canadian

context (Kuchnow & Workman, 2021; Obrien et al., 2016) within these two groups, and no studies have assessed barriers and facilitators specific to RxTGA. Additionally, no studies have addressed barriers and facilitators to prescription physical activity engagement through the lens of the COM-B model. Thus, the overarching purpose of this case study (Kowalski et al., 2022) was to assess the barriers and facilitators to RxTGA involvement experienced among both healthcare providers and prescription recipients using quantitative and qualitative approaches (Kowalski et al., 2022). Using a COM-B lens, this was achieved in two ways: 1) Perceived barriers and facilitators to engaging in conversations with patients and writing physical activity prescriptions was assessed among RxTGA prescribers using a series of validated surveys and open questions; and 2) One-on-one semi-structured interviews were used to explore the barriers and facilitators to obtaining, redeeming, and engaging in prescription-based physical activity among RxTGA recipients. Because participation with RxTGA among those receiving prescriptions is multi-faceted, it is important to explore these three involvement phases to better understand where specific issues to engagement may arise (i.e., seeking out and receiving the prescription; taking the prescription to the RxTGA website to "redeem it;" and engaging with their created physical activity plan). It is also important to consider both current and prior physical activity experiences as part of engagement, given past physical activity can play an integral role in the participant's current willingness to engage with a new RxTGA prescription. Additionally, relationships between variables were examined to further discern prescribing behaviours among RxTGA healthcare providers. It was hoped that the data uncovered through this study would provide insights into contributors to RxTGA involvement from these two key groups, as well as actionable recommendations for improvements to organizational processes that might be made to increase uptake.

Methods

Study Design

A case study strategy of inquiry with two separate and independent study arms was selected and is commonly applied to understand a phenomenon of interest. This design allows for a multi-faceted and in-depth exploration of complex issues within a real-life setting (Crowe et al., 2011; Kowalski et al., 2022). Case studies are inherently defined by their "case," which has a pre-defined boundary to clarify the nature and time period of a study. For this research, the "case" was represented by the RxTGA organization as it existed in Spring 2024, and the phenomenon was facilitators and barriers to engagement among prescribers and recipients (Crowe et al., 2011). Case studies often involve multiple sources of evidence in order to develop a comprehensive understanding of the case (Crowe et al., 2011; Kowalski et al., 2022); to this end two study arms were implemented and both quantitative and qualitative approaches were applied.

1) In the **RxTGA prescriber** arm, the strength of barriers and facilitators associated with prescribing physical activity were assessed in the context of the health care providers' unique characteristics and involved a mixed-method approach using primarily quantitative descriptive methods, as well as a series of open questions to provide further insights into quantitative results.

2) In the **RxTGA recipient** arm, the barriers and facilitators associated with obtaining, redeeming, and using a prescription were gleaned solely using qualitive descriptive methods. Qualitative research can enable an exploration into participant views that may not be captured through post-positivist approaches (Kowalski et al., 2022). Qualitative description, one of the most commonly used methodological approaches in the practice disciplines, allowed for a comprehensive description and summary of a phenomenon in everyday language (Kim et al.,

2018; Kowalski et al., 2018; Polit & Beck., 2014). Qualitative description is also a preferred method when a description of a health-related phenomenon is the goal; it can be extremely powerful in the development and refining of interviewing guides (Kim et al., 2018; Neegaard et al., 2009; Sullivan-Bolyai et al., 2005). For example, it recognizes the collection of data as an iterative process allowing the researcher to respond to participants' shared views and continuously adapt the conversation to allow for new insights (Kim et al., 2018; Patterson & Morin, 2012). Descriptive methods allowed the data to remain truthful to the participant's account while ensuring researcher biases are transparent and eliminated (Clancy, 2013; Kim et al., 2018; Sandelowski, 200). In this instance, allowing the participant's true experiences to be explored and represented lent additional credence to the case study, enabling the researcher to represent RxTGA barriers and facilitators, thus allowing for future refinement of the program (Kim et al., 2018). Additional details pertaining to the methods for each study arm have been provided below along with the related results.

1) Methods - Healthcare Providers

Participants

For the purposes of this study, RxTGA prescribers were comprised of partnering healthcare professionals in the province of Alberta (Pearson et al., 2023) who are part of a clinical setting affiliated with a medical or nurse-practitioner led clinic (RxTGA, 2021). Those who can write prescriptions include physicians, nurses, recreational therapists, mental health practitioners, social workers, physiotherapists, clinical leads/support, exercise physiologists, kinesiologists, dietitians, and occupational therapists (RxTGA, 2021).

Any healthcare provider prescriber who was formally registered with RxTGA and interested in participating was deemed eligible, regardless of prescription writing frequency. This

enabled a comprehensive understanding of the barriers and facilitators associated with involvement (i.e., why they prescribe or not). All RxTGA prescribers were approached to participate (e.g., physicians, allied health professionals, physical activity professionals). Due to data being collected virtually, it was expected that participants would have access to a WIFI-compatible device. In addition, participants were all expected to be fluent in English.

Sampling. Purposive sampling (Kowalski et al., 2022) was used to recruit RxTGA prescription providers. This type of sampling involved *criterion-based selection* in which certain attributes of one's sample were crucial to the study (Merriam & Tisdell, 2016). Creswell and Clark (2011) noted that purposeful sampling allows researchers to identify individuals who possess a breadth of experience with a phenomenon; in this case, healthcare providers who prescribe physical activity were contacted. In consultation with the Executive Director of RxTGA, prescribers were emailed via their list-serve (Appendix A) with an invitation to participate. A presentation was also made by the student researcher in collaboration with the Executive Director to the Calgary health care provider network chapter: a main conduit of communication for RxTGA.

Sample Size. The G*Power software (Erdfelder et al., 1996) was used to determine the projected sample size per the Correlation: Bivariate normal model. Based on previous correlational research assessing barriers and facilitators (Koh et al., 2022) using an alpha level of 0.05, a medium effect size of 0.3, a suggested power of 80%, and as per similar studies assessing relationships between capability, opportunity, and motivation constructs, it was determined that 84 participants were needed for this study. This number was deemed feasible given there are currently 1900 healthcare providers registered as prescribers with RxTGA (J. Tareta, personal communication, 2023) and a two-month rolling recruitment window was used. However,

according to Fraenkel and Wallen (2009), a minimum sample size of 30 is deemed feasible for a correlational study to give accurate indications of the degree of correlation.

Procedures

Healthcare providers were recruited via a personalized email (Appendix A) sent using contact information from the RxTGA registration database. Presentations to healthcare network chapters encouraging participation and conveying the importance of the study were made. This method was effective for another physical activity prescription research study conducted in Canada (Kuchnow & Workman, 2022; Obrien et al., 2016). The personalized email included a study poster (Appendix B), and a detailed letter of information (Appendix C). The letter of information included important information regarding the study purpose, potential risks and benefits, the time commitment, as well as an informed consent statement. The email also included a link to Survey Monkey for the questionnaire. Participants were notified that by clicking the link to the survey, they have provided their consent to participate. The survey began with a brief demographic questionnaire (Appendix D), followed by a 26-item survey to assess barriers to physical activity (Appendix E), a 17-item COM-B survey modified for the present study to assess physical activity prescribing behaviour (Appendix F), and an 8-item RxTGA-specific survey (Appendix G) to glean views on the organization. Each section has been described below under Instruments. Following completion of the survey, participants were thanked for their participation.

Instruments

Demographic Questionnaire. The demographic questionnaire for healthcare providers (Appendix D) was created by the researcher in line with previous studies with similar purpose statements (Kuchnow & Workman, 2021; Obrien et al., 2017). A number of variables were

included such as age, sex, gender, ethnicity, current profession (physician, physiotherapist, etc.), years working in current practice, estimates of the percentage of patients they prescribe exercise to, and how many patients they work with per day (Kuchnow & Workman, 2022; Obrien et al., 2017). This demographic information helped RxTGA contextualize its current prescriber base.

Barriers and Facilitators to Prescribing Physical Activity Survey. To assess the perceived barriers and facilitators to prescribing physical activity among healthcare providers, a questionnaire was developed by Obrien and colleagues (2017) and was used for the present study (Appendix F). Obrien and colleagues (2017) originally adapted this survey from the National Survey on Counselling and Prescription among Canadian Primary Care Physicians that was deemed to be accurate by ± 0.64%, 19 times out of 20 (Petrella et al., 2007). This survey suggests that certain population attributes such as sex, age, and years in current practice were found to predict prescription behaviour. The survey assessed barriers and facilitators to prescribing physical activity among healthcare providers associated with Exercise is Medicine Canada and was replicated for assessing barriers and facilitators to prescribing in Physiotherapists (Obrien et al., 2020) and Chiropractors (Obrien et al., 2023). For the current study, participants were given a set of perceived barriers (items 1-17) and asked to rate whether that barrier applies to them (Obrien et al., 2017, 2020, 2023). If yes, participants were asked how much the barrier impacts their ability to prescribe physical activity ranging from 1 indicating 'does not prevent me from prescribing,' to 4 indicating 'completely prevents me from prescribing' (Obrien et al., 2017). Additionally, participants were asked whether there are any other barriers that affect their ability to prescribe not listed and were given room to list them. Participants were then given a set of perceived facilitators (items 18-30) and asked whether that facilitator helps make it easier for them to prescribe (Obrien et al., 2017; Obrien et al., 2020;

Obrien et al., 2023). If yes, participants were again asked how significantly these facilitators make it easy for them to prescribe physical activity ranging from 1 indicating 'does not at all make it easy for me to prescribe physical activity,' to 4 indicating 'makes it very easy for me to prescribe physical activity'. Similar to barriers, participants were asked whether there are any other facilitators that ease their ability to prescribe not listed and will be given room to list them (Obrien et al., 2017). Individual scores for barriers and facilitators were calculated using the mean average of strength (out of 4) as they are perceived by healthcare providers.

Capability, Opportunity, and Motivation (COM-B) Survey. To assess barriers and facilitators to effectively engage in conversation with patients about physical activity and writing prescriptions in conjunction with the COM-B model (Michie et al., 2011; The Decision Lab, 2023), participants were asked to complete a 17-item validated survey that was initially developed to assess hand hygiene behaviour and modified for health care prescribers in the current study (Lydon et al., 2019; Appendix E). This survey is comprised of three subscales: Capability (items 1-5, α=0.74) which is defined as the participant's belief in their ability to carry out physical activity prescription procedures; Opportunity (items 6-12, α=0.81) which is defined as the participant's belief that resources and environment are suitable to support prescribing physical activity; and Motivation (items 12-17, α=0.76) which is defined as the participant's belief in the utility of physical activity prescriptions (Lydon et al., 2019). Scores for individual subscales were calculated by adding all of the item scores and then dividing by the number of items in each subscale. For example, in the capability subscale, responses to the five items were added together, and then divided by five (Lydon et al., 2019). Overall, the survey possesses strong internal consistency between intercorrelated subscales (Cronbach's α=0.81; Lydon et al., 2019). The survey uses a 5-point Likert scale in which participants are required to indicate their

agreement level with each statement ranging from 1 to 5, with 1 indicating ‘strongly disagree,’ 2 indicating ‘disagree’, 3 indicating ‘neither’, 4 indicating ‘agree’, and 5 indicating ‘strongly agree’ (Lydon et al., 2019). In order to modify this instrument to fit the population of healthcare providers, the wording of the questions was changed slightly. For example, “I have received adequate training in hand hygiene practices in this unit” was changed to “I have received adequate training in physical activity prescription practices in this unit.”

RxTGA Organization Program Survey. A 10-item survey (Appendix G) was created by the Executive Director of RxTGA to assess the perceived organizational barriers and facilitators of RxTGA-affiliated healthcare providers. Participants were asked how much they agreed with the statements ranging from 1 indicating ‘strongly disagree’ to 5 indicating ‘strongly agree’. This survey helped RxTGA staff better understand the involvement of healthcare providers and will be used for future planning.

Data Analysis

All quantitative data pertaining to healthcare providers was assessed using the Microsoft Excel and IBM SPSS Software. All demographic information was expressed using descriptive statistics (e.g., means, standard deviations, frequencies) to provide greater contextualizing value for the results (Fisch, 1998).

Barriers and facilitators identified through the Obrien and colleagues (2017, 2020, 2023) survey also involved descriptive statistics (i.e., means and standard deviations). Data were analyzed based on how frequently participants indicated the barriers and facilitators as affecting their ability to prescribe. Frequencies give research a strong sense of a variable’s salience (Shreffler & Huecker, 2023) based on how often they appear in data. Additionally, means were calculated for each barrier/facilitator based on how strong (out of 4) they were perceived by the

healthcare providers. Given the purpose of the study was to understand the barriers and facilitators to prescribing physical activity, determining how often these occur along with their perceived strength was essential.

The COM-B Survey by Lydon and colleagues (2019) was used to assess barriers and facilitators to engaging in conversation with patients about physical activity prescriptions and writing physical activity prescriptions through the lens of Capability, Opportunity, and Motivation (Lydon et al., 2021). Scores for each COM- B subscale were summed and descriptive statistics (i.e., means and standard deviations) were used to examine each subscale.

To develop a further understanding of barriers and facilitators through a COM-B lens, correlations were used to assess the strength of relationships between COM- B subscales (Capability, Opportunity, and Motivation) and demographic variables (e.g., gender, current profession). Correlations allowed the researcher to understand how strongly different genders and professions perceive the barriers and facilitators healthcare professionals face in prescribing physical activity.

Data from the RxTGA organization survey were analyzed using descriptive statistics (Fisch, 1998). This helped RxTGA contextualize healthcare provider's satisfaction with the RxTGA training, material, and tools, and the program itself.

Taken together, analysis using these surveys allowed the researcher to quantify the barriers and facilitators to engaging in conversation with patients about physical activity prescription, and ability to prescribe physical activity (Kowalski et al., 2022; Obrien et al., 2017, 2020, 2023), as well as an understanding of the organizational barriers and satisfaction with RxTGA prescription practices.

Quantitative Results for Healthcare Providers

In total, 35 healthcare providers engaged with the survey during the four-month recruitment window (February – May 2024). Ninety-four percent of these individuals completed all of the questions while two completed certain parts but not the entirety of the survey. According to ®SurveyMonkey, the estimated time to completion was 23 minutes.

Demographic Information

All 35 participants provided demographic data in whole or part. Participants' ages ranged from 23 to 60 years (Mean (M) = 38.83, Standard Deviation (SD) = 9.76). All participants in the sample expressed that their gender aligned with their biological sex, with 77.1% (n = 27) being female and primarily white/Caucasian (76.5%). The majority of participants were Registered Nurses (25%), followed by Clinical Lead/Clinical Support and Recreation Therapists (11%), with most participants being in their respective practice for less than two years or between 10-12 years. Lastly, over half (54.5%) of participants reported prescribing physical activity to less than 10% of their patients. See Table 1 for a complete summary of healthcare provider demographic characteristics.

Table 1

Demographic Information of Prescription to Get Active (RxTGA) Healthcare Providers (n=35)

Variables	Mean ± Standard Deviation (SD) (Range)	% (n)
Age (years)	38.83 ± 9.76 (23-60)	
Sex		
Female		77.1% (27/35)
Male		22.9% (8/35)
Gender		
Female		77.1% (27/35)
Male		22.9% (8/35)
Ethnicity		
White/Caucasian		76.5% (26/34)
Asian		11.8% (4/34)
Jewish		2.9% (1/34)
Non-Status First Nations		2.9% (1/34)
Pakistani		2.9% (1/34)
Hispanic		2.9% (1/34)
Current Practice		
Registered Nurse		25.7% (9/35)
Recreation Therapist		11.4% (4/35)
Clinical Lead/Support		11.4% (4/35)
Dietitian		8.6% (3/35)
Kinesiologist		8.6% (3/35)
Psychologist		8.6% (3/35)
Physiotherapist		5.7% (2/35)
Physician		5.7% (2/35)
Exercise Physiologist		5.7% (2/35)
Social Work		2.9% (1/35)
Respiratory Therapist		2.9% (1/35)
Occupational Therapist		2.9% (1/35)
Time in Current Practice		
< 2 Years		17.14% (6/35)
2-4 Years		11.43% (4/35)
4-6 Years		11.43% (4/35)
6-8 Years		2.86% (1/35)
8-10 Years		5.71% (2/35)
10-12 Years		17.14% (6/35)

12-14 Years		20% (7/35)
15+ Years		14.29% (5/35)
Patients Seen Per Day (Average)	6.59 ± 3.7 (2-20)	
Patients Seen Per Week (Average)	28.7 ± 18.26 (8-85)	
Time Spent With Each Patient		
2-10 Minutes		5.9% (2/34)
11-20 Minutes		14.7% (5/34)
21-30 Minutes		14.7% (5/34)
30+ Minutes		64.7% (22/34)
Years as a RxTGA Prescriber	3.31 ± 3.09 (0-12)	
Estimated % of Patients Prescribed To		
<10%		54.5% (18/33)
10-20%		9.1% (3/33)
21-30%		9.1% (3/33)
31-40%		3.0% (1/33)
41-50%		12.1% (4/33)
Other		12.1% (4/33)

Barriers and Facilitators to Prescribing Physical Activity Survey

Part 1: Barriers

In total, 30 RxTGA healthcare providers completed the barriers portion of this survey. Results indicated that the most frequent barriers to prescribing physical activity were: *other competing variables* (weather, finances, etc.); *a lack of patient interest in physical activity; patient not interested in physical activity*; and *lack of resources necessary to prescribe physical activity.* In total, 28/30 (93.3%) healthcare providers indicated these as barriers. The least reported barrier to prescribing physical activity was a *lack of an appropriate billing structure* with only 16/30 (53.3%) indicating this. In the context of barriers, the impact mean refers to the strength of the perceived barrier: a number closer to four indicates the barrier is a more significant deterrent to prescribing physical activity. Therefore, the higher the number, the more

concerning. The barriers with the highest impact means were *a lack of continuing PA educational opportunities (*2.2 ± 1.31*)* and *competing variables* (weather, finances, etc.; 2.21± 1.20). The barrier with the lowest impact mean was *a lack of evidence for effectiveness of PA prescription* (1.16 ± 0.56). See Table 2 for a complete list of perceived barriers and impact means among RxTGA healthcare providers.

Table 2

RxTGA Healthcare Provider's Perceived Barriers to Prescribing Physical Activity (n=30)

Barrier	Frequency (%)	Mean (/4)	SD
Competing Variables (Weather, Finances, etc.).	28/30 (93.3%)	2.21	1.20
Lack of Patient Interest in PA	28/30 (93.3%)	2.18	1.19
Lack of Resources Necessary to Prescribe	28/30 (93.3%)	1.89	1.07
Lack of Continuing PA Educational Opportunities	27/30 (90%)	2.22	1.31
Patient Competing Illness	27/30 (90%)	2.07	1.11
Other Lifestyle Changes More Important to Patients	27/30 (90%)	2.04	1.02
Lack of Follow-up with Patient	27/30 (90%)	1.81	1.00
Lack of Knowledge on How to Prescribe	27/30 (90%)	1.63	0.97
Patients Prefer Standard Medical Care	26/30 (86.7%)	1.96	1.21
Lack of Education in Professional/Medical School	26/30 (86.7%)	1.5	0.88
Lack of Time	26/30 (86.7%)	1.5	0.79
Personal Knowledge	26/30 (86.7%)	1.38	0.81
Lack of Guidance	25/30 (83.3%)	1.6	0.92
Lack of Evidence for Effectiveness of PA Prescription	25/30 (83.3%)	1.16	0.56
Lack of Appropriate Billing Structure	16/30 (53.3%)	1.19	0.72

*Barriers ordered by highest frequency; instances with the same frequency, ordered by strength of impact mean

To provide greater context to these barriers, healthcare providers were asked to list any additional barriers or to describe anything else related to barriers faced when prescribing physical activity. Five common themes emerged. The first involved healthcare providers

describing limited facilities, particularly in certain areas/neighbourhoods as a barrier to prescribing physical activity (*n* = 7).

> "There are not a lot of facilities that accept RxTGA in our area, and because of this I do not find it that useful for patients."
>
> "The only facility in our town accepting RxTGA is our community center with a gym."
>
> "Limited facilities/organizations with offers or a part of the program (Lethbridge and area)."
>
> "Facilities available are not suitable for my clients."
>
> "We have no community partners to prescribe to our clients. In our location we only have online resources that we can reference to our clients."
>
> "Participating facilities in my area are scarce."
>
> "Need to focus more on informing and collaborating with community resources and facilities."
>
> "All locations have different options. Many of our client's reside in rural Alberta with minimal in-person opportunities available through RxTGA."

The second theme pertained to the patients possessing a lack of interest in or motivation toward physical activity (*n* = 4) and this served as a barrier to using their RxTGA prescription.

> "I prescribe exercise but patients may not follow through or have no interest in exercise."
>
> " I quite routinely ask and talk about exercise, but I only really use the prescription if they say they are wanting to go to a gym."
>
> "Lack of patient interest [in being active]."
>
> "Patient willingness/interest/understanding the need of physical activity/social stressors and prioritizing health and physical activity. They quite often need a very enthusiastic presentation from our office to get them motivated."

The third theme was patients' accessibility to WIFI or virtual skills (*n* = 3); this was expressed as being a barrier for their patients to use the RxTGA program.

"Patient's unreliable access to WiFi."
"The website - Makes it seem like you need a physical script from a physician. Patients get confused when trying to access the pass."
"Trying to explain the virtual platform [to their patients] is difficult."

The fourth theme was financial barriers, in which some healthcare providers noted that not having viable financial resources for patients, particularly beyond their 10 free sessions (*n* = 3) was a barrier to utilizing the RxTGA program.

"They [their patients] can't afford the fees after the free trial period is over."
"The cost of continuing with a membership after the 30-day trial or 10 sessions are used [is a barrier for patients]."
"Still cost involved."

Lastly, the fifth theme was that not having viable options for patients with social, or anxiety challenges (*n* = 2), which in turn, resulted in prescribing difficulties.

"Lack of options for yoga or other beginner activities for folks with social anxiety challenges."
"It's [physical activity] overwhelming for clients that are avoiding exercise because of body self-consciousness, anxiety, or other reasons."

Additional barriers that were mentioned on one occasion that are of interest, but were not pertinent enough to be a common theme were: the importance of RxTGA providing a more holistic health approach, as health is more than just physical activity (*n* =1); language barriers between healthcare providers and their patients (*n* =1); and RxTGA not providing viable transportation options for patients who wish to attend a gym or pool (*n* =1).

Part 2: Facilitators

In total, 30 healthcare providers completed the facilitators portion of the prescribing physical activity survey. The two most commonly reported facilitators among participants were: *having physical activity and exercise programs to refer patients to;* and *personal comfort and*

confidence in the subject area. All participants (30/30) noted these as facilitators. Having *access to administrative assistance* was the least reported facilitator with 24/30 (80%) of healthcare providers indicating this. In the context of facilitators, the impact mean refers to the strength of the perceived facilitator, with a number closer to four indicating a stronger enabler to prescribing physical activity. Therefore, the higher the number, the more the facilitator is perceived to be beneficial to individuals. The facilitator with the strongest impact mean was *patients having greater readiness to do PA* (3.31 ± 1.24); meanwhile, the facilitator with the least strong impact mean was *having access to administrative assistance* (2.45 ± 1.47). See Table 3 for the complete list of perceived facilitators and impact means among RxTGA healthcare providers.

Table 3

RxTGA Healthcare Providers' Perceived Facilitators to Prescribing Physical Activity (n = 30)

Facilitator	Frequency (%)	Mean /4	SD
Having PA and exercise programs to refer to	30/30 (100%)	3.03	1.13
Personal comfort/confidence in subject area	30/30 (100%)	2.93	1.17
Patients having greater readiness to do PA	29/30 (95.7%)	3.31	1.24
Having PA facilities in the community	29/30 (95.7%)	3.03	1.26
Readily available resource support and tools	29/30 (95.7%)	3.0	1.21
Patient expectations/interest in PA	28/30 (93.3%)	2.93	1.12
Flexibility in booking or scheduling patients	28/30 (93.3%)	2.85	1.27
Other qualified PA professionals available to refer to	28/30 (93.3%)	2.85	1.35
Available PA prescription education opportunities	27/30 (90%)	2.62	1.38
Support of practice group, management, and organization	25/30 (83.3%)	2.64	1.49
Administrative assistance	24/30 (80%)	2.45	1.47

*Facilitators ordered by highest frequency; instances with the same frequency, ordered by strength of impact mean

To provide greater context to the facilitator data, healthcare providers were also given the option to write in any additional details related to factors that might assist them regarding RxTGA physical activity prescriptions. One common sentiment emerged from the data and involved having facilities for patients with specific conditions readily available for patients (*n* = 2).

"Places where patients can redeem their script that are specific to their condition (eg. yoga for pain management, aerobics for heart conditions) - so patients feel confident that they're safe and will not exacerbate their conditions."

"Having standard resources for patients with common medical co-morbidities."

Additional facilitators that were mentioned on one occasion that are of interest were: having a welcoming environment for their patient's, making it more likely that the patient would use their prescription (n = 1); patient readiness to try physical activity (n = 1); and having strong connection with the community (n = 1).

Some additional comments were framed in the form of future suggestions for RxTGA such as implementing health coaching to increase patient follow-through (n = 1), providing transportation for those with mobility issues (n =1), being able to consult with patients about financial options (n =1), as well as implementing physical activity into a more holistic health approach (n = 1).

Capability, Opportunity, and Motivation (COM-B) Survey

In total, 29 healthcare providers completed the COM-B survey to assess their Capability, Opportunity, and Motivation to prescribe physical activity to their patients. Scores ranged from zero to five, with higher scores indicating stronger agreement. *I know how to write a RxTGA prescription* (Capability) was the item that RxTGA healthcare providers agreed with the most strongly with as indicated by a mean of 4.14 ($\pm$ 1.27), followed by *I have enough time to engage in writing RxTGA prescriptions* (Opportunity) with a mean of 3.96 ($\pm$ 1.17). The two least supported statements were associated with the Opportunity subscale and included: *healthcare providers visiting this practice/clinic always engage in writing RxTGA prescriptions when needed* (M=1.93 $\pm$ 1.05) and *physicians in this clinic always engage in writing RxTGA prescriptions when needed (M*=2.03 $\pm$ 1.18*)*. Upon review of the subscores for each COM-B category, capability had the highest score of 3.64, followed by motivation at 3.26, and opportunity at 2.86. See Table 4 below for a complete list of COM-B items pertaining to prescribing physical activity among RxTGA healthcare providers.

Table 4

Capability, Opportunity, and Motivation (COM-B) to Prescribe Physical Activity (n=29)

Item	Mean ± SD	Subscore
Capability		
1. I have received adequate training in physical activity prescription procedures from RxTGA	3.72 ± 1.33	-
2. I know the moments when a RxTGA prescription is required	3.76 ± 1.27	-
3. I know how to write a RxTGA prescription	4.14 ± 1.25	-
4. I engage in writing RxTGA prescriptions without thinking	2.86 ± 1.53	-
5. I find it easy to adhere to RxTGA prescription writing protocols in this practice/clinic	3.62 ± 1.45	-
		*3.62
Opportunity		
6. I have enough time to engage in writing RxTGA prescriptions	3.97 ± 1.15	-
7. This practice/clinic has adequate resources to support RxTGA prescription writing	3.79 ± 1.21	-
8. Physicians in this practice/clinic always engage in writing RxTGA prescriptions when needed	2.03 ± 1.18	-
9. Allied healthcare providers in this practice/clinic always engage in writing RxTGA prescriptions when needed	2.69 ± 1.37	-
10. Healthcare providers visiting this practice/clinic always engage in writing RxTGA prescriptions when needed	1.90 ± 1.05	-
11. The RxTGA prescription writing protocols for this practice/clinic are clear	3.38 ± 1.45	-
12. There are prompts to remind healthcare providers to engage in writing RxTGA prescriptions in this practice/clinic	2.17 ± 1.07	-
		*2.85

Motivation		
13. RxTGA prescription writing is considered important by staff in this practice/clinic	3.11 ± 1.45	-
14. Physical activity prescription writing considered important by staff in this practice/clinic	3.43 ± 1.50	-
15. I strive to write RxTGA prescriptions in this practice/clinic whenever I see a need	3.82 ± 1.42	-
16. We remind each other to write RxTGA prescriptions in this practice/clinic	2.53 ± 1.29	-
17. Physical activity guidelines encourage me to write RxTGA prescriptions in this practice/clinic	3.43 ± 1.40	-
		*3.26

Correlations

Correlations were used to further understand the COM-B results and provide insight into relationships with the sample characteristics in relation to prescribing behaviour. A correlation coefficient less than .30 is considered weak, .40 to .60 is moderate, and .70 and above is strong (Hinkle et al., 2003).

Categorical Variables and COM-B Scores, Demographic Data. Point-biserial correlations were used to understand how strongly the categorical variables (gender and profession) affect the perceived Capability, Opportunity and Motivation to prescribe physical activity among other variables. The data indicated no significant relationships between Sex or Profession on perceived Capability, Opportunity, or Motivation to prescribe Physical activity. See Table 5 for additional relationships.

Table 5

Point-Biserial Correlations Between Pertinent Demographics and Sex, Profession, and Ethnicity

Variable	*n*	M	SD	**Sex**	**Profession**
1. Capability	29	3.62	1.14	.162	.143
2. Opportunity	29	2.85	0.78	.097	.102
3. Motivation	29	3.26	1.04	-.133	-.121
4. Length in Current Practice	29	8.34	5.04	.010	.082
5. Patient/Day	29	2.96	3.17	-.316	.239
6. Patients/Week	29	30.22	18.28	.186	. 268
7. % Patients Prescribed to	29	16.90	16.39	.259	.009
8. Age	29	37.34	9.3	.208	-.004

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

COM-B Subscores and Demographic Data. Spearman's Rho correlations were used to understand the directional relationships between COM-B subscores and continuous demographic data. Correlational analysis indicated that moderate, significant and positive correlations were found between Capability and Motivation ($r_s[29]$=.501, p=.006), and Capability and Opportunity ($r_s[29]$=.692, p<.001), in addition to a significant, large, positive correlation between Motivation and Opportunity ($r_s[29]$=.727, p<.001). Additionally, moderately significant, positive relationships were found between patients seen per day and Capability (r_s[29]=.416, p=.025) and between the age of the prescriber and percentage of patients prescribed to (r_s[29]=.439, p=.017). No other significant relationships were found. See Table 6 below for additional relationships.

Table 6

Spearman's Rho Correlations Between Demographic Data

Variable	*n*	M	SD	1	2	3	4	5	6	7	8
1. Capability	29	3.62	1.14	-	-	-	-	-	-	-	-
2. Opportunity	29	2.85	0.78	.692**	-	-	-	-	-	-	-
3. Motivation	29	3.26	1.04	.501**	.727**	-	-	-	-	-	-
4. Length in Current Practice	29	8.34	5.04	.277	.103	.105	-	-	-	-	-
5. Patient/Day	29	2.96	3.17	.416*	.122	.241	.160	-	-	-	-
6. Patients/Week	29	30.22	18.28	-.067	-.194	-.070	.087	-.114	-	-	-
7. % Patients Prescribed to	29	16.90	16.39	.274	.096.	.128	.074	.220	-.206	-	-
8. Age of Prescriber	29	37.34	9.3	.286	.082	.266	.162	.133	.144	.439*	-

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed

RxTGA Organization Program Survey

Overall, 27 healthcare providers completed the RxTGA organization survey. Means were out of five, where one indicates "strongly disagree" and five indicates "strongly agree." Healthcare providers indicated they most strongly agreed that *the RxTGA program is a valuable tool to promote health* (M=4.2, SD=1.24) and least strongly agreed that their *clinic has informed them of the progress of RxTGA over the last 6 months* (M=2.75, SD=1.59). In addition, 26/27 (96%) indicated they would recommend RxTGA to a colleague. See Table 7 below for the full list of RxTGA organization items.

Table 7

RxTGA Organization Survey (n = 27)

Item	Mean	SD	Frequency (%)
1. I am very satisfied with my overall RxTGA experience	3.7	0.92	-
2. I have the material to administer RxTGA properly	3.65	1.31	-
3. I have received training to feel confident in RxTGA	3.5	1.54	-
4. The RxTGA program is a valuable tool to promote health.	4.2	1.24	-
5. In last 6 months, my clinic has talked to me about progress	2.75	1.59	-
6. I would recommend RxTGA to colleagues to prevent and treat chronic diseases in their patients	-	-	96%

To provide greater context regarding satisfaction with the RxTGA experience, healthcare providers were asked what the team should START doing, STOP doing, AND CONTINUE to do, in order to make it a more valuable health promotion program.

When asked what RxTGA should START doing, three common themes emerged. The first theme involved making RxTGA more well known to patients, including increased advertising (n = 6)

"Have more posters and visual prompts for clinics or partners to display."
"More marketing."
"Posters for clinic. Videos for clinic to prompt patients too."
"Be more well-known to patients and health care providers."
"More advertisement. Posters at clinic, on the clinic tv. It's not exposed enough to the community."
"Provide handouts that staff can give clients when providing RxTGA prescription."

The second theme involved creating and finding more community partners to increase the facility options for their patients to be physically active (n = 6).

"More available facilities participation."
"Be recognized by more fitness facilities so that patients have the opportunity to use them."
"AUGMENTING AVAILABILITY OF PARTICIPATING FACILITIES IN MY AREA."
"Engage more partners in smaller rural areas."
"Continue to make connections with facilities."
"Create more community partners."

Lastly, the third theme pertained to creating more options for participants to remain physically active beyond their 10 free session (n = 3).

"Create better value for patients. Increase the trial period or # of free sessions as cost can be a barrier."

"To add in instructions of what to do once pt [patient] is done with 10 free passes or 1 month free. I find, this is where most pt [patients] stop their physical activity. There is not next steps on how to keep pt [patient] going [with physical activity]."

"Allow for repeated prescriptions for clients that find the first place [facility] they go isn't the right fit for them."

When asked what RxTGA should STOP doing, very few suggestions were offered. However, individual suggestions including limiting which providers can refer (n = 1), having a complicated sign-up format on the website (n = 1), and having facilities turn away patients attempting to redeem their prescriptions (n = 1) were mentioned in this section.

Lastly, when asked what RxTGA should CONTINUE to do, two themes emerged. The first theme which was mentioned by most healthcare providers was continuing to partner with local fitness centers (n = 5).

"They need to continue to partner with local rec centers/gyms to create greater access for people in all areas of the province (smaller towns and communities)."

"Continue to partner with communities."

"Continue to expand options available in the community."

"Offering resources to facilitate activity in community."

"More community partners."

Additionally, the second theme related to the importance of continuing to add additional prescribers (n = 2).

"Continue to allow kinesiologists along with other exerciser professionals such as physical therapists to be prescriber."

"Continue bringing on more prescribers."

2) Methods - Physical Activity Prescription Recipients

Participants

Individuals were eligible if they were currently living in Alberta and received their prescription from a registered RxTGA prescriber within the previous three year to limit recall bias regarding barriers and facilitators to engagement (Pearson et al., 2023). In line with the prescriber group, recipients who were provided with but did not redeem their prescription were eligible. Due to interviews being completed virtually, it was expected that participants had access to a WIFI-compatible device with video-conferencing software or a telephone depending on comfortability and access (Pearson et al., 2023). In addition, participants were required to be fluent in English.

Sampling. Purposive sampling, when used in qualitative research, is effective for the identification and selection of individuals with high levels of information, and valuable when dealing with limited a sample size (Patton, 2002). Creswell and Clark (2011) noted that purposeful sampling allows researchers to identify individuals who possess a breadth of experience with a phenomenon, in this case, individuals who had received physical activity prescriptions. Additionally, snowball sampling, a method designed to have individuals recruit other like individuals to participate, was encouraged (Emerson, 2015).

Sample Size. Given the qualitative nature of this study and in line with other like studies in a similar context (e.g., Andersen et al., 2019; Timlin et al., 2016), it was estimated that 20 participants would be recruited. Creswell (1998) provided a suggested range of five to 25 participants in order to develop satisfactory themes for qualitative interviewing research. By interviewing 16 physical activity prescription recipients, this was satisfied (Vasileiou et al., 2018). Moreover, data saturation, which is referred to as the point where no additional themes

are discovered through data analysis (Creswell, 1998); was used to determine the number of participants needed.

Procedures

Recipients of physical activity prescriptions were recruited via multiple methods including a study poster (Appendix H) posted on the RxTGA website and social media, a banner ad on the RxTGA website and emails sent directly to registered RxTGA recipient, facilitated by the executive director Jeff Tareta. Posters included important information regarding the study purpose, inclusion and exclusion criteria, information on how to participate in the study, and a link to an eligibility questionnaire (Appendix I). Once a participant was deemed eligible, they were be asked to enter their contact information so that the researcher could reach out to verify inclusion criteria, proof or RxTGA prescription and schedule an online appointment at a mutually convenient time for the interview. During the meeting and once informed consent was obtained verbally, a brief demographic questionnaire (Appendix J) was completed verbally, followed by a 20-30-minute interview (Appendix K). This method had been deemed effective in previous health research recruitment (Cavallo et al., 2020; Gu et al., 2016).

A semi-structured interview guide, created for this population and informed by the COM-B Model, was used (Michie et al., 2011; The Decision Lab, 2023). This format allowed for pre-determined topics to be explored, yet still left room for extended discussion of concepts that emerge and are not included originally (Kowalski et al., 2018). When using interviews as a data collection method, it is important to understand the relational nature of the interviews and ensure that the researchers and participants work in harmony to generate data that addresses the research topic (Kowalski et al., 2018). The semi-structured interview guide followed the three main phases of qualitative interviewing: (1) an introductory period to build rapport between

interviewer and interviewee and relay ethical procedures such as informed consent and voluntary participation; (2) a questioning phase shaped by a semi-structured interview guide with questions progressing from easy to more challenging; and (3) a closing phase to discuss final thoughts and next steps (Kowalski et al., 2018). Interviews were conducted via telephone, or zoom, due to the physical distance between the researcher and the interviewees. Having virtual interviews provided several benefits to both the participant and the interviewer. For example, the remote platform allows individuals to participate in the comfort of their own personal space which can provide rich therapeutic value (Oliffe et al., 2021). Moreover, provided individuals have WIFI, costs can be reduced (e.g., associated with travel, parking, etc.) which helps to extend recruitment, accessibility, and inclusivity (Oliffe et al., 2021).

Instruments

Eligibility Questionnaire. Prior to the study, interested participants were required to complete an eligibility questionnaire (Appendix I) in line with the inclusion criteria set by the researcher. These criteria included whether they reside in Alberta, whether their prescription was provided in Alberta, whether they received their prescription within the previous year, and whether they had access to a video-conferencing software platform or telephone. At the end of the questionnaire, recipients were asked whether they were interested in a 20–30-minute interview and asked to volunteer an email address to set up a meeting.

Demographic Questionnaire. A demographic questionnaire (Appendix J) for recipients was created by the researcher and is in line with the goals of the RxTGA team (J. Tareta, personal communication, 2023). The purpose of this questionnaire was to collect demographic information pertaining to the current RxTGA recipient base and will provide context to the perceived barriers and facilitators to prescription redemption and engagement involvement.

Variables collected will include age, sex, gender, ethnicity, highest level of education, and current job/profession. In addition, the questionnaire asked about specific RxTGA prescription information such as where the prescription was written, by whom, whether it was registered, and when. These questions were in line with similar health-related research (Pelletier et al, 2021) and research regarding barriers to prescribed physical activity (Perri et al., 2002).

Interview Guide. A qualitative, semi-structured interview guide (Appendix K) grounded in the COM-B framework (Andersen et al., 2019; Michie et al., 2011; The Decision Lab, 2011; Timlin et al., 2021) was created by the researcher to assess barriers and facilitators to related to four main topics: 1) engaging in a conversation about prescription-based physical activity; 2) redemption of the physical activity prescription; 3) engagement with the prescription; and 4) the RxTGA program overall. To facilitate discussion on the four main topics, participants were given a model as a point of reference throughout interview process (See Appendix L) adapted by the researcher either through Zoom Screen share feature or email if by phone. This method has been effective in similar research assessing barriers and facilitators to prescribed physical activity qualitatively (Andersen et al., 2019). The semi-structured interview guide and questions were adapted from a study assessing patient's experiences of modifying a MIND diet through a COM-B lens (Timlin et al., 2021). Specific probes have been added to foster deeper exploration into participant responses (See Appendix K).

Data Analysis

After completion of the interviews, the researcher underwent the six steps of qualitative thematic data analysis layed out by Elo and Kyngas (2008). These included: (1) organizing the oral data and transcribing it into written text; (2) reading and reviewing the transcripts multiple times; (3) coding and systematically organizing the data into meaningful segments that could be

later analyzed for emerging themes; (4) generating themes and representing the data to create a meaningful "story"; (5) deciding how the findings would be represented; and finally (6) interpreting the findings (Kowalski et al., 2018). In this case, the overarching themes represented the barriers and facilitators to engaging in a conversation about prescription physical activity, redemption of physical activity prescriptions, and engagement with their prescription in line with the COM-B framework. Deductive thematic analysis is beneficial when there is a breadth of knowledge about the phenomenon being examined, and themes are predetermined (Elo & Kyngas, 2008), as is the case in this study where the predetermined themes were the tenants of COM-B and barriers and facilitators. This method was in line with similar research qualitatively assessing experiences with prescribed physical activity using the COM-B model (Andersen et al., 2019). Inductive analysis is also used in circumstances when there are no preconceived themes and themes must be developed (Easton et al., 2018). There are three phases of inductive analysis, the preparation phase which includes choosing the unit of analysis (transcripts), the organizational phase which includes coding and labelling the transcript, and the reporting phase which includes grouping the codes into meaningful themes until saturation has been met (Elo & Kyngas, 2008). This type of analysis is beneficial in circumstances when information is revealed, and the researcher is required to label information thematically. This method of inductive analysis was used to map participant's experiences and words onto the COM-B framework with attention paid to the barriers and facilitators to each construct (Andersen et al., 2019). Thus, barriers and facilitators to engaging in a conversation about prescription physical activity, redemption of physical activity prescriptions, and engagement with their prescription were gleaned using both inductive and deductive approaches.

Trustworthiness. Trustworthiness in qualitative research pertains to the overall quality of research and helps maintain the quality of data (Rose & Johnson, 2020). Inherent concepts include: truth value, which refers to the study's credibility, ensuring that the findings are true to participants' experiences; applicability or transferability, which refers to whether the findings can be applied to other contexts; consistency, which refers to the degree to which findings could be replicated to other study contexts; and neutrality, which is the degree to which study findings are true to participants intended meanings and experiences (Kowalski et al., 2022).

To ensure trustworthiness of the qualitative data, the researcher implemented several strategies. These included: (1) using an audit trail by which the researcher will include transparent descriptions of the research process; (2) member checking by consistently checking in with participants throughout the interview process to ensure participants thoughts are correctly understood and represented; (3) peer debrief by having Justin Tremblett and his supervisor (Dr. E. Pearson) both review and confirm themes; (4) providing rich, thick descriptions of the themes/findings to highlight the participants' unique and complex experiences of RxTGA; and (5) using purposive sampling to identify recipients of RxTGA prescription recipients that can share personal experiences of RxTGA in great detail, thus allowing the phenomena of barriers and facilitators to engagement with RxTGA to be explored (Kowalski et al., 2022)

Qualitative Findings for Recipients of RxTGA Prescriptions

In total, 16 recipients of prescriptions engaged in a qualitative semi-structured interview during the three-month recruitment window (March – May 2024). Interviews lasted between 30-45 minutes in length and were completed via ®ZOOM or telephone.

Demographic Information. All 16 participants provided demographic data in whole or part. Participants' ages ranged from 20 to 74 years (M = 41.81, SD = 16.91). All participants in the sample expressed that their gender aligned with their biological sex, with 56.25% (*n* = 9) being female and most identifying as white or Caucasian (37.5%). The majority of participants have obtained either a Post-degree (43.75%) or an Undergraduate degree (31.25%). Most participants received their prescription from their family doctor (50%) and were able to successfully register their prescription within one month (43.75%). See Table 8 for a complete summary of healthcare provider demographic characteristics.

Table 8

Demographic Information of RxTGA Prescription Recipients (N=16).

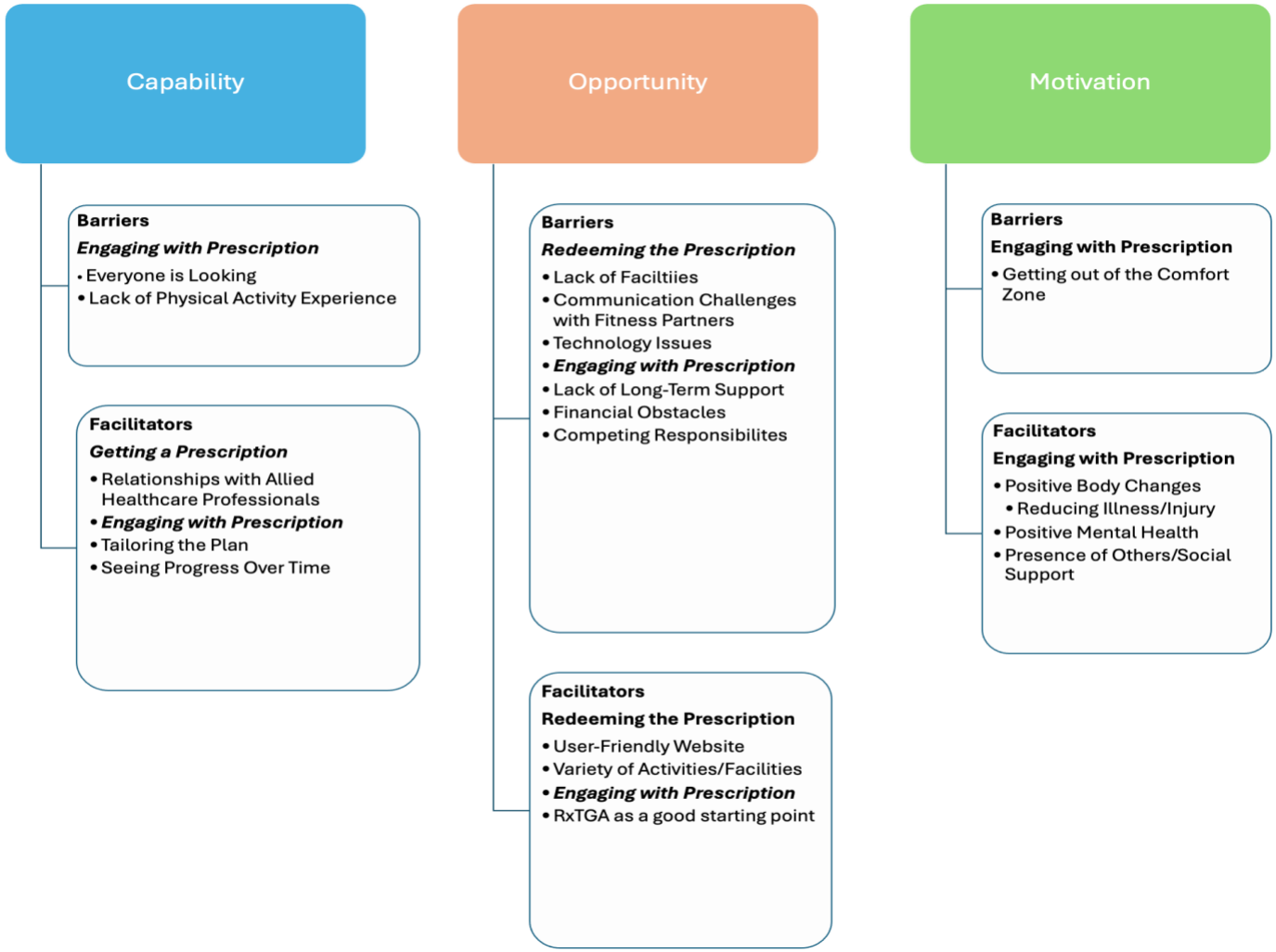
Variables	Mean ± SD (Range)	% (n)
Age	41.81 ± 16.91 (20-74)	-
Sex	-	
Female		56.25% (9/16)
Male		43.75% (7/16)
Gender	-	
Female		56.25% (9/16)
Male		43.75% (7/16)
Education	-	
Post-Degree		43.75% (7/16)
Undergraduate Degree		31.25% (5/16)
High-School		12.5% (2/16)
Other		12.5% (2/16)
Ethnicity	-	
White/Caucasian		37.5% (6/16)
Black		31.25% (5/16)
South Asian		12.5% (2/16)
Indian		6.25% (1/16)
Hispanic		6.25% (1/16)
European		6.25% (1/16)
Who Wrote Prescription	-	
Family Doctor		50% (8/16)
Physician/Doctor		43.75% (7/16)
Rehab Specialist		6.25% (1/16)
Register Prescription	-	
Yes		87.5% (15/16)
No		12.5% (1/16)
How Long To Register	-	
Within 1 Month		43.75% (7/16)
Within 1 Week		31.25% (5/16)
N/A/Not Sure		12.5% (2/16)
Within 6 Months		6.25% (1/16)
More than 6 Months		6.25% (1/16)

Qualitative Themes

Deductive qualitative themes were organized categorically into barriers and facilitators regarding one's Perceived Capability, Opportunity, and Motivation to engage in RxTGA ranging from 1) Getting a Prescription from their healthcare provider, 2) Redeeming their prescription on the RxTGA website and using it at an associated fitness partner, and 3) Engaging with the physical activity in line with their prescription. See Figure 1 below for a flow chart depicting the qualitative themes.

Figure 1

Qualitative Theme Chart



Capability

In the context of thematic analysis, Capability was defined as an individual's psychological and physical capacity to engage in the behaviour concerned (RxTGA), including encompassing the necessary knowledge, ability, and skills required to engage in the behaviour (Michie et al., 2011).

Barriers

Engaging with Prescription/Being Physically Active. Two themes emerged pertaining to Capability barriers associated with engaging with RxTGA: everyone is looking; and lack of physical activity experience. Both barriers revolved around perceived capacity and ability to use the prescription and be active. Table 9 provides illustrative quotes.

Everyone is Looking. Some participants noted how feeling like everyone is looking at them can be a barrier to being physically active in a public setting and using their prescription. Feelings of discomfort, feeling "exposed," and intimidation were shared by a few participants

Lack of Physical Activity Experience. Some participants also noted that having a lack of prior experience being physically active or belonging to a gym acted as a barrier to engaging with their prescription. Overall, many participants in this population mentioned having limited experience in being physically active prior to receiving a RxTGA. The inability to understand how to use equipment properly and not having a background in physical activity was highlighted among many participants, resulting in a barrier to being able to initially engage with their prescription.

Table 9

Barriers to Capability to Engage in RxTGA

Engaging with Prescription/Being Physically Active
Everyone is Looking "I'm open and everybody is **looking at me**. Like, you're standing in a gym or you're standing in aerobics class and I think that's why that [water activity] has worked out so well is that I feel like the water protects me…I'm not exposed to everybody." (Participant 10) "Overall I think sometimes it's **a bit intimidating** when you're working out with other people…" (Participant 8) "It was just it took me a few months to actually use it [the prescription] you know, just **the fear of going to a gym**. I guess you know, at first actually step foot in there and to feel comfortable enough I guess." (Participant 16)
Lack of Physical Activity Experience "I as an adult had never participated in anything outside of my kids' activities, so to think as an adult that these are options open to me? I had **no idea**…" (Participant 10) "I think for myself, just having healthcare background is one thing and then just growing up in a **family that wasn't really focused towards physical activity** [made it difficult to engage in physical activity]." (Participant 7) "Personally, getting started working out was really hard because I **didn't really know what equipment to use** and like, how to properly, like, with form when it came to lifting." (Participant 8)

Facilitators

Getting a Prescription. There was one facilitator pertaining to one's capability to obtaining a RxTGA involving relationships. Depictive quotes for Capability facilitators can be found in Table 10.

***Relationships with Allied Healthcare Professionals*.** Many participants noted that they received their prescription or became aware of the program via an allied healthcare professional.

Thus, highlighting the importance of buy-in from a multitude of healthcare professionals to be able to implement and promote the program effectively. Participants in this case specifically mentioned the importance of Kinesiologists, Nurses, Dietitians, Nutritionists, and Rehabilitation Specialists as being important to the RxTGA program.

Engaging with Prescription/Being Physically Active. Two facilitators pertaining to increasing perceived capability to engage with the physical activity in line with their prescription were gleaned and involved personalization and observed progress over time.

Tailoring the Plan. Several participants shared that personalizing the physical activity plan helped increase their perceived capability to engage with their prescription. Some participants noted that the more tailored and specific the plan was to them, and their current perceived capability, the more likely they were to feel confident in completing the physical activity in their prescription.

Seeing Progress over Time. Noticing improvement over time in regards to body image was noted by a handful of participants. In addition, several shared how the associated sense of accomplishment experienced upon completing a task can facilitate improvements to heir perceived capability. This in turn, helped to promote engagement in physical activity. A few participants expressed often that feeling as if they "did it," boosted their confidence.

Table 10

Facilitators to Capability to Engage in RxTGA

Getting a Prescription
Relationships with Allied Healthcare Professionals
"…Primary care providers, I think they don't have as much like knowledge on like I think diets and like physical activity that might work for different people, um, just depending on … whether they have like diabetes or like different types of illnesses**… getting referred to like a dietitian or nutritionist** [can be helpful for being prescribed a RxTGA]." (Participant 7)
"No, I actually had no idea and it might have been like they did put me in touch with a… **a dietitian or nutritionist**….it was a phone call but it may have been them that mentioned it…" (Participant 16)
"She [Family MD] had **also prescribed me to a kinesiologist** and it was actually my discussion with the kinesiologist [where] she explained what the prescription to get active was … she… really …explained it to me as to what it was; what it was meant for." (Participant 10)
"It wasn't until I started working with the **rehabilitation advisor** at Glen Rose that the opportunity [to receive a RxTGA] became apparent to me.." (Participant 14)
Engaging with Prescription/Being Physically Active
Tailoring the Plan
"If are you like a senior who starts **from zero or are you a middle-aged person** that has been active and just wants to get back in, 'cause that's a huge difference [between the capability of these two groups]." (Participant 12)
"I do think though that trying to **personalize things a little bit** [is helpful for engagement with the prescription**]** (Participant 9)
" I think that maybe it might be able to **sort of target things** [the participant's goals/needs] a little bit better [." (Participant 9)
"I think it [using RxTGA] takes a long time … whether they lead a healthy active lifestyle really depends on the type of information that they are provided and … **whether it (RxTGA) is tailored to them specifically**." (Participant 8)

Seeing Progress over Time

"I had some kind of base physical activity prior already so I think to be honest it's [the RxTGA program] is good maintenance, and just learning new ways to adapt to physical activity and just the **variety of things I've learned over this time**." (Participant 8)

"Um, it's kind of the feeling of accomplishment like **'I did it**.'… When you feel that [accomplishment], all your body gets stronger you **feel more capable of doing the exercises** that you want to do you can maybe even do more long-distance things…" (Participant 11)

"It feels good after you go to the gym, and you **actually 'did it'** when you're not wanting to, and days when you're not really wanting to and when you finally do it you're like **'That wasn't so bad. I did it!'**"(Participant 16)

Opportunity

In this instance, Opportunity was defined as all the factors OUTSIDE of the individuals, that make the behaviour (RxTGA engagement) possible or more likely" (Michie et al., 2011).

Barriers

Redeeming the Prescription. There were three themes that emerged as barriers to opportunity specific to being able to redeem their RxTGA. These involved communication, lack of facilities, and technology issues.

Communication Challenges with Fitness Partners. Several participants highlighted that communication challenges between RxTGA and certain fitness partners impacted their ability to redeem their prescription. For example, many participants noted that when they went to redeem the prescription at a facility, some were not able to accommodate them or were not aware of the RxTGA program.

Lack of Facilities. Some participants shared that few or no facilities impeded them from being able to redeem their prescription. A few participants noted the inequity of resources in

certain areas of the city compared to others, in addition of a lack of certain specific types of facilities such as swimming pools, recreation centers, and female-only gyms.

Technological Issues. A handful participants described technological or website issues as a barrier to registering the RxTGA. Frustration with a lack-of user friendliness, as well as issues with Wi-Fi compatibility were discussed.

Engaging with Prescription/Being Physically Active. There were two barriers that emerged pertaining to the opportunity to engage in physical activity per their RxTGA. These related to finances and competing responsibilities.

Financial Obstacles. Many participants noted the financial burden that obtaining a gym membership can have. This was especially evident once the initial RxTGA trial period ended, and participants were required to pay for their own memberships long-term.

Competing Responsibilities. Competing responsibilities associated with life that often take priority over being active were mentioned often by a few participants. Priorities including work scheduling and family commitments were noted frequently.

Table 11

Barriers to Opportunity to Engage in RxTGA

Redeeming the Prescription
Communication Challenges with Fitness Partners
"I think when redeeming it [the prescription] at the gym specifically … **they did struggle a bit I guess redeeming it** in the way that they were supposed to, I guess, just based on how they were supposed to like input the information or like relay the charge." (Participant 8)
"I did have to call the gym a few times, and like**,** they were really confused and they would like transfer me to other people and then I think I had to call like the corporate gym phone number… when I did go end up going to the gym**, it took them a day or two to even like figure out how to do it.** So I think that process just maybe needs a bit more work." (Participant 8)
"I was trying to see if the YMCA had the [RxTGA] and if I was able to use it there … it was actually like, I didn't even know who I could ask. I just know **YMCA said 'no we've never heard of it [RxTGA].'"** (Participant 10)
"…the **YMCA did not offer the prescription to get active**.. so I felt like (huhh chuckle), 'Well this is useless, right?' (laugh). So that was a little frustrating..." (Participant 7)
"Could I go to every location and do a one-month free trial or is this per institution? And same with, with the city of Calgary. Can I go to every let's say pool and do the 10 drop-ins there? Or is this just for one-use for the whatever the city provides. **That wasn't so clear….**" (Participant 11)
Lack of Facilities
"There's like fitness centres at the university that I go to, or just like pathways around my house that I can go on a walk [but it] … isn't as good as it should be. Like, we **don't really have like a recreation centre near us** compared to like other communities." (Participant 8)
"I think something that I personally valued was a women's only gym so there **wasn't really a lot of women's only gyms around my house** which kind of made it hard for me to, I guess, want to workout..." (Participant 8)
"I don't really have um a swimming pool and where I can get **the swimming pool is … kind of far from my side [of town]**." (Participant 2)
"Once I felt like, 'I can do this.' And 'This will work.' And I go and I see that … **the facility's down for renovation.** So it's just like 'Come on!' right?" (Participant7)

Technological Issues
"It depends on the kind of the facility that you're looking for. Sometimes **they [the fitness facility] might not have a web friendly** kind of user friendly (chuckle) web page…" (Participant 7)
"[It] was **very, very hard for me to connect to [RxTGA website]** through the site sometimes. I was just feeling like it is maybe my Internet connection was bad or stuff like that, but I just feel like the site is kind of slow to load." (Participant 2)
"I was also looking at the online resources but the **fitness plus doesn't seem to work for Android phones.** And then the Go Get Fit, I signed up today to get the code to see if that works but like**,** I was hoping for more online courses." **(Participant** 12)
"**The website is not, not very user friendly**, um, I had a closer look at it again today …for like mobile friendliness and it doesn't even pass the mobile friendly test …It's just not so easy to navigate." (Participant 11)
Engaging with Prescription/Being Physically Active
Financial Obstacles
"I remember with my prescription I got a one-month free trial at a gym in my area which is what I mainly used … [it was] after [the free trial ended] that I didn't really end up getting... like a regular like membership um, at that gym just because of **I guess the price and it was kind of inconvenient**." (Participant 8)
"Yeah one thing that I'll say … f**inances is almost a top barrier… to getting my physical prescription."** (Participant 2)
"Yeah like personally I think what really was the main barrier was… all the gyms that I've always been interested in there's just this huge up cost where either signing up for a **ridiculously [expensive] membership where it can cost you so much** and you don't know what they have to offer and what you're able to get out of it." (Participant 7)
"I think if I would have access to a gym for a **much lower price than what it is normally**, um, I would use it [the gym] more." (Participant 8)
"Cause if I have to pay $15 every time I go because, **this also feels very expensive** so I'd rather stay home. **But if I had much more affordable access to it, um, yes I would, I would use it more, that's for sure**." (Participant 10)
Competing Responsibilities
"I have my kids that I take care of. I also have my parents. I have my work. I have my own health to take care of. So, **I try to manage my time."** (Participant 2)

"I have **two grandchildren and my daughte**r lives in town and I help her out a lot. What would make it harder to again continue to use it [the RxTGA]." (Participant 15)

"I have twins, they're six **…** they are active so I, I need to be active. I need to keep up with them and I just to do stuff with them outside. But then on the other hand, **I can't just, um, like take off go for a bike ride …** I always have to make sure that that **my children are taken care of** …" (Participant 11)

"I just think the **greatest barrier [to being active] is time commitment**…scheduling things in …" (Participant 7)

"And **then the time commitment [makes it hard to be physically active].** So for myself, I do a lot of like **shift work..** so just like, how do you schedule things in when you're dealing with like day shift, evening shifts? And just coming off of those type of days are very challenging to schedule a proper workout." (Participant 7)

Facilitators

Redeeming the Prescription. Two themes emerged pertaining to facilitators and opportunity, specific to redeeming the RxTGA. These involved the website and variety.

User-Friendly Website. Conversely to the barrier outlined above, many participants noted the ease of using the RxTGA website and how this increased their opportunity to effectivity redeem the prescriptions. Most participants also shared that they were able to access the RxTGA website and register their prescription with relative ease and some highlighted the simple design of the website which similarly facilitated opportunity.

Variety of Activities/Facilities. Having a variety of available activities and facilities for participants to redeem their prescription was described by many participants. An appreciation for the abundance of viable facilities including recreation centers/gyms as well as more localized resources such as walking trails was expressed by many.

Engaging with Prescription/Being Physically Active. There was one facilitator that emerged regarding motivation toward engaging with the physical activity in line with their

prescription. This was specific to the role that RxTGA plays as a catalyst to regular physical activity.

RxTGA as a Good Starting Point. RxTGA was noted by a handful of participants as a good entry point to becoming physically active, particularly for those who were not physically active prior to receipt. Some participants shared that RxTGA was a great way to get introduced to physical activity, as well as the gym/fitness environment. Contrary to other findings, some participants highlighted that RxTGA was a strong way to help counter the financial burden often associated with fitness. For example, the free trials allow the participants to experience certain facilities via 10-free sessions and then decide what to commit to at a later date.

Table 12

Facilitators to Opportunity to Engage in RxTGA

Redeeming the Prescription
User-Friendly Website "Yeah I really found **that navigating... it [the website]... was very easy**...**."** (Participant 2) **"I think it's [the website] pretty easy to navigate** and find where I guess gyms in my area were able to.. I was able to redeem it at." (Participant 8) "I just like, the like t**he navigation tools are pretty easy**." (Participant 8) "Registering [the RxTGA] … **was not hard to navigate**." (Participant 10) "Well there is the first button on the main page it says 'register first prescription' … you click there and then it's, it's pretty easy to get that … **Registering the prescription is very straightforward."** (Participant 11)
Variety of Activities/Facilities "I think, you know, because there's l**ike fitness centres at the university** that I go to or just like pathways around my house that I can go on a walk." (Participant 8) "Whenever I'm very much less busy at home and at work, and I can go for a swimming. Or yeah, like yoga and running. **I can do that anywhere**." (Participant 2) "[The] ease of use of the program is like having a **variety of different options for facilities was really nice.** … having the program reach out to all these affiliate facilities and then having them on board with this prescription to get active was the greatest thing, I think, for this program." (Participant 7) " I really enjoyed the fact that they [RxTGA] **offered so much variety all over the, the city,** different quadrants, so that was the greatest part." (Participant 9) "I think their [physical activity options are] quite good here in Edmonton. They have **extensive walking paths through the communities,** and especially through the North Saskatchewan River Valley, which flows throughout city. There are numerous trails and parks which are quite scenic and nice to go for walks on." (Participant 14)

Engaging with Prescription/Being Physically Active
RxTGA as a Good Starting Point "Y**ou can try things out, um, see how it fits in your life** and then later commit towards something**.** So it gives you that upfront initial kind of sample and I thought it was great. It was definitely a good opportunity to give various facilities that I was nearby a try and then see how things would work out." (Participant 7) "[RxTGA] **is a good start, to just try out different facilities**." (Participant 11) "It did definitely get me into the gym and get me started going there … you know?" (Participant 16) "Having the **opportunity to try things out,** be the variety of things and then see what actually works for me was really a good opportunity." (Participant 7) "I do think that after that [what? Getting the prescription?] I was able to I guess like be more physically active and like other ways so I do think it [RxTGA] was like **a good like push in the right direction for me.**" (Participant 8)

Motivation

Motivation was defined as the brain processes energizing and directing an individual towards a desired behaviour (RxTGA engagement), including, the conscious, deliberate decision making, as well as the emotional responding (Michie et al., 2011).

Barriers

Engaging with Prescription/Being Physically Active. There was one emerging theme motivation barrier that related to engaging with the physical activity in line with one's prescription.

Getting out of the Comfort Zone. Many participants often noted having trouble getting out of their initial comfort zone to become more active was a barrier. For example, a few expressed that feeling comfortable in their home environment makes it hard to motivate themselves to be active. Some emphasized that personal choice and autonomy are important in "breaking the cycle" and becoming active.

Table 13

Barriers to Motivation to Engage in RxTGA

Engaging with Prescription/Being Physically Active
Getting out of the Comfort Zone
"For me personally the biggest one is like, it's hard for me … we're good at home, just because it's a distracting environment, and … i**t's hard to get you out of that comfort zone at home."** (Participant 8)
"…'The pools are closed, can't go' **so that gives you an excuse to sit on the couch and eat chips, right**?" (Participant 10)
"**I think it's a personal choice at the end of the day,** where someone needs to be motivated enough [to become physically active]." **(Participant 7)**
"Well, you need to motivate yourself. I**t's always more comfortable and easy to just fall on the couch instead of working out."** (Participant 11)
"[Sometimes I think] I'll just go on and do my thing and then if I have time, I'll spare like half an hour at midnight to exercise... **Like, I don't do that**…" (Participant 7)

Facilitators

Engaging with Prescription/Being Physically Active. There were three themes pertaining to motivation and facilitators to engaging with physical activity in line with one's prescription. These involved positive body changes (illness and injury), mental health, and social support.

Positive Body Changes. According to most participants, observing positive body changes can be a strong motivator to continue to be physically active. Participants emphasized how noticing physical body changes either themselves, or having loved ones notice, was a strong motivator to continue.

Reducing Illness/Injury. A subtheme to positive body changes involved illness and injury. A few participants shared that a reduction in an illness or injury-related symptoms, especially when that illness or injury was the main reason for receiving the RxTGA in the first place, was a strong motivator to continue engaging.

Positive Mental Health. Similar to positive body changes, improvements in mental health were noted as a motivator to continue with the physical activity in line with one's prescription. Notions of feeling happier, more focused, reducing anxiety, and sleep were mentioned by several/all/some participants

Presence of Other/Social Support. Having support from family/friends was highlighted by most participants as a motivator to continue being active. Many participants noted that both support and guidance on physical activity from family and friends was facilitative for both beginning and maintaining physical activity.

Table 14

Facilitators to Motivation to Engage in RxTGA

Engaging with Prescription/Being Physically Active
Positive Body Changes "You know like when I do [engage in physical activity], I notice **so positive changes in my body**, you know? …it's been good actually." (Participant 1) "When you get positive feedback that, you know, that you're **looking healthier that you've lost weight** …or you know, you're walking better or things like that…, I guess could be a **positive reinforcement**." (Participant 15) "I say the process is ongoing through **where I was before [weight] and where I am now [weight loss]** you know? This is like a kind of motivation and stuff like that that makes me you know want to do more and more. Like, want to engage more in physical activities and stuff like that." (Participant 2) "…especially my work and friends. They see the difference in the especially the weight loss and just how I am like I'm just.. so much like friendlier**. I guess more open, More confident. More willing**." (Participant 10) "Well I've lost 125 lbs….. so I'm like, a whole new person. And **I feel like... everything is easier. It's [weight loss] made life easier.** I was able to hike Machu Picchu in February. I can keep up with my kid… I fit now in the world and …I feel I can do anything." (Participant 10) "Sleeping much better, **I feel my body is just much bette**r." (Participant 10)
Sub-Theme: Reducing Illness/Injury "I've noticed, uh, a **return strength to my legs**. Prior to the surgery, I was going through a bit of a battle because I had **blockage of several arteries** where I was [dealing with] some acute discomfort. And so, I am very happy that now I can do better workouts and longer walks without suffering those consequences." (Participant 14) "**My blood pressure has dropped** so that was one of my main things**,** so that's good."(Participant 16)
Positive Mental Health "Saying that they [family/friends] **actually love the way I am now,** and they actually like, see me you know? Being happy and everything**…**it's actually more motivation for me to be … using my [prescription]." (Participant 2)

"[I am] definitely [a] **happier person …** with more energy, **mental clarity** as well I guess." (Participant 16)

"I think it was **just easier to focus on studying** when you're like able to have that [movement] break …, I think it does help to focus and I do, I did notice that when I was exercising more regularly, I was **much more happier** compared to before." (Participant 8)

"We just even went on a hot air balloon ride, and **I have no anxiety about getting in** and out of the basket… Before, like, I couldn't. …I would have probably not even done it … and this now, I'm like 'Woah! Let's go right?" (Participant 10)

"It [physical activity] **does improve the mood and reduce the stress level** and, um, sleep, I've had positive benefits for the sleep for sure." (Participant 11)

"I just feel like I'm on such a better routine. I can handle things better. **I'm not overwhelmed with stress** or overwhelmed with life. I feel that rubs off on my kids…" (Participant 10)

"Since I have been engaging in the program, like um I had some **positive change in my energy level** and so yeah, why not. I would sure recommend them." (Participant 2)

Presence of Other/Social Support

"**Being around them [**friends**]** most times. They kind of like remind me to like go [go and what?] and um, sometimes they just stick with me actually. So like, **it's a big motivation**." (Participant 1)

"**I think they [my friends] definitely motivate** you when you surround yourself with people who are um, working towards like a healthier lifestyle." (Participant 8)

"So, I did go the first couple times with my friend that goes…She doesn't go to the same gym but she came to the one that I want to go to for a couple nights. **Just kind of show me the ropes and stuff and make me comfortable**." (Participant 16)

"I feel that [being physically active] rubs off on my kids …**both of my kids differently at different times asked me about coming to the gym** or if some, some kind of workout that they can do as well…" (Participant 10)

"I do [find motivation from others], so that's.. that's why I like taking the classes, so I.. I take the deepwater classes becaus**e I like seeing the same people and I like chatting with them.** I like all the that." (Participant 10)

Discussion

The purpose of this case study was to assess the barriers and facilitators to RxTGA involvement as experienced by the health care providers and recipients associated with this community-based program. To this end, a combination of quantitative and qualitative approaches were used and focussed on prescription writing, redemption, and engagement in accordance with the COM-B model. To date, this is the first study to assess physical activity prescription behaviour among RxTGA healthcare providers, and one of the first studies to assess prescribing behaviour through the lens of one's Capability, Opportunity, and Motivation. Overall, results obtained through a series of questionnaires completed by the healthcare providers indicated that Competing Variables, a Lack of Patient Interest in Physical Activity, and a Lack of Resources were the most commonly reported barriers. Additionally, from the perspective of COM-B model, perceived Capability, Opportunity, and Motivation to prescribe physical activity were significantly correlated with each other, suggesting that these constructs are inextricably linked, and all three are important to consider in the context of prescription-based programming. For prescription recipients, findings gleaned through the semi-structured interviews revealed that a lack of physical activity experience and fear that everyone is looking are detractors to capability, while seeing progress over time was identified as a facilitator to boost it. Accessibility to facilities and communication between community partners were identified as prominent barriers to supporting opportunity, while getting out of one's comfort zone appeared to be the most prevalent barrier to being motivated. Notably, variety and a user-friendly website were salient themes regarding opportunity and RxTGA was highlighted by many as a good entry point to becoming more active. Relatedly, the mental and physical benefits associated with being active and the value of social support were discussed as essential for physical activity engagement.

Identifying barriers and facilitators to physical activity engagement within the emerging prescription field in partnership with the healthcare system is important to identify strategies for future wide-scale change in a positive direction (Graham et al., 2006). Taken together, the current study data highlight the relationships that exist between capability, opportunity, and motivation, as well as barriers and facilitators that are common to both study populations. How these constructs link to one another is important to consider when developing and implementing prescription physical activity programs. In a behaviour change context, if an individual does not feel motivated or able to change a behaviour, they are unlikely to do so – even when ample opportunities are present (Paterson et al., 2024). Given the strength and number of facilitators to capability and motivation identified by both sample groups, it would appear that RxTGA is successfully addressing key aspects of the behaviour change process for its stakeholders. However, opportunity was the lowest scored item for health care providers and several barriers to opportunity were identified by recipient participants suggesting that this particular area may warrant ongoing attention. The ensuing discussion will provide insight into the results obtained from the healthcare providers, followed by findings gleaned from the recipients of prescriptions.

Barriers and Facilitators to Prescribing Physical Activity Among Health Care Providers

Part 1: Barriers

The evaluation for RxTGA healthcare providers revealed specific barriers faced when prescribing physical activity. Similar to previous studies assessing barriers to prescribing physical activity (e.g., Kuchnow & Workman, 2021; Obrien et al., 2016, 2020, 2023), the most frequently reported barriers were Competing Variables (Weather, Finances, etc.), a Lack of Patient Interest in Physical Activity, and Patient not Interested in Physical Activity. These results align with research conducted by Obrien and colleagues (2016) who found that patients not being

interested in exercise/physical activity was the top barrier for healthcare providers when prescribing activity to their patients (i.e., for 92.9% of physicians and 92.6% of allied healthcare professionals). Patients not interested in Physical Activity in the current study was rated as 1.96/4, compared to 2.77/4 and 2.73 by physicians and allied healthcare professionals in the Obrien study, respectively (Obrien et al., 2016). These mean differences are likely related to sample size (i.e., 35 versus 209 participants). According to Chittaranjan (2020), studies with larger sample sizes are perceived to be more representative of the intended population (i.e., eligible prescribing healthcare providers). Patients not being Interested in Physical Activity was similarly found to be the most commonly reported barrier in two additional studies by Obrien and colleagues: one was completed among chiropractors (2023) and another among physiotherapists (2020). Among chiropractors, this item was rated as an average impact mean of 2.5/4 among both Canadian and International participants (Obrien et al., 2023), while 90% of physiotherapists had an impact mean of 2.35/4 (Obrien et al., 2020). Overall, it would seem that the patient expressing a lack of interest in physical activity is consistently noted as being one the strongest detractors to providing a prescription (Obrien et al., 2016, 2020, 2023). The qualitative portion of the survey supported this notion whereby RxTGA healthcare providers noted the lack of patient interest in or motivation toward being active as a barrier to prescribing. It may be worthwhile to consider ways in which such a component might be integrated into the prescription-based program model in an effort to offset this common barrier and increase engagement. The literature has shown several strategies that may be effective in this regard. For example, providing social support, mainly by family members, has been shown to help boost interest in physical activity (Jones et al., 2020; Smith et al., 2017). Additionally, a study of 140 adults (77.8% Female, 58.6% > 55 years) found that engaging in physical activity with a friend

was associated with overall interest in activity (Withall et al., 2011). These strategies were similarly endorsed by the RxTGA prescription recipients of this study whereby social support was noted as a motivator to being active.

The highest-rated barrier in this study was Competing Variables (Weather, Finances, etc.). This result diverges from previous research (e.g., Kuchnow & Workman, 2021) where this item was not ranked in the top eight barriers to prescribing provided by 108 internal medicine physicians. One potential reason for this difference might be the location of where the study was conducted. The current study was completed among RxTGA healthcare providers living and working in Alberta, a province that is considered the coldest in Canada (Chaurasia, 2024), compared to the Obrien and colleagues (2016) study which was completed across provinces that experience milder winters such as Ontario, British Columbia, and Nova Scotia (Chaurasia, 2024). With recruitment for this study occurring between February and May, it is possible that inclement weather could have been deterrent for RxTGA healthcare providers to prescribe physical activity, as research suggests a link between reduced physical activity and increased sedentary behaviour in the winter months (Snanaszek et al., 2023). Compounding weather variables, it is also noteworthy that recipients highlighted financial obstacles and lack of facilities as salient barriers to opportunity. Such competing variables might be addressed per the recipient facilitators shared such as having a variety of choices for physical activity. The RxTGA website provides an array of indoor and outdoor as well as in-person and remote options. The prescription recipients themselves highlighted the value of tailoring the plan to the individual. Ensuring prescribers are aware of the multitude of activity options through enhanced education and regular contact from a prescribing program entity, like RxTGA, may be one way to address some of these competing priorities and boost capability simultaneously. There is a known

positive impact of heightened efficacy and capability in the pursuit of habitual physical activity engagement (Hartman et al., 2012; Teo et al., 2022).

There was a vast discrepancy in perceived Lack of Time being a barrier to prescribing physical activity in this study as compared to the work of Obrien and colleagues (2016). In their study, Lack of Time was noted as a barrier by 95.6% of participants with an impact mean of 2.62/4, compared to 86.7% of RxTGA healthcare providers who noted this as a barrier with a lower impact mean of 1.5/4. Similarly, another study conducted among 45 Exercise is Medicine clinical oncologists found that a lack of time was identified as being a prominent barrier to prescribing physical activity (Nauta et al., 2022). This discrepancy may be due to the interdisciplinary nature of the prescriber population and having an extended amount of time to interact with each patient. According to the demographic data, 64.7% of the RxTGA healthcare providers surveyed indicated that they spend 30+ minutes with each patient which may allow for prescriptions to be written and explained without time being a burden. A decreased emphasis on time as a barrier might also be linked to the variety of disciplines represented in the current study – many of whom often have lengthier patient encounters due to their scope of practice (Pellerine et al., 2022). Beyond physicians who are traditionally included in these types of interventions, including allied health professionals as part of the prescriber pool to optimize the time they have available to consult with patients appears to be a worthwhile consideration when seeking to enhance writing and uptake of movement-based prescriptions.

Taken together, the results associated with barriers to prescribing physical activity in this population suggest that assessing patient interest in becoming physically active is an important first step in the process of prescribing. Qualitatively, recipients noted the value of RxTGA as a "good starting point" when seeking to engage in physical activity suggesting that preliminary

conversations about the program may be useful. Prescribing entities may wish to identify efficient yet comprehensive strategies healthcare providers can use in service of this goal. For example, motivational interviewing is a behaviour change framework that involves a partnership between a healthcare provider and patient focused on resolving ambivalence about change by using the client's personal strengths and values (Miller & Rollnick, 2013). To this end, asking open questions, providing acknowledgements, and reflective listening could be applied (Miller & Rollnick, 2013).

Part 2: Facilitators

Several facilitators in the current study were similar to or different from other studies involving prescribing physical activity. Having physical activity and exercise programs to refer (patients) to and personal comfort/confidence in the subject area were the most identified facilitators, noted by 100% of healthcare provider participants. Having PA and exercise programs to refer patients to was also supported by the recipient accounts whereby having a variety of facilities was noted as a facilitator to using their prescriptions. However, these facilitators differ from a study conducted amongst physiotherapists in Nova Scotia, (n = 146) that involved assessing barriers and facilitators to prescribing physical activity; Having physical activity and exercise programs to refer (patients) to was the third most common facilitator identified (i.e., 87% of participants), and personal comfort in the subject area was the fifth (i.e., 86% of participants; Obrien et al., 2020). One potential reason for these differences is the professional homogeneity of the population examined by Obrien et al. (2020) compared to the heterogeneity of professions in the current study population. Physiotherapists are typically recognized as a population that strongly supports and recommends physical activity as a health promotion strategy, with reportedly 85% of physiotherapists regularly discussing the benefits of

physical activity with patients who have suffered from a stroke, and an additional 54% encouraging physical activity to at least 10 patients per month (Lau et al., 2016; Shirley et al., 2010). Additionally, one study showed that individuals who received a physical activity prescription from a physiotherapist were three times more likely to increase their physical activity (Sheedy et al., 2000) compared to control participants who did not receive a prescription. These results suggest that physiotherapists may be more primed to provide physical activity prescriptions compared to the general healthcare provider population and thus, may experience facilitators differently. In both studies, having access to administrative assistance was the least reported facilitator; however, there were vast differences in the percentages where 80% of RxTGA participants identified this as a facilitator compared to 38% in the physiotherapist study (Obrien, 2020). One potential reason for this difference could involve the size of the organizations and associated reach of administrative assistance. Exercise is Medicine Canada is a national organization covering a large geographic region (Sallis, 2009), whereas RxTGA is Alberta-based with fewer active prescribers (J. Tareta, personal communication, 2023; RxTGA, 2022); thus, it may be more feasible to achieve administrative assistance in the smaller region.

Taken together, facilitators from this set of RxTGA healthcare providers shines light on the importance of having adequate facilities and opportunities to refer patients to; this was supported both quantitatively by healthcare providers and qualitatively by recipients of prescriptions. Current and future health-promotion planners in this context should consider whether their patient has adequate opportunity to actually engage in physical activity and discuss alternative options when needed. This tailoring is especially important, and could help alleviate competing variables, which was considered the top barrier to prescribing among the same set of healthcare providers. Additionally, personal comfort in the subject area being a top facilitator

suggests that current and future programming may benefit from having a core healthcare provider group confident in their abilities. This may be achieved by implementing continuing educational physical activity prescription opportunities for the prescriber base, which have been deemed effective for prescriber confidence in the literature (Pancio et al., 2023; Windt et al., 2015). A group of 17 medical students at Sidney Kimmel Medical College had a significant increase in self-reported exercise prescription confidence following an exercise prescription course (Pancio et al., 2023), while another study focusing on 25 family physicians in British Columbia increased their prescription writing from 40 – 68% for patients four weeks after a three-hour exercise prescription workshop (Windt et al., 2015). This need for ongoing learning and refreshers is explicitly supported with a lack of continuing physical activity educational opportunities being noted as a barrier by 90% of RxTGA prescribers.

Capability Opportunity, and Motivation to Prescribing Physical Activity

To date, no studies have assessed the barriers and facilitators to prescribing behaviour quantitatively using the COM-B model, therefore making this study unique. Results obtained through Likert scale data revealed that capability items had an average of 3.62, indicating a "Neither Agree nor Disagree – Agree" response. Within the capability items, I know how to write RxTGA prescriptions was the highest agreed-upon statement with a score of 4.14 (Agree). This suggests that RxTGA prescribers have the perceived knowledge required to write physical activity prescriptions. However, this result was not consistent with the barriers to prescribing survey where 90% of participants noted a lack of knowledge on how to prescribe as a barrier: a finding that mirrors other studies in which a lack of knowledge on how to prescribe physical activity was noted as a significant barrier (e.g., Morris et al., 2019; Rooney et al., 2023). This discrepancy may be attributed to a disconnect between having the necessary perceived

knowledge about physical activity to counsel about it and the actual process knowledge needed to write the prescription. It may be the case that more and continuing education on prescription writing procedures is needed during the onboarding stage for health care providers so that they feel both confident and capable when providing physical activity prescriptions for patients (Pancio et al., 2023; Windt et al., 2015).

Conversely, the lowest-rated capability item was I engage in writing RxTGA prescriptions without thinking, with a score of 2.86 (Disagree). This is consistent with other behaviour change studies, particularly physical activity studies focusing on autonomous, automatic processing, which is the behavioural information processing that occurs without conscious thought (Hoffman et al., 2009; Strack & Deutsch, 2004). This theory was originally developed by Shiffrin and Schneider in 1977. Studies in this arena posit that automatic processing is strongly correlated with a behaviour, particularly physical activity behaviours (Pfeffer & Strobach, 2021; Wang et al., 2023), and that context clues and consistent reminders to engage in a behaviour are a strong way to develop and strengthen this type of thought (Fabio et al., 2019). “Nudging” is often used in health promotion research and involves subtle, often unconscious reminders that are strategically placed to affect a positive, preferred behaviour change by helping participants overcome preconceived biases and habits (Forberger et al., 2019). Nudging had been effective in improving health behaviours previously including increasing physical activity (Forberger et al., 2019; Gilson et al., 2009) and reducing sedentary behaviours (Forberger et al., 2019). This suggests that RxTGA and similar physical activity prescription programs may benefit from sending out subtle reminders or “nudges” to write prescriptions, with the goal of making the behaviour more automatic for healthcare providers who are often multi-tasking varying priorities throughout their work day.

Beyond capability, participants in this study had an opportunity score of 2.85, falling in the “Disagree-Neither Agree nor Disagree” window. The most agreed upon statement was I have enough time to engage in writing RxTGA prescriptions, which possessed an average score of 3.97 (nearing Agree). This notion is contradictory to a previous study assessing barriers to physical activity prescription writing among Nova Scotia physiotherapists in which a lack of time was noted as a significant barrier (Obrien et al., 2020). These results are also contradictory to previous studies assessing prescribing behaviour among Internal Medicine physicians who noted a lack of time as the third most commonly reported barrier at 12% (Kuchnow & Workman, 2021). A qualitative study similarly showed both a lack of opportunities, time, and flexibility to effectively prescribe among midwives who recommended community-based physical activity to postnatal women (Allin et al., 2023). Taken together, these results suggest that the overall perceived Opportunity to prescribe physical activity amongst RxTGA prescribers is moderate to low, despite a higher degree of capability and more time in comparison to participants from other studies (Fremont et al., 2014; James et al., 2017; Obrien et al., 2016). The lower perceived opportunity score may be because this particular construct is largely external to the healthcare provider as compared to capability and motivation. Thus, the opportunity to prescribe is more dependent on the patient’s availability, readiness, and willingness to get a prescription as well any competing variables they may be experiencing – all of which serve to place a limitation on the prescriber and limit opportunity. Furthermore, the qualitative portion of this study highlighted the complexities faced by individuals as they seek to obtain and pursue their prescription, further compounding the barriers for healthcare providers. When compared to capability and motivation, which are more in control for health care providers, addressing

opportunity may be more multifaceted, as patient's experiences and environments must also be considered (Fowles et al., 2018).

Healthcare prescribers in this study had a motivation score of 3.26, anchored between "Neither Agree nor Disagree to Agree." Findings in this section aligned with Self-Determination Theory: an approach to personality and motivation that views motivation on a continuum ranging from external to intrinsic (Ryan & Deci, 2000). As motivation becomes more intrinsic, the theory posits that an individual is more likely to engage in and maintain a certain behaviour (Ryan & Deci, 2000). Within the motivation subscale items, I strive to write RxTGA prescriptions in this practice/clinic whenever I see a need was the most agreed upon item with an average of 3.82/5. This statement would fall closer to internal regulation which involves understanding the importance of engaging in a certain behaviour, in this case, the moments when an activity prescription is required. Conversely, the least agreed upon item was we remind each other to write RxTGA prescriptions in this practice/clinic with an average rating of 2.53 (Disagree). This statement would fall more under external regulation which is the motivation to complete a behaviour contingent on receiving an award such as praise, or avoiding a punishment (Deci & Ryan, 2000).

Overall, results from this study support that COM-B constructs capability, opportunity, and motivation are essential for engaging in prescription writing (Michie et al., 2011; The Decision Lab, 2023, Timlin et al., 2021). Participants possessed the lowest score in the opportunity subcategory as compared to capability and motivation, perhaps reflective of the lack of overall prescribing behaviour in which more than half (54.5%) of participants reported prescribing to less than 10% of patients. This is noteworthy given studies assessing relationships between COM-B variables have found Opportunity and Motivation ($\beta = .91$, $p < .001$) to be

strongly linked in behaviour change models to increase physical activity (Wilmott et al, 2021). Additionally, Capability is found to be a strong mediator between Opportunity and Motivation (Wilmott et al., 2021). The significant correlations observed between these three constructs support these relationships, suggesting that a behaviour may be unlikely to occur unless all three COM facets are adequately endorsed.

Fostering capability can be done by increasing RxTGA-related training procedures using educational workshops and courses (Fowles et al., 2018; Windt et al., 2015) when recruiting new health care professionals. Providing such regular opportunities can serve to keep prescribers up to date on prescribing procedures and physical activity facts that may be useful – especially if they don't personally engage in physical activity and lack first-hand knowledge of its benefits. This notion was also supported by RxTGA recipients who noted that communication challenges with stakeholders served as a barrier to obtaining and acting on a prescription. Similarly, relationships with knowledgeable healthcare providers about physical activity was also highlighted as a facilitator to prescription receipt. Workshops have been successful in increasing prescription writing among registered physicians (n =158) in Abbotsford, British Columbia who completed a three-hour educational workshop on the tools and procedures of prescription writing (Windt et al., 2015). Fostering opportunity can be most facilitated effectively by helping to alleviate cost and timing constraints for patients (Michie et al., 2011; Social Change UK, 2024), both of which were discussed as barriers to prescription uptake. Fostering motivation is often reliant on having the proper perceived capability and opportunity to engage in prescription writing (Michie et al., 2011), relying on not just a "need" to engage in a behaviour, but also a "want" to engage. One way that has been effective in increasing motivation in behaviour change models is by linking the behaviour to the individual's personal core values. Evidence-based

studies assessing the implementation of core values via the Co-active life coaching principles (fulfillment, balance, and process coaching) have demonstrated effects on increasing motivation to promote behaviour change long-term (Pearson et al., 2011).

By fostering all three COM-B constructs, the literature suggests that healthcare providers can increase their perceived capability to prescribe, which may in turn, increase the opportunity for prescribing to become a part of their routine. Lastly, seeing benefits of their prescribing over time may serve to reinforce their motivation to continue doing so (Michie et al., 2011; Social Change UK, 2024).

RxTGA Organization Program Survey

To date, no studies have directly measured involvement satisfaction among RxTGA healthcare providers affiliated with the RxTGA program. These prescribers exemplified an average self-reported score of 3.7/5. In addition, 26/27 (96%) indicated they would recommend RxTGA to a colleague to treat and prevent chronic disease in their patients. This finding is supported by a study among Exercise is Medicine physicians who agreed that the Exercise is Medicine program was valuable and enabled physicians to support their patients in disease prevention and treatment (Thompson et al., 2020). Participant recommendations for future enhancements commonly included advertising the program more, continuing to add new physical activity/fitness facilities, as well as providing viable options to increase patient engagement beyond the 10 free sessions.

Barriers and Facilitators to Engaging with Prescriptions Among Prescription Recipients

Capability

In terms of capability, participants noted a feeling that everyone is looking at them as a barrier to being physically active. Specifically, being active in a group setting resulted, for some, in feelings of discomfort and anxiety: a notion supported in the physical activity literature. A study assessing gym anxiety found that individuals participating in physical activity programs may experience negative body image and reduced self-esteem: a phenomenon referred to as social physique anxiety (SPA; Hart et al., 1989; Zartaloudi et al., 2023). Social physique anxiety, a subset of social anxiety, is characterized by the feeling of judgement on one's appearance when being observed (Hart et al., 1989; Jin & Fung, 2021). This is especially relevant as the individuals who reported experiencing SPA in this study were primarily older individuals and female (~57%); both characteristics are associated in the literature as making one more susceptible to experiencing this phenomenon (McAuley et al., 2002; Nah et al., 2023 Zartaloudi et al., 2023). This finding is noteworthy, as one study found that among 390 adults (63% male, *mean age*= 35), SPA was a negative predictor of physical activity levels (Zartaloudi et al., 2023). Ironically, one systematic review found that engaging in physical activity may actually alleviate symptoms of SPA (Zika & Becker, 2021). This is promising given the recipient population in the current study noted that RxTGA is a good introduction to physical activity. Thus, this finding provides RxTGA a promising avenue to leverage options for addressing demographic-specific facilities such as women's-only gyms. Literature has supported that women's-only facilities can be beneficial for attenuating SPA and increasing capability by promoting comfort (Walton & Finkenberg, 2002). Having the option for women's-only gyms was explicitly mentioned by one participant as a way to increase their comfort in a gym setting.

Beyond SPA (Hart et al., 1989), many participants in this population expressed an overall lack of personal experience being physically active prior to receiving a RxTGA. This is supported in another similar study assessing prescribed physical activity prescription engagement using the COM-B model among individuals (n =13) who received a physical activity on prescription from their primary physician (Anderson et al., 2019). Qualitatively, those participants noted that an individual's unique prior experiences with physical activity can act as a barrier to becoming physically active (Andersen et al., 2019) either positively or negatively. To combat this barrier, healthcare providers may wish to discuss physical activity history with their patients prior to writing a prescription to identify a feasible and comfortable starting point based on the individual's interests and abilities.

Facilitators also pertained to capability with regards to using the RxTGA prescription. Many participants made note that they received their prescription or became aware of the program via an allied healthcare professional (e.g., nurses, kinesiologists, rehabilitation specialists). This is important, as healthcare provider advice is commonly cited as a strong facilitator to increasing one's perceived capability to engage in a behaviour (Vishnubala et al., 2022). This facilitator aligns with the findings from the qualitative portion of the RxTGA healthcare provider survey where the value of including a variety of interprofessional prescribers was noted. Indeed, RxTGA relies on multi-faceted support from differing healthcare providers to prescribe physical activity to their patients (J.Tareta, personal communication, 2023). As chronic disease rates remain high and movement and sedentariness behaviours worsen, this professional diversity may be important for extending the reach of prescription-based physical activity programs from a public health standpoint.

Overall, participants in both the current study and the one conducted by Andersen and colleagues (2019) assessing barriers and facilitators to a prescription physical activity program in Sweden highlighted the importance of accounting for individual experiences when prescribing physical activity to patients, especially among those who are new to physical activity. This is an important consideration for RxTGA and other prescription physical activity programs, as the literature consistently suggests that individual differences and achievements can affect one's behavioural regulation (i.e., motivation) toward becoming physically active (Box et al., 2019; Li et al., 2023). Indeed, participants in the current study shared that feelings of accomplishment (e.g., via goal setting) served to facilitate related feelings of capability which, in turn, affected motivation to be active – another example that highlights the reciprocal relationships that exist as part of the COM-B framework (Michie et al., 2011). Additionally, the qualitative findings supported the literature in suggesting that self-efficacy and mastery are important for facilitating one's capability to engage with a physical activity prescription. Self-efficacy is an individual's belief in their capacity to execute the behaviour necessary to produce a performance (Bandura, 1977). Mastery experiences are related and defined as personal encounters of success over time that help to increase one's self-efficacy (Bandura, 1977). Because self-efficacy has been identified as a strong indicator of perceived capability, individuals who have high self-efficacy are more likely to engage in physical activity; this has been demonstrated both in the general population and among those with medical conditions (e.g., multiple sclerosis; Ojo et al., 2019; Silveria et al., 2021). In the current study, the theme of noticing progress over time emerged, and participants shared how the associated sense of accomplishment through such mastery experiences facilitated increased feelings of capability to continue engaging with their physical activity prescription. Participants often felt that when they "did it," their confidence continued to

rise, therefore highlighting the importance of celebrating achievements over time. Thus, RxTGA and other prescription physical activity programs should consider the inclusion of strategies that acknowledge milestones and successes regularly such as e-notifications and certificates in service of boosting capability and ultimately, adherence to physical activity. For example, literature has supported that mobile apps capable of sending milestone updates and weekly reminders are successful in increasing self-efficacy to engage in physical activity and promote adherence (Sun et al., 2021; Voth et al., 2016). Taken together, it appears that working collaboratively with patients to set incremental goals and acknowledging related successes may be important for boosting one's capability when receiving a physical activity prescription and should be taken into consideration to increase engagement (Andersen et al., 2019; Michie et al., 2011; Nah et al., 2023; Obrien et al., 2016, 2020, 2023; Ojo et al., 2019; Pearson, 2012; The Decision Lab, 2023).

Opportunity

Several barriers to opportunity were identified by interview participants. Financial obstacles were noted often, with many citing the monetary burden that obtaining a gym membership can have. This was especially evident once the initial RxTGA trial period ended, and participants were required to pay for their own memberships long-term. This finding is consistent with previous COM-B literature in which financial barriers to engagement with postnatal physical activity and limited opportunity were shared among female participants (Ellis et al., 2019). In another qualitative study, finances was a theme that was discussed similarly by six injured or wounded veterans as a barrier to one's opportunity to engage in physical activity (Walker et al., 2022). Together, these findings support that considering financial status and providing lengthier free or subsidized trial options for participants may be beneficial, and in fact

needed, in order to enhance engagement, thus allowing time for physical activity to be become more established. Literature suggests that affecting behaviour change and habit creation is a process that takes time (Gardner et al,, 2012). As the initial RxTGA prescription works to introduce individuals to physical activity, longer prescriptions may help individuals to remain active long-term.

According to participants, a lack of and/or reasonable access to RxTGA facilities a participant can attend should be considered, as well as transportation, during the prescription redemption phase. Participants also noted an unequal distribution of facilities in certain areas of the city, in addition to a paucity of gender specific options. This same notion was repeated when healthcare providers were asked to list any barriers to prescribing physical activity. Thus, RxTGA and other prescription physical activity programs should continue to acquire and partner with facilities in both rural and urban areas, as having equitable access has been demonstrated through the literature to alleviate such barriers to opportunity (Safi et al., 2022; Samara et al., 2015).

Conversely, some participants shared that having an abundance of available activity options allowed for increased opportunities to use their prescriptions. This finding is consistent with prior physical activity prescription literature in which participants have noted that having access to appropriate facilities, including the option for home-based activities such as cycling and walking, was important for prescription engagement (Andersen et al., 2019). Additionally, the value of seasonal activities offering outdoor options for warmer months and indoor facilities for colder months was discussed in both studies (Andersen et al., 2019). Moreover, a recent systematic review indicated that having a variety of physical activity options increases one's engagement with physical activity by providing more opportunity and motivation (Eather et al.,

2023). Given the demonstrated links between the COM-B dimensions (Michie et al., 2011), the notion of variety appears to be pivotal and should be considered by programmers for boosting engagement.

Motivation

This study highlighted that being motivated to engage in RxTGA is vital to overall physical activity engagement. One barrier to motivation was revealed and involved getting out of the initial comfort zone. Conversely, multiple facilitators to increase motivation were revealed including positive body changes and reduction of illness, improved mental health, as well as having a strong social support base. Given that motivation has been identified as a key precursor to successful behaviour change (Blom et al., 2021; Hardcastle et al., 2015), understanding the associated barriers and facilitators to enhancement is important to consider in a physical activity prescription context (Andersen et al., 2019; Davis et al., 2021; Deci & Ryan; 2000; Marashi et al., 2021). Participants often noted that having trouble getting out of their comfort zone to become more active was a barrier and coincided with decreased motivation. Participants also shared that having personal choice and motivation are important for "breaking the cycle" and becoming active. This notion of choice supports the Self-Determination Theory (Deci & Ryan, 2000; Ryan & Deci, 2000) and the concept of autonomy – a term that represents an individual's own sense of volition when engaging in a behaviour. Within each individual, the degree to which someone is intrinsically motivated to complete an activity or pursue a behaviour change is different and depends on one's values, beliefs, and resources (Ryan & Deci, 2000, Deci & Ryan, 2000). This is further supported in a study assessing intrinsic motivation and autonomy in regard to becoming less sedentary, in which intrinsic motivation was strongly associated with positive increases in movement (Rollo et al., 2016). Additionally, the implementation of an autonomy-

supportive coach has shown merit as a way to foster this construct; one study conducted among 62 elementary school students found that an autonomy-supportive coach was able to increase feelings of autonomy as well as physical activity behaviour (Huescar et al, 2019). Taken together, this supports that accounting for and fostering autonomy in the initial prescription process phase is important and may play a role in boosting feelings of capability simultaneously, thereby helping individuals to step out of the "comfort zone."

Observing positive body changes was discussed often by recipients as a motivator to continue being physically active. Participants emphasized how noticing themselves or having loved ones notice improvements was incentivizing to continue. This is consistent with previous literature indicating that females who perceived weight loss had increased body image throughout the intervention as well as higher motivation to engage in physical activity (O'Dougherty et al., 2010). Literature has demonstrated the links that exist between body image dimensions, motivation, and physical activity. For example, an 18-week cardiovascular exercise intervention conducted among female non-exercisers with obesity (n = 37) suggested that one mechanism for the increase in motivation was a result of improvements to appearance and body satisfaction (Pearson & Hall, 2013). Both body image constructs examined were significantly correlated with intrinsic motivation, which in turn was correlated positively with the amount of exercise engaged in over time. The authors emphasized the value of focusing on the important role that body satisfaction can in a physical activity promoting context, especially when involving new exercisers (Pearson & Hall, 2013).

Social support from family and friends was also noted as a facilitator towards engaging with their prescription. A study by Andersen and colleagues (2019), similarly found that having support from close individuals who can encourage physical activity participation is a strong

motivator to continue being active. For example, their study suggested that family members providing a "push" to adhere to physical activity was strongly encouraging for individuals (Andersen et al., 2019). Social rewards via compliments have been shown to increase the motivation to continue being active (Davis et al., 2021). Based on these results, a potential avenue for RxTGA to increase motivation to engage in prescription physical activity is to provide social support options for patients when joining – for example, through encouraging signing up for RxTGA with a partner. The mechanism of action for this is that social support, mainly by family members, is associated with overall interest in activity (Withall et al., 2011) as well as motivation.

Strengths and Limitations

This study had many strengths, including being the first to assess an established, community-based prescription physical activity program, taking into account the barriers and facilitators experienced among both the healthcare providers and recipients of prescriptions. Understanding the opinions of the program from both perspectives provided valuable insights into the prescription process from writing to redeeming to engagement. By completing this research on an established community program, the study's ecological validity is increased which can provide direct benefits to the community partner as well as their stakeholders (Bogart & Uyeda, 2010). This, in turn, can help to advance their goal to promote community physical activity and health. Moreover, by implementing a case study strategy of inquiry, a multi-faceted and in-depth exploration of physical activity prescription within a real-life setting was examined at one juncture of time (i.e., Crowe et al., 2011; Kowalski et al., 2022; Spring 2024). A significant benefit of a case study is integrating multiple sources of evidence in order to develop an understanding of the case: in this instance, quantitatively assessing barriers and facilitators to

prescribing physical activity and understanding qualitatively, the challenges and enablers to receiving, redeeming, and engaging with the prescription (Boden & Misener, 2020). Thus, the study purpose was addressed comprehensively. To the researcher's knowledge, this was the first study to assess prescription physical activity through the COM-B model. In a research context, the role of theory is to provide complex and thorough conceptual understandings of large ideas (Collins & Stockton, 2018; Michie et al., 2011). Theories give researchers different "lenses" through which to look at complicated problems and social issues, focusing their attention on different aspects of the data and providing a framework within which to conduct their analysis (Collins & Stockton, 2018; Michie et al., 2011). The COM-B model's three necessary behaviour change factors were targeted: the participant's capability; the degree of opportunity; as well as the motivation to engage in the behaviour (Michie et al., 2011).

Specific to the recipients of prescription group, a strength was completing the interviews via zoom or telephone. Having virtual/remote interviews provides benefits to both the participant and the interviewer including reducing costs which can help to extend reach and inclusivity, as well as providing the ability for individuals to participate in the comfort of their own home, which is especially important in the COVID-19 recovery period (Oliffe et al., 2021). This remote feature is also of value in instances where individuals may be discussing sensitive information or feeling discomfort sharing personal information (Keen et al., 2022). Similarly, another strength is that the qualitative interviews were completed using a semi-structured interview guide. Semi-structured interviews fit the research purpose for this study as they allow participants to explain their position in the world as well as their own personal experiences with the phenomenon while not relying on a restrictive interview guide or the experiences of the interviewer (Hancock & Algozzine, 2011).

Finally, pertaining to the recipients of prescriptions group, a strength was the sample size recruited for this study. A similar qualitative study on prescription physical activity engagement among recipients was able to reach data saturation with 13 participants (Andersen et al., 2019); the current study enrolled 16. Additionally, Creswell (1998) provided a suggested range of five to 25 participants to develop satisfactory themes for qualitative interviewing research. By interviewing 16 physical activity prescription recipients, this was satisfied (Vasileiou et al., 2018). After 14 participants were interviewed, additional information did not result in any new themes and data saturation was reached. Two additional participants were interviewed to verify this.

Conversely, one limitation of this study was the sample size in the quantitative arm. Based on previous correlational research assessing barriers and facilitators (Koh et al., 2022) using an alpha level of 0.05, a medium effect size of 0.3, and a suggested power of 80%, it was determined that 84 participants would be needed for this study. In total, 38 participants were recruited: about 45% of the desired target. One potential reason for the lack of participants is the busy nature of the population, being active healthcare professionals. According to Fraenkel and Wallen (2009), a minimum sample size of 30 is deemed feasible for a correlational study to give accurate indications of the degree of relationships. Thus, the current study results should be interpreted with caution.

Another limitation is the use of self-report questionnaires (Barriers and Facilitators, COM-B, Organization Survey) for the healthcare providers. Self-report questionnaires can be subject to personal and moment bias, potentially leading to lack of accuracy in results (Brenner et al., 2015). Furthermore, another problem with self-report questionnaires is the notion of social desirability bias which occurs when participants attempt to appear “normal” in order to please

researchers (Brenner et al., 2015). To overcome this, this study implemented open-ended questions immediately following the self-reported questionnaire to allow healthcare providers to add additional context and provide a rationale to their answers.

Due to limited research on barriers and facilitators to prescribing physical activity through the lens of the COM-B model, no previously validated surveys were available for this specific context. To accommodate, an existing survey was modified slightly to fit this study purpose. Thus, despite being validated in its original context, the psychometric properties of the survey within the current prescription physical activity context are unknown.

Similarly, recipients who were interviewed for the study may have provided responses that would appear more favourable to the researcher. Participants can often skew their responses and overestimate physical activity expenditure (Adams et al., 2010) in order to appease the interviewer and appear more socially desirable, especially in circumstances where key health measures are being discussed (Latkin et al., 2021). In an attempt to overcome this barrier, the interviewer made sure to explicitly mention that he was not directly associated with RxTGA.

Conclusion

This study was the first to assess barriers and facilitators to writing, redeeming, and engaging with physical activity prescriptions from the perspectives of health care providers and recipients as part of an established community-based program: RxTGA. Given the known health benefits associated with more movement (Arija et al., 2017; Broman-Fuchs & Storey, 2008; Harvey et al., 2018; Liu et al., 2020; ParticipACTION, 2023) and decline in physical activity rates during the COVID-19 pandemic (Detsky & Bogoch, 2020; ParticipACTION, 2021), this evaluation is both timely and warranted. Moreover, using the COM-B (Michie et al., 2011) lens

to frame the results is a unique study feature that enabled a more in-depth understanding of the challenges and enablers to RxTGA and physical activity engagement that were shared.

Healthcare providers identified several key barriers to writing prescriptions, including competing variables and a lack of patient interest in physical activity. An important finding was the significant correlations identified between perceived capability, opportunity, and motivation, indicating that these factors are inter-related and all crucial for effective prescription-based programming. Similar to behaviour change in other areas, healthcare providers must feel capable of writing activity prescriptions, have sufficient opportunity to write activity prescriptions, and be motivated to provide activity prescriptions in order for prescription activity writing behaviour to occur (Michie et al., 2011).

Interviews with prescription recipients highlighted a lack of prior physical activity experience and fears about social scrutiny as detractors from their perceived capability to engage in physical activity. Conversely, witnessing personal progress over time was identified as a key facilitator in enhancing their capability and motivation. Accessibility to the program through healthcare provider relationships, technology, and facilities was also a salient facilitator to capability and opportunity.

Because the focus of this case study is a well-entrenched, real-world prescription program, the study outcomes can be applied by their team immediately in an effort to boost engagement and enhance their model. Involving the Executive Director through the development and implementation of this research in a consultative capacity helped to strengthen its' relevance and usefulness to the organization: a key principle associated with integrated knowledge translation (Lawrence et al., 2019). In essence, the results support RxTGA's mission of using physical activity prescriptions to promote participation in movement and exercise within the

community, recreation facilities, and on-line, and can be used to fulfill their purpose “to inspire, move, thrive” (RxTGA, 2021).

This study underscores the importance of addressing both structural and psychological barriers to enhance the effectiveness of physical activity prescription programs. Given the interconnectedness of capability, opportunity, and motivation, programs should be multi-faceted, aiming to boost healthcare providers' confidence in prescribing physical activity while simultaneously ensuring that recipients have the necessary support and resources to follow through.

For healthcare providers, training that enhances their capability and opportunity to prescribe physical activity, along with the provision of adequate resources, could mitigate some of the barriers identified. Similarly, patient-centred approaches that address individual concerns about starting a program and promote gradual progress might improve adherence to prescribed physical activity.

Future studies could build upon these findings by exploring interventions that specifically target the interrelated aspects of the COM-B model. Additionally, longitudinal research could assess the long-term impacts of such interventions on both providers and recipients, offering deeper insights into the sustainability of behaviour change in such community-based programs. In sum, this study contributes to a growing body of literature on physical activity prescription, emphasizing the need for a holistic approach that considers the complex interplay of factors influencing both healthcare providers and recipients. By addressing these barriers and leveraging facilitators, physical activity prescription programs can be better tailored to meet the needs of diverse populations, ultimately promoting greater health and well-being.

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Appendix A

Recruitment Email for Healthcare Providers

Hello!

You are invited to participate in a project titled "Understanding the Barriers and Facilitators to a Physical Activity Prescription Program from the Perspectives of Health Care Providers Using the COM-B Framework." The project is being led by Justin Tremblett, MSc candidate, under the supervision of Dr. Erin Pearson, Associate Professor: both from the School of Kinesiology at Lakehead University.

If interested, please read the attached Letter of Information and view the study poster prior to clicking the Survey Link.

Please note that by clicking the survey link you have indicated that you have thoroughly read and understood the letter of information.

If you have any questions or have trouble accessing the Letter of Information/Poster/Survey, please feel free to reach out to me at jtremble@lakeheadu.ca.

* SurveyMonkey Survey Link*

Thank you for your consideration,

Sincerely, Justin Tremblett and Dr. Erin Pearson

Attach PDF of Study Poster
** Attach PDF of Letter of Information**

Appendix B

Recruitment Poster for Healthcare Providers

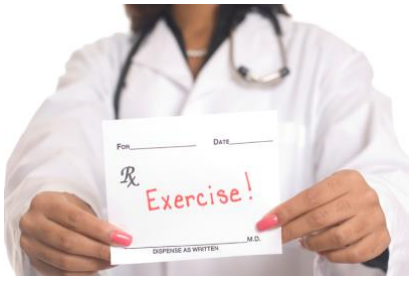
Are you a RxTGA Prescribing Healthcare Provider?

Researchers want to hear from you!

We want to understand your RxTGA experiences regarding prescription writing. Your views will be used to enhance the program for existing and future prescribers!

You may be eligible if you:

- Are a healthcare professional who can prescribe RxTGA prescriptions
- Want to share your RxTGA prescribing experience
- Have acces to a WIFI compatible device



What's Involved?

- Complete a 20-minute survey about your work history, barriers and facilitators to writing prescriptions, and RxTGA involvement experience.
- As a participant, you will be entered to win one of four $100 gift cards

For more information, contact:
Justin Tremblett: jtremble@lakeheadu.ca

Principal Investigator: Dr. Erin Pearson

Approved by the Lakehead University Research Ethics Board, # 1470311

Appendix C

Letter of Information for Healthcare Providers

Lakehead UNIVERSITY

School of Kinesiology
t: 807-343-8544

Letter of Invitation Regarding Prescription To Get Active Barriers and Facilitators: Prescription Recipient Interview

Dear Potential Participant,

You are invited to participate in a project titled "Understanding the Barriers and Facilitators to a Physical Activity Prescription Program from the Perspectives of Recipients". The project is being led by Justin Tremblett, MSc candidate, under the supervision of Dr. Erin Pearson, Associate Professor: both from the School of Kinesiology at Lakehead University.

PURPOSE
The purpose of this study is to explore the barriers and facilitators you may be experiencing with regard to: 1) obtaining a prescription from Prescription To Get Active (RxTGA), 2) redeeming your Prescription to Get Active (RxTGA) prescription, and 3) engaging in physical activity in line with your prescription. You are being invited to participate because you reside in Alberta, received your Prescription to Get Active (RxTGA) prescription from a healthcare provider within the previous year, are aged 18-64, have access to a WI-FI compatible device, and are fluent in English.

WHAT IS REQUESTED OF ME AS A PARTICIPANT?
As a participant, you will be asked to 1) complete a brief demographic questionnaire asking about things like your gender, ethnicity, and age; and 2) engage in a one-on-one interview with a member of the research team to explore your RxTGA experiences. Completion of these two components should take approximately 30-45 minutes. As a token of gratitude for participating in the study, you will be provided with a $40 gift card upon completion of the interview.

WHAT ARE THE RISKS AND BENEFITS?
It is important to know that there are no anticipated risks or harms associated with involvement in this research. There are no right or wrong answers. You may choose not to answer any questions and can withdraw from the study at any point without penalty. Alternatively, through participating, you are helping to understand the barriers and facilitators individuals may face with RxTGA. By providing this information, you can help RxTGA to make changes that make RxTGA more friendly for everyone.

WHAT ARE MY RIGHTS AS A PARTICIPANT?
It is important for you to understand that your participation in this study is entirely voluntary. Thus, you may choose not to answer any question you are not comfortable answering. You are also able to refuse participation by not completing the interview. To protect voluntariness, as a participant you are free to withdraw from the research at any time, without offering any reason for doing so. You will not face any disadvantage or penalty for withdrawal. Your care will not be impacted by your decision to participate (or not) in this research.

Lakehead UNIVERSITY

School of Kinesiology
t: 807-343-8544

CONFIDENTIALITY AND ANONYMITY
Steps will be taken to protect the confidentiality of all study results. To ensure your identity remains confidential, each participant will be provided an ID code. Participant names and ID codes will be stored on a file separate from the study findings. The study findings may be released but participants will remain confidential. Only the researchers will have access to the documents gathered for this study. Any presentation of the findings will be anonymized meaning, they will not name you personally. This interview includes open-ended questions, and participants may choose to include identifiable information. The research team will work to remove identifying information before any data is reported or analyzed.

HOW WILL MY DATA BE STORED?
All findings, including audio recordings, transcriptions, and data from this study will be used only for the purpose of this study and be securely stored for a minimum of 7 years as outlined by Lakehead University's Policy. The researchers (Justin Tremblett and Dr. Erin Pearson) will be the only ones with access to the findings. Audio recordings and electronic data will be securely stored on the researcher's password protected computer. Any hard copy information will be stored under lock and key in the research supervisor's office at the School of Kinesiology.

RESEARCH ETHICS BOARD REVIEW AND APPROVAL:
This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca

FUNDING AND POTENTIAL CONFLICTS OF INTEREST
This study is funded by Prescription to Get Active (RxTGA). Members of the research team include Dr. Fariba Aghajafari and Jeff Tareta who are representatives for Prescription to Get Active (RxTGA). Given this affiliation, they will not have access to any of the data collected for study purposes but will only review anonymous summaries. The other research team members declare no actual, perceived, or potential conflicts of interest.

HOW CAN I RECEIVE A COPY OF THE RESEARCH RESULTS?
Should you wish to request a summary of research findings after completion of the study, please notify the researcher below, Justin Tremblett.

If you have any questions or concerns about the research, please feel free to contact us via the contact information below.

Thank you for your consideration.
Yours truly,

Justin Tremblett
MSc Candidate, School of Kinesiology, Lakehead University
Email: jtremble@lakeheadu.ca
Dr. Erin Pearson, Principal Investigator
Associate Professor, School of Kinesiology, Lakehead University

Lakehead UNIVERSITY

School of Kinesiology
t: 807-343-8544

Informed Consent to Participate:

I _____ have read and understand the information letter and agree to participate in the study. In doing so, I understand:

- the procedures involved and what will be required of me as a participant
- the potential risks and benefits involved with participation, and what those are
- that my participation is completely voluntary
- that I am free to not answer any questions and can withdraw my participation at any time without penalty
- that the data will be stored securely at Lakehead University for a minimum of 7 years following completion of the project
- that I will remain anonymous in any presentation or publication of the findings
- that I may request to review the interview transcriptions for accuracy once complete (as indicated below)
- that the findings of the research will be available to me upon request after the study is complete (as indicated below)

I would like to review my transcript of the interview for accuracy prior to its use in the study.
☐ Yes ☐ No

I would you like to be sent a summary of the general findings of the research upon completion.
☐ Yes ☐ No

If you answered yes to any of the above, please include your preferred method of contact:

_____

All questions have been answered to my satisfaction.

Print name: _____ Date: _____

Signature: _____

Appendix D

Demographic Questionnaire for Healthcare Providers

What is your age?: _____

What is your sex? _____

What is your gender?: _____

Male _____ Female_____ Other_____

What is your ethnicity?: _____

What is your current professional position?

Physician _____ Allied Health Professional_____ Physical Activity Professional_____

Other _____

What is your title?:_____

How long have you been in your current practice?

> 2 Years_____ 2-4 Years_____ 4-6 Years_____ 6-8 Years_____

8-10 Years_____ 10-20 Years_____ 20-30 Years_____ 30+ Years ____

On average, how many patients do you communicate with on an average day?:_____

On average, how much time do you spend with each patient?

<2 Minutes_____ <10 Minutes_____ 10-20 Minutes_____ 20-30 Minutes_____

30+ Minutes_____

What is the estimated percentage of patients you prescribe exercise to on a weekly basis?

<10% _____ 11-25% _____ 26 – 35%_____ 35 - 45% _____ 50+%_____

How long have you been registered as a prescriber with RxTGA? _____

Appendix E
Barriers and Facilitators to Prescribing Physical Activity
(Adapted from O'Brien et al., 2017, 2020, 2023)

Part 1: Barriers
Please indicate whether each statement prevents you from prescribing physical activity to your patients.

Please rate the following statements using the guide below.
1= Does not at all prevent me from prescribing physical activity
2= Sometimes prevents me from prescribing physical activity
3= Often prevents me from prescribing physical activity
4= Completely prevents me from prescribing physical activity

1. Patients not interested in physical activity_____

   1 2 3 4

2. Lack of guidance/resources on physical activity for those with chronic disease____

   1 2 3 4

3. Lack of time_____

   1 2 3 4

4. Patients prefer standard medical care

   1 2 3 4

5. Lack of physical activity education in medical/professional school_____

   1 2 3 4

6. Personal knowledge _____

   1 2 3 4

7. Other lifestyle changes are more important to patients_____

   1 2 3 4

8. Lack of evidence for the effectiveness of physical activity prescription_____

   1 2 3 4

9. Lack of patient interest in physical activity_____

   1 2 3 4

10. Lack of knowledge regarding how to prescribe physical activity_____

    1 2 3 4

11. Lack of resources necessary to provide a RxTGA physical activity prescription_____

    1 2 3 4

12. Patient competing illness_____

    1 2 3 4

13. Competing variables (financial, weather, etc.)_____

    1 2 3 4

14. Lack of follow-up with patient_____

    1 2 3 4

15. Lack of appropriate billing structure

    1 2 3 4

16. What other barriers may prevent you from writing RxTGA physical activity prescriptions?

    _____

17. Is there anything else about barriers to RxTGA physical activity prescription writing not included to this point that you would like to share?

    _____

Part 2: Facilitators
Please indicate whether each statement helps facilitate you to prescribe physical activity to your patients.

Please rate the following statements using the guide below.
1= Does make it easy for me to prescribe physical activity
2= Sometimes makes it easy for me to prescribe physical activity
3= Often makes it easy for me to prescribe physical activity
4= Makes it very easy to prescribe physical activity

1. Patient expectation or interest in physical activity_____

   1 2 3 4

2. Patient having greater readiness to do physical activity____

   1 2 3 4

3. Having physical activity and exercise programs in the community to refer to_____

   1 2 3 4

4. Readily available resource supports and tools_____

   1 2 3 4

5. Personal comfort and confidence in the subject area_____

   1 2 3 4

6. Availability of continuing physical activity prescription education opportunities_____

   1 2 3 4

7. Having physical activity facilities in the community_____

   1 2 3 4

8. Flexibility in booking or scheduling patients_____

   1 2 3 4

9. Other qualified physical activity professionals are available to refer to as needed_____

1 2 3 4

10. Support of practice group, management, manager, or organization_____

2 2 3 4

11. Administrative assistance _____

1 2 3 4

12. What other facilitators may help you write RxTGA physical activity prescriptions?

_____

13. Is there anything else about facilitators to RxTGA physical activity prescription writing not included to this point that you would like to share?

_____

Appendix F

COM-B Questionnaire for Health Care Providers (Adapted from Lydon et al., 2019)

Please Use the Guide Below:
1= Strongly Disagree
2= Disagree
3= Neither Agree nor Disagree
4= Agree
5= Strongly Agree

1. I have received adequate training in physical activity prescription procedures from RxTGA.

   1 2 3 4 5

2. I know the moments when a physical activity prescription is required.

   1 2 3 4 5

3. I know how to write a RxTGA physical activity prescription.

   1 2 3 4 5

4. I engage in writing RxTGA physical activity prescriptions without thinking.

   1 2 3 4 5

5. I find it easy to adhere to RxTGA physical activity prescription writing protocols in this practice/clinic.

   1 2 3 4 5

6. I have enough time to engage in writing RxTGA physical activity prescriptions.

   1 2 3 4 5

7. This practice/clinic has adequate resources to support RxTGA prescription writing

   1 2 3 4 5

8. Physicians in this practice/clinic always engage in writing RxTGA physical activity prescriptions when required.

   1 2 3 4 5

9. Allied healthcare professionals in this practice/clinic always engage in writing RxTGA physical activity prescriptions when required.

   1 2 3 4 5

10. Healthcare professionals visiting this practice/clinic always engage in writing RxTGA physical activity prescriptions when required.

    1 2 3 4 5

11. The RxTGA physical activity prescription writing protocols for this practice/clinic are clear.

    1 2 3 4 5

12. There are prompts to remind healthcare providers to engage in writing RxTGA physical activity prescriptions in this practice/clinic.

    1 2 3 4 5

13. RxTGA physical activity prescription writing is considered important by staff in this practice/clinic.

    1 2 3 4 5

14. RxTGA physical activity prescription writing is considered important by staff in this practice/clinic.

    1 2 3 4 5

15. I strive to write RxTGA physical activity prescriptions in this practice/clinic whenever I see a need.

    1 2 3 4 5

16. We remind each other to write RxTGA physical activity prescriptions in this practice/clinic.

    1 2 3 4 5

17. Physical activity guidelines encourage me to write RxTGA physical activity prescriptions in this practice/clinic.

    1 2 3 4

Appendix G

Prescription to Get Active Organizational Questionnaire for Healthcare Providers

Please indicate how much you agree with the following statements

Please use the guide below:
1= Strong Disagree
2= Disagree
3= Neither Agree/Disagree
4= Agree
5= Strong Agree

1. I am very satisfied with my overall Prescription to Get Active (RxTGA) experience?

   1 2 3 4 5

2. I am very satisfied with my overall Prescription to Get Active (RxTGA) experience?

   1 2 3 4 5

3. I have the materials I need to administer the RxTGA prescription effectively.

   1 2 3 4 5

4. I have received the training I need to feel confident in administering the RxTGA effectively.

   1 2 3 4 5

5. The RxTGA program is a valuable tool to promote good health for my patients.

   1 2 3 4 5

6. In the last 6 months, someone at my clinic has talked to me about the progress of their RxTGA prescription.

   1 2 3 4 5

7. I would recommend to my colleagues that they utilize the RxTGA tool to help prevent and treat chronic conditions in their patients.

   Yes No

If you answered yes to question 7, what makes you say this? If you answered no, what would need to happen to change your answer to a yes?

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8. What does RxTGA need to START DOING to become a more valuable health promotion program?

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9. What does RxTGA need to STOP DOING to become a more valuable health promotion program?

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10. What does RxTGA need to CONTINUE to do to become a more valuable health promotion program?

Appendix H

Recruitment Poster for Recipients of Physical Activity Prescriptions

Have you received a Prescription from RxTGA?

Researchers want to hear from you!

We want to understand your RxTGA experiences. Your views will be used to enhance the program for current and future users!

You may be eligible if you:

- Reside in Alberta
- Received a RxTGA prescription in the previous three years
- Want to share your RxTGA experiences

What's Involved?

- Complete a brief demographic survey
- Engage in a one-on-one interview over the phone or online lasting about 30 minutes
- Receive a $40 gift card for your time.

To find out if you are eligible to participate, please visit the link or email the researcher noted below:

https://www.surveymonkey.com/r/6ZKJ7VB

Justin Tremblett:
jtremble@lakeheadu.ca

Principal Investigator: Dr. Erin Pearson

Approved by the Lakehead University Research Ethics Board, #1470311

Appendix I

Eligibility Questionnaire for Recipients of Physical Activity Prescriptions

Do you currently live in Alberta?

Yes___ No_____

Did you receive your RxTGA in Alberta?

Yes_____ No_____

Have you received your RxTGA prescription within the previous year?

Yes_____ No____

Do you have access to a Wifi-Compatible Device or a telephone?

Yes ___ No_____

Would you be interested in participating in a 20–30-minute interview to assess the barriers and facilitators to engaging with your RxTGA prescription?

Yes _____ No _____

If yes, please leave an email address and the researcher will contact you within a few days _____

Appendix J

Demographic Questionnaire for Recipients of Physical Activity Prescriptions

1. What is Your Age?: _____

2. What is Your Sex?: _____

3. What is your Gender?: _____

4. What is your highest level of education obtained?

High School_____ Undergraduate Degree_____ Post-Graduate Degree_____

Other, please specify_____

5. What is your ethnicity? _____

6. What is your approximate income range

$0-10,000 ____ $10,000-20,000____ $20,000- 30,000_____30,000- 40,000____

$ 40,000- 50,000____ $50,000-60,000_____ $60,000-70,000___ $70,000-80,000____

$80,000-90,000____ $90,000-100,000_____ $100,000+_____

7. Where did you receive your RxTGA prescription?:_____

8. Who wrote your RxTGA prescription for you? _____

9. Did you register your prescription on the RxTGA website?

Yes___ No_____

10. Approximately how long after you received your prescription did you register it?

Within 1 week_____ Within 1 Month____ Within 3 months_____ Within 6 months___

More than 6 months_____

11. What is your profession/job?:

Appendix K

Interview Guide for Physical Activity Prescription Recipients

To start, I just want to say thank you for taking the time to interview with me today. To briefly introduce myself, My name is Justin Tremblett, I am a Master's student at Lakehead University in Thunder Bay Ontario and working under the supervision of Dr. Erin Pearson. I am very interested in your feedback and learning more about what Prescription to Get Active (RxTGA) has been like for you. For the next 30 minutes or so, I am going to ask you some questions about your experiences with getting a prescription to get active, registering that prescription, and then using your prescription.

Before I begin, I will briefly go over the letter of information for this study which describes the purpose, benefits and potential risks, and your rights as a participant. Please feel free to ask any questions or ask for clarification on anything about the study that you are not sure of.

*** Read over Letter of Information***

Before we begin. Please know that there are no right or wrong answers and we would like to hear anything you have to say about your Prescription to Get Active experience, feel free to go in-depth with any answers.

1. To start, can you tell me, what does physical activity mean to you? Is it something that you value in your everyday life?
    - What motivates you to be physically active?

2. Could you tell me about the appointment where you received your Prescription to Get Active?
    - About how long ago did this take place?
    - Was RxTGA something you asked for? Or was it something that your _____ brought up/
    - What did you like about that process? Dislike?
    - Was talking to your doctor about physical activity something that you were comfortable with?

3. After you received your prescription? What was it like for you to register your prescription?
    - What made it hard?
    - What made it easy?

4. How often would you say you use your prescription?
    a. What about on a weekly/monthly basis, approximately?

5. What personal physical or mental health improvements have you noticed from using your prescription? So we can start with physical health. Have you noticed any physical health improvements? Mental?

6. To what extent do other people (e.g., family/friends/colleagues) impact your ability to use your prescription?

- Help or hinder
- How do others impact your motivation to use your prescription?
- How often do you do physical activity with others? What's important about this to you, if anything?

7. When it comes to using your prescription, what barriers do you experience?
- Refer to diagram below.
- A. During your initial meeting
- B. Finding a physical activity option that fits your needs
- C. Being able to participate in physical activity

8. When it comes to using your prescription, what kinds of things help? (e.g., facilitators)
- Support, money, accessibility, opportunity, winter

9. On a scale of 0-10 (0 being not at all and 10 being the most it could be), how confident do you feel when you are engaging in physical activity?
- What impacts your confidence and why?

10. What kinds of physical activity options are right for you?

11. To what degree does RxTGA provide enough physical activity opportunities that are right for you?
- Are there any options for physical activity that would be of interest to you that you don't see offered currently?

12. On a scale of 0-10 (0 being not at all and 10 being the most it could be), how confident are you in putting together a physical activity plan that fits your physical activity needs/goals?

13. If a problem with your prescription arose, how much do you feel you could count on Prescription to Get Active to help you resolve the problem?
- Examples: You can't find a suitable physical activity facility for you to use; you cannot access the Prescription to Active website

14. What could RxTGA start doing to be a more valuable physical activity program for you?
- Stop doing/Continue doing

15. How does engaging with your prescription make you feel?
- If you aren't engaging, what might help you to do so, if anything?

16. Would you recommend RxTGA to a friend/family member or co-worker? Why or why not?

Is there anything else pertaining to this study that has not been covered that you wish to share?

Appendix L

Interview Model for Physical Activity Prescription Recipients