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Addressing Key Stakeholders to Assess the Reach of a Community-Based Pediatric Oncology Physical Activity Program

by

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Abstract

Physical activity provides both physical and psychosocial benefits to children with cancer. The Pediatric Cancer Patients and Survivors Engaging in Exercise for Recovery (PEER) program is a community-based pediatric oncology program supporting the physical, social, and mental wellbeing of children affected by cancer. Using the RE-AIM framework to assess the reach of the PEER program, we implemented a mixed methodology approach to gather both quantitative and qualitative data from key stakeholders. Participants included healthcare professionals practicing in pediatric oncology, parents/guardians of PEER program users and parents/guardians non-users, adolescent PEER program users and eligible adolescent non-users, and Kids Cancer Care informants. Participants completed a preliminary survey followed by an optional 30-minute in-person or telephone interview with the study coordinator. The results generated six main themes around factors that impact the reach including knowledge, program support, sharing information, program referrals, participation barriers, and participation facilitators. Understanding these themes related to the PEER program's reach provides potential solutions to foster increased PEER program awareness and uptake by the pediatric cancer community.

Keywords: pediatric oncology, physical activity, programming, RE-AIM, reach

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Dedication

This work is dedicated to my buddy, Finn. Assisting you in the PEER program has been beyond rewarding as I witness your incredible growth, strength, and perseverance. I will always be ready to race to the lions with you.

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Abbreviation	Definition
HCP	Healthcare Professional
KCC	Kids Cancer Care
PEER	Pediatric Cancer Patients and Survivors Engaging in Exercise for Recovery
HSCT	Hematopoietic Stem Cell Transplant
RE-AIM	Reach Effectiveness Adoption Implementation Maintenance
CEP	Certified Exercise Physiologist
AEP	Accredited Exercise Physiologist
ACH	Alberta Children's Hospital

Chapter 1 Introduction

Purpose Statement

Utilizing the RE-AIM framework, the purpose of this project was to gather perspectives from multiple stakeholders on possible means of improving the reach of the Pediatric Cancer Patients and Survivors Engaging in Exercise for Recovery (PEER) program. The RE-AIM framework encourages program planners, evaluators, readers of journal articles, funders, and policy-makers to focus on essential program elements that can improve the sustainable adoption and implementation of effective, evidence-based health promotion programs (Belza et al., 2007). Within RE-AIM, the reach factor is the extent to which a program attracts its targeted participants. This current work focused on assessing the PEER program's reach using 3 populations. First, we gathered information from parents/guardians of PEER users and non-users, as well as adolescent PEER users and non-users, regarding their awareness of, interest in, and feedback for the PEER program. Second, the focus was on understanding healthcare professionals' (HCP) knowledge of the PEER program and how that knowledge has translated into clinical referrals towards the program. Third, the aim was to better understand the Kids Cancer Care's (KCC) partnership with the PEER program and the ways in which a greater awareness of the program with the intended audience (e.g., families of a child with cancer) can be generated from this source.

Literature Review

Pediatric Oncology. Approximately two in five Canadians will receive a cancer diagnosis in their lifetime (Canadian Cancer Statistics, 2015). Of these cancer cases, 2% will be members of the pediatric population whose ages range from 0 to 17 years old. While cancer remains relatively rare in the pediatric population, it is important to study because it is the most common cause of death due to disease in children over the age of one (Davidoff, 2010). The prevalence of different cancer types varies in the pediatric population according to age with particular cancers being more common in children under the age of 14 versus 15 and above. Children age 0-14 years old are most commonly diagnosed with leukemia (32%), brain and central nervous system (19%), and lymphoma (11%), with the majority of cancer deaths resulting from brain and central nervous system, leukemia, neuroblastoma and other peripheral nervous cell tumours (Canadian Cancer Society, 2018). However, adolescents and young adults aged 15-29 years old are more likely to be diagnosed with thyroid (16%), testicular (13%), Hodgkin lymphoma (12%), and melanoma (8%) with the majority of cancer deaths resulting from leukemia, brain and central nervous system, and bone cancer (Canadian Cancer Society, 2018). Cancer treatments often include multiple modalities of therapies including chemotherapy, immunotherapy, surgery, radiation therapy, and hematopoietic stem cell transplant (HSCT). The goals of the treatment are to target the cancer cells' death, minimize short and long-term toxicities, and maximize patients' quality of life. Although the potential side effects of cancer treatments are extensive and vary across the different therapies, some common effects include fatigue, nausea, immune suppression, loss of appetite, vomiting, anemia, diarrhea, distress, depression and anxiety (Huang et al., 2011; Kremer et al., 2012; Shankar et al., 2008).

Pediatric Oncology and Physical Activity. Two of the greatest challenges facing public health in the 21st century are a lack of physical activity in children and adolescents and rising levels of childhood obesity (Belanger et al., 2016). Pediatric cancer survivors are particularly vulnerable to these issues for a number of reasons. To begin, the cancer treatments needed to achieve remission or sustain life can cause a range of short and long-term negative implications on physical and mental health. These include, but are not limited to, decreased cardiovascular fitness, musculoskeletal abnormalities, limited range of motion, increased likelihood of developing metabolic syndromes (i.e., obesity and diabetes), fatigue, neurocognitive deficits and social isolation (Ness & Gurney, 2007). These physical and psychosocial side effects have been linked to a decreased ability to perform activities of daily living and overall well being (Haung & Ness, 2007). This inactivity can then carry over into adulthood, which has the additional potential health impacts of a sedentary lifestyle such as cardiovascular disease, secondary cancers, obesity, and mental health issues.

Physical activity has been studied as a safe and important part of a healthy lifestyle and can prevent or reduce the severity of the side effects experienced during pediatric cancer therapy and survivorship care (Ortega-Sanchez et al., 2004). It has also been identified as an activity that can enhance the feeling of normalcy for children with cancer as their lives are often dramatically changed by their disease and its treatments. Formally, physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure (Caspersen et al., 1985). For children, physical activity is often accomplished through game playing, engaging in community-based sports (or learn-to-play programs), and physical education opportunities at school. Unfortunately, for children with cancer, many of these normal physical activity developmental opportunities are missed (Chamorro-Viña et al., 2015).

Nineteen studies have evaluated physical activity and assessed health-related fitness in pediatric cancer survivor populations (see Table 1 for an overview; Perondi et al., 2012; Tanir et al., 2012; Marchese et al., 2004; San Juan et al., 2007; San Juan et al., 2007; San Juan et al., 2008; Moyer-Mileur et al., 2009; Rosenhagen et al., 2011; Keats & Culos-Reed, 2008; Shore and Shepard, 1999: Takken et al., 2009; Chamorro-Viña et al., 2010; Hartman et al., 2009; Wurz et al., 2014, Geyer et al., 2011; Bogg et al., 2015; Esbenshade et al., 2014; Kabak et al., 2016; Yeh et al., 2011). These studies were either supervised, home-based, or a combination of both of these methods. The intervention periods ranged from 6 weeks to 2 years and the frequency of intervention varied between 1 to 7 times per week. Most of the physical activity programs reported a combination of moderate aerobic training with some progressive resistance training and flexibility. Throughout these studies, evaluating changes to pediatric cancer patients' and survivors' health-related fitness was assessed to measure the benefits of physical activity. Health-related fitness is comprised of cardiovascular fitness, muscular endurance, muscular strength, body composition, and flexibility. These are valuable outcomes to study as they are often negatively affected by cancer and/or cancer therapy. Although this field of research is relatively young, intervention results reveal improved cardiorespiratory fitness, strength, body composition, flexibility and physical function among pediatric cancer survivors. Most importantly, no negative side effects were reported in any of the physical activity programs.

Table 1

Summary of Literature for Pediatric Oncology and Physical Activity Interventions

Authors, Year	**Population**	**Intervention**	**Results**
Perondi, M.B., Gualano, B., Artioli, G.G., Painelli, V.S., Filho, V.O., Netto, G., Muratt, M., Roschel, H., & de Sa Pinto, A.L., 2012	ALL (maintenance phase) 6-16 years old n=6	Duration: 12 week supervised in-hospital intervention Frequency: 60 min, 2/week Intervention: Progressive resistance training, aerobic training	Strength increased 50-73% in all muscles tested
Tanir, M.K. & Kuguoglu, S., 2013	ALL (in remission) 8-12 years old n=40	Duration: 12 week home-based intervention Frequency: 3 times/day, 3/week Intervention: Progressive resistance training, active ROM exercises, aerobic training	Increased aerobic capacity, functional capacity and strength
Marchese, V.G., Chiarello, L.A., & Lange, B.J., 2004	ALL (maintenance phase) 5-15 years	Duration: 12 week, 5 sessions of individualized physical therapy + 4 months home-based exercise Home-based: Functional	Increased ankle ROM and knee extension strength, maintain/no change

	old n=28	exercises of daily living, lower extremity strengthening, and aerobic training	aerobic capacity
San Juan, A.F., Fleck, S.J., Chamorro-Viña, C., Maté-Muñoz, J.S., Moral, S., Garcia-Castro, J., Ramirez, M., Madero, L., & Lucia, A., 2007	ALL (maintenance phase) 4-7 years old n=7	Duration: 8 week supervised in-hospital intervention Frequency: 90 min, 3/week Intervention: Progressive resistance training, aerobic training	Increased functional capacity and strength
San Juan, A.F., Fleck, S.J., Chamorro-Viña, C., Maté-Muñoz, J.S., Moral, S., Garcia-Castro, J., Ramirez, M., Madero, L., & Lucia, A., 2007	ALL (maintenance phase) 4-7 years old n=7	Duration: 16 week supervised in-hospital intervention Frequency: 90 min, 3/week Intervention: Progressive resistance training, aerobic training	Increased functional capacity, aerobic capacity and strength
San Juan, A.F., Fleck, S.J., Chamorro-Viña, C., Maté-Muñoz, J.S., Moral, S., Garcia-Castro, J., Ramirez, M., Madero, L., & Lucia, A., 2008	HSCT patients (IG: 8 ± 4 years old, CG: 7 ± 3 years old) n=15 IG= 8 HSCT CG= 7 healthy children	Duration: 8 week supervised in-hospital intervention Frequency: Approximately 50 min, 3/week Intervention: Progressive resistance training, aerobic training	Increased aerobic capacity and strength, aerobic capacity lower in HSCT patients than in healthy controls
Moyer-Mileur, L.J., Ransdell, L., & Bruggers, C.S., 2009	ALL (standard risk) 4-10 years old n=14	Duration: 12 months home-based exercise intervention Frequency: 15-20 min, at least 3/week Intervention: Individualized exercise program based on the Physical Activity Pyramid for youth	Increased physical activity minutes and aerobic capacity, maintain/no change in flexibility and upper body strength
Rosenhagen, A., Bernhorster, M., Vogt, L., Weiss, B., Senn, A., Arndt, S., Siegler, K., Jung, M., Bader, P., & Banzer, W., 2011	HSCT patients 15.3 ± 3.7 years old n=23	Duration: Approximately 34 days in-hospital intervention Frequency: Approximately 50 min, 3/week Intervention: Progressive resistance/coordination training, aerobic training	Increased functional capacity and strength. Regular physical activity during isolation phase of HSCT is feasible, safe, and counteracts the side effects of

			immobilization, like muscular atrophy.
Keats, M.R. & Culos-Reed, S.N., 2008	Mixed cancer types 14-18 years old n=10	Duration: 16 weeks (follow ups at 3 and 12 months) Frequency: 90 min, 1/week Intervention: Education sessions, aerobic training, core and strength training	Increased upper body strength, flexibility, and aerobic capacity maintained through follow up assessments
Shore, S. & Shepard, R.J., 1999	Most ALL (IG: 14±0.6 years old, CG: 13±3.1 years old) n=6 IG=3	Duration: 12 weeks, supervised 1/week and home-based 2/week Frequency: 35 min, 3/week Intervention: Aerobic training and flexibility	Maintain/no change aerobic capacity
Takken, T., van der Torre, P., Zwerink, M., Hulzebos, E.H., Bierings, M., Helders, P.J.M., & van der Net, J., 2009	ALL (survivors) 6-14 years old n=9	Duration: 12 weeks, home-based 2/week, physiotherapist supervised 2/week Frequency: 45 minute, 4/week Intervention: Aerobic training, progressive resistance training and flexibility	Maintain/no change aerobic capacity, strength, flexibility, and BMI
Chamorro-Viña, C., Ruiz, J.R., Santana-Sosa, E., Vicent, M.G., Madero, L., Perez, M., Fleck, S.J., Perez, A., Ramirez, M., & Lucia, A., 2009	HSCT (in isolation phase) 4-16 years old n=20	Duration: Approximately 30 days supervised in-hospital intervention Frequency: 50 min, 5/week Intervention: Progressive resistance training, aerobic training	Increased BMI and weight, increased fat free mass and body fat, increased aerobic fitness and strength
Hartman A., te Winkel, M.L., van Beek, R.D., de Muinck Keizer-Schrama, S.M.P.F., Kemper, H.C.G, Hop, W.C.J, van den Heuvel-Eibrink, M.M., & Pieters, R., 2009	ALL 1-18 years old n=41	Duration: 2 yr, home-based exercise program with individual physiotherapist follow-up every 6 week Frequency: 7/week Intervention: Jumping, hand and leg function exercises, and flexibility	Decreased BMI and percentage body fat to normal values
Wurz, A., Chamorro-Vina, Guilcher, G.M., Schulte, F., & Culos-Reed., S.N.,	Mixed cancer types (out-patients) 5-17 years old	Duration: 12 week supervised group yoga Frequency: 60 min, 2/week Intervention: Flexibility	Increased functional mobility and hamstring flexibility, maintain/no change

2014	n=8		ankle dorsiflexion ROM
Geyer, R., Lyons, A., Amazeen, L., Alishio, L., & Cooks, L., 2011	Mixed cancer-types (on-treatment) 11.6±5.3 years old n=6	Duration: 5 week in-hospital group yoga Frequency: 60 min, 1/week Intervention: Flexibility, breathing	Increased child perception of gross motor function
Bogg, T. F., Broderick, C., Shaw, P., Cohn, R., & Naumann, F. L., 2015	Mixed cancer-types (on-treatment) 12.8±3.6 years old n=14	Duration: Supervised and individually tailored exercise program continued until discharge Frequency: 10-60 min, 5/week Intervention: Aerobic exercise, strengthening, balance, and stretching exercises	Upper and lower body strength showed stabilizing effect
Esbenshade, A.J., Friedman, D.L. Smith, W.A., Jeha, S., Pui, C.H. Robison, L.L., & Ness, K.K., 2014	ALL (at least 6 months of treatment) 7. 4±2.0 years old n=17	Duration: 6 months of ability specific, progressive stretching, strengthening, and aerobic exercise Frequency: 30-40 min, 6/week Intervention: Participants were instructed to complete pre-scribed flexibility, strengthening, and balance exercises 3 days per week, and to complete prescribed general fit- ness activities on 3 other days per week.	Improvements in knee and grip strength, hamstring/low-back, ankle flexibility and endurance
Kabak, V. Y., Duger, T., & Cetinkaya, D. U., 2016	Mostly ALL (on-treatment) (IG: 9.3±3.4 years old, CG: 6.7±3.0 years old) n=22	Duration: Length of hospital stay Frequency: 20-40 min, 7/week Intervention: Structured exercise program including strengthening, endurance, stretching, and relaxation exercises.	The children's physical function and functional performance increased statistically significantly in the intervention group ($P < 0.05$) and decreased statistically significantly in the control group ($P < 0.05$)
Yeh, C. H., Wai, J. P., Lin, U., &	ALL (on-treatment)	Duration: 6-week home-based aerobic exercise intervention	Decreased fatigue

Chiang, Y., 2011	(IG: 11.0±3.6 years old, CG: 12.5±3.9 years old) n=22	Frequency: 30 min, 3/week Intervention: aerobic exercise intervention included 3 sections: a warm-up (5 minutes), aerobic exercise (25 minutes), and cool down (5 minutes)	

Note. ALL = Acute Lymphoblastic Leukemia, ROM = Range of Motion, HSCT = Hematopoietic Stem Cell Transplantation, IG = Intervention Group, CG = Control Group

In addition to the numerous physical benefits noted above, studies have found that physical activity provides improvements in overall quality of life (Keats & Culos-Reed, 2008; Rosenhagen et al., 2011; San Juan et al., 2007; Marchese et al., 2004; Gohar et al., 2011; San Juan et al., 2008; Shore and Shepard, 1999; Speyer et al., 2010). Quality of life is defined as an individual's perception of their position in life, in the context of the culture and value systems in which they live, and in relation to their goals, expectations, and standards (Ness et al., 2009). In the studies, different measured outcomes that reflect an increased quality of life include increased and improved social interaction, improved self-esteem, decreased anxiety, improved mental health, increased comfort, and increased resilience.

Despite the growing amount of research supporting physical activity as a means to mitigate the negative effects of cancer and cancer therapies and enhance quality of life, pediatric cancer survivors still tend to be inactive (Krull et al, 2011). Wampler et al. (2012) found that only approximately 50% of pediatric cancer survivors met the Center for Disease Control and Prevention (2016) recommended 60 minutes of physical activity a day. These reduced levels of physical activity may contribute to continued impaired health-related fitness and various additional chronic health conditions linked to sedentary lifestyles (i.e., cardiovascular disease, obesity, diabetes, osteoporosis and mental health disorders; Keats & Culos-Reed, 2008). Several possible reasons for inactivity include overly cautious approaches from parents and/or physicians, anxiety or lack of confidence in the cancer survivors, social isolation, or lack of knowledge (Eyermann et al., 2005). Unfortunately, a negative cycle of repeated inactivity can begin when cancer survivors are sedentary as they experience a decline in physical functioning, which translates to a loss of performance, which then translates to greater inactivity. Not participating in physical activity for an average of two years whilst undergoing cancer treatment has a critical impact on children whose peers are typically being introduced to leisure time physical activity and sports (San Juan et al., 2011). The absence of these formative experiences and learning has significant implications for future physical activity, health outcomes and ultimately, quality of life.

Community-Based Pediatric Oncology Physical Activity Programs

Worldwide, only three community-based programs have been initiated targeting pediatric cancer survivors and physical activity (Chamorro-Viña et al., 2015). These programs use a combination of aerobic, progressive resistance, and flexibility training. Although there are no universally accepted training guidelines for children with cancer at this time, it is recommended to develop an individualized, disease-specific training program following the F.I.T.T. principle: Frequency, Intensity, Time, and Type (Chamorro-Viña et al., 2015). The three examples of community-based cancer-specific physical activity programs for children are Play Strong, the University of South Australia - Little Heroes Physical Activity Program, and the Pediatric Cancer Patients and Survivors Engaging in Exercise for Recovery (PEER) program.

Play Strong. Play Strong was developed in 2011 and operates out of Ohio, USA ("Play Strong", 2018). Its primary aim is to assist pediatric, adolescent and young adult cancer survivors in a safe transition back to physical activity through fun and games. Through this transition, improvements in functional movement skills, muscle power and strength, balance and coordination, and confidence are addressed. Participants are encouraged to meet twice a week and the program runs for 8-week time periods. Progress is monitored using quantifiable assessments like the balance error scoring system (BESS), sit-up screen, squat screen, Edgren side step test, sit and reach flexibility test, vertical jump, and PACER test. In addition, surveys at the beginning and end of the program are conducted to determine any changes in the participants' feelings and attitudes towards physical activity (Chamorro-Viña et al., 2015). Play Strong is currently offered at two locations, Westerville Sports Medicine and Orthopedic Center and Livingston Ambulatory Center, with referrals made available through the haematology/oncology/bone marrow transplant, heart center, center for health weight and nutrition, rheumatology, metabolic bone clinic, and gastroenterology/hepatology/nutrition, genetics, and sports medicine of the Nationwide Children's Hospital ("Play Strong", 2018). The number of registrants and users was not available.

Little Heroes Physical Activity Program. Although it is no longer operating, the University of South Australia – Little Heroes Physical Activity Program shared similarities in aims and framework with Play Strong. Its objective was to provide a 12-week individualized evidence-based physical activity program under the direction of an accredited exercise physiologist (AEP) within the Little Heroes Foundation Survivorship Services Program ("Little Heroes Care Program", 2018). The types of physical activities varied according to the age of the participants. Those aged 5 – 10 years old developed skills in movement, coordination, endurance and fitness, while the 11 – 18 year olds met mostly in a gym setting and developed strength, endurance and physical activity self-efficacy skills. Like Play Strong, quantifiable assessments were measured pre and post participation. Unfortunately, due to the costs associated with the

AEP and subsequent membership implications, the program was terminated in 2013. There are no publications on the program's impact available.

The PEER program. PEER was developed in May of 2012 in the Health and Wellness Lab at the University of Calgary, Alberta. It was founded on four key pillars developed in the Thrive Centre, a free adult fitness center for cancer survivors and their support people in Calgary, Alberta (Culos-Reed & Capozzi, 2012). These pillars are evidence-informed, volunteer-run, community-based, and sustainable. By having fun and being active, the PEER program's ultimate aim is to empower and improve the quality of life for children affected by cancer. The program has four primary goals with its participants. The first is to improve physical literacy in children and adolescents affected by cancer and their families. Second, is to promote an active lifestyle in order to decrease the risk of acquiring other chronic diseases resulting from the perpetuation of a sedentary lifestyle promoted by cancer and its treatment. The third goal is to restore healthy levels of muscular strength, muscular endurance, aerobic capacity and flexibility. Finally, the content of the PEER program aims to improve quality of life, body image and self-confidence, and decrease levels of fatigue in the program participants (Chamorro-Viña et al., 2015).

The PEER program is currently split into three group sessions based on age to best meet the specific expectations, preferences, barriers and motivational factors of participants': ages 2-5 years old, 6-12 years old, and 13-17 years old. The PEER delivery format is a group-based activity class based on findings that cohesive group-type fitness correlates to greater adherence to physical activity programs (Burke et al., 2008). The group-based format also makes the classes more enjoyable for the children and teen participants. PEER operates in three modules (fall, winter, and spring) where the participants meet for one-hour, one time per week, for 13-weeks, 13-weeks, and 10-weeks, respectively. Refer to Table 2 as an example of the PEER curriculum over a 5-week time period. Beyond that time period, participants continue to progress in similar increments with the inclusion of more fundamental movement skills. Every participant, both on- and off-treatment, receives clearance from their physician and a parent/guardian provides information regarding their child's disease, treatment, and side effects prior to being able to participate in the PEER program.

As of January 2017, PEER has 18 registered and screened participants in the preschool session ages 2-5 years old, 23 participants in the school session ages 5-12 years old, and 10 participants in the adolescent session ages 13-17 years old. Most of these children and adolescents were recruited to the PEER program through the Alberta Children's Hospital (ACH) and the KCC foundation (community partner with the PEER program in Calgary, Alberta).

Table 2

Example of a 5-Week PEER Curriculum (Chamorro-Viña et al., 2015)

Week	Fundamental Movement Skill	Easy application of skill	Moderate Application of skill	Hard Application of skill	Active living objective	Healthy living objective
1	Baseline test					Safety. Understand the common terminology used in class as well as behavioral expectations and class rules.
2	Run	Breaking down movement, running on the spot, slow run or jog	Sprinting	Running backwards	Review and understand the guidelines and important of physical activity	Hygiene. Learn and practice proper hand washing techniques and importance of washing hands in prevention of illness
3	Dodge	Dodging stationary objects	Dodging moving objects	Dodging multiple moving objects		RPE and Pain Scale. Use of the pain scale and rate of perceived exertion scale to understand the different levels of intensity in

						physical activity
4	Hop/skip	Hopping on the spot, step with knee drive	Hopping while moving in multi directions, skipping	Hoping while switching feet in multiple directions, skipping backwards		Understanding stiffness and soreness. Understanding different levels of stiffness and what it means in terms of getting fitter and stronger or as an indication of injury
5	Kick	Kicking a stationary ball while standing still	Kicking a moving ball while standing still	Kicking a moving ball while you are moving	Discovering factors that motivate participation in physical activity, understand why motivation is important.	Sleep and Relaxation. Understanding the importance of sleep and relaxation in recovery and health

Based on the research to date, physical activity affords multiple physical and psychosocial benefits that can mitigate the negative effects of cancer and cancer treatments. However, there has been limited translation of this evidence to practice, as seen by only 3 pediatric oncology physical activity programs that have been offered worldwide. Translational work must consider how to move this evidence to practice in order for the many benefits of physical activity to be realized by pediatric oncology patients and survivors. Sustainable programs built into the community provide an excellent vehicle to transfer this knowledge into the hands of its targeted population. When considering the development of sustainable community-based programs for children with cancer, a useful framework to direct these initiatives is the Reach Effectiveness Adoption Implementation Maintenance framework (RE-AIM).

The RE-AIM Framework

A valuable framework used to both develop and evaluate community-based programs that are translating research into evidence-based initiatives is RE-AIM (Belza et al., 2007). RE-AIM specifically identifies 5 key factors that are important, with the goal to improve the implementation and sustainability of community-based programs. RE-AIM addresses concerns at both the participant and organizational level (Belza et al., 2007). The "RE" applies to the participant level, addressing reach and effectiveness. Reach is the extent to which a program is accessing its target population. Reach also includes the concern for which barriers are preventing this targeted population from partaking in the program. Effectiveness refers to the program outcomes and is assessed according to whether or not the intervention is meeting the expected results. Essentially, does the program work for its intended purpose? The "AIM" focuses on the organization, including adoption, implementation, and maintenance. Adoption parallels reach but functions on the level of the community versus individual participants. The focus is to develop organizational support to deliver these interventions without depending on the resources provided by studies or academic institutions. Implementation/intervention fidelity includes the extent to which program components are being delivered as intended by program developers. It also assesses the consistency of the intervention across different staff and time. Maintenance in fact applies to both the participant and organization. Pertaining to the participant, maintenance is concerned with the long-term effect of the intervention on the expected outcomes and quality of life indicators. As it applies to the organization, maintenance looks to support the longevity and sustainability of effective evidence-based health promoting programs.

Rationale

There are approximately 80 – 90 new pediatric cancer diagnoses annually at the ACH, half of whom are Calgary residents and eligible for utilizing the PEER program. Eligible participants of the program need to be between the ages of 2-17 with a pediatric cancer diagnosis, have access to the ACH, and have received medical clearance by a physician. It is thus clear that there is a discrepancy between the number of eligible pediatric cancer patients and survivors for the PEER program, and the current number of ongoing PEER participants (n=51). Although not every pediatric cancer patient and survivor may be eligible for the program based on certain demographic and risk factors, there remain a significant number of potential participants who are not participating in the PEER program.

In applying an established framework (RE-AIM), barriers and facilitators to PEER program participation were identified and strategies were developed to specifically address the reach component. The ultimate aim of the current work was to understand the factors that may enable PEER to increase participant uptake, and to forward potential strategies to improve reach so that children and adolescent cancer patients and survivors can benefit from this important program. Future directions will consider the potential benefits of the implementation of these strategies within the PEER environment.

Chapter 2 Research Methodology

Methods

Research design. A case study methodology with purposive sampling of key stakeholders assessed how to improve the reach of a community-based pediatric oncology wellness program. Reach is defined as the extent to which a program is accessing its target population (Belza et al., 2007). The PEER program was the case of study. Case study methodology was most suitable, as it is designed for in-depth investigation of a limited number of issues (i.e., the reach) fundamental to a system (i.e., the PEER program; Feagin et al., 1991). This methodology has been approached pragmatically, by which reality is presumed the practical effect of ideas (Dewey, 1922). The pragmatism is that knowledge is inherently social, the result from multiple experiences, and influenced by the social environment. The central value that Dewey (1922) advocates for in pragmatism is freedom of inquiry, in which individuals and social communities are able to define the issues that matter most to them and pursue those issues in the ways that are the most meaningful to them. Such a paradigm is particularly useful when addressing a practical research question such as in the current study, as it provides meaning to all the participants' responses in gaining knowledge around the reach of the PEER program.

A mixed methods approach is considered the third methodological paradigm with quantitative and qualitative representing the first and second paradigms, respectively (Venkatesh et al., 2013). Mixed methods involve collecting, analysing, and integrating quantitative (e.g., surveys) and qualitative (e.g., interviews, focus groups) research thus offsetting the weaknesses inherent to using either method by itself. For this study, a mixed methods approach allows the richness and uniqueness of qualitative data collected from interviews and focus group to inform and expand on the quantitative findings from the survey around the PEER program's reach.

Preliminary surveys were provided to all study participants to assess the reach while the follow-up qualitative interviews explored the depths of stakeholders' perspectives with probing questions. With both the quantitative and the qualitative aspects, the question of improving the reach of a community-based physical activity program is potentially better understood with greater depth and corroboration.

Participants. Three stakeholder groups were identified because of their significant contributions to the reach and thus the sustainability of the PEER program: (1) parents/guardians of PEER program users and parents/guardians of eligible non-users and adolescent PEER program users and eligible non-users; (2) HCP including pediatric oncologists, occupational therapists (OT), physiotherapists (PT), registered nurses, psychologists, and a child life specialist; and (3) PEER program partner, KCC key personnel, involved with the PEER program outreach and delivery.

Procedure. Ethical approval of the study was obtained prior to any study participant involvement (HREBA.CC-17-0060). An initial meeting was conducted with the PEER program director and an ACH pediatric oncologist to help inform the questions to be used in the quantitative survey and qualitative semi-structured interview portions of the study.

The standardized survey (see Appendix A, Figure A.1) was provided to all study participants to establish an understanding of the areas of interest and inform the semi-structured interview. The survey included demographic information to describe the participants, and questions pertaining to the program's reach. These questions specifically addressed study participants' knowledge of physical activity relating to pediatric oncology, awareness of the PEER program, distribution of information, participation barriers and facilitators, referral barriers and facilitators, and program satisfaction, if applicable based on the study participant population.

For example, HCP were asked about referral, whereas parents and children/teens were asked about program satisfaction. All items were scored on a 1 (high/positive outcome) to 5 (low/negative outcome) scale. At the end of the questionnaire, participants were asked to indicate if they wished to be contacted for a follow-up interview.

To prepare for the interviews and focus group, the study coordinator received specific interview training in a qualitative interview workshop, followed by 10 hours of mock-interview practice to ensure preparedness. The interviews were designed to last approximately 30-minutes and participants' answers were probed to elicit examples and elaboration. For those study participants who indicated interest in a follow-up interview, the study coordinator contacted them via email or phone to arrange a time. The interviews were conducted one-on-one, using a semi-structured interview format, in a private room that was deemed convenient to the interviewee. They had the option to complete the interview at the University of Calgary, at the ACH, or at KCC. For ethical reasons, either a parent or a KCC representative was present for those participants under the age of 18. As a result, the adolescents' willingness to fully express their thoughts and feelings may have been affected. Select study participants (n=6) indicated that a telephone interview was necessary for them to partake in the interview portion of the study. For the adolescent non-user participants, a focus group was conducted (n=5) to increase recruitment and better support this population in comfortably discussing their physical activity interests as they relate to pediatric cancer. Clinical psychologist Dr. Fiona Shulte was prepared to provide clinical support in the case that the interviews provoked feelings of anxiety and/or distress in parents/guardians or adolescents. No participants indicated any distress or the need for follow-up with the psychologist.

Parents/guardians and adolescents. The first of the stakeholder groups were the parents/guardians and adolescents, who were categorized as either PEER program users or non-users. During the Fall 2017 PEER sessions, parent/guardian and adolescent users were able to complete the survey and indicate their preference for an optional interview. Of those who chose to partake in the interview, one family opted to have a telephone interview due to a scheduling conflict. All parents/guardians and adolescents had the opportunity to provide recommendations on ways to maximize the reach to eligible participants and increase participant usage of the PEER program. Parent/guardian users and adolescent users were interviewed to address the barriers to program participation and their potential solutions. Specifically, parent/guardian users addressed how they heard about the program, the barriers and facilitators to usability of the program, and their satisfaction with the program (see Appendix A, Figure A. 2.). Adolescent users focused primarily on the kinds of activities and environments they would like to see in order to continue to utilize and enjoy the PEER program (see Appendix A, Figure A. 3.).

Parent/guardian non-users were interviewed to address the barriers to program participation and provide their thoughts on potential solutions. Additionally, these non-users provided information specific to what they knew about the PEER program, the resources that would help them seek out additional information about being physically active, and the types of additional information on the role of physical activity during and after cancer treatment that they would like to receive (see Appendix A, Figure A.4). Given the adolescent PEER group is particularly underrepresented in terms of program participation, interviews included a non-user population as well. The non-user adolescents were brought together for a discussion in a focus group setting. These participants addressed questions with regards to the attractiveness of the PEER program, barriers to their participation, and made recommendations for enhancing PEER's suitability for their age group (see Appendix A, Figure A.5). Non-users were recruited through KCC utilizing two means. First, a study representative presented the study at a KCC Family Camp (October 6-8, 2017), and a Teen Camp (October 27-29, 2017), at Camp Kindle, Alberta. Interested participants completed the survey portion at this time. Second, an email invite to participate in the study was distributed through the KCC family network. Parent/guardian and adolescent non-users responded by email after having completed the survey and expressed their further interest in a follow-up telephone interview or focus group, respectively.

HCP. The second targeted stakeholder group were HCP. Interviewing HCP was important to understand overall the barriers and facilitators around referrals and/or approving patients for the PEER program (see Appendix A, Figure A.1). Specifically, HCP were asked (a) about current barriers and their overall knowledge of and satisfaction with the PEER program, (b) to provide their ideas around solutions for better or systematic referral into the PEER program, and (c) the resources they would need to facilitate referral.

The HCP participants included pediatric oncologists, physiotherapists, occupational therapists, registered nurses, a child life specialist, and a clinical psychologist. The oncologists and a child life specialist were recruited after having the opportunity to present at Research Rounds (October 26, 2017; ACH). Surveys were completed in hardcopy and participants had the option to participate in the follow-up interview. OT and PT were recruited through a KCC presentation of the PEER program (November 12, 2017; ACH). Study participants were later contacted via email to complete the survey and optional follow-up interview. Recruitment of registered nurses occurred through an email invite sent from the oncology unit manager (August 15, 2017), inviting them to complete the survey and schedule an optional follow-up interview. The clinical psychologist was contacted directly to participate in the study.

KCC. Finally, the third stakeholder group was the KCC foundation. The KCC informants included an outreach specialist and the PEER program director. Both were contacted directly and agreed to participate in the study survey and follow-up interview. The PEER program currently operates under the umbrella of KCC and it provides a significant source of referrals to the program. Like HCP, the interview questions addressed what this foundation needs in order to feel supported in promoting and raising awareness of the PEER program (see Appendix A, Figure A.7). The interview specifically examined the current barriers and facilitators to making recommendations to PEER, the sufficiency of awareness of the PEER program within KCC, and potential outreach techniques to better target potential participants for the program.

Data analysis. The study participants received an identification number and had all personal identifying information kept separate from their files to ensure anonymity. The information from the surveys were input into SPSS, analyzed for demographic information, and the reach of the PEER program assessed from each of the stakeholder groups (see Table 4). Within these groups, the survey means and standard deviations are presented. Due to the small sample size and ordinal nature of the variables, a non-parametric test (Mann-Whitney) was used to detect statistically significant differences ($p<0.05$) between parent/guardian and adolescent users versus non-users. The binary nature of one question required application of the Fisher Exact test to detect statistically significance differences ($p<0.05$) of users versus non-users.

All interviews were audio recorded, transcribed verbatim, stored and thematically coded using NVivo software. The thematic analysis of this qualitative data followed a guided process in accordance to Braun & Clarke (2006). First, the transcripts were reviewed for familiarity and initial coding commenced. Second, the codes were used to inform the development of core themes. These themes were refined throughout the process to ensure that all of the codes were being accurately represented. Third, the themes were reviewed and definitively named, allowing for them to be written up. A second author, Dr. Nicole Culos-Reed, examined the themes and reviewed them in conjunction with the codes for accuracy. All constructive feedback was dealt with by going back to the transcripts, reviewing the codes and discussing the issues until consensus was reached. The themes identified from the transcripts were used to further the understanding of the reach that the informants indicated in the survey.

Results

The demographics (age, sex, ethnicity, level of education, stakeholder group, user versus non-user) of the participants are displayed below in Table 3.

Table 3

Representation of Key Stakeholder Groups

Demographics	**Participants (N=50)**
Age	x=30.1 sd=12.47
Sex	
Male	11
Female	39
Ethnicity	
Caucasian	35
Black	1
Latino	5
East Asian	6
Other	2
Education	
Middle School	6
Some High School	11
Completed High School	3
Some University/College	4
Completed University/College	15
Graduate Degree	11
Participant	
Healthcare Professional	12
Parent/Guardian	19
Adolescent	17

Kids Cancer Care	2
User	
Yes	16
No	21
N/A	13

The quantitative and qualitative findings are presented together as their findings compliment one another. The results of the survey, with 1 representing a high/positive outcome, to 5 representing a low/negative outcome, are outlined according to stakeholder group (parent/guardian users and non-users, adolescent users and non-users, HCP, KCC informants) in Table 4. Comparisons between the parent/guardian and adolescent users' versus non-users' survey responses using the Mann-Whitney and Fisher Exact test are depicted in Table 5 and Table 6, respectively.

Table 4

Key Stakeholder Survey Responses

Participants (N=50)	*Overall, I feel knowledgeable about physical activity and pediatric cancer.*	*I am aware of the PEER program.*	*I understand the purpose of the PEER program.*	*I feel confident talking to others about the PEER program.*	*I have shared information about the PEER program with others.*	*The PEER program is accessible for pediatric cancer patients and survivors.*	*There are barriers affecting PEER program participation.*	*There are facilitators affecting PEER program participation.*	*There are barriers affecting PEER program referral.*	*There are facilitators affecting PEER program referral.*	*I am satisfied with the PEER program.*	*I believe the PEER program is beneficial for pediatric cancer patients and survivors.*
Healthcare Professional (N=12)	X=2.08 SD=1.24	X=1.58 SD=0.51	X=1.58 SD=0.67	X=2.25 SD=1.22	X=1.42 SD=0.51	X=1.92 SD=0.79	X=2.00 SD=0.77	X=2.20 SD=0.63	X=2.38 SD=0.74	X=3.00 SD=0.63	X=2.00 SD=0.63	X=1.36 SD=0.67
Parents/Guardians of PEER Program Users (N=12)	X=2.25 SD=1.22	X=1.17 SD=0.39	X=1.33 SD=0.49	X=1.42 SD=0.51	X=1.00 SD=0.00	X=1.33 SD=0.49	X=2.33 SD=0.89	X=2.42 SD=1.16	X=3.33 SD=1.03	X=3.50 SD=1.04	X=1.17 SD=0.39	X=1.08 SD=0.29
Parents/Guardians of Non-Users (N=7)	X=2.14 SD=0.90	X=2.43 SD=1.51	X=2.29 SD=1.25	X=3.00 SD=1.00	X=2.57 SD=1.13	X=2.14 SD=1.07	X=2.43 SD=1.27	X=3.14 SD=0.90	X=3.33 SD=0.58	X=3.25 SD=0.50	N/A	X=1.71 SD=0.49
Adolescent PEER Program Users (N=3)	X=1.67 SD=0.58	X=1.00 SD=0.00	X=1.67 SD=0.58	X=1.67 SD=0.58	X=1.67 SD=0.58	X=1.67 SD=0.58	X=2.00 SD=0.00	X=2.33 SD=0.58	X=3.00 SD=1.00	X=2.67 SD=0.58	X=2.00 SD=0.00	X=1.67 SD=0.58

Adolescent Non-Users (N=14)	X=2.21 SD=0.70	X=2.21 SD=0.97	X=1.79 SD=0.58	X=2.79 SD=0.89	X=2.00 SD=0.00	X=1.57 SD=0.51	X=2.77 SD=0.73	X=2.54 SD=0.78	X=2.71 SD=0.49	X=2.86 SD=0.38	N/A	X=1.46 SD=0.66
Kids Cancer Care (N=2)	X=1.50 SD=0.71	X=1.00 SD=0.00	X=1.00 SD=0.00	X=1.00 SD=0.00	X=1.00 SD=0.00	X=1.00 SD=0.00	X=1.50 SD=0.71	X=1.00 SD=0.00	X=1.00 SD=0.00	X=1.50 SD=0.71	X=1.5 SD=0.71	X=1.00 SD=0.00
Total	X=2.12 SD=0.98	X=1.72 SD=0.95	X=1.66 SD=0.75	X=2.22 SD=1.07	X=1.56 SD=0.50	X=1.66 SD=0.72	X=2.33 SD=0.88	X=2.44 SD=0.93	X=2.79 SD=0.88	X=2.96 SD=0.79	X=1.96 SD=0.83	X=1.38 SD=0.57

Note. 1 = Strongly Agree, 2 = Agree, 3 = Undecided, 4 = Disagree, 5 = Strongly Disagree

Table 5

Comparing Users Versus Non-Users with the Mann-Whitney Test

Statement	**Participant**	**Mean Rank**	**Exact Sig. (2-tail)**
"Overall, I feel knowledgeable about physical activity and pediatric cancer."	Parents (n=19)	User (n=12) = 10.04	1.000
		Non-User (n=7) = 9.93	
	Adolescents (n=17)	User (n=3) = 6.17	0.269
		Non-User (n=14) = 9.61	
"I am aware of the PEER program."	Parents (n=19)	User (n=12) = 7.92	0.015*
		Non-User (n=7) = 13.57	
	Adolescents (n=17)	User (n=3) = 3.00	0.016*
		Non-User (n=14) = 10.29	
"I understand the purpose of the PEER program."	Parents (n=19)	User (n=12) = 8.33	0.079
		Non-User (n=7) = 12.86	
	Adolescents (n=17)	User (n=3) = 8.33	1.000
		Non-User (n=14) = 9.14	
"I feel confident talking to others about the PEER program."	Parents (n=19)	User (n=12) = 6.92	<0.001*
		Non-User (n=7) = 15.26	
	Adolescents (n=17)	User (n=3) = 4.00	0.072
		Non-User (n=14) = 10.07	

"The PEER program is accessible for pediatric cancer patients and survivors."	Parents (n=19)	User (n=12) = 8.33 Non-User (n=7) = 12.86	0.079
	Adolescents (n=17)	User (n=3) = 9.67 Non-User (n=14) = 8.86	1.000
"There are barriers affecting PEER program participation."	Parents (n=19)	User (n=12) = 10.17 Non-User (n=7) = 9.71	0.896
	Adolescents (n=16)	User (n=3) = 4.50 Non-User (n=13) = 9.42	0.164
"There are facilitators affecting PEER program participation."	Parents (n=19)	User (n=12) = 9.00 Non-User (n=7) = 11.71	0.302
	Adolescents (n=16)	User (n=3) = 7.33 Non-User (n=13) = 8.77	0.925
"There are barriers affecting PEER program referral."	Parents (n=9)	User (n=6) = 4.92 Non-User (n=3) = 5.17	1.000
	Adolescents (n=10)	User (n=3) = 6.17 Non-User (n=7) = 5.21	0.625
"There are facilitators affecting PEER program referral."	Parents (n=10)	User (n=6) = 5.83 Non-User (n=4) = 5.00	0.810
	Adolescents (n=10)	User (n=3) = 4.83 Non-User (n=7) = 5.79	1.000
"I am satisfied with the PEER program."	Parents (n=18)	User (n=12) = 6.50 Non-User (n=6) = 15.50	<0.001*
	Adolescents (n=16)	User (n=3) = 7.50 Non-User (n=13) = 8.73	0.786
"I believe the PEER program is beneficial for pediatric cancer patients and survivors."	Parents (n=19)	User (n=12) = 7.79 Non-User (n=7) =13.79	0.010*
	Adolescents (n=16)	User (n=3) = 10.00 Non-User (n=13) = 8.15	0.550

Note. * = Significant at 0.05 level

Table 6

Comparing Users Versus Non-Users with the Fischer Exact Test

		"I have shared information about the PEER program with others."	User		**Exact Sig. (2-tail)**
			n_{yes}	n_{no}	
Participant	Parents (n=17)	n_{yes}	11	0	<0.001*
		n_{no}	0	6	
	Adolescents (n=17)	n_{yes}	1	0	0.176
		n_{no}	2	14	

Note. * = Significant at 0.05 level

Six main themes and corresponding subthemes reflect the interview responses across the stakeholder groups (n=35) including parent/guardian users and non-users, adolescent users and non-users, HCP, and KCC (refer to Figure 1). In each category, all relevant quantitative findings are first outlined, followed by the corresponding qualitative themes and subthemes gathered from the interviews.

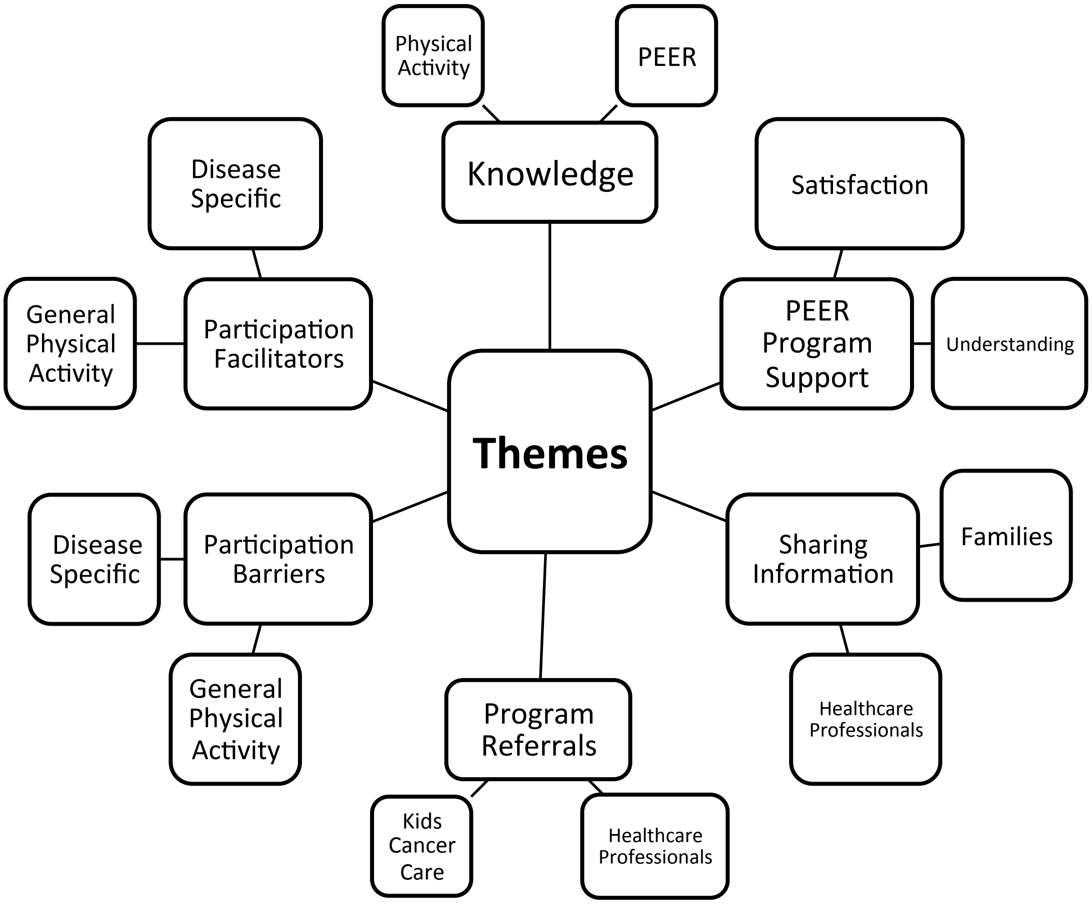

Figure 1. Themes and subthemes gathered from the interviews with key stakeholders (n=35)

Knowledge. Knowledge was defined as understanding the evidence-based benefits of physical activity for pediatric oncology patients and survivors, as well as understanding the PEER program as a community-based resource to provide the benefits of physical activity to its participants into survivorship. On average, all study participants rated their knowledge about pediatric oncology and physical activity as moderately positive (X=2.12 SD=0.98). In addition, participants believed themselves to have a relatively high understanding (X=1.66 SD=0.75) of the PEER program's initiatives.

From the interviews, the main qualitative subthemes in this category included having sufficient knowledge, lacking knowledge, understanding PEER, and valuing physical activity. When the stakeholder groups were asked about the details of their knowledge in the interviews, they generally felt informed based on the exercise guidelines for children not affected by cancer. One parent/guardian user reflected this importance of physical activity in general by stating, “I think just as much informed as for general healthy well kids. Like, these are their 60-minutes a day. Just the same.” Others felt it held a greater importance in pediatric oncology, as another parent/guardian user stated “… I feel like I do have, from what I read and [PEER program director] sent me that I have a lot of information on what the idea is. Which is basically to encourage physical activity in cancer survivors because there is the tendency to be sedentary. And too because the theory that exercise will help them in their recovery.” One HCP was concerned that physical activity need not be medical, “… in contrast to those that believe that, if you believe that physical therapy is good for everybody, that includes patients with cancer and they do not need to be segregated into an, ‘oh do you know that it’s good for them too?’ You just assume that it’s good for them because it is good for everybody. So I’m not sure that everybody would say there’s a need to know it is a distinct knowledge.”

While some felt sufficiently knowledgeable, others expressed a lack of understanding for the role of physical activity in pediatric oncology. Parents/guardians users and non-users (n=6) stated that they were not well informed about the benefits of physical activity and modes of activity for their children affected by cancer. One parent/guardian using the PEER program said, “I don’t specifically, I didn’t know the general data around this … if you were to ask me what the health benefits of [exercise for] somebody who has leukemia, I wouldn’t know.” Families also expressed a strong desire for the information that would best assist their child in treatment and recovery. Whether it was visual, physical, or mental disabilities, families still wanted to address the negative side effects of cancer and its treatments. One parent/guardian user stated, “We are one year out. Lets see where we are at now, what can we do, because as you get further out from those issues, the treatment, the concern from the HCP isn’t top of mind, whereas it is on ours because we still have to deal with it day to day.”

HCP also highlighted a gap in their knowledge regarding the benefits of physical activity for pediatric cancer patients and survivors. One HCP expressed, “I think if a patient or family came to me and said, ‘let me know about my kid who has been on this treatment or had this cancer’, I feel I would be like, ‘I need to look that up’. So, I feel I have a good sense, I won’t say that I feel 100% informed." Another HCP said, “I would want more information, like the studies and research behind activity in order, I need a refresher… we are limited by that.”

Although sufficient knowledge of physical activity and pediatric oncology was not consistently communicated among stakeholder groups, a common subtheme was appreciating its importance. HCP, parent/guardian users and non-users, adolescent users and non-users, and KCC all stated that physical activity is an imperative part of health. One parent/guardian non-user summarized it as, “oh yeah, and this population and my daughter and everybody else. It is common practice you would think, right?”

Program support. Program support was first captured as program awareness, but also as program satisfaction and confidence for those who were familiar with PEER. When stakeholder groups were surveyed regarding their awareness of the PEER program, participants responded as strongly aware (X=1.72 SD=0.95). There were significant differences, however, between parent/guardian users versus non-users ($p=0.015$) and adolescent users versus non-users ($p=0.016$) in their level of awareness. Significant differences were also found between the parent/guardian users versus non-users groups in both their satisfaction of the PEER program ($p=<0.001$) and whether they supported the benefits of the PEER program ($p=0.010$). These significant differences highlight a deficit in providing information to all of the PEER program's targeted population.

From the interviews, the qualitative subthemes included program understanding and satisfaction. When all three stakeholder groups were asked about their understanding of the PEER program in the interviews, there was much more inconsistency communicated between the groups. An adolescent user described PEER as, "a program for children who have had cancer, child cancer survivors and people undergoing treatment and their families to undergo a regiment of physical activity once per week in a fun and engaging manner." Non-users were not successful in expressing the purpose to the same extent. HCP responded at varied levels of understanding of the PEER program. Some of these HCP regarded it as "not well" while others felt, "…fairly informed. I think enough to understand the referral process and know who is included and who is not included. I would say a pretty good amount." HCP were generally able to state the targeted population for the program as any child with cancer; however, many felt unsure knowing any additional inclusion/exclusion criteria.

In the interviews, parent/guardian users were overwhelmingly satisfied with their experience in the PEER program. One parent/guardian user said, "Absolutely. Absolutely. Like I said, I think it is more than satisfied because I think you are doing way more than just that hour of PEER. Like checking in on [child's name] development, but also checking in with [child's name] physiotherapy. It is not just the hour of PEER, it just goes in [child's name] medical team. I consider PEER part of [child's name] medical team."

Parent/guardian non-users attested to their interest in the PEER program. One parent stated in support of the program, “I think it is awesome. I think sports are always good and also just a chance of interacting with other kids that might have gone through something similar to them. Just promoting a healthy lifestyle and all of that. I like it, I really I would love for my kids to go there.”

Although the adolescent groups did not show a significant difference between users versus non-users in their support for the PEER program in the surveys, the participants spoke differently about it in the interviews. One user reflected on the experience in PEER as, “I was super excited when I was in the PEER program and I really enjoyed it.” By contrast, non-users spoke at length about the barriers preventing their participation, as most knew that the program existed and chose not to come. One non-user expressed that they “preferred to work out by myself,” while another stated, “it just doesn’t necessarily show interest to me because I have other organized activities that I do.”

For those HCP who were familiar with the program, they were able to convey positive reflections. One HCP stated, “I am definitely satisfied with what is provided on site here.” However, many HCP possessed a limited knowledge of the program that posed as a challenge when responding to their satisfaction and confidence with the program. Some of these HCP requested more experience working with the program to address their satisfaction or confidence in it, while others felt that more research should be conducted with the program’s participants to receive HCP buy-in. One HCP said, “I have certainly heard positive things. But I think more evidence for that would be great. So if we could say, look at how it impacts quality of life or whatever that might be … it would be nice to have more data on that.”

Sharing information. Sharing information was defined as communicating the benefits of physical activity as well as providing the details about the PEER program to families affected by childhood cancer. On the survey, parent/guardian users responded significantly different ($p<0.001$) compared to non-users about their confidence in talking to other families about the PEER program. Additionally, significantly more parent/guardian users versus non-users ($p<0.001$) acknowledged sharing PEER information with others. HCP rated their confidence in talking about the PEER program as moderately positive ($X=2.24$ $SD=1.22$) and sharing information about the PEER program as positive ($X=1.42$ $SD=0.51$). KCC informants scored the most positively regarding their confidence in talking about the PEER program ($X=1.00$ $SD=0.00$) and sharing information about the program ($X=1.00$ $SD=0.00$).

From the interviews with the stakeholder groups, the subthemes included HCP talking about physical activity, HCP advocating for the PEER program, family users advocating for the PEER program, and non-users receptiveness to the PEER program. Both parent/guardian and adolescent users indicated they had shared information about the PEER program to other families in the pediatric cancer community. A parent/guardian user stated, "anybody that I talk to I would tell them about it." The parent/guardian users also responded to questions about sharing information with other families who are not currently participating receptiveness to the PEER program. The responses they received varied from families already being part of the program to, "they didn't know. People don't know so." For those families who were not informed about the program, they were curious about the PEER program's timing, location, and format of the classes.

Very few HCP responded, "yes" to actively prescribing physical activity as common practice. Specifically, when HCP were asked about referring patients to the PEER program, only

4 of 10 said this was common practice. One HCP responded to his/her recommendation of PEER as, "I don't prescribe it… I would just encourage it and usually what I do is for kids who play, I encourage play and outdoor play." When probed to further explore this physical activity prescription, the HCP responded, "… one thing that would make me prescribe it frequently is if I believed it was necessary or helpful. So the fact that I don't prescribe physical activity probably reflects that I don't believe it necessary to. And that could be a deficiency on my part." Furthermore, it was often not until a piece of information about the patient triggered a reminder to refer to the program. One HCP expressed, "if I have a kid who is close to discharge, and I'm starting to think about what they are going to do in the community? What it is going to be like for them? And I actually find, especially when I know a kid is previously involved in sports or we built that relationship where they express to me they were involved in sports, sometimes that does come to mind to think to do that. Or, say, if I know they have siblings, that's another thing that sort of triggers it for me or … makes it a little bit easier for me to recommend it." Some HCP are therefore only discussing the PEER program with patients when they bring up their physical activity or mention a history in sports.

KCC informants responded to interview questions about sharing information on pediatric oncology and physical activity and the PEER program very positively. The program director specified the main sources of outreach: "first source, mouth-to-mouth when families talk to other families. That is one. Second, we try to get the healthcare providers informed so we usually do one to two education seminars to inform the physicians and nurses or physiotherapists in the program in the hospital about the PEER program. The third one is advocating in other activities [KCC] have." The aim from KCC informants was to continue expanding the PEER program and to contact more HCP on a more regular basis.

Program referrals. Program referrals were all the recommendations made in to the PEER program, either formally through physician sign-off or informally through word-of mouth. All stakeholder groups were surveyed regarding the barriers and facilitators affecting PEER program referrals. No significant differences were found between the groups regarding program referral barriers (X=2.79 SD =0.88) and facilitators (X=2.96 SD=0.79).

From the interviews, the subthemes included KCC' referrals, HCP' referrals, and referral timing. KCC currently provides the greatest source of referrals to the PEER program. When interviewed, KCC spoke to the growth of the program from when it began (in 2012) to now (2018). One KCC informant expressed, "KCC is a really strong foundation and people really trust them, so something that is offered by KCC is kind of well accepted for the families who have kids with cancer. So I think it is an excellent connection we have there and at the same time … it is really awesome being in different types of activities that they offer to their families. Because you can advocate for the PEER program to families as you meet families and you can tell them what the PEER program looks like and I think that is making a huge difference. You know like, when we started and I told you with 2 kids, 3 kids, and now we have 51 kids so I think it is a huge difference."

This partner also believes that they play a significant role in the recruitment process for the PEER program. A second KCC informant stated, "yes, so we see our role as being exactly that, the recruitment part. So, we have it as part of all our program invites. And the structure of how we reach all of our families. PEER is included in all of that. So we talk about it with all of the families that we are involved with, they get emails and invite to PEER gets sent out every 2 weeks, just refreshing the families that it is there. It is on our website all of the time and it is one of our go to programs to tell our families about because it is so specialized and it is weekly and it is so conveniently located in the hospital. So everyone in the foundation is super pumped and quick to talk about the PEER program. Because it has been so successful." No barriers were identified by the KCC informants when referring families into the program. They do, however, hope to establish a stronger rapport with the HCP to support the program and refer into it.

Many of the parent/guardian users attributed their participation in the PEER program to KCC. One user stated, "if I had not contacted, been in contact with KCC, I would not know about the PEER program." That being said, parent/guardian and adolescent users and non-users expressed a desire to receive a HCP' referral. A parent non-user said, "my boy would have needed it at the time but nobody explained it to me about this. When he was in there for treatment, there were times he was lying on the bed for 24 hours seven, so that was a time he needed to exercise. Nobody told us about the program in there." Parent/guardian and adolescent users and non-users were also questioned more specifically regarding the most appropriate timing of a PEER program referral. Everyone expressed a desire to receive a HCP referral, yet there was a great variety in suggested times ranging from the immediate point of diagnosis to being at the survivorship clinic. To add, one parent/guardian user mentioned the value of repetitively delivering messages during this time as many are not being heard and/or understood.

As HCP are challenged with the ask to provide PEER program referrals, one HCP suggested the following, "if [PEER referrals] were incorporated into a routine practice… often it is just a matter of remembering. So we have a long list of things to remember. When we are in clinic, we have all the medical issues, medications, nutrition, psychosocial, distress, and these are all important. It is almost if we had checklist and we have seen this even with the more, quote on quote, medical issues, where if we wanted to make sure we didn't forget to assess lymph nodes on a clinical examination or assign a performance status which is a standard scale to get a sense of how well a child is functioning. When we put them listed on a sheet for physical examination, it is just a matter of prompting humans to remember things. So I think if we had a more standard process then maybe that is something that could be imbedded in a new patient checklist where we would want to make sure they have been engaged with obviously a physician and then a primary nurse, social worker, child life, dietician. And then if we value physical activity and its benefits, then it could be added as a list incorporated into information provided to new families. I don't know that any one in our program is opposed to the idea of physical activity, I think it is just a matter of remembering and adding it to a long list of things to remember." HCP expressed that a greater value needs to be placed on the role of physical activity in pediatric oncology among medical staff to incorporate it more successfully into routine practice and standard care.

Participation barriers. Participation barriers were the variety of reasons why participation in the PEER program was limited or not accessed by its targeted population. When all stakeholder groups were surveyed regarding their feelings that barriers affect PEER program participation, participants responded as being very neutral about the impact of barriers (X=2.79 SD=0.88). Additionally, no significant differences were found between the different groups of stakeholders. Upon discussing this theme with participants in the interviews, two subthemes of barriers emerged. These subthemes included general physical activity program barriers and specific pediatric oncology and physical activity program barriers (see Figure 2).

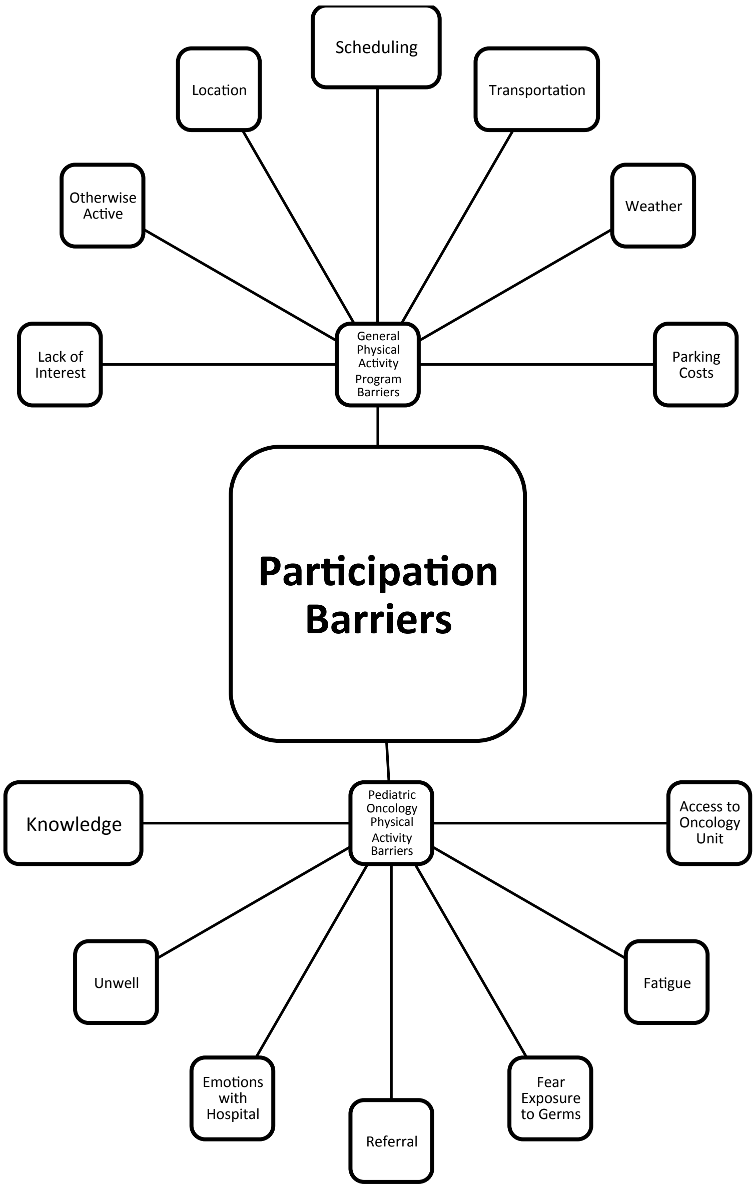

Figure 2. Participation barriers to partaking in the PEER program.

First, all stakeholder groups spoke about more general physical activity program barriers. These were barriers that would also exist for non-cancer specific community-based physical activity programs. They included limited locations, scheduling conflicts, transportation, parking costs, weather, lack of interest, and otherwise being physically active. One parent/guardian non-user stated that, “it is just my daughters’ willingness to participate in a physical activity. She is not, she doesn’t really like sports or you know, nothing physical.” Other non-users also included a lack of interest as a barrier to engaging in physical activity. On the contrary, being currently active in other physical activity programs was discussed as a barrier to PEER program participation. In fact, 1 adolescent user is now limited in attending the program because of participation in additional physical activity programming. This participant stated, “well I haven’t been able to be a part of the program for the last few years … I have started into para-sport outside of school so I am able to still be athletic.”

All stakeholder groups talked about barriers that exist specifically for pediatric oncology and physical activity programming. First, receiving a PEER program referral has been challenging for some families. A parent/guardian non-user stated, “… when my boy really need [physical activity] was when he was in treatment, I didn’t know where to ask for help.” A KCC informant also stated, “oncologists buy in might be a barrier too. If oncologists or physicians aren’t recommending or encouraging the program, the parents might not want to take it on.” From the HCP perspective, there is a burden in the number of tasks that they are responsible for. One HCP expressed, “in terms of making referrals, I think again, just not always being at the top of mind. And I think that sometimes I will meet with a patient and I will provide some recommendations and then afterwards I will think, ‘oh shoot, you know I should have mentioned this also’. So I think that is something.”

Understanding the research and benefits of physical activity within pediatric oncology was discussed as another barrier. HCP have experienced hesitation from families fearing that it will be unsafe for their child. A HCP expressed, “I think families continue to think ‘this is not appropriate for my child because they are undergoing cancer therapy and you know, can’t engage in whatever activity’”. From a KCC informant, similar feelings were expressed where there is, “… just the lack of knowledge around exercise for patients and so parents kind of being the helicopter parents trying to protect their kid and if they have been told not to do exercise or they are just scared to see their sick child exercising." Regarding the knowledge around the PEER program, the adolescent non-users discussed their misunderstanding about who the PEER program is targeted for. An individual from this group said, "when I think of PEER, I think of little kids and that makes me not want to go."

From the families' perspective, children's fatigue arose as a participation barrier. Without fully understanding the benefit of physical activity for fatigue, parents/guardians struggle to engage their child in physical activity with the PEER program. Users and non-users both made similar statements such as, "I think fatigue. When your child is fatigued and you are tired, it is hard to get them out of the house at 5 or 5:30." A parent/guardian user said, "… and then I think the other thing is everyone has so much fatigue that getting over that," however, they followed it up with "… and I think [PEER program director] has learned now with the families. I think she has learned over time to tell them if the kids are fatigued to bring them. And I think that is great."

Parents/guardians also talked about the fear of exposure to germs and unsanitary environments associated with physical activity. As the children are often in immuno-compromised states, safe environments are of the utmost concern. A parent/guardian user stated, "… the closer to in-treatment, I think being afraid of germs is a barrier." KCC informants and HCP also acknowledged this as a significant concern for these children. The children's health status was presented as a participation barrier as there are restrictions for safe blood counts and consideration for being asymptomatic of the cold and flu. A parent/guardian user said a participation barrier was, "… overall health. But that's part of our world. When you have a bunch of cancer kids that are immune-suppressed in the winter, cold and flu season comes, like [child's name] up until two weeks ago had a runny nose from September." A parent/guardian non-user mentioned regarding treatment, “we tried to do what we could but when you are there with an infant who is not, I mean and they are so sick, they don’t want to be doing too much because their little bodies are being pumped full of garbage, right. So, we did what we could.” A HCP stated that, “sometimes when they are inpatients that we see, they are not appropriate because of how sick they are, so I don’t think that would be the best time for [physical activity].”

Another discussed barrier was not having access to physical activity on the pediatric oncology unit. KCC informants expressed a desire to provide physical activity to these patients in their rooms through a modified version of the PEER program. In addition, a HCP said, “I wish that the hospital, I understand the hospital’s issues, I wish the hospital could be a more inviting environment. I would love to see [PEER] on unit 1.”

Lastly, several participants brought up the hospital site being a source of negative emotions and a barrier to participate in the PEER physical activity program. This had a particular effect on those families who were beyond the immediate need to be at the hospital in their journey to recovery. A parent/guardian non-user stated, “[child] does not like being at the hospital unless it is for clinic… he is very uncomfortable being at the hospital.” Some of the adolescent non-users added to this barrier in that the ACH was not a desirable location for them to be physically active.

Participation facilitators. Participation facilitators were the different factors that enable or improve participation in the PEER program for its targeted population. When all stakeholder groups were surveyed regarding the effect that facilitators have for PEER program participation, participants responded as being very neutral around the impact of facilitators (X=2.96 SD=0.79). No significant differences were found between the different participant categories. Upon discussing this subject with all stakeholder groups in the interviews, two themes of facilitators emerged, including general physical activity program facilitators and specific pediatric oncology and physical activity program facilitators (see Figure 3).

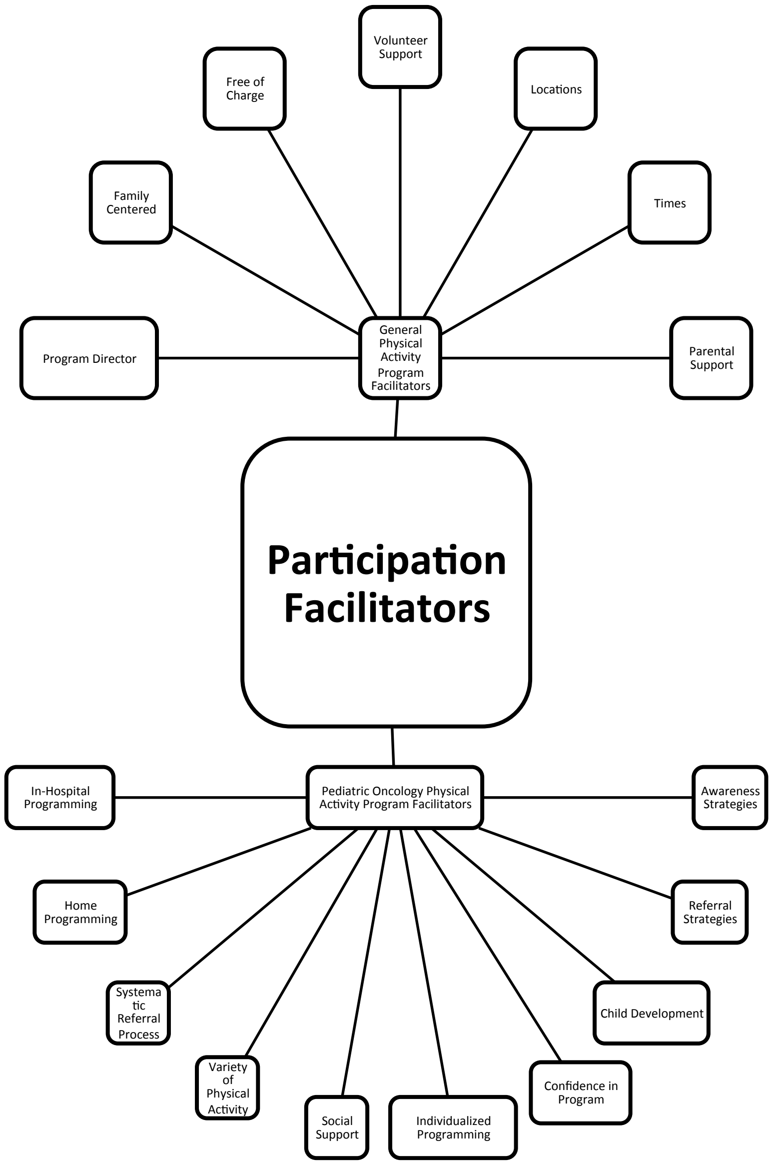

Figure 3. Participation facilitators to partaking in the PEER program.

First, stakeholder groups spoke about more general physical activity program facilitators. The general facilitators that were discussed pertaining to the PEER program included the program's schedule, locations, free of charge, family centered approach, and the program director's positive interactions with users. Another general facilitator that PEER has recently explored and began implementing was complimentary programming for parents/guardians. One parent/guardian user made a point of saying, "I like when you do yoga for the parents [laugh]. When we have that, yoga for the parents, or any parent activity, that is really nice. I have only really been able to do the yoga. That was really awesome." In addition, a parent/guardian non-user stated, "I think it might have helped if there was like, I need to get my exercise in too, and I've been pretty careful about that. But I, if there was something that I could do while I am waiting for my children, that would be helpful because I am always looking for ways to be a little more efficient [laugh]."

Second, stakeholder groups talked about facilitators that exist specifically for pediatric oncology and physical activity programming. The first pediatric oncology and physical activity program-specific facilitator discussed by all stakeholder groups was having confidence in the PEER program. KCC, HCP, and PEER users all spoke about the challenging nature of entrusting a sick child into the care of an extracurricular program. One parent/guardian user said, "it is hard to bring your kids when you haven't entrusted them in anybody else. And when you see the amount of volunteers… that helps our families immensely because we know that they're supported and we know that they're coming to a program that is well organized, where the caregivers are just as concerned about the kids as the parents." When making referrals to the program as a HCP, one stated, "the other thing that I think makes it easier is that they have professionals that understand and have studied cancer and I think, at least I have heard that from parents too, that they feel like they have got these nurses or they have these kinesiologists, people that know what to do with their kids, they know how to help their kids, as opposed to just take them to say the gym class at school, right. Or maybe they are not as comfortable or informed of what is going on with their kid. So I think that is what makes PEER probably much more of a safe place for families."

The ability to have individualized programming tailored to a child's specific needs was discussed as another facilitator within the PEER program. An adolescent user said, "I liked when I was on treatment that I was able to stay really active because I have a lot of physical limitations. So I was just starting to get back on my feet and start walking again so it was good to have that." A parent/guardian user made a similar statement with, "… the biggest barrier for us was that [child] needs one-to-one aid because she can't walk independently and even in the walker she needs some help. So finding physical therapy programs for her were not as easy. So, this one was really good because through KCC this would be great for her because her dad and I can't do everything all the time." HCP also recognized this one-on-one support option provided by PEER as a reason to recommend the program to their patients and families.

Parent/guardian users of the program attested to the noticeable progressions made by the children. As such, this was stated as being a motivation to continue to utilize the PEER program. One parent/guardian user expressed, "… she would barely make it through the class and now she is raring to go and running and she is doing really well. So and they have done a full assessment on her and her 6-minute walk test has improved … like all the objective markers have improved. So for us, it is great." Another parent/guardian user said, "he gets here and 2 or 3 minutes in the door, his confidence boosts and he is like, 'I can do this.' Instead of 'I can't,' it is 'I can.' Right, so it is not just physical, it is mental, and it is wonderful." HCP and KCC discussed the value of reporting these physical, social, and mental gains in research to expand the evidence around physical activity and pediatric oncology. A HCP said, "I think also, to be honest, having [pause] I want to say good evidence that will say, ‘ok we know that this makes a difference and here is what it makes a difference for.’ So that then if a patient came through and said, ‘ok well here is what I am struggling with,’ I could be like, ‘ok, well here is where you need to go.’ So really, having that justification of what it is doing and how it is helping.”

HCP and PEER users both spoke about the valuable social support provided by the PEER program. This support was mentioned as multifaceted in that the children received social support from their peers while the parents/guardians receive it from each other. An adolescent user said it was, “good to be able to be around other patients and survivors.” Similarly, a parent/guardian user voiced, “there is not a lot of programs out there that help, especially kids like my daughters situation, or other kids because they don’t get out of the house a lot and they don’t interact with kids who have similar, same problems, issues that are going on with them. I understand that every kid has a different kind of cancer problem/situation, but when they all come together, they don’t think that they’re sick, they don’t think that they have a problem. They just go out and have fun and enjoy themselves.” HCP recognized the social support PEER provided to its users but also to the additional family members. One HCP stated, “mental health is such a huge piece of it … how to advocate for families to be social and even when they have an immune-compromised child.” Parent/guardian users also spoke about the ease of bringing siblings and appreciating this time it provides for their kids to be together. A parent/guardian user voiced, “if I can keep my girls together that is huge because for me to do two separate [classes] would be very difficult, you know. And for me, it is really important that her sister, who is able-bodied child, work with her too. Because it is a bonding thing for us.” Adolescent non-users expressed a desire to bring a friend to satisfy this social support and increase the program’s appeal of the underutilized adolescent PEER group.

Part of the enjoyment and fun of PEER discussed by the stakeholder groups was the variety of physical activity offered by the program. A parent/guardian user said, “to be honest, you guys are doing an awesome job. Like you guys cover every corner for them. Like you always do something different, like you go bike riding, help them bike ride, you do soccer, you do gymnastics. You guys do a lot of range of stuff for the kids with what they can do and actually, you help a lot to just to encourage them to push themselves to what they need to.” An adolescent user spoke about the physical activity options and said that, “as participants, we were able to experience a lot of different activities that we wouldn’t normally be able to do.” According to the adolescent non-users, however, this group was more interested in physical activity beyond the gymnasium. One participant voiced, “I think doing like workout classes or going out and doing stuff … maybe like roller skating or whatever.”

Facilitators were also discussed that have only recently been implemented by the PEER program as well as suggestions were made to improve existing practices that could facilitate increased PEER participation. A facilitator that was only recently implemented in the PEER program was home programming. Stakeholder groups spoke about the potential for prescribed physical activity at home during times when attending PEER in the gymnasium at the Children’s Hospital was not possible. A KCC informant addressed this by acknowledging a plan “… to start home-based exercise programs, to get the kids set up in their home and get the family involved so they have a plan that they are set up for.”

A discussed facilitator that has not yet been implemented by the PEER program was in-hospital programming. One primary concern by stakeholders was to gain access to patients in the pediatric oncology unit. Without having this access, members of the targeted population of the PEER program are being missed. From a HCP perspective, “it would be nice if it could be in the hospital during the day in a place, where our kids could easily go. So whether it is in the basement in school and physiotherapy, in the sunroom on [pediatric oncology unit], or something else, nothing would sell it like being visible. Right? I know there is a million obstructions to that [laugh], but I think that is the best one… so a PEER program that is available when the kids need it as opposed to the PEER program is here now come to them." As mentioned, there was the additional benefit to being in-hospital, with PEER having greater exposure to families and HCP. Parents/guardians expressed their support for this potential facilitator. One parent/guardian user framed it as, "having a specific on-treatment group would probably be good, then having an off-treatment, because the worry about germs and stuff is super important when you are on-treatment and it is not as top-of-mind when you are off-treatment. But those kids need the attention too."

An important facilitator for PEER uptake concerning all stakeholders was possible strategies to increase program awareness. For HCP, a KCC informant expressed, "I think it more depends on education with the physicians and having them more onboard because actually, they are the ones that have to send them down. So probably have that. Have a better relationship and make them more comfortable to send the kids down." HCP also acknowledged a gap in their knowledge regarding the program. One HCP stated, "For me personally, I think it is just knowledge. Like just knowing that it's there and knowing the benefits of it. If there has already been something established, whether about the PEER program or about exercise, in cancer specifically. I think that would probably promote it a lot more among the staff. Because if it's something that's helpful, with little downsides, then I think for our patients we would want to do it. But if you don't know about it, and this is where I think that specific part to cancer comes in, because I mean everyone knows that exercise is good. But you know if there is something specific to cancer that might push people a little bit more. I don't think, from my experience at least, when you hear people talk about exercising and PEER, I don't think anyone is reluctant to refer. It is maybe just not, like I said, for me it is knowledge. Like you know, can a parent or a patient self refer? I don't actually know if they can or not. Or if they need like a HCP to bring it up. I mean if the parent doesn't know about it, they are not going to ask about it either."

Aptly informing the families regarding the PEER program was critical and stated as currently at a deficit. What needs to be addressed is the current inactivity and subsequent negative side effects that result from cancer and cancer treatments in-hospital, which can be mitigated by providing physical activity to the patients. A HCP expressed, "but that requires materials or verbal communication, and this is where I sometimes think materials are a good way because a lot, those parents will read these materials. They have a lot of time in hospital, a lot of time in clinic depending on. They have a lot of time in at least one of those two places to pass time. And often this is the kind of thing that if the reassurance is provided, families want to hear because it is health promoting, something they can actively be a part of in a situation that they often feel very helpless. It fits with a lot of people's philosophy of minimizing toxicity, which we believe in as well. It is a more holistic approach to the person receiving cancer treatment. So I think it resonates with people. I think it is just a matter of getting it to them." The stakeholder groups explored options as to who should be responsible for raising the awareness with families, and identified KCC, pediatric oncologists, physiotherapists, occupational therapists, primary nurses and social workers as key informants. Stakeholders also voiced the need for more frequent information seminars hosted by PEER to sufficiently educate families and receive their buy in.

Building upon increased awareness, the "next step" facilitator discussed by stakeholders was possible PEER program referral strategies. Currently, KCC predominately advocates for the program and initiates referrals for families into PEER. A KCC informant stated this as, "…we have a poster in the, there is a big KCC board in the outpatient clinic at the Children's…inviting families to come to PEER. Every two weeks, like I said, we send out a MailChimp invite where the families will get an updated info on the PEER program and how they can sign up. We have it on our website and we do shout-outs on social media and with some of our staff because we do try and get grants for the programs. That shares the knowledge of the program. Within the staff are people who are working on the grants for PEER. They then get all involved in the research and all the stats behind PEER so they become really well versed in it as well. And yeah, I think it is featured in our annual video last year. A family spoke out on it. So the annual video gets shown at all of our major events for fundraising and any time that we are sharing the message of KCC, that video is shown and there is families on it and talk about PEER."

The final facilitator to increase PEER reach in the future discussed primarily by HCP was developing a systematic referral process for the PEER program within the hospital. Currently, no such process is currently implemented at the ACH. In an attempt to minimize the burden of adding to the workload of HCP, it was important to explore different options available to negate forgetting about this valuable program. First, easy access to the referral forms was communicated as a pivotal component to HCP' referrals. Second, the completion of the referral form was dependent on being uncomplicated yet effective. One HCP stated, "… depending on what the referral process is like, if it is cumbersome or not. Sometimes it is easier to not refer when it's a 10-page application process versus if it is shorter. Maybe it is a little bit easier." Third, exploring options for the different types of HCP able to refer into the program. HCP recommended primary nurses, outpatient clinics, and physiotherapists as assets in assisting pediatric oncologists referring patients into PEER. One HCP admitted, "I was told that physiotherapy couldn't do the referral. And there is a disconnect between physicians and physiotherapy. Like we are not part of rounds. It is often hard to get a hold of them. And then they are usually discharged before you get the time to make a suggestion of, 'are they doing this?' Like the follow-up, knowing did the physician refer them or did anyone do this? Yeah, we are working on that." Fourth, incorporating a systematic approach into the referral process to ensure PEER was being introduced to all newly diagnosed patients was identified as a central issue. A HCP voiced, "… but also wondering, I think the binders that are given to families with paper documents are very typically, very well received and I can see them brought into the clinic and often well used. Parents keeping notes and things like that, even on paper today. So, being able to embed something that is informative but not too onerous to read to at least get people to know that physical activity is safe and beneficial…may need modification. But important that it should be part of cancer therapy and that there are resources that exist and that they should be given appropriate information to access those resources and to ask about them. Even as a starting point, I would hope this would increase uptake and the more families that talk about physical activity with their providers, the more it becomes a part of culture of practice where, just like nutrition, it is inherit to all of our discussions on in-patient rounds. Every discussion in clinic, so it can really become embedded in our culture."

Discussion

PEER is a community-based exercise program designed to improve recovery and enhance the quality of life for children affected by cancer. The program aims to restore healthy levels of strength, aerobic capacity, flexibility, coordination, balance and physical literacy through exercises and games in order to facilitate engaging children with cancer back into sports and physical activity programs. The limited availability of such programming impedes children with cancer from being active in a medically safe program, both during treatment and throughout survivorship. PEER is one of few programs available worldwide that is committed to translating the research in pediatric oncology and physical activity into a sustainable program.

The RE-AIM framework is a valuable guide used to evaluate the sustainable adoption and implementation of effective, evidence-based health promotion programs (Belza et al., 2007). It provides a framework to assess both the participant and organization level of the reach, effectiveness, adoption, implementation, and maintenance of these programs. To address the extent to which the PEER program is capturing its targeted population, the reach was focused on in the current work.

Stakeholders of a community-based pediatric oncology physical activity program provided information pertinent to the PEER program's reach. Specifically, all study participants (n=50) responded to survey questions where items were scored on a 1 (high/positive outcome) to 5 (low/negative outcome) scale and completed an optional follow-up interview (n=35) to address the barriers and facilitators that contribute to effectively targeting children diagnosed with cancer for participation in PEER. The qualitative and quantitative results are interpreted together as they support 4 novel solutions that could be used to increase the reach of PEER: (1) facilitating the sharing of knowledge regarding pediatric oncology and physical activity and increasing awareness of the PEER program among HCP and families; (2) ensuring referrals are available to all pediatric cancer patients and survivors by establishing a systematic referral process, (3) having multiple sites with a variety of time options to best suit the needs of the participants; and (4) satisfying stakeholders in delivering a legitimate evidence-based pediatric oncology and physical activity program.

Sharing of knowledge. The survey indicated higher (less positive) ratings (X=2.12, SD=0.98) around level of knowledge, and issues were shared during the interviews regarding insufficient knowledge of pediatric oncology and physical activity by HCP, parent/guardian users and non-users, and adolescent users and non-users. These groups also responded with a positive understanding about the PEER program in the survey (X=1.66, SD=0.75). From the interviews, the groups expressed more varying degrees of understanding, ranging from a high degree of understanding about the PEER program to very limited understanding. Not surprisingly, from non-users of the PEER program, there was a lack of knowledge regarding the details about the program and significant differences ($p<0.05$) found between the parent/guardian and adolescent users versus non-users. Specifically, a parent/guardian non-user stated during the interview, “my boy would have needed it at the time but nobody explained it to me about this. When he was in there for treatment, there were times he was lying on the bed for 24 hours seven, so that was a time he needed to exercise. Nobody told us about the program in there.” Statements such as this demonstrate there is clearly a gap in distilling information systematically to all potential PEER participants that should be addressed.

Furthermore, HCP and parent/guardian users and non-users indicated a lack of knowledge around different aspects of PEER participation. For example, both HCP and parent/guardian users stated their concerns about the child’s fatigue and exposure to germs as being a participation barrier. Given the approach of PEER to provide a healthy environment and the numerous precautions that are taken to ensure safety is the highest priority, these stakeholder groups brought attention to certain knowledge pieces that are being left unshared.

A solution-oriented approach to help alleviate these knowledge-related barriers was discussed. Specifically, HCP believed that knowledge about PEER and its role in the cancer journey could be shared by hosting frequent education seminars, about 1-2 times/year to ensure staff (including new staff) are aware and knowledgeable about PEER. As one HCP stated, “we have education days, usually twice a year, one to two times per year, and I actually think that would be an awesome opportunity to get in. And even just with a 30-minute presentation." The recommended platform to host these seminars included pediatric oncologist fellows' academic half days and other professional research days provided by the ACH. Second, participants also indicated primary nurses, oncologists, physiotherapists, and occupational therapists as primary targets to best establish this knowledge-sharing role. Third, there is an opportunity to increase the utilization of the Pediatric Oncology Exercise Manual (POEM): Professional Version among HCP by distributing condensed chapter summaries, to reduce the necessary reading time (Chamorro-Viña et al., 2015). Generating a sufficient awareness and understanding of the PEER program among all HCP involved in pediatric oncology will ensure knowledge-barriers within this stakeholder group are diminished and, as a result, enable them to share information and provide referrals to families affected by pediatric cancer. The sharing of information by HCP and receiving a physician-referral has been shown to significantly impact patients' behaviour change and improve adherence to medical treatment (Dimatteo et al., 1993). It is therefore paramount that HCP assume a role in the dissemination of PEER information and referring patients in to the program.

Families' awareness and understanding presented as another knowledge-related barrier, thus HCP can assist in knowledge sharing to this stakeholder group. The survey results indicated significant differences ($p<0.05$) in the levels of awareness of the PEER program when comparing PEER parent/guardian and adolescent users versus non-users. It is important to use this family education as an opportunity to address the benefits of safely delivered physical activity and address concerns around fatigue and sanitization. Families should learn that physical activity can improve the feelings of fatigue in children with cancer (Chamorro-Viña et al., 2015).

Additionally, these families should feel confident knowing that the PEER program is directed by a certified exercise physiologist with additional training in cancer and exercise, focusing predominantly on safe and sanitary practice.

The PEER program is also founded on the principles of behaviour change and incorporating physical activity into daily living for children with cancer. Beyond educating the stakeholders about physical activity and the PEER program, it is important that these individuals understand the practices necessary to sustainably achieve an active lifestyle. These knowledge pieces are well presented in the POEM manual and contain examples such as committing oneself to small increasing bouts of physical activity, even while in the hospital, to receive the related benefits (Chamorro-Viña et al., 2015). This education piece is critical as it could contribute to childhood cancer patients' and survivors' improved quality of life, cardiovascular health, reduced risk of reoccurrence, and negating the negative side-effects of cancer and its treatment (Ortega-Sanchez et al., 2004).

Program referrals. A commonly discussed subtheme among parent/guardian and adolescent users and non-users was not receiving a referral to the PEER program. Many HCP did not discuss physical activity and pediatric oncology with families and patients. Furthermore, very few families received a direct PEER referral from a HCP. The second solution to potentially maximizing the reach of the program is to establish a systematic referral process ensuring every eligible pediatric oncology patient is provided the opportunity to participate.

HCP support the idea of a systematic referral process by which they could offer PEER to all pediatric cancer diagnosis. A HCP made the recommendation to include the PEER referral as part of the "new diagnosis" binder provided to incoming families on the oncology unit. Another HCP stated, "so I think if we had a more standard process then maybe that is something that could be imbedded in a new patient checklist where we would want to make sure they have been engaged with obviously a physician and then a primary nurse, social worker, child life, dietician. Then if we value physical activity and its benefits, it could be added as a list incorporated into information provided to new families. I don't know that any one in our program is opposed to the idea of physical activity, I think it is just a matter of remembering and adding it to a long list of things to remember." Through this manner of adding the PEER referral to the "new diagnosis" binder, all in-patients would be informed about the program. In addition, it would make the referral process systematic, easily accessible, and relatively quick to complete to minimize the burden placed on HCP.

Beyond sharing information about the PEER program in the "new diagnosis" binder, HCP discussed who should be predominantly responsible for discussing the PEER program with pediatric oncology patients and families. First, primary nurses were said to be the most present and consistent HCP communicating with the patients and families, thus best permitting them to advocate for the PEER program. Second, PT and OT felt the PEER program was a suitable means to ensure their patients were adhering to physical care, particularly after their stay in the hospital. With a greater understanding of the program, PT and OT were willing to refer into the program on a regular basis. Third, parents/guardians and adolescents expressed a desire to hear more information regarding physical activity and the PEER program directly from their oncologist. The value of an oncologist-referral to an exercise and healthy eating supportive-care program was highlighted by Kirkham et al. (2017) as a means to achieve greater exercise-adherence and maintaining quality of life. One HCP said, "I am also a supporter of everybody being involved, right, because it is that Swiss cheese thing. If one person doesn't hit that person, but there's that many more people who know about it, I think that could be helpful too."

Parents discussed the most appropriate timing for when to receive a PEER program referral for their child. Consistent with the systematic referral process, making the referral available from the beginning was seen as important. Although some families felt that they may not immediately utilize the program based on the child's condition, everybody wished to know that it was available at the ACH. Consistent with implementing a referral at the beginning of the diagnosis, families who live outside of Calgary would be able to utilize the PEER program for the interim during their stay at the hospital. Additionally, by having families aware of the program early on, it gives them the opportunity to inquire more about it and familiarize themselves with the program's logistics. Provided this opportunity, these families may feel more confident engaging their children in physical activity under the direction of the PEER program. Winter et al. (2010) reported that there is a strong need to encourage pediatric oncology patients to be physically active during and after treatment to prevent the severe effects of cancer and treatment.

KCC has been a fundamental partner and currently leads advocating opportunities for the program. The KCC informants indicated that the foundation feels responsible for sharing the program with as many families affected by childhood cancer as possible. All of the PEER program parent/guardian and adolescent users attributed their participation in the program at least in part to KCC. One parent/guardian user voiced, "if I had not been in contact with Kids Cancer Care, I would not know about the PEER program." KCC has been committed to reaching as many families as possible through their presence within the oncology unit at the ACH and outreach programs provided to families affected by childhood cancer. Their current methods include having PEER information brochures, emailed newsletters, PEER presence on the KCC website, social media, PEER at KCC camps, and PEER depicted in the annual KCC video.

According to a KCC informant, these strategies have been efficacious considering the program operated with two participants during its conception and now has three separate classes hosted at the ACH gymnasium for preschool, school, and teen age-groups. A primary aim communicated by the KCC informants was to receive greater support from HCP through increased referrals into the program. One KCC informant expressed, “I think it more depends on education with the physicians and having them more onboard because, actually, they are the ones that have to send them down. So probably have that. Have a better relationship and make them more comfortable to send the kids down.”

Program availability. The stakeholder groups highlighted some of the limitations created by offering the PEER program at select locations: the ACH and Jaime’s Preschool (limited to preschool children and started in 2017). Along with limited locations, only offering the PEER program at certain times was also a barrier, but is a necessary part of the logistics of offering a small program. While the times and locations work for some participating families, there is an issue for families who reside in other quadrants of the city or beyond the city limits. The cost of parking at the hospital and travel to this location were barriers for potential participants as well. Furthermore, some children and parents/guardians associated negative feelings with the hospital and would rather not subject themselves to more time spent there for physical activity.

By expanding the PEER program to incorporate multiple sites and more times, some of these barriers may be addressed. KCC informants revealed the foundation’s future plans to add a south location to increase the program’s accessibility. An adolescent user added, “I think the surveys are really good in that you can find the times that most people that would be interested joining the program are available at. So I think that is very good. And then, even just like finding a location that would work for those that are wanting to come to PEER and not that far from everyone." In addition to considering the different potential locations to host the program, its sustainability must be taken into account. One of the discussed facilitators of the program was it being free of charge; therefore, it is important that the operational costs do not exceed the limited budget provided by KCC and place a new financial burden on the participants. The program's expansion does, however, offer the potential to negate the cost of parking, transportation, and emotions that are currently affecting some families' participation in PEER at the ACH.

Current parent/guardian and adolescent users acknowledged the PEER program for the variety of physical activities made available. By increasing the number of sites offering the PEER program, there is even greater opportunity to offer different forms of physical activity to its participants. This is particularly relevant when focusing on the adolescent age group that is currently underutilizing the PEER program. As indicated in the results, this group is most interested in participating in PEER outside of the hospital and doing activities that are different from what is provided in a school's physical education curriculum. By increasing the program's availability and physical activity options for the adolescent PEER group, there would be greater uptake by this targeted age group. Along with increased participation, the social support and social connections being sought after by this group could be addressed.

Parents/guardians spoke about their time barrier to incorporate physical activity, but expressed a desire to partake in adult exercise classes, such as yoga or running, that operate alongside their child's PEER class. A parent/guardian non-user indicated, "I need to get my exercise in too and I've been pretty careful about that. But I, if there was something that I could do while I am waiting for my children, that would be helpful because I am always looking for ways to be a little more efficient [laugh]." By expanding the offered locations and increasing participant uptake, options such as this become feasible and compliment the PEER model's family centered approach.

In addition to expanding the PEER program to incorporate multiple sites and more times, a significant contribution to the program would be to offer it within the pediatric oncology unit at the ACH. Parents/guardians users and non-users communicated the particular needs of their children when they are on-treatment versus when they are off-treatment. More specifically, when the children are on-treatment, sanitization and having no exposure to germs and infections are of the utmost importance. The journey into survivorship is equally important, however, because despite treatments subsiding, there are many late and long-term effects that could be mitigated by utilizing the benefits of physical activity. A parent/guardian user stated, "we are one year out, lets see where we are at now, what can we do. Because as you get further out from those issues the treatment the concern from the healthcare professionals isn't top of mind where as it is on ours because we still have to deal with it day to day." KCC informants and HCP discussed the benefits of engaging pediatric oncology patients in physical activity during their stay as they receive active treatment. This solution also addresses parents/guardians concerns regarding their children's particular needs when they are on-treatment versus off-treatment. Currently, the PEER program accepts participants who are on-treatment, but they must be able to come into the gym setting. The program has been unable to directly provide PEER to patients on unit 1. The aim is to tailor the PEER program within the inpatient rooms, and then allow these participants to progress into the existing program. Such exercise programs and interventions have been offered in other in-hospital settings (Speyer et al., 2010; Hinds et al., 2007; Chamorro-Viña et al., 2010; Kabak et al., 2017; Winter et al., 2013; Rosenhagen et al., 2011; Müller et al., 2014; Geyer et al., 2011; Diorio et al., 2015; Bogg et al., 2015). Ruslter et al. 2017 performed a systematic review of these exercise interventions (n=10) for patients with pediatric cancer during inpatient acute care. These researchers found that with individual, supervised, combination training with adaptability to meet variable patient abilities, physical activity programming is feasible and potentially beneficial, and thus should be offered to pediatric oncology inpatients.

A novel solution recently integrated into PEER was home-based programming. For the targeted participants who are outpatients but too unwell to attend PEER at a public space like the ACH gymnasium, they now have the option to receive a home-based physical activity program prescribed by a CEP. This solution encourages the child with cancer to move and play while they are medically unfit to attend the group classes. Parent/guardian users also expressed the difficulties experienced when their children incur the common cold or flu and are consequently unable to participate at that time. The home-based PEER model alleviates this participation barrier and enables participants to maintain their levels of physical activity until their symptoms have subsided.

Program satisfaction. Other commonly discussed themes with the study participants pertained to their satisfaction with the PEER program or, for non-users, their support for it on a conceptual level. Parent/guardian users rated both their satisfaction with the program and belief in its benefits for pediatric oncology patients and survivors significantly different ($p<0.05$) than the non-users. This overwhelming support for the PEER program was a principle facilitator for families' uptake and continued participation. A parent/guardian user regarded their satisfaction as, "I think it is more than satisfied because I think you are doing way more than just that hour of PEER. Like checking in on [child's name] development, but also checking in with [child's name] physio. It is not just the hour of PEER, it just goes in [child's name] medical team. I consider

PEER part of [child's name] medical team." A HCP stated, "definitely satisfied." Based on the content of the interviews, this satisfaction stems from 4 different factors.

First, all stakeholder groups spoke to their confidence in what the program provides as a key component of their program satisfaction and supporting its legitimacy. This confidence is regarding PEER being an evidence-based program that is committed to translating the research in pediatric oncology and physical activity into practice. In addition, PEER operates with CEP and cancer-specific experts to ensure the safe and appropriate prescription of physical activity to its participants. The goal of these professionals and KCC is to work towards improved collaboration with HCP to provide the best care available to all pediatric oncology patients and survivors.

Second, parent/guardian users discussed at length their appreciation for the PEER program director's exceptional communication regarding the details of their children's participation and class formats. A user expressed, "[director] is amazing. Like she, every week we know what is coming up." In order to continually reach all families with childhood cancer, parent/guardian and adolescent non-users also suggested receiving this communication through KCC to stay informed about the program. The idea of using a social media platform, such as Facebook, to share this information was presented by the adolescent non-users. In such a way, participants could provide feedback on different activities to participate in through PEER.

Third, the PEER program was founded on sustainability and utilizes volunteers to operate. These volunteers receive specific cancer and exercise training to be well informed while engaging children with cancer in physical activity. Parent/guardian users attested to the valuable support of these volunteers in allowing their children to succeed within the program. One parent/guardian user said, "[children] love the volunteers and we love that the kids are supported and you take care of them. We can walk away and not worry so it is very valuable to everybody.

It is really awesome." Additionally, the consistency in the volunteer support has allowed the PEER participants to build social relations and instil confidence in them returning to participate in the program. Another parent/guardian user voiced, "I think having the same volunteers every week so the kids get to know their faces and names and be excited to see you guys, so that is nice." A participation facilitator that was reiterated numerous times from study participants was the program's ability to tailor the physical activity to the individual PEER participants. This individualization is exemplified by providing direct one-on-one volunteer support with any participant in need.

Fourth, the results indicated that parent/guardian and adolescent users of the program felt that PEER was contributing to physical and mental improvements during treatment and survivorship. One parent/guardian user stated, "she would barely make it through the class and now she is raring to go and running and she is doing really well. So and they have done a full assessment on her and her 6-minute walk test has improved … all the objective markers have improved." An adolescent user said, "I have limitations on my one leg so I would have never thought I could have rock climbed. But it was really good that the program kind of enabled me to be able to do that." HCP highlighted the untapped research potential to showcase these improvements in the PEER participants. Successfully collecting and publishing data on these physical and mental measures would also serve as a means to generate greater buy in from the HCP, and thus facilitate referral.

Limitations. Despite the strengths and the knowledge gleaned from the current work, limitations are inherent in all research. Caution in interpretation of the findings must be taken into account based upon the following factors. First, a case study design is descriptive by nature. Because the study participants were purposively selected, there is an inherent selection bias that limits the generalizability of the quantitative results. Second, the small sample size of the surveys (n=50) will effect how this research translates to other community-based pediatric oncology and physical activity programs.

For the qualitative findings, a limitation may be in the ability of the interviewer to connect and further probe some of the participants (e.g., non-users) to a consistent depth during the semi-structured interviews. As a result, some of the qualitative data may be overrepresented by a portion of the stakeholder groups (e.g., users that the interviewer was familiar with in the PEER program) and not equally representative of all. As well, having participants self-select to participate, the findings only reflect the views of this population. While the qualitative approach to exploring the perspectives of stakeholders to assess the reach of the PEER program was a strength to this study, the study personnel are aware that applying the pragmatic theory reflects only one interpretation of the results and additional perspectives should be applied to this type of research.

Very few programs of this type have been initiated and therefore such novel information still holds value to encourage greater availability and sustainability of such programs. The PEER program has successfully demonstrated the translation of knowledge to practice and is a valuable case to study to expand the research behind sustainable evidence-based community programs.

Conclusion. The many added benefits of physical activity during and after cancer treatments have been outlined and support the need to increase the inclusion of physical activity within standard cancer therapies. As a result, it is critical that cancer-specific community-based physical activity programs become more available for pediatric cancer patients and survivors. Researching the reach factor of the RE-AIM framework will therefore continue to be an important factor when ensuring the effective implementation and sustainability of such programs.

Overall, this study found quantitative and qualitative data to support four key solutions that may facilitate increasing the reach of the PEER program. These included increasing knowledge sharing and awareness among stakeholders, establishing a feasible and sustainable systematic referral process, expanding the available locations and times for participants, and maintaining satisfaction among stakeholders as a legitimate evidence-based pediatric oncology physical activity program. By implementing such practices, the ultimate aim is to ensure that the program's targeted population is accessing and utilizing the program with minimal barriers. As such, the gap closes between those participants who are eligible to participate in the program and those who are currently participating and receiving its intended benefits.

Chapter 3 Future Directions

This preliminary research addressed key stakeholders of a community-based pediatric oncology physical activity program to assess accessing its targeted population. The RE-AIM framework was used to inform this work as it identifies critical elements that are important to consider in both the development and evaluation of such programs (Belza et al., 2007). Of the RE-AIM framework, both the (R) reach and (E) effectiveness evaluate these programs on a participant level, while the (A) adoption, (I) implementation, and (M) maintenance focus on the operations of the organizations. This study focused on the reach factor, with study participants responding to survey and optional interview questions about reach strategies to ensure all eligible pediatric oncology patients and survivors can participate in the program.

The PEER program was utilized in this case study and incorporated stakeholders including HCP, parents/guardians of PEER program users and parents/guardians of eligible non-users, adolescent PEER program users and eligible non-users, and KCC informants. The survey results indicated positive ratings on factors addressing the reach, with significant differences ($P<0.05$) found between parent/guardian users versus non-users in their awareness, satisfaction, confidence, and sharing information about the PEER program. As well, a significant difference was found between adolescent users versus non-users regarding their awareness of the program. The qualitative results highlight 6 main themes including knowledge, program support, sharing information, program referrals, participation barriers, and participation facilitators. Each of the themes was refined into subthemes to accurately capture the dialogue of the participants during the interviews (Figure 1). Based on these findings, four key solutions were identified as potential means to increase the uptake of the PEER program by its targeted population. These included sharing of knowledge, program referrals, program availability, and program satisfaction.

Moving forward with the PEER program, the next important steps to take to increase the program's reach involve actionable items on these 4 solutions. First, enhancing the reach requires education for families and HCP, outreach initiatives by KCC, and increasing the PEER program availability. Second, the implementation needs to include fidelity checks informed by the RE-AIM framework, a restructuring of the evaluation process on participants (Shank et al., 2018)), and establishing a systematic referral at the ACH. There are specific aims to HCP and families that has been outlined below to address both the research implications and clinical implications of this research.

Outreach. Sharing of knowledge is a critical piece that involves properly distributing the information from the literature regarding pediatric oncology and physical activity into the hands of key stakeholders. As well, it includes sufficiently informing these key stakeholders about the details of the PEER program. There are several key factors to address to enhancing the reach of PEER.

First, generating consistent awareness and understanding from HCP for the program is necessary for long-term sustainability. Sharing knowledge among this key stakeholder group can be achieved through three modalities. First, to continue delivering regular in-person education seminars by which information about the PEER program, its conception, and its implementation is shared. This forum allows for a two-way dialogue for HCP to inquire about the intricacies of the program and establish a rapport with the directors of the program. Second, to develop a 3-5 minute online video that communicates the benefits of physical activity for pediatric cancer patients and survivors, effectively represents the PEER program, and contains the contact information for the appropriate personnel within the KCC foundation. This video should be made available on the KCC website and become an integral part of the HCP learning in pediatric oncology. Third, to distribute and review the POEM manual (professional version) and/or condensed chapter summaries with all HCP within pediatric oncology at ACH. Fourth, for the PEER program to host an annual HCP versus kids with cancer class where HCP are able to experience the program firsthand in a fun and playful way. A "PEER HCP" checklist including these four items could be implemented within the pediatric oncology group, with encouragement for all new staff to complete on an annual basis.

Similarly, receiving the buy-in from families of kids with cancer is necessary to ensure long-term sustainability. Three key knowledge sharing tactics could be utilized to adequately inform this key stakeholder group. First, quarterly in-person educational seminars hosted by KCC at the ACH, with a questions and answer period, could be offered for all families/support persons. At this time, information brochures would be distributed summarizing information about pediatric oncology and physical activity and the PEER program. Second, a family-specific 3-5 minute online video distributed through KCC to families that represents the program and provides the necessary information on pediatric cancer and physical activity relevant. Third, to distribute and review the POEM manual (family version) and/or condensed chapter summaries to all families receiving a childhood cancer diagnosis at ACH. As KCC is a primary vehicle to share this knowledge with families affected by childhood cancer, it is critical that its members and volunteers sustain sufficient comprehension of the program in order to be able to accurately inform others.

A logistical barrier that is important to overcome when addressing the long-term sustainability of the PEER program is its availability. This includes both the times and locations that the program can be offered to its participants. During its conception, PEER was developed to be a sustainable community-based program with a framework that could be reproduced at multiple sites. This study has emphasized a greater need to expand the program to offer new locations, thus increasing its accessibility to its targeted population distributed across the city. A city-south location is the next apparent step in establishing another independent site, followed by expansion into new cities across Canada, followed by international infiltration. As the PEER program is reproduced elsewhere, it must adhere to the framework set forth from the Health and Wellness Lab and KCC and maintain its founding pillars: 1) evidence informed, 2) volunteer-run, 3) community-based, and 4) sustainable (Chamorro-Viña et al., 2015).

When considering the program's expanded availability, there is another need to acquire access to the oncology unit at the hospital to provide PEER to pediatric inpatients. These individuals are part of the targeted population and are therefore an important part of the reach of the PEER program. Researchers, KCC, and the PEER program director must continue to address the barriers that currently exist within the hospital, thus preventing PEER from having a presence on the pediatric oncology unit. The aim of this model is to have PEER collaborate directly with the pediatric oncology team to provide the best possible and most comprehensive care to the patients, starting with an in-hospital program. Of note, this work will move forward in 2019 with a post-doctoral fellow and CIHR funding (Wurz, 2018) to support the development of in-hospital guidelines and resources.

Implementation. Capturing all of the PEER program's targeted population also encompasses key factors regarding implementation. Fortunately, the overall implementation of the PEER program has been highly regarded by HCP, KCC, and families alike. While these key stakeholder groups responded with immense satisfaction to PEER, the RE-AIM framework remains a valuable model to systematically assess the intervention fidelity. This fidelity check entails the extent to which the program's components are being delivered as intended by program developers (Belza et al., 2007). The PEER program was developed in 2012 and continues to be an evidence-based initiative. Therefore, evaluating the fidelity of the current program is important to ensure that its principle aims are still being adhered to. Much like the RE-AIM framework was a necessary tool in assessing the reach of the PEER program, it is also well suited to guide research in systematically evaluating the intervention fidelity. This data could then be used to further validate the PEER program in what it provides its participants and support key stakeholders in their feelings of complete satisfaction.

A specific implementation factor that is currently being addressed within the PEER program is the evaluation of its participants (Shank et al., 2018). This evaluation was also developed from the RE-AIM framework and examines the physical literacy, fitness, and psychosocial outcomes of the participants as PEER intends them. By generating this source of data, two key stakeholders are better informed. First, parents/guardians will be able to monitor their child's progress within the program and highlight positive changes as well as potential areas of weakness that need to be addressed. Second, HCP can have progress results made available, facilitating greater support among the medical community for physical activity as part of standard cancer treatment. A greater buy-in from this key stakeholder group may also contribute to an increase in referrals to the PEER program. In the future, more research can be conducted to directly identify correlations between physical activity and the effects of treatment, such as blood counts and time-to-recovery.

A priority with HCP is to establish a systematic referral process that effectively refers all eligible pediatric oncology diagnoses to the PEER program. In line with the other baseline cancer-therapies, nutrition, and social support information that is provided to families at the time of diagnosis, sharing physical activity information and accessibility through the PEER program should become standardized. The feasibility of a systematic referral process first needs to be evaluated to understand the usability from a HCP perspective and the effectiveness from a family and patient perspective. Future research should assess if utilizing the “new diagnosis” binder that is provided to all families in the oncology unit at the ACH would be the best platform to provide PEER information and a program referral.

The PEER program is a valuable innovative, evidence-based, pediatric oncology physical activity program that is sustainable within the community. By assessing the reach of PEER, this study can be used to inform other pediatric oncology physical activity programs as they address their concerns pertaining to program sustainability and implementation. As these programs become better supported, they should become more available to pediatric cancer patients and survivors nationally and internationally. The same four solutions that have been identified in the discussion above (program satisfaction, sharing of information, systematic referrals, and program availability) can be applied to potentially aid in the initial development, as well as increase the reach, of other community-based pediatric oncology and physical activity programs.

Physical activity is an essential component of cancer therapies and recovery, and thus, there is a great need to increase the availability of programs such as PEER both nationally and internationally. Based on this research, the aim is to facilitate greater participation in the PEER program while providing potential insight to address the reach factor in other and future pediatric oncology and physical activity programs. Together, these programs can foster improved implementation and sustainability for the betterment of pediatric oncology patients and survivors.

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Appendices

Appendix A

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HREBA.CC-17-0060

The PEER Program Feedback Form

The PEER program values your thoughts and opinions. Any feedback you give us helps us to further fine tune and improve our program in hopes of improving our reach to paediatric cancer patients and survivors. By completing this survey, you are implying consent and allowing your results to be used in this study. Please mark your feelings to each question below and add as many comments as you'd like below each.

1. Age: ___________

2. Sex:

Male ☐

Female ☐

3. Education Level (please check highest level attained):

Middle school: ☐

Some high school: ☐

Completed high school: ☐

Some University/ College: ☐

Completed University/ College: ☐

Graduate Degree: ☐

4. Which of the following best represents your racial or ethnic heritage:

Non-hispanic White or Euro-American: ☐

Black, Afro-Caribbean or African American: ☐

Latino or Hispanic American: ☐

East Asian or Indian American: ☐

Middle Eastern or Arab American: ☐

Native American or Aboriginal: ☐

Other: ☐

If other: _____________________________

5. Please check the box you identify with most:

Healthcare Professional	Parent/Guardian	Teen	KCC Representative
☐	☐	☐	☐

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6. Overall, I feel knowledgeable about physical activity and paediatric cancer.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

____
____
____
____

7. I am aware of the Paediatric Cancer Survivors Engaging in Exercise for Recovery (PEER) program.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

____
____
____
____

8. I am a user of the Paediatric Cancer Survivors Engaging in Exercise for Recovery (PEER) program.
   Yes: ☐
   No: ☐
   Does not apply: ☐

9. I understand the purpose of the PEER program.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

____
____

10. I feel confident talking to others about the PEER program.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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11. I have shared information about the PEER program with others.
    Yes: ☐
    If yes, with whom:
    ____
    ____
    ____
    ____
    No: ☐
    Does not apply: ☐

12. The PEER program is accessible for paediatric cancer patients and survivors.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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____
____

13. There are barriers affecting PEER program participation.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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14. There are facilitators affecting PEER program participation.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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15. There are barriers affecting PEER program referral.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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16. There are facilitators affecting PEER program referral.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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17. I am satisfied with the PEER program.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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____

18. I believe the PEER program is beneficial for paediatric cancer patients and survivors.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

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19. Do you have any suggestions for things that we can do to make PEER program participation easier?

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20. Do you have any suggestions for things that we can do to make PEER program referrals easier?

21. Do you have any additional suggestions for improvements of the PEER program?

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22. Would you be willing to participate in an optional 15-30 minute one-on-one interview regarding the PEER program?

Yes ☐

No ☐

Thank you for your time in completing this survey. The feedback you provided is extremely helpful to us and greatly appreciated!

Figure A. 1. The study participants' fillable survey.

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INTERVIEW GUIDE

Introduction:

- Welcome and thank the participant
- My primary interest in this interview is to understand your awareness of the PEER program, to understand the barriers/facilitators that exist for making referrals and hear your suggestions for the program.
- I am here to learn from you. I will ask certain questions, but I encourage you to include anything you feel is important. There are no right or wrong answers these questions; I just want to better understand your perspective.
- I am going to be audio recording our discussion. The recordings and transcripts of the conversation are confidential, so when we report the results of the study, we won't use your real name or any information that would allow other people to identify who you are and what you said.
- You have the right to choose not to answer any particular question or to end the interview at any point if you wish.
- Are there any questions before we begin?
- (Start the recording)

Questions:

1. First we will focus on **physical activity**.
   a. Has a healthcare professional discussed with you the benefits of physical activity for pediatric cancer patients and survivors?
   b. Do you feel well informed about the benefits of physical activity for pediatric cancer patients during and after treatment?
   c. What kind of information would you like to have regarding physical activity as it relates to pediatric cancer?

2. Next we will focus on the **PEER program**.
   a. How did you become aware of the PEER program?
   b. How informed about the PEER program do you feel?
   c. What information or other support do you need to feel confident bringing your child to the PEER program?
   d. Do you have any concerns about bringing your child to the PEER program?
   e. What forum is the best way to present PEER to patients and families? When do you feel is the best time to do this?
   f. Have you recommended PEER to other families in the pediatric cancer community? If yes, what kind of response did you get from other families? If not, why not?
   g. Would you prefer having PEER provided at the Alberta Children's Hospital or other places around the city? Where would it need to be for you to participate?
   h.
3. Next, I'd like to hear your thoughts on the things that make it harder and easier for PEER program participation.
   a. What things make it hard for families/cancer patients and survivors to participate in PEER?
   b. Do you have any suggestions on what the PEER program could do to minimize these challenges?
   c. What kinds of things help make it possible or easier for families and cancer patients and survivors to participate in PEER?
   d. Do you have any suggestions on what the PEER program could do to make it even easier to participate?

4. Finally, are you satisfied with your experience in the PEER program? Why or why not?

5. Do you have any suggestions for the program?
6. Do you have any other comments you would like to add?

Thank interviewee again.

Figure A.2. The interview guide for parent/guardian users of the PEER program.

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INTERVIEW GUIDE

Introduction:

- Welcome and thank the participant
- My primary interest in this interview is to understand your awareness of the PEER program, to understand the barriers/facilitators that exist for making referrals and hear your suggestions for the program.
- I am here to learn from you. I will ask certain questions, but I encourage you to include anything you feel is important. There are no right or wrong answers these questions; I just want to better understand your perspective.
- I am going to be audio recording our discussion. The recordings and transcripts of the conversation are confidential, so when we report the results of the study, we won't use your real name or any information that would allow other people to identify who you are and what you said.
- You have the right to choose not to answer any particular question or to end the interview at any point if you wish.
- Are there any questions before we begin?
- (Start the recording)

Questions:

1. First we will focus on **physical activity**.
   a. Has a healthcare professional discussed with you the benefits of physical activity for pediatric cancer patients and survivors?
   b. Do you feel well informed about the benefits of physical activity for pediatric cancer patients during and after treatment?
   c. What kind of information would you like to have regarding physical activity as it relates to pediatric cancer?

2. Next we will focus on the **PEER program**.
   a. How did you become aware of the PEER program?
   b. Do you understand what the PEER program is for? If so, what is that?
   c. What kinds of things do you like about the PEER program? What other things would you like to be part of the PEER program?
   d. What kinds of physical activities do you want to have part of the PEER program? **Work out for non-participant aware**
   e. Would you prefer having PEER provided at the Alberta Children's Hospital or other places around the city? Where would it need to be for you to participate?
   f. What would make the PEER program more appealing to teenagers?
   g. [Mention siblings allowed] Is it appealing for you to bring a sibling?
   h. Would you like to be able to bring a friend if you could?
   i. Have you recommended PEER to other teens with cancer? If yes, what kind of response did you get? If not, why not?

3. Next, I'd like to hear your thoughts on things that make it harder and easier for PEER program participation.
   a. What things make it harder to participate in PEER?
   b. Do you have any suggestions on what the PEER program could do to minimize these challenges?
   c. What kinds of things help make it possible or easier for you to participate in PEER?
   d. Do you have any suggestions on what the PEER program could do to make it even easier to participate?

4. Finally, are you **satisfied** with your experience in the PEER program? Why or why not?

5. Do you have any other suggestions for the program?

6. Do you have any other comments you would like to add?

Thank interviewee again.

Figure A.3. The interview guide for adolescent users of the PEER program.

UNIVERSITY OF CALGARY
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INTERVIEW GUIDE

Introduction:

- Welcome and thank the participant
- My primary interest in this interview is to understand your awareness of the PEER program, to understand the barriers/facilitators that exist for making referrals and hear your suggestions for the program.
- I am here to learn from you. I will ask certain questions, but I encourage you to include anything you feel is important. There are no right or wrong answers these questions; I just want to better understand your perspective.
- I am going to be audio recording our discussion. The recordings and transcripts of the conversation are confidential, so when we report the results of the study, we won't use your real name or any information that would allow other people to identify who you are and what you said.
- You have the right to choose not to answer any particular question or to end the interview at any point if you wish.
- Are there any questions before we begin?
- (Start the recording)

Questions:

1. First we will focus on **physical activity**.
   a. Has a healthcare professional discussed with you the benefits of physical activity for pediatric cancer patients and survivors?
   b. Do you feel well informed about the benefits of physical activity for pediatric cancer patients during and after treatment?
   c. What kind of information would you like to have regarding physical activity as it relates to pediatric cancer?

2. Next we will focus on the **PEER program**.
   a. [Provide summary of the PEER program; parent focused] Would you be interested in bringing your child to this program? If not, why not? If yes, what is appealing to you about the PEER program?
   b. What information or other support would you need to feel confident bringing your child to the PEER program?
   c. As a parent, from whom would you like to get information or a referral to the PEER program? Is there a way that you would prefer to receive this information [i.e. print material, online, personal recommendation, etc.]? When would you have liked to receive this information?
   d. Would you prefer having PEER provided at the Alberta Children's Hospital or other places around the city? Where would it need to be for you to participate?

3. Next, I'd like to hear your thoughts on the things that make it harder and easier for PEER program participation.
   a. What things would make it hard for families/cancer patients and survivors to participate in PEER?
   b. Do you have any suggestions on what the PEER program could do to minimize these challenges?
   c. What kinds of things would help make it possible or easier for families and cancer patients and survivors to participate in PEER?

4. Finally, I'd like to ask if you have any other recommendations for the PEER program?
   a. Do you have any other comments you would like to add?

Thank interviewee again.

Figure A. 4. The interview guide for parent/guardian non-users of the PEER program.

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INTERVIEW GUIDE

Introduction:

- Welcome and thank the participant
- My primary interest in this interview is to understand your awareness of the PEER program, to understand the barriers/facilitators that exist for making referrals and hear your suggestions for the program.
- I am here to learn from you. I will ask certain questions, but I encourage you to include anything you feel is important. There are no right or wrong answers these questions; I just want to better understand your perspective.
- I am going to be audio recording our discussion. The recordings and transcripts of the conversation are confidential, so when we report the results of the study, we won't use your real name or any information that would allow other people to identify who you are and what you said.
- You have the right to choose not to answer any particular question or to end the interview at any point if you wish.
- Are there any questions before we begin?
- (Start the recording)

Questions:

1. First we will focus on **physical activity**.
   a. Has a healthcare professional discussed with you the benefits of physical activity for pediatric cancer patients and survivors?
   b. Do you feel well informed about the benefits of physical activity for pediatric cancer patients during and after treatment?
   c. What kind of information would you like to have regarding physical activity as it relates to pediatric cancer?
   d. Are you currently physically active? If yes, what are you doing to be physically active? If no, why not?
   e. Do you want cancer specific exercise or prefer non-cancer specific exercise? Why?

2. Next we will focus on the **PEER program** more generally.
   a. [Provide summary of the PEER program] Would you be interested in coming to this program? [If not, why is that? If yes, why do you think this is something you would want to try?]
   b. Would you consider using PEER to return to physical activity to regain strength for non-cancer specific exercise? If not, why?
   c. What kinds of physical activities would you like them to include if you were in the PEER program?
   d. What other kinds of things would you like to see included if you were in the PEER program?
   e. Would you prefer having PEER provided at the Alberta Children's Hospital or other places around the city? Where would it need to be for you to participate?
   f. What would make the PEER program more appealing to teenagers?
   g. If you were in PEER, would you prefer to bring a sibling or a friend to PEER?

3. Next, I'd like to hear your thoughts on things that would make it harder and easier for PEER program participation.
   a. What things make it harder to participate in PEER?
   b. Do you have any suggestions on what the PEER program could do to minimize these challenges?
   c. What kinds of things would help make it possible or easier for you to participate in PEER?

4. Finally, I'd like to ask if you have any other recommendations for the PEER program?

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a. Do you have any other comments you would like to add?

Thank interviewee again.

Figure A. 5. The focus group guide for adolescent non-users of the PEER program.

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INTERVIEW GUIDE

Introduction:

- Welcome and thank the participant
- My primary interest in this interview is to understand your awareness of the PEER program, to understand the barriers/facilitators that exist for making referrals and hear your suggestions for the program.
- I am here to learn from you. I will ask certain questions, but I encourage you to include anything you feel is important. There are no right or wrong answers these questions; I just want to better understand your perspective.
- I am going to be audio recording our discussion. The recordings and transcripts of the conversation are confidential, so when we report the results of the study, we won't use your real name or any information that would allow other people to identify who you are and what you said.
- You have the right to choose not to answer any particular question or to end the interview at any point if you wish.
- Are there any questions before we begin?
- (Start the recording)

Questions:

1. First we will focus on **physical activity**.
    a. Do you feel well informed about the benefits of physical activity for pediatric cancer patients and survivors? Do you talk to pediatric cancer patients and survivors about physical activity?
    b. Are you prescribing physical activity to your patients? If not, why? What would encourage you to prescribe physical activity more frequently?

2. Next we will focus on the **PEER program**.
    a. Are you aware of the PEER program? How did you become aware of the PEER program?
    b. How informed about the PEER program do you feel?
    c. Do you know who the targeted population for PEER is?
    d. Have you referred patients/families to the PEER program?
    e. Are there patients you feel should not be referred to PEER program? If yes, why?
    f. What forum do you think is the best way to present PEER to patients and families?
    g. What resources would help you to talk about and make referrals to the PEER program?
    h. How can PEER be better promoted among HCP?

3. Next, I'd like to hear your thoughts on **barriers/facilitators** for PEER program participation.
    a. What barriers exist that hinder making PEER program referrals?
    b. What barriers are preventing you from clearing patients for participation in the PEER program?
    c. What are your suggestions to overcome these barriers?
    d. What kinds of things help make it possible or easier to refer cancer patients and survivors to participate in PEER?
    e. What is needed to increase patient referral to the PEER program?
    f. Would a PEER referral slip make referrals easier for you? *See attached*
    g. What barriers/facilitators are there for families/patients?

4. Finally, are you satisfied with what the PEER program provides to its participants?

5. Do you have any other suggestions for the program?

6. Do you have any other comments you would like to add?

Thank interviewee again.

Figure A. 6. The interview guide for HCP within pediatric oncology.

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INTERVIEW GUIDE

Introduction:

- Welcome and thank the participant
- My primary interest in this interview is to understand your awareness of the PEER program, to understand the barriers/facilitators that exist for making referrals and hear your suggestions for the program.
- I am here to learn from you. I will ask certain questions, but I encourage you to include anything you feel is important. There are no right or wrong answers these questions; I just want to better understand your perspective.
- I am going to be audio recording our discussion. The recordings and transcripts of the conversation are confidential, so when we report the results of the study, we won't use your real name or any information that would allow other people to identify who you are and what you said.
- You have the right to choose not to answer any particular question or to end the interview at any point if you wish.
- Are there any questions before we begin?
- (Start the recording)

Questions:

1. First we will focus on **physical activity**.
   a. Do you feel well informed about the benefits of physical activity for pediatric cancer patients during and after treatment?
   b. What kind of information would you like to have regarding physical activity as it relates to pediatric cancer?

2. Next we will focus on the **PEER program**.
   a. How informed about the PEER program do you feel?
   b. What does KCC see as their role in the recruitment of participants for PEER?
   c. What resources would help you to talk about and make recommendations to the PEER program?
   d. How can PEER be better promoted from KCC?
   e. In what ways is it possible to integrate PEER within other KCC initiatives (i.e. camps, family pizza night)?
   f. Can PEER have increased representation at Kids Cancer Care camp?
   g. The PEER program teen's group is an underserved population; can KCC promote PEER within their teen programs?
   h. Does KCC see potential for supporting the growth of the PEER program at the Alberta Children's Hospital? At multiple locations?

3. Next, I'd like to hear your thoughts on **barriers/facilitators** for PEER program participation.
   a. What barriers are there for recommending the PEER program to families/cancer patients and survivors?
   b. What are your suggestions to overcome these barriers?
   c. What kinds of things help make it possible or easier to recommend the PEER program to families and cancer patients and survivors?

4. Finally, I'd like to ask you about your **satisfaction** with the PEER program.
   a. Do you have any suggestions for the program?
   b. Do you have any other comments you would like to add?

Figure A. 7. The interview guide for KCC informants with the PEER program.