Psycho-Social Support for Patients with Cardiovascular Disease (CVD): Barriers to Cardiac Rehabilitation Program (BCRP)

by

Monica BK Lee
Bachelor of Arts, Simon Fraser University, 2010

Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science

in the Department of Biomedical Physiology and Kinesiology Faculty of Science

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<table>
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<tr>
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<td>Degree:</td>
<td>Master of Science</td>
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**Examining Committee:**

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<tr>
<th>Chair:</th>
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<tr>
<td>Scott Lear</td>
<td></td>
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<tr>
<td>Senior Supervisor</td>
<td></td>
</tr>
<tr>
<td>Professor</td>
<td></td>
</tr>
<tr>
<td>Ryan Dill</td>
<td></td>
</tr>
<tr>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>Senior Lecturer</td>
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<tr>
<td>Tricia Tang</td>
<td></td>
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<tr>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>Associate Professor</td>
<td></td>
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<tr>
<td>Department of Medicine</td>
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<td>University of British Columbia</td>
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<td>Wolfgang Linden</td>
<td></td>
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<tr>
<td>External Examiner</td>
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<tr>
<td>Professor</td>
<td></td>
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<tr>
<td>Department of Psychology</td>
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Ethics Statement

The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

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Abstract

Cardiac Rehabilitation Programs (CRP) are effective behavioural interventions that reduce morbidity and mortality in patients with cardiovascular disease. Despite the myriad of benefits, participation remains sub-optimal with drop-out rates as high as 60%. Patients who discontinue CRP are under-treated and consequently, are at greater risk for further cardiac events. It is imperative to find alternative strategies to support to this high-risk population. The objectives of the present thesis were three fold: i) to identify baseline characteristics of participants who previously dropped-out of a CRP (chapter 2); ii) to assess self-efficacy among patients who complete a CRP versus those who drop-out (chapter 3); iii) to test the feasibility of an Internet-mediated VC intervention to provide ongoing psycho-social support among patients who previously dropped-out of a CRP (chapter 4).

Keywords: Cardiac Rehabilitation; Cardiac Rehabilitation Program; Barriers; Drop-out; Self-Efficacy
Dedication

I would like to dedicate this thesis to my family and friends who have consistently been there for me in countless ways. Your unconditional love, ongoing support, and words of encouragement carried me through my academic journey. Thank you, forever and always.
Acknowledgements

I would like to acknowledge and thank my supervisor, Dr. Scott Lear, for his enduring patience and guidance. Thank you for always believing in me and encouraging me to be the best version of myself.

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Chapter 1.

Introduction

1.1. Cardiovascular Disease

Cardiovascular Disease (CVD) is the leading cause of death worldwide and remains the second leading cause of death in Canada.\(^1\,^2\) In 2007, it was estimated that approximately 1.3 million Canadians were living with CVD costing our nation $22.2 billion annually in health care costs and lost productivity.\(^3\,^4\) Currently, CVD is the leading cause of hospitalization in Canada and statistics show that one in five Canadians will die from CVD.\(^4\,^5\) Although mortality rates have declined in the last fifty years, the prevalence and costs of CVD are projected to rise substantially in the near future due to the increasing in the aging population, rise in risk factors such as obesity and diabetes, in addition to improvements in acute care.\(^5\,^6\)

There are numerous risk factors for CVD. The non-modifiable risk factors are those that cannot be changed and include: a) age, b) gender, c) ethnicity, and d) genetics or family history.\(^7\) The modifiable cardiac risk factors are those that can be changed ‘or modified’ through lifestyle and/or medications and include: a) smoking, b) dyslipidemia, c) hypertension, d) diabetes mellitus, e) unhealthy dietary patterns, f) sedentary lifestyle, and g) psychosocial factors such as depression, and stress.\(^1\,^5\) The progression of CVD is expedited by the cumulating effects of these risk factors.\(^7\) Current statistics show that 90% of Canadian adults are living with at least one modifiable risk factor and 40% of Canadian adults are living with three or more risk factors.\(^3\) Significant morbidity and mortality are associated with CVD including sudden death, heart failure, and stroke.\(^8\) However, the risk factors for CVD are well established and preventable. Thus, in order to reduce the burden caused by CVD, effective primary and secondary prevention are crucial.\(^7\)
1.2. Cardiac Rehabilitation Programs

Cardiac rehabilitation programs (CRPs) are recognized as the standard of care for patients with CVD. The Canadian Association of Cardiac Rehabilitation (CACR) has defined CRPs as “the enhancement and maintenance of cardiovascular health through individualized programs designed to optimize physical, psychological, social, vocational, and emotional status. This process includes the facilitation and delivery of secondary prevention through risk factor identification and modification in an effort to prevent disease progression and the recurrence of cardiac events.” While primary prevention aims at delaying the onset of CVD; CRP is a multidisciplinary secondary prevention program offered to patients following cardiac events to modify risk factors and lifestyle behaviours. These aims are achieved by addressing the main modifiable behavioural cardiovascular risk factors, most commonly associated with physical inactivity, smoking, diet and weight management, and psychosocial health. Ultimately, the goal of CRP is to restore optimal physiological, psychological, and vocational status, while reducing the risk of cardiac morbidity and mortality. A summary of a multidisciplinary CRP and its core components are illustrated below in FIGURE 1.
The guidelines suggest all patients be screened at the entry of CRP. During this intake process, each patients’ lifestyle behaviours and risk factors are assessed. Patients also receive counselling from various allied health professionals including nurses, dieticians, and certified exercise specialists regarding stress management, smoking cessation, nutritional counselling, and physical activity training. While exercise training has previously been considered to be the central component of CRP, current practice guidelines also recommend CRPs provide comprehensive care to optimize cardiovascular risk reduction, foster healthy behaviours, reduce disability, and promote an active lifestyle.
The Healthy Heart Program CRP from which the study participants were recruited is a traditional, multidisciplinary, four month intervention program that is supervised by cardiologists, nurses, dieticians, and American College of Sports Medicine certified exercise leaders. The program consists of an intake clinic, assessment of lifestyle behaviours and risk factors, and counselling. Patients are also expected to engage in a monitored exercise program that consists of aerobic exercise and resistance training two days per week for 16 weeks. Exercise classes includes warm up (treadmill walking, rowing, or cycling), aerobic activity with prescribed target heart rates determined by an exercise stress test, resistance training (hand weights, wall pulleys, various weight bearing machines), and cool down. The exercise and resistance training are led and supervised by nurses and exercise leaders, who also assess patients throughout program to ensure the patients' are working towards their rehabilitation goals. Patients also receive dietary counselling, a smoking cessation program (optional), and an exit assessment clinic.

1.2.1. Benefits of Cardiac Rehabilitation Programs

There is consistent favourable evidence that CRPs are effective in improving patient outcomes. Specifically, patients who attend a comprehensive CRP and adhere to the prescribed rehabilitation regiments have demonstrated improvements in risk factor modification, reduction in morbidity, and reduction in mortality rate compared to patients who do not participate in a CRP. Nutritional education and exercise training that is offered in CRPs have also shown to be effective in supporting patients adopt a healthy lifestyle, better manage co-morbidities such a diabetes, and improve exercise capacity. Furthermore, patients who participate and adhere to the rehabilitation guidelines have reported improvements in psychosocial health including stress management, smoking cessation, improvements in self-reported quality of life (QOL), and increased confidence in their abilities to meet their recovery goals.

1.2.2. Barriers to Cardiac Rehabilitation Programs

Despite the myriad of benefits that can be acquired from engagement in a CRP, participation remains sub-optimal with drop-out rates as high as 60%. Generally, poor attendance and high drop-out rates may be grouped into centre-based or patient-related
factors. The main centre-based factors that have been widely cited to decrease CRP participation include transportation issues such as distance to CRP, parking at the CRP facility, travel time as well as travel costs associated with program attendance. Furthermore, programs that were perceived as poorly organized, lacking cultural sensitivity, and too standardized or narrowly focused to meet individual patient needs, have also been reported to decrease CRP participation. Qualitative meta-analysis that explored patients’ reasons for non-participation or non-adherence to hospital-based CRPs found negative experiences with CRP healthcare providers or minimal physician support also decreased participation.

Patient characteristics including sociodemographic, medical, and psychological factors, have also been associated with low CRP attendance. Low socioeconomic status, defined as low education level, low income, or residing in a disadvantaged area, have been documented in various systematic reviews to be associated CRP non-attendance. Patients’ age has also shown to impact CRP attendance; with younger patients often reporting work or family obligations as barriers to ongoing participation, while older patients are more likely to report physical impairments and the presence of comorbidities as reasons for early program discontinuation. In some systematic reviews women have demonstrated show poorer attendance rates compared to men due to higher prevalence of musculoskeletal issues, arthritis, and depression rates among women. Studies have found women were also least likely to receive family support due to their social roles associated with childcare, housework, and family life. In addition, women of ethnic minority groups have reported cultural norms prevented CRP participation as it is considered ‘sinful’ to exercise with men in some cultures.

Patient medical factors such as the existence of comorbidities such as diabetes, obesity or high body mass index (BMI), and increased CVD risk factors, have been associated with low CRP attendance. Some previous studies have also found patients with angina and myocardial infarction were least likely to adhere to CRP whereas those with coronary artery bypass graft were more likely to adhere to CRP, compared to other CVD diagnostic groups. Furthermore, patients who smoke, or those who were physical inactive previous to the onset of CVD, are less likely to attend CRP. Personal beliefs regarding their medical condition or CRP have also shown to influence CRP attendance.
For instance, patients who do not understand what CRP is, or how it may benefit their medical condition, are also less likely to attend a secondary prevention program.\textsuperscript{30}

Psychological factors have also been found to have major health implications and have been associated with early discontinuation of CRP.\textsuperscript{10,23,31} Previous systematic reviews have shown minimal social support, both acute and chronic life stresses, anxiety and depression, and personality traits such as neuroticism contribute to premature discontinuation of CRP.\textsuperscript{10,23,31} In addition, there is evidence that suggests that psychological factors such as stress and depression may increase the development of CVD and poorer prognosis post disease onset.\textsuperscript{27} For example, in the INTERHEART study found stress and depression combined accounted for 32.5\% of attributable risk factors for CVD. In addition, patients who report low motivation, lack of enjoyment of CRP, and low self-efficacy are more likely to demonstrate low program attendance and early discontinuation to a CRP.\textsuperscript{18,23,29}

1.3. Addressing Barriers to Cardiac Rehabilitation Programs

Considerable attention has been devoted to addressing barriers to CRP as uptake and adherence to such programs are below recommended levels.\textsuperscript{32} While CVD knowledge is considered a key element of adherence to rehabilitation regiments, improvements in rehabilitation behaviours may not occur with education alone.\textsuperscript{33} Much still needs to be learned about the impact of psycho-social factors including self-efficacy and social support in patients who previously dropped-out of a CRP, as there are a limited number of intervention studies that have been conducted involving this population.\textsuperscript{33,34}

Self-efficacy (SE) is the “beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations” and is considered an important factor that mediates patients’ adherence to rehabilitation regiments and patients who drop-out of a CRP may have lower SE levels compared to those who do not drop-out.\textsuperscript{33,35} Low levels of social support has also shown to be associated with poor disease prognosis following a cardiac event and patients who discontinue a CRP may lack access to such supports.\textsuperscript{36} Thus, the present study will evaluate the effect of CVD education, peer
support, and SE enahcing opportunities among CRP drop-out patients (FIGURE 2). These psycho-social supports will also be delivered using the Internet to minimize barriers of geography, which has been widely cited as a barrier to CRP uptake.

![Diagram of barriers addressed in the present study]

**Figure 2** Summary of barriers addressed in the present study.

**1.3.1. Increasing Social and Peer Support**

The presence of supportive social relationships following a cardiac event have shown to help mitigate the negative consequences of CVD.\(^{37,38}\) Social support (SS) refers to the degree of perceived satisfaction with social support provided by others, which may be derived from social networks including one-on-one support (from a health-care providers or spouse), or in groups between peers, family members, and community connections.\(^{39}\) Patients who have access to these supports may be better able to handle stressful situations.\(^{37,40,41}\) For instance, family members or spouses may provide tangible support including assistance with material needs such as finances or transportation to a CRP.\(^{40}\) Furthermore, researchers have found patients who have access to emotional support, which involves the provision of closeness, intimacy, and the ability to share feelings with someone, have reported better quality of life, increased ability to handle stressful situations, and cope more effectively.\(^{23,40,42}\) It is suggested that the benefits of emotional support is mediated through encouragement and motivation that is often provided by supportive networks.\(^{43}\)
Though SS is associated with improved psycho-social health, evidence demonstrating SS as an independent risk factor for CVD morbidity and mortality is inconclusive.\cite{40,44,45} In the Enhancing Recovery in Coronary Heart Disease (ENRICHD) study found patients receiving cognitive therapy that targeted perceived SS showed improvements in perceived SS, but SS did not affect cardiac mortality.\cite{46} The authors concluded that SS may influence health outcomes through a number of pathways and SS may only be effective at improving cardiac morbidity and mortality if SS directly affects CVD risk factors (i.e. medication or exercise behaviours).\cite{46,47} Furthermore, the authors suggest that psychological interventions such as group therapy may be a viable option for patients with very low SS, as it may provide a temporary network in the form of resources, new friendships, and relationships.\cite{46}

A type of SS is peer support, defined as “the degree of perceived satisfaction with social support provided by peers.”\cite{48} The core belief underlying peer support or peer support-group strategies is that individuals share a common problem and have resource to offer one another.\cite{49} The majority of research evaluating peer support involves burn patients, those with diabetes, breast cancer survivors, or those with human immunodeficiency virus (HIV).\cite{49-52} These studies have reported positive results and researchers have found peer support to be an effective intervention for patients with other chronic illnesses.\cite{53,54} Research exploring peer support in a CRP setting is, however, minimal and inconclusive.\cite{49,53,55} In a study by Patent et al (2000) found peer support decreased anxiety during hospitalization in patients undergoing cardiac surgery for the first time. Moreover, patients who were receiving peer support reported higher self-efficacy and general activity following cardiac surgery.\cite{53} On the other hand, Riegel et al (2004) found patients who were receiving peer support through home visits or telephone contact had higher hospital readmission rates compared to patients in the control group. No other group differences were found in terms of length of hospital stay, or hospital costs.

While peer support have been effective in improving health outcomes in a variety of clinical conditions, data demonstrating the benefits of peer support in patients with CVD are lacking.\cite{49,53,55} The development and diagnosis of CVD is undoubtedly a significant source of distress for individuals.\cite{31,56} The current CACR guidelines suggests that attempts
should be made to enhance SS, reduce social isolation, and improve psychological well-being to improve quality of life among cardiac patients.38,46

1.3.2. Improving Self-Efficacy

Self-efficacy is considered an important factor that mediates patients’ adherence to rehabilitation regiments.18,57–61 The Self-Efficacy Theory derived from Albert Bandura’s Social Learning Theory, postulates that learning occurs in a social context with the dynamic and reciprocal interaction between the individual, behaviour, and the environment.60,62 The central construct of the Self-Efficacy Theory is the concept of perceived self-efficacy (SE) defined as “beliefs in one’s capabilities to organize and execute the courses of action required to manage prospective situations.”62

According to Bandura (1997) SE arises from four sources including: 1) physiological arousal, 2) verbal persuasion, 3) vicarious experience, and 4) mastery of experiences, which is the strongest source (FIGURE 2). Physiological arousal are affective states that have shown to influence SE, for example experiencing fear or being tired lowers SE, whereas feeling happy excited can increase SE.62 Verbal persuasion involves positive and encouraging statements and a credible source in believed to improve SE.62 Vicarious experience, or modelling, represents the observation of others performing a task. It is believed that the effects of modelling are greater when the model shares attributes with the observer, such as gender or similar health conditions.62 Mastery of experiences is considered as the most potent source of SE, which involves successful performance or attainment of a desired behaviour (start and finish of a specific exercise).62
Bandura further posits that there is a "relationship between perceived self-efficacy and behavioural changes." Individual's SE is proposed to influence thought and/or emotional reactions to various situations, determine how much effort will be expended, and how long a coping behaviour will last in the face of adversity. Individuals who lack SE are more likely to behave ineffectually, even if they know what to do and how to do it. In a CRP setting, a patient who previously acquired exercise skills by attending a CRP may lack the SE to carry out the exercises on his/her own due to concerns of a recurrent cardiac event. Patients with higher SE may have more confidence in their abilities to carry out exercises safely, effectively, and independently. Previous research findings from the CRP literature support SE as an important variable that mediates heath behaviours and there is evidence that improving patient SE levels may also increase patients' activities of daily living, as well as physical and social functional status.

While SE is considered as an important determinant of health behaviours, studies have also found SE levels improved post-interventions demonstrating that secondary prevention strategies can act as a vehicle to enhance patient SE. A study by Millen et al found patients receiving a SE enhancing instructional manual (using all four SE enhancing strategies) and Thera-Band for resistance training improved patient SE levels and independent exercise behaviours at 4-weeks and at 3-month follow-up. Carlson et al found a modified intervention that utilized all four SE enhancing strategies for exercise and nutritional behaviours outside the CRP setting, increased SE for independent exercise, although no other differences were found. Patients who participate in a CRP
have demonstrated improvements in SE levels, which is promising considering the important role SE in mediating health behaviours both during and beyond the CRP setting.\(^{67}\)

Considering the important role SE plays in mediating health behaviours, Bandura's Theory of SE was considered an appropriate theory to underpin the development of this thesis and the theoretical framework for the present study is provided in FIGURE 4. Based on prior studies, patients who drop-out of a CRP may suffer from low SE and the present study will test the effect of social persuasion in facilitating the adoption of rehabilitation behaviours among CRP drop-out participants.

\[\text{Figure 4} \quad \text{The role of the Self-Efficacy Theory in the present study.}\]

### 1.4. Telemedicine

Telemedicine (also known as telehealth), involves the transfer and exchange of health information between patient and health-care provider through electronic devices.\(^{68-70}\) The application of telemedicine (TM) has numerous advantages including the capacity to reach a large number of patients and provide vast amount of information, while giving patients the flexibility to choose when they would like to interact and receive health-care information.\(^{68,71-74}\) The widespread access to the Internet has provided a new segway to bridge the gap between the patient and healthcare provider that may be cost-effective, though more research is warranted.\(^{73,75}\) The TM strategies can be grouped into three categories: 1) remote monitoring, 2) store-and-forward, and 3) interactive applications including video-conferencing.\(^{69}\) For the purpose of this thesis, TM was defined as the use
of the Internet to participate in an Internet based video-conferencing (VC). An Internet-based health information web-page was used as the platform to engage in interactive online group video-conferencing between study participants and/or between participants and healthcare provider.

1.4.1.  Internet Mediated Video-Conferencing

The Internet may provide a modality to deliver support to patients who previously discontinued a CRP. To date, research investigating VC strategies in CRP are limited as they are either feasibility studies, are presently ongoing, or have demonstrated inconclusive results.\(^6\) In a recent systematic review that evaluated the acceptability and the costs-effectiveness of interactive TM strategies reported nine studies that employed real-time VC in patients with CVD.\(^7\)–\(^8\) Among these studies, five intervention studies compared the effectiveness between telemonitoring, VC, and telephone supported CRP to usual care revealed no statistically significant differences in physical health, inpatient admissions, bed days of care, emergency department visits, or days of hospital stays.\(^7\),\(^9\),\(^1\),\(^2\),\(^3\),\(^5\) On the other hand, three studies found VC or VC plus telemonitoring, reduced number of hospital readmissions, days spent in the hospital, readmission hospital charges, and improved blood pressure, blood lipid levels, and medication adherence.\(^7\),\(^7\),\(^8\) A study by Keyserling evaluated counsellor-delivered and web-delivered lifestyle and medication (L&M) counselling on CVD risk factors in patients with coronary heart disease and found improvements in both intervention groups. The authors of this study concluded that both face-to-face and web-based strategies were effective, however the web intervention was more cost-effective and minimized clinic staff demands and costs.

To the best of our knowledge, there is only one study by Singh and Martin (‘Activate your Heart’) that includes patients who either declined or dropped-out from a CRP and this study is presently ongoing. More intervention studies are needed to investigate alternative secondary prevention programmes that specifically target the majority of patients who discontinue a CRP.
1.5. Rationale

Undoubtedly, CRPs are effective behavioural interventions that reduce morbidity and mortality in patients with CVD. However, the success of CRP depends upon patient adherence to prescribed regiments and patients who discontinue CRP are under-treated and consequently, are at greater risk for further cardiac events.\textsuperscript{16,86} It is imperative to find alternative strategies to support to this high-risk population.

1.6. Study Objectives

The objectives of the present thesis were three fold:

i. to identify baseline characteristics of participants who previously dropped-out of a CRP (chapter 2);

ii. to assess self-efficacy among patients who complete a CRP versus those who drop-out (chapter 3);

iii. to test the feasibility of an Internet-mediated VC intervention to provide ongoing psycho-social support among patients who previously dropped-out of a CRP (chapter 4).
1.7. References


http://www.psychosomaticmedicine.org/content/60/4/473.full.pdf.


Chapter 2.

Patients Who Drop-out of a Cardiac Rehabilitation Program

2.1. Introduction

Cardiac rehabilitation programs (CRP) are fundamental to the comprehensive care of patients with cardiovascular disease (CVD). These multidisciplinary secondary prevention programs are offered to patients following cardiac events to modify risk factors and lifestyle behaviours. General program content includes exercise training, nutrition counselling, psychosocial support and information about self-management of the chronic condition. The main goals of CRP are to provide important resources for optimizing the acute and chronic care of patients and to limit the adverse physiological and psychological effects of cardiovascular disease (CVD). Research has shown patients who attend a CRP generally are male, with an average age of 64 years, non-smokers, diagnosed with myocardial infarction, and who are on lipid lowering medications. Those who attend a CRP have shown significant reductions in modifiable risk factors such as total cholesterol, systolic blood pressure, smoking cessation, as well as improvements in psychosocial wellness and exercise capacity. Furthermore, CRP participation can help the management of co-morbidities such as diabetes through educational counselling.

Despite many benefits acquired from engagement in CRP, participation remain sub-optimal with attendance rates as little as 10% to 30%. Additionally, among patients who participate in CRP, more than 50% fail to complete the entire program and drop-out prematurely. Survey-based studies cite common reasons for discontinuing CRP including lack of perceived need for CRP, presence of co-morbidities, low motivation or enjoyment, and dissatisfaction with the program components or location. Motivators for attending CRP include enjoyment of exercise routine, social support (such as networking with other patients, family involvement, access to medical expertise) and the perceived benefits from attending the program. While research has identified the predictors of CRP referral rates or factors that influence initial participation, these studies
have not increased our understanding of the complex processes that may influence ongoing participation or early program discontinuation. Thus, the objective of this sub-study was to further our understanding of patients’ reasons for dropping-out of a standard CRP through qualitative inquiry.

2.2. Methods

This current study is part of a larger study that utilized mixed-methods research to test a web-based intervention in patients dropping out of a CRP. This subsection of the study utilized a qualitative research method to gather information and evaluate the experiences of participants who dropped-out of a CRP. The study received approval from the research ethics boards of Providence Health Care and Simon Fraser University. All participants provided informed consent.

2.2.1. Setting

The St. Paul’s Hospital Healthy Heart Program CRP from which participants were recruited is a traditional multidisciplinary four-month intervention program that is supervised by cardiologists, nurses, dieticians and American College of Sports Medicine certified exercise specialists and exercise leaders. The CRP consists of an intake clinic where the patients’ social characteristics, lifestyle behaviours and risk factors are assessed, and they receive counselling from a cardiologist and various allied health professionals. The monitored exercise program consists of aerobic exercise and resistance training two days per a week for 16 weeks. Exercise included warm up (treadmill walking, rowing, or cycling), aerobic activity with prescribed target heart rates determined by an exercise stress test, resistance training (hand weights, wall pulleys, various weight bearing machines), and cool down. The exercise and resistance training were led and supervised by nurses and exercise specialists. Additionally, patients also took part in dietary counselling, a smoking cessation program and an exit assessment clinic.
2.2.2. Population and Sample

A non-random convenience sample of patients who dropped-out of the St. Paul’s Hospital Healthy Heart Program CRP in Vancouver were recruited for this study. Drop-out was defined as those patients who attended a minimum of two exercise classes and who were formally discharged from the St. Paul’s Hospital Healthy Heart Program CRP by a healthcare provider.

The inclusion criteria were (1) patient of St. Paul’s Hospital Healthy Heart Program CRP, (2) signed the Cardiac Rehabilitation and Prevention Clinic Consent form to give permission for future contact for research purposes, (3) dropped-out of a CRP (attended a minimum of two classes and discharged from CRP), and (4) ability to speak and understand English. As the current study was part of a larger trial to test a web-based intervention in patients dropping out of a CRP, another inclusion criterion was having regular Internet access. Participants with (1) co-morbidities at the acute stage, (2) planned surgical intervention, or (3) with significant psychiatric disease were excluded from the study.

2.2.3. Recruitment

Charts of patients of the St. Paul’s Hospital, Healthy Heart Program CRP, who were enrolled from January 2011 to March 2013 were identified (n=993). Of the 993 individuals, a total of 571 (58%) individuals were ineligible for the current study as they had either completed the CRP (n=503, 51%), or the individuals’ charts were inaccessible (n=68, 7%). From this, a total of 422 (42%) patients who did not complete the CRP were identified. Among these participants, only individuals who signed the Cardiac Rehabilitation and Prevention Clinic Consent form where the patient has agreed to be contacted for future research were screened for the study inclusion criteria. The research assistant (RA) sent potentially eligible participants (n=339, 80%) a letter of introduction and a consent form, inviting them to participate in the Barriers to Cardiac Rehabilitation Program (BCRP). Two weeks following the mailing date, the RA will followed-up with a telephone call to those patients who have not responded to the letter to discuss the BCRP.
Among the 339 potentially eligible participants, a total of 248 (74%) actively declined participation to the current study, and 5 (1%) were hoping to return to the Healthy Heart CRP. Some patients (n=35, 10%) were considered to be ‘unable to be reached’ after being called five times over a four week period, other patients (n=13, 4%) were hospitalized, and 11 (3%) patients passed away before contact could be made. A total of 27 (8%) eligible participants consented to participate in the current and a total of 23 (7%) participants completed the study (FIGURE 5).

Figure 5  Recruitment Summary.

2.2.4. Data Collection & Instruments

Consenting participants who agreed to participate in the present study were asked to set up an appointment to meet with the RA at a time convenient for the participants.
The appointment consisted of a brief introduction and a semi-structured interview that took approximately 30 minutes in length total (listed below). The interview questions were developed in consultation with the research team, existing literature, experiences within the CRP and the study purpose. Each interview was audio-recorded and transcribed verbatim. Interviews were recorded using an Olympus WS-321M Digital Voice Recorder (no participant identifiers were recorded), which was transcribed by the RA for coding purposes. Interview data were analyzed and coded utilizing the Grounded Theory approach.25

Baseline Interview explored the following questions:

1. Mr/Mrs X, what was your reaction when you first realized that you had a heart condition?

2. Can you tell me what it has been like for you to manage your heart condition since you were first diagnosed?

3. What do you feel about all of the different treatments that you have had – hospital – Dr. visits – rehab program?

4. Could you describe a typical week and how your disease has affected what you do and how you feel.

5. How does managing your heart condition affect your relationships with family, friends, co-workers etc?

6. Could you describe the major challenges of managing a heart condition?

7. What role do you think CRP has in managing CVD?

8. What are the supports you feel you need to manage your disease? (What sort of supports/programs would be helpful?)

9. List up to 3 points (each) that you feel to be the advantages and disadvantages of participating in a regular CRP?
2.2.5. Data Analysis

Qualitative content analyses of the recorded interviews were completed using Grounded Theory methods by Strauss and Corbin (1998). The RA transcribed all the audio-recorded interviews verbatim. The RA reviewed each transcribed interview (transcribed data) for selection and development of codes and themes across responses while focusing on the unique features of each data set. The analysis began with a general content analysis whereby initial themes across responses were explored. Once the themes were identified, reoccurring codes were extracted. The overall goal was to identify personal and environmental barriers to uptake of treatment regimen and program attendance.

Quantitative data analyses were completed using the SPSS37 statistical software package. Baseline characteristics (gender, age, education, income, marital status, and smoking status) were compared using Pearson Chi-square tests for categorical factors and Mann-Whitney test for continuous factors. The descriptive statistics were presented as n (%) and mean ± standard deviations. The change in the SE scores between the two groups was compared by using the Mann-Whitney test. Continuous variables were presented as median and Inter-quartile ranges (IQR) respectively.

2.3. Results

Baseline characteristics of all 23 study participants are provided in Table 1. Ages of participants ranged from 34 to 87 years, with a mean age of 60.6 ± 14.5 years. The majority (65%) of participants were men. No significant differences were found for the baseline characteristics between men and women. The number of completed CRP sessions ranged from 2 to 18 classes, with the median completed sessions being 7 classes. The main themes identified from the baseline interviews were Challenges living with Cardiovascular Disease, Value of CRP, Disadvantages of CRP, and Additional Supports. Themes, codes, and number of references are provided in Table 2.
2.3.1. Qualitative Data Synthesis

2.3.1.1. Challenges living with CVD

Physical limitations

Adjusting to new physical frailties following a cardiac event was reported to be a major struggle for majority of participants. Feeling ‘out of breath,’ ‘tired’ and unable to ‘move around’ as participants were used to were common complaints. These new frailties and physical limitations were also reported to compromise participants’ ability to engage in regular daily activities, including work, household chores, and grocery shopping. More so, participants stated that these physical limitations inhibited their ability to make necessary lifestyles changes to improve their health. Many participants also stated that these hindrances acted as barriers to engaging in physical activity. Other participants reported that physical setbacks contributed to the early discontinuation of CRP. Participants commented:

I clean the house over a period of 4 days... we get our groceries delivered because I can’t lift heavy things, I’m not supposed to. [13]

I was having physical problems at the time, and that’s why I stopped coming [to CRP]. [34]

Social support

Having access to emotional and tangible supports was reported to be ‘reassuring’ and enabled participants to work towards their health goals and rehabilitation behaviours with more sense of security and ease. Tangible support was commonly identified as partners or family members ‘helping with chores’ and assuming additional domestic responsibilities. Emotional support was identified as ‘open and honest’ communication between participants and their networks where participants felt they can ‘talk about anything’. For example:

They [family and friends] have all been very supportive. People all wanting to help. I am very independent, so if I can do it myself I will. Sometimes I have a
little help. I have a friend who comes around every couple of weeks...It’s things like that, that is nice to know that there’s somebody there. [14]

Some participants reported having minimal support or felt apologetic about accepting help from their partners, family members, or other social support network. Readjusting to everyday life was deemed to be particularly challenging for these participants, both physically and emotionally. Consequently, participants reported experiencing elevated stress levels that strained close relationships. One participant explains:

You know, I suppose the only thing that’s made any relationship different is the relationship with my wife. Because she has had to pick up all the loose ends, and as much as we all think that our partners should be willing and able to want to embrace that or you know pick up the slack, it only goes so far. And especially when it starts really impacting her life, right. She has a great career, she’s really busy, so all of a sudden now she’s having to pick up my slack and it’s hard. She can’t help but feel a little resentful. [17]

Depression/anxiety

Many participants also reported coping with ‘depression’ and/or ‘anxiety.’ The fear of having another cardiac event, particularly that it might be fatal; and the desire to get ‘back to normal’ were commonly stated concerns. These fearful and negative emotions often left participants feeling helpless and vulnerable to uncertainty, which contributed to the avoidance of particular situations. Participants highlight:

I was nervous going up and down stairs...I get a little bit of anxiety once in a while ... [31]

See and I’m not a paranoid person at all, but having had what happened to me... But the issue to me is that I don’t want to be walking down the street and keel over, and be walking my dog and have these freaking chest pains again. I don’t want that to happen again. [21]
I was having physical problem at the time, and that’s why I stopped coming because I could not do everything... [24]

Diet/nutrition

Becoming skilled at ‘eating healthier’ was another major challenge. Most participants reported that they changed some aspects of their daily eating habits, which was viewed in terms of ‘eating less unhealthy foods’ or introducing ‘more healthy foods’ into their diet. However, change in food patterns seemed difficult to accomplish, especially in situations where cultural and social gatherings where food or alcohol was emphasized. Two participants commented:

I can’t go to the party! That’s another one too, you can’t go to the party no more. Because they are eating pretty good and you are not. They are dancing and food around the table and there’s a roasted pig there... wholly-molly! [18]

All my friends have been unhelpful in as much as they say, have another drink! [43]

2.3.1.2 Benefits of CRP

Motivation

The CRP was described to be important because it was ‘motivational and encouraging’. Attending CRP was enjoyable for these reasons and participants valued the psychosocial aspects of the program. As participants explain:

They [healthcare professionals] gave me motivation and hope. [34]

The guys [healthcare professionals] who run it [CRP] motivate you, they really motivate you and they’re interested in you. [15]

I exercise anyway, but it [CRP] can act as sort of a way to give me encouragement to behave myself. [36]
Support

A key benefit was found in the group settings where participants were able to interact with healthcare professionals and other CVD patients. Through these relationships and peer support, participants reported feeling comfort and assurance to engage in healthier activities to better manage their health. Participants explain:

…it was nice to see people and be able to talk with them and it felt more like I was going to say a gym class instead of it being more like this thing because you’re sick. [23]

There is comfort in talking to other people with the same disease... It’s nice to know that you are not the only one. [15]

Structure

Participants in our study also reported to value CRP because the program provided ‘structure and routine’. Participants also reported that through program participation, they felt they were able to begin the process of rehabilitation and ‘become healthy again’. Participating in a structured exercise program that encouraged participants to carry out regular physical activity was reported to be a great merit for some participants. For example:

Yeah, well I think the idea is to set me on the right path. One of the difficulties that I had was exercising on my own. I’d come to the class and the instructor would lead us through warm up and cool down, and we had talks. It was social and it was actually enjoyable, the whole process. [41]

I think the most important thing [in regards to CRP] is it makes us [patients] aware that we have heart disease and that we can go on living a very normal life with limitations... [12]
2.3.1.3.  **Disadvantages of CRP**

When we asked our study participants what they disliked about the CRP, the predominant responses were related to time constraints, transportation issues such as distance to the program, and dissatisfaction with the exercise intensity. Participants stated:

... it takes too much time out of my day for very little results. [13]

I couldn’t make it here [CRP] on time... couldn’t get here for the hour twice a week... Or else I would have kept going. [23]

Participants who reported to have ‘no time’ for CRP were often bound by work or family obligations. Additionally, patients who identified time as a barrier were also more likely to claim that carrying out habitual physical activity was not a priority or felt they were dedicating a lot of time to drive to CRP for ‘very little results.’ These participants often downplayed the importance of exercise in risk factor modification, which impacted beliefs about the necessity of CRP. Distance to the program was also found to be a downfall of attending CRP, which often acted as a barrier for our participants. For instance, traveling distances were reported to be challenging and these participants were less likely to participate in the program. Participants explain:

Yeah I think it would be good if you know, steered people into one [CRP] that was close to home... I don’t know where these guys live, but they’re obviously coming in from all over. [12]

I did do it [CRP] for 2 months... It was interesting to talk to people, like the trainers... which was useful from my perspective. But it did become quite inconvenient to be coming out here. [15]

Participants also reported dislike for the exercise component of CRP. The dissatisfaction was reported around exercise intensity and participants felt the program could be better tailored to meet their individual needs. For example, participants who were previously physically active reported feeling ‘held back’ in a group setting as they did not feel challenged with the new exercise regimen. These participants felt the exercise training
sessions could have been greater in intensity and shorter in duration when it came to cool-down/warms-ups, despite their new health status. Contrastingly, participants who reported to be physically inactive before attending CRP felt the exercise component was not enjoyable or overwhelming. Participants explain:

... I thought the warm up sessions was rather long... the strengthening was a little bit slow for me for moving along...must have been there 6 or 7 sessions ...I thought that was rather slow to move me along or me up to another level. [31]

I know it’s tough to organize people at different levels... But I think if you got people of similar levels at the same time, it would help. [36]

I stopped CRP because I get much better cardio workouts on my own. [17]

Because I could not do everything [exercises]...I was having a lot of anxiety and my depression was getting worse because I thought like - wow what’s wrong with me if I can’t even do this?! [34]

Lastly, some participants stated that CRP was useful and reported no disadvantages of attending the program. In a few cases, dissatisfaction with the level of confidentiality exercised by program staff or exclusion of family members throughout the program were reported to be disadvantages of CRP. For example:

I think patient confidentiality is bit of an issue... professionals [exercise specialists] will come and talk with you about your problems in front of everyone... I was looking around and everyone was stretching behind me. [36]

2.3.1.4. Additional Supports

Participants felt ‘more facetime’ or additional time with the cardiologist was a form of support they would greatly benefit from. For instance, some participants felt appointments that were more ‘frequent’ would be favourable whereas other participants felt longer appointment times would better support them in managing their disease. In both cases however, participants felt having an ‘ongoing rapport’ with the physician would
ultimately help them feel more supported and assured of their disease state and prognosis. For example:

There is one thing that I would like... and it is having to do with the doctors... I mean he is nice and everything... but it’s just that there’s not much interaction after months... you know? [24]

Community based CRP outside the hospital setting or programs closer to home were also identified as additional supports participants felt they would benefit from. Having facilities that are ‘more accessible’ were reported to ‘make it easier exercise’. Participants also reported that having an ‘exercise-partner’ would greatly motivate them to exercise more. For example:

Well I think a lot more centres, like community centres ... like the YMCA, if they could help get people in and... have programs like this [CRP]... then I think more people would stick with it. [23]

I should go out more. I should try and push myself... Occasionally someone will come up and ask if I’d like to go out for a walk and I say I’d love to and I enjoy it. But I don’t take the initiative... [25]

Some participants in our study reported that additional support was ‘not needed’ whereas other participants stated that additional support for making dietary changes was necessary to better manage their disease. These participants recognized that diet has a prominent role in managing CVD but fell short of incorporating food modifications and felt more guidance in the knowledge translation would be beneficial. For example:

I’m amenable to it [alcohol intake]... But I don’t know what you people [dieticians] mean by too much! [36]

I don’t think there are any [additional supports] no. No, there are no supports I need. [15]
2.4. Discussion

We found that CVD patients who dropped-out of a CRP prematurely generally had difficulties managing their health. Hardships reported included adjusting to physical setbacks while implementing health-promoting behaviours such as CRP. Reduced physical fitness, low energy level, fatigue and being short of breath were common health complaints. Having access to tangible and emotional support was considered to be important for all CRP drop-out participants. Many participants reported coping with depression and anxiety surrounding CVD re-occurrence or progression. Despite receiving nutritional counselling, change in food patterns was difficult to accomplish. Attending CRP was reported to be advantageous as it motivated participants to engage in rehabilitation behaviours by providing structure and routine. Barriers to CRP that’s contributed to drop-out included time constrains, distance to CRP, and dissatisfaction with exercise prescription. More time with the cardiologist and accessible community based CRPs were a desired supports that would aid our study participants in managing their health.

Drop-out participants in our study were not different from patients who attend a traditional CRP. For instance, 63% of the CRP drop-out patients in the present study were men, with an average age of 61 years, who were former smokers; while 83% of patients who attend a CRP are men, with an average age of 64 years, and non-smokers. CRP drop-out patients in the present study, however, reported great degrees of physical setbacks while implementing health-promoting behaviours including as low energy level, fatigue and being short of breath, which were supported in previous studies. The presence of family, friends or partners during recovery was highly valued as it helped foster a sense of security that supported adherence to rehabilitation behaviours. Similarly, Eriksson et al (2012) found patients reported that it felt good to have family close by when they were ill. Wang et al (2006) found that social support was predictive of increased self-care behaviours in heart transplant candidates. Participants in our study reported receiving both tangible and emotional supports that often went hand in-hand. For example, family and friends assisted with household chores and partners often assumed more domestic responsibilities due to patients’ poor health. The openness of receiving these supports was reported to facilitate more ‘honest and open’ lines of communication. The presence
or absence of supports affected participants’ overall contentment and perceptions on health in our study. This is in line with Bohachick et al (2000) who reported that cardiac patients who perceived better social support network over time had higher levels of optimism, better functioning and a stronger sense of well-being. Clark et al (2013) also found family support being an important factor related to participation to CR programs.

Participants also valued the close social networks gained by attending CRP. Typically, patients felt ‘supported’ and ‘understood’ by the networks that were created and maintained during the group exercise classes. Conversely, Gafarov et al (2013) found low levels of social networks were associated with negative health habits such as low smoking cessation or physical inactivity, which reinforces the importance of social support in rehabilitation behaviours. A few participants in our study stated that more family involvement throughout the course of the CRP would be helpful. In a study by Gulanick et al (1995) that explored patient perspectives on what would be helpful during recovery, patients requested a more supportive, confidence-building environment and individualized education for the patient and for the family. Therefore, CRP should strive to improve provision of support and education to spouses and family members on the important roles they have in facilitation of the health benefits that can be derived from CRP. Even though social networking was identified as a merit of attending CRP, participants still reported to discontinue the program due to issues surrounding distance, time constraints, or dissatisfaction with the exercise intensity. Previous studies have also found these factors to be barriers to attending CRP.

Living with CVD was reported to be physically challenging for our study participants. The majority of our participants reported that having to adjust to new physical limitations elicited feelings of anxiety, depression, and insecurity regarding their new health status, which was also described by Mierzynska et al (2010). While we do not know of the prevalence of depression in our study population, many studies have shown a high prevalence of depression among CVD patients. Furthermore, the presence of depression and anxiety of being ‘afflicted again’ or ‘leaving home’ arose as a possible barrier for attending the CRP in our participants. Similarly, studies have shown depression to be a predictor of poor adherence to prescribed health regiments such as smoking, medication non-adherence, physical inactivity, and CRP drop-out in cardiac
Indeed, study participants who reported feeling anxious about their disease also reported to fall short of engaging in rehabilitation behaviours such as regular physical activity or healthy eating. Having to cope with physical frailties while coping with anxiety surrounding their health condition imposed great functional impairment and as a result, participants often remained ‘close to home’. Similarly Perkins et al (1998) found adverse psychological reactions to cardiac surgery often impaired patients’ motivation to adhere to health care regiments and resume normal activities. This is concerning seeing that social isolation and minimal self-care behaviours are associated with increased cardiac mortality. Thus, we recommend an introduction of a more vigorous and comprehensive assessment of patients’ psychosocial condition during CRP to better support these individuals. In doing so, healthcare providers may minimize the prevalence of depression, which is a risk factor for CVD, and ultimately reduce cardiac mortality.

Study participants who previously dropped-out of a CRP reported gaining benefits from participating in CRP despite their early discontinuation. For instance, ‘motivation’ and ‘encouragement’ derived from fellow patients and exercise leaders were seen as valuable elements of attending CRP. Some participants appreciated nurse and exercise leaders’ involvement and expertise during their program attendance. Similarly, Fox et al (2000) demonstrated the importance of positive and encouraging leadership styles of exercise leaders in participants’ enjoyment and intention for future involvement. A small number of participants, on the other hand, felt staff involvement and ongoing discussions regarding participants’ current health status in an open group setting was a breach of patient ‘confidentiality’. In light of this, Hildingh and Fridlund (2003) found not all patients benefit from support groups and reported conflicting evidence about whether information should be provided by professional healthcare workers. In our study, most participants reported to enjoy the group settings where they were able to socialize with other patients. In doing so, participants felt more motivated to engage in rehabilitation behaviours and found comfort in knowing that all CRP patients were working towards a collective goal. Even among participants who reported to ‘get better exercise on their own’, they still reported to enjoy the group exercise component because it reminded them that they ‘weren’t alone’. By ‘sharing stories’ participants reported to feel ‘support’ and ‘assurance’ regarding their disease. Previous studies have also found social support to be an important determinant
of overall health and well-being in cardiac patients. Participants in our study also stated that the CRP group exercise classes were advantageous as it provided ‘routine and structure’. In support of this, research has shown that group settings were found to be helpful in dealing with life stressors by providing stability. In addition, because the CRP exercise classes were offered at a set time and location, we speculate that this may have provided a source of routine and stability for the study participants. There were some participants who found it inconvenient to attend CRP at schedule times that contributed to program discontinuation, which was also found in previous studies. There are benefits that can be realized with participation of CRP including increased motivation for healthy behaviours, routine and structure, as well as social support. However, the elements of these benefits are not clear-cut. Thus, achieving a greater understanding of these components as well as other motivators of CRP participation is necessary to implement interventions that can maximize participation.

Having ‘more time with the cardiologist’ was an additional support that was reported to help patients better manage CVD. Participants felt having an ongoing rapport with the physician would instill feelings of security regarding their disease diagnosis and prognosis. In support of this, research has illustrated that physician involvement has been associated with improved patient outcomes and long term medication adherence. A small number of participants in our study reported the need for more psychological resources to better manage their health. However, these participants may be faced with minimal support, anxiety, or depression as previously mentioned above. Regardless of the fact, the request for more professional involvement and guidance cannot be overlooked, and further research in the types of support that is required for this demographic is warranted. In light of this, more follow-up appointments with the cardiologists and alternative CRPs may better assist CRP drop-out participants.

Participants also pressed on the need for supplementary CRPs beyond the hospital setting in addition to exercise classes with varied exercise intensities better suited for their needs. Such programs would minimize issues of program non-attendance related to program inaccessibility, dissatisfaction with the exercise component, and time constraints that were identified as barriers in our study among other studies. Research exploring alternative CRPs, such as home-based programs or programs
delivered through the use of telehealth strategies have demonstrated success and cost-effectiveness; illustrating it’s potential role in secondary prevention for patients who drop-out of a traditional CRP or even offered as an alternative to face-to-face CRP. Booster sessions offered outside hospital settings enriched with support groups may also be helpful for CRP drop-out participants to further aid recovery and maintenance of rehabilitation behaviours.

Participants who identified no disadvantages of attending CRP still dropped-out of a CRP. These participants reported to discontinue CRP because they were managing well independently, felt they received better exercise on their own, and reported that additional supports were unwarranted. It may be that these participants felt cured following a cardiac event and did not take CRP seriously. Furthermore, these participants were reported to be physically active prior to CRP participation so it is possible that this demographic may possess higher confidence regarding exercise or higher self-efficacy (SE), which is defined as confidence to be successful in a behaviour. Patients with higher SE have demonstrated higher activities of daily living, exercise behaviour, and functional status. Conversely, Sarkar and colleagues found that CVD patients with lower SE demonstrated greater symptom impact, more impaired physical function, lower quality of life, and lower health status. Thus, it is possible that personality differences as well as psychosocial constructs such SE may play a role in cardiac rehabilitation behaviours and program attendance. Alternative CRPs may be better-suited for patients who were previously physically active or possess high SE pertaining to health behaviours such as physical activity. Although the standard CRP places great weight on the exercise component, these secondary preventative programs are multifaceted and are designed to influence all aspects of health and health related behaviours. Thus, a trimmed down program that embraces the other facets of CRP including counselling, education, goal setting on medication, exercise, and diet would be a great alternative for participants who are dissatisfied with the exercise component of CRP. In a systematic review by Taylor et al (2004) found no differences in mortality among cardiac patients who attended an exercise only CRP versus a comprehensive program, illustrating that non-exercise CRP that is holistic in nature may be equally effective in reducing cardiac mortality.
2.4.1. Limitations

The current study examined various factors associated with early drop-out of patients from a CRP and its limitations must be acknowledged. Foremost, caution is required in the generalizability of our findings as this is a single-site study. In addition, this study was limited by a small sample size. However, the amount of patient-level and qualitative data present allows an in-depth look at this population compared with other studies relying largely on quantitative data. Moreover, the population was primarily Caucasian and the results may not apply to women, older citizens, patients living in high social deprivation, and those from ethnic minorities (McGee & Horgan 1992; Pell & Morrison 1998; Taylor et al. 2001; Tod et al. 2001). The sample recruited for the present study all had internet access and may not be representative of the general population as those with Internet access tend to be younger and more educated than those without (Lear et al., 2009). Lastly, the semi-structured questionnaire was comprised of questions that were specifically written for this study. One limitation regarding the use of these questions was that they have not undergone rigorous testing to demonstrate validity and reliability. Future research should more fully explore multiple CRP practices in different regions using similar qualitative inquiry amid CRP drop-out participants.

2.4.2. Conclusion

The present study was unique in that it identified personal reasons that contributed to early discontinuation of CRP participation. Indeed, cardiac patients face a wide range of challenges living with CVD that are complex and interrelated. There are several beneficial elements of CRP participation that can play a role in the attitudes, commitment, and adherence of cardiac patients. Social support was reported to contribute to the success of the patient. Group treatment has been found to show positive results. However, the drop-out rate in CRP remains high. We believe that a key to minimizing CRP discontinuation lies in the identification of personal barriers and customization to the patient’s individual needs on a holistic level and addressing these barriers prior to starting CRP. Findings from our study indicate that CRP drop-out is likely a result of the interrelationship of multiple physiological and psychosocial factors such as depression, anxiety, fatigue, in conjunction to established barriers such as time, distance, and minimal social support.
More research exploring the differences in psychosocial variables is necessary to better understand and support CVD patients who drop-out of CRP. Analysing the beneficial components noted above could provide some beneficial data about how the assistance to CRP patients can be improved, and how the drop-out rate can be lowered.
2.5. References


http://www.psychosomaticmedicine.org/content/60/4/473.full.pdf.
Chapter 3.

Cardiac Rehabilitation Program Completers versus Non-Completers

3.1. Introduction

Cardiac Rehabilitation Programs (CRPs) are recommended as a core intervention for patients living with cardiovascular disease (CVD). These secondary prevention programs are designed to slow the progression of CVD through a multidisciplinary intervention approach that reduce disease risk factors by changing lifestyle behaviours. General program content includes exercise training, nutrition counselling, psychosocial support, and self-management education of the chronic condition. The benefits of attending and completing CRP have been well documented indicating a reduction in both cardiac and total mortality. Although active engagement in CRP and adherence to the lifestyle changes are imperative for these benefits to be obtained, participation rates remain sub-optimal with drop-out rates as high as 65%

Low program attendance and non-participation has been associated with psychological variables such as depression, social isolation, and low self-efficacy. Derived from Albert Bandura’s Social Cognitive Theory, self-efficacy (SE) is defined as “an individual’s judgment of their capacity to perform specific actions.” The theory posits that SE influences an individual’s choice of activity, the level of effort expenditure, and persistence in the face of adversity. The theory further posits that SE may be enhanced by four specific mechanisms: performance attainments (most potent), vicarious experiences, verbal persuasion, and awareness of one’s physiological state during the desired behaviour.

Research exploring SE in CRP participants is well established. There is evidence that Individuals with low SE will behave ineffectually even if they know what to do and how to do it; whereas individuals with higher SE will behave more efficacious and execute a course of action even in the face of adversity, in a specific domain or situation. In a CRP setting, patients with low SE are less likely to engage in habitual exercise and are
more likely to drop-out of a CRP, which are two important behaviours that can have significant impact on the functional capacity and mortality in patients with CVD.\textsuperscript{3,14–18} However, research comparing SE in patients who have previously completed a CRP versus those who dropped-out are minimal. Studies exploring differences in these two populations may provide greater insight into the SE processes that contribute to CRP participation and adherences to lifestyle behaviours. Furthermore, studies that examined changes in SE (pre/post CRP) among cardiac patients who either completed or dropped-out of CRP are minimal. Thus, the objective of this study was: 1) to compare differences in baseline SE between patients who completed a CRP versus those who discontinued the program prematurely, 2) to explore changes in SE, among patients who complete a CRP as well as those who drop-out of CRP.

3.2. Methods

The current study is part of a larger pilot study that utilized a mixed-methods approach to test a web-based intervention in patients dropping out of a CRP. In the current study quantitative research methods were utilized to: 1) gather and evaluate SE between CRP completers and drop-out participants, and 2) to explore changes in SE between CRP completers (pre/post CRP) and drop-out participants (pre/post over a similar time period as the CRP). The current study received approval from the research ethics boards of Providence Health Care and Simon Fraser University. All participants provided informed consent.

3.2.1. Setting

The St. Paul’s Hospital Healthy Heart Program CRP from which participants were recruited is a traditional multidisciplinary four-month intervention program that is supervised by cardiologists, nurses, dieticians, and American College of Sports Medicine certified exercise specialists and exercise leaders. The CRP consists of an intake clinic where the patients’ social characteristics, lifestyle behaviours and risk factors are assessed, and they receive counselling from a cardiologist and various allied health professionals. The monitored exercise program consists of aerobic exercise and resistance training two days per a week for 16 weeks. Exercise included warm up
(treadmill walking, rowing, or cycling), aerobic activity with prescribed target heart rates determined by an exercise stress test, resistance training (hand weights, wall pulleys, various weight bearing machines), and cool down. The exercise and resistance training were led and supervised by nurses and exercise specialists. Additionally, patients also took part in dietary counselling, a smoking cessation program and an exit assessment clinic.

3.2.2. Recruitment

3.2.2.1. CRP Non-completers

Charts of patients of the St. Paul’s Hospital, Healthy Heart Program CRP, who were enrolled from January, 2012, to January, 2013, were identified (n=993). Of the 993 individuals, a total of 571 (58%) individuals were ineligible for the current study as they had either completed the CRP (n=503, 51%), or the individuals’ charts were inaccessible (n=68, 7%). From this, a total of 422 (42%) patients who did not complete the CRP and were previously ‘discharged’ by the program nurses were identified. Among these participants, only individuals who signed the Cardiac Rehabilitation and Prevention Clinic Consent form where the patient has agreed to be contacted for future research were screened for the study inclusion criteria. The research assistant (RA) sent potentially eligible participants (n=339, 80%) a letter of introduction and a consent form, inviting them to participate in the Barriers to Cardiac Rehabilitation Program (BCRP). Two weeks following the mailing date, the RA followed-up with a telephone call to those patients who did not respond to the letter to discuss the BCRP.

Among the 339 potentially eligible participants, a total of 248 (74%) actively declined participation to the current study, and 5 (1%) were hoping to return to the Healthy Heart CRP. Some eligible participants (n=35, 10%) were considered to be ‘unable to be reached’ after being called five times over a four week period, others (n=13, 4%) were hospitalized, and 11 (3%) passed away before contact could be made. A total of 27 (8%) eligible participants consented to participate in the present study.

The inclusion criteria were (1) patient of St. Paul’s Hospital Healthy Heart Program CRP, (2) signed the Cardiac Rehabilitation and Prevention Clinic Consent form to give
permission for future contact for research purposes, (3) dropped-out of a CRP (attended a minimum of two classes and discharged from CRP), and (4) ability to speak and understand English. As the current study was part of a larger trial to test a web-based intervention in patients dropping out of a CRP, another inclusion criterion was having regular Internet access. Participants with (1) co-morbidities at the acute stage, (2) planned surgical intervention, or (3) with significant psychiatric disease were excluded from the study.

3.2.2.2. CRP Completers

Patients of the St. Paul’s Hospital Healthy Heart Program CRP who were undergoing the intake process from March, 2013, to September, 2013, and who met the inclusion criteria (below) were invited to participate in the present study (n=72). Patients who were undecided about participating in the present study opted to take the consent form home and the RA followed-up with a telephone call two weeks after to discuss BCRP. Among these potentially eligible participants, 3 (4%) were considered ‘unable to be reached’ after being called five times over a four week period. From the remaining 69 potentially eligible participants, 19 (26%) actively declined participation to the current study because they were ‘too busy’ (n=14, 20%) or ‘uninterested (n=5, 7%). A total of 50 (72%) eligible participants consented to participate in the present study.

The inclusion criteria were: (1) patient of St. Paul’s Hospital Healthy Heart Program CRP, (2) ability to speak and understand English, (3) enrolled in the Healthy Heart Program CRP. Participants with (1) co-morbidities at the acute stage, (2) planned surgical intervention, or (3) with significant psychiatric disease were excluded from the study.

3.2.3. Study Design

Baseline Assessment

Individuals who agreed to participate in the present study were required to complete the consent form. Those who provided consent underwent a baseline assessment consisting of two questionnaires: 1) Exercise Self-Efficacy, 2) General Self-Efficacy.
Follow-up Assessments

Approximately three months from the baseline assessment, all participants underwent a follow-up assessment consisting of the same two questionnaires.

3.2.4. Measures

Exercise Self-Efficacy

Confidence for exercise behaviour adoption and maintenance were assessed using the Exercise Self-Efficacy Behaviour Scale.\textsuperscript{19,20} Each item on the Scale asks ‘how confident’ the respondent is that s/he could exercise under specific circumstances using a 7-point likert scale (0 = Not confident at all, 4 = Maybe, 7 = Very confident). Numeric responses were summed and then divided by the number of questions on the questionnaire to report as a general score with a minimal score of 12 and a maximal score of 84.

General Self-Efficacy

Confidence to successfully adhere to prescribed medication and diet behaviours were assessed using the General Self-Efficacy Behaviour scale.\textsuperscript{19,20} Each item on the Scale asks ‘how confident’ the respondent is that s/he could adhere to prescribed medication and diet behaviours under specific circumstances on a 4-point likert scale (0 = Not at all true, 4 = Very much true). The numeric responses were summed and then divided by the number of activities on the questionnaire to provide a general score for the respective behaviours with a minimal score of 12 and a maximal score of 48. Questions that were negatively stated (i.e."I doubt that I can manage to really carry through with a low fat diet.") were scored reversely, where the numerical scoring scale was marked in the opposite direction. Both SE questionnaires have been used in-house for a number of projects.\textsuperscript{19,20}
3.2.5. Data Analysis

Demographic characteristic differences between CRP completers and non-completers were explored with an independent samples t-test for continuous variable (age) and Pearson chi-square tests for categorical variables (gender, education, income, marital status, smoking status). All variables were tested for normality pre-analysis using the Kolmogorov-Smirnov test. All the variables were normally distributed. However, due to the small sample size non-parametric statistical tests were used.

The Mann-Whitney test was used to analyze differences in SE between groups and Wilcoxon matched-pairs test was used to analyze within group changes in SE. Data are reported as median and inter-quartile ranges (IQR), respectively. Change in exercise and general SE scores were obtained by subtracting baseline SE scores from 3 month SE scores. The Mann-Whitney test was used to test for differences in change between the completers and non-completers. Data are reported as median IQR, respectively. All analysis used a p-value of .05 for significance and data were analyzed using the SPSS37 statistical software package.

3.3. Results

3.3.1. Sample Characteristics

A total of 68 participants (n=45 CRP completers, n=23 CRP drop-out) completed the present study. Participants considered lost to follow-up (n=9) were not significantly different to participants who completed the study with respect to age, gender, household income, marital status, education and SE (p< 0.05). Those who were lost to follow-up were more likely to be female (56%), single (33%), with high school education (44%), and a reported house hold income that was less than $30,000 (33%) (data not shown).

A summary of demographic characteristics describing the study participants is presented in TABLE 1. No baseline socio-demographic differences were found between CRP completers and non-completers. The ages of participants ranged from 34 to 89 years, with a mean age of 61.6 ± 13.3 years. The majority of participants were men (61%),
were predominantly married (41%), with a reported household income $60,000 or more, received post-secondary education (49%), and former smokers (46%).

Table 1  
Socio-demographic characteristics of individuals who completed versus those who did not complete cardiac rehabilitation program (CRP).

<table>
<thead>
<tr>
<th></th>
<th>Overall Sample (n=77)</th>
<th>Did not complete CRP (n=27)</th>
<th>Completed CRP (n=50)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (%: n)</td>
<td>30 (39%: 27)</td>
<td>10 (37%: 9)</td>
<td>20 (40%: 12)</td>
<td>0.799+</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td>61.6 ± 13.3</td>
<td>61.1 ± 13.8</td>
<td>61.8 ± 13.1</td>
<td>0.608‡</td>
</tr>
<tr>
<td><strong>Education:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>24 (31%: 20)</td>
<td>4 (15%: 3)</td>
<td>19 (38%: 15)</td>
<td>0.147+</td>
</tr>
<tr>
<td>College/Diploma</td>
<td>15 (19%: 12)</td>
<td>6 (22%: 5)</td>
<td>9 (18%: 6)</td>
<td></td>
</tr>
<tr>
<td>University/Masters/PhD</td>
<td>38 (49%: 29)</td>
<td>17 (63%: 14)</td>
<td>21 (42%: 17)</td>
<td></td>
</tr>
<tr>
<td><strong>Income:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30 000</td>
<td>20 (26%: 15)</td>
<td>6 (22%: 5)</td>
<td>14 (28%: 9)</td>
<td>0.123+</td>
</tr>
<tr>
<td>30 000-40 000</td>
<td>8 (12%: 6)</td>
<td>2 (7%: 1)</td>
<td>6 (12%: 3)</td>
<td></td>
</tr>
<tr>
<td>40 000-50 000</td>
<td>5 (4%: 3)</td>
<td>0 (0%: 0)</td>
<td>5 (10%: 2)</td>
<td></td>
</tr>
<tr>
<td>50 000-60 000</td>
<td>3 (4%: 2)</td>
<td>0 (0%: 0)</td>
<td>3 (7%: 2)</td>
<td></td>
</tr>
<tr>
<td>&gt;60 000</td>
<td>27 (36%: 22)</td>
<td>14 (51%: 12)</td>
<td>13 (26%: 11)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>27 (35%: 20)</td>
<td>8 (30%: 6)</td>
<td>21 (42%: 15)</td>
<td>0.177+</td>
</tr>
<tr>
<td>Married</td>
<td>29 (41%: 22)</td>
<td>10 (37%: 7)</td>
<td>19 (38%: 13)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>6 (8%: 4)</td>
<td>3 (11%: 2)</td>
<td>3 (6%: 1)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>8 (10%: 6)</td>
<td>3 (11%: 2)</td>
<td>5 (10%: 3)</td>
<td></td>
</tr>
<tr>
<td>Common Law</td>
<td>5 (7%: 4)</td>
<td>3 (11%: 2)</td>
<td>2 (4%: 1)</td>
<td></td>
</tr>
<tr>
<td><strong>Smoking Status:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>31 (40%: 24)</td>
<td>9 (33%: 6)</td>
<td>22 (44%: 13)</td>
<td>0.477+</td>
</tr>
<tr>
<td>Former</td>
<td>37 (48%: 27)</td>
<td>15 (56%: 11)</td>
<td>22 (44%: 10)</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>6 (8%: 4)</td>
<td>3 (11%: 2)</td>
<td>3 (6%: 2)</td>
<td></td>
</tr>
<tr>
<td><strong>Exercise Self-Efficacy:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>64 (51, 74)</td>
<td>61 (47, 75)</td>
<td>66 (56, 72)</td>
<td>0.078++</td>
</tr>
<tr>
<td><strong>General Self-Efficacy:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>42 (38, 45)</td>
<td>40 (36, 45)</td>
<td>42 (39, 45)</td>
<td>0.561++</td>
</tr>
</tbody>
</table>

+ Group differences in categorical variables explored by Chi-square test and presented as n (%)
‡Group differences in continuous variables explored by Mann-Whitney test and presented as mean ± standard deviation (SD)
++Group differences in SE at baseline and 3 month follow-up explored by Mann-Whitney test and presented as median and inter-quartile range (IQR)

3.3.2. Exercise and General Self-Efficacy

The Mann-Whitney test was conducted to explore SE measures between CRP non-completers and completers (TABLE 1). The results showed no baseline differences
in exercise SE between CRP non-completers and completers (61, 47, 75 vs 66, 56, 72, p=.078) and general SE between CRP non-completers and completers (40, 36, 45 vs 42, 39, 45, p=.561). With respect to within group change in SE, there were no changes in exercise SE pre/post CRP (-3, -17, 4, p=.461) or general SE (0, -6, 6, p=.884) among the CRP non-completers; and no changes in exercise SE pre/post CRP (0, -4, 7 p=.812) or in general SE (1, -3, 4, p=.334) among the CRP completers (data not shown). Changes in SE between groups were also examined. There were no differences in change in exercise SE between CRP non-completers and completers (-4, -17, 4 vs 0, -4, 6, p=.059). There were no differences in change in general SE between CRP non-completers and completers (0, -6, 7, vs 1, -3, 4, p=.959). Changes in SE from baseline to 3 month follow-up in CRP completers and non-completers are presented in TABLE 2.

Table 2  Change in Self-efficacy (SE) of individuals who completed versus those who did not complete CRP from baseline and 3 month follow-up.

<table>
<thead>
<tr>
<th></th>
<th>Did not complete CRP (n=23)</th>
<th>Completed CRP (n=45)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Exercise Self-Efficacy</td>
<td>-4 (-17, 4)</td>
<td>0 (-4, 6)</td>
<td>0.059+</td>
</tr>
<tr>
<td>Change in General Self-Efficacy</td>
<td>0 (-6, 7)</td>
<td>1 (-3, 4)</td>
<td>0.959+</td>
</tr>
</tbody>
</table>

+ Group differences in change in SE explored by Mann-Whitney test and presented as median and interquartile range (IQR)

3.4. Discussion

Despite the numerous benefits that can be gained by participating in a CRP, program participation remains low due to various clinical, demographic, co-morbidity, and psychosocial issues.\(^1,3,21\) Patients' SE levels have shown to be associated with numerous rehabilitation behaviours including exercise and attendance to CRP.\(^8,15,22\) Thus, the present study evaluated SE in patients who previously completed CRP as well as in those who discontinued the program prematurely. Furthermore, we examined changes in SE pre/post CRP and also compared changes in SE between CRP completers (pre/post CRP) and non-completers (pre/post over a similar time period as the CRP) groups. Results showed no baseline differences in exercise and general SE between groups. There also were no differences in the change in SE (pre/post) CRP in both groups.
We hypothesized that participants who previously dropped-out of CRP would report lower exercise and general SE compared to those who successfully completed CRP. Patients who lack SE have been found to behave ineffectually, even if they know what to do and how to do it whereas patients with high SE have been found to engage in rehabilitation behaviours.\textsuperscript{3,14–18} The results from the present study were unexpected as there were no differences in either SE between CRP completers and drop-outs at baseline. There are several plausible explanations as to why there were no differences in SE. One possibility is that CRP drop-out participants were over-estimating their SE at the onset of the present study. Bandura (1997) states that without actual experience in a particular domain, individuals are unable to accurately rate their confidence for a specific task. It is highly plausible that participants were overconfident in their abilities to exercise or engage in general rehabilitation prescriptions in the present study, despite previously dropping-out of CRP (inefficacious behaviour associated with low SE), since SE is domain specific.

It is also possible that patients who felt they were managing well independently withdrew from CRP while patients experiencing challenges remained in the program as they recognized their need for support. As a result, a selection bias may have occurred where only patients in need of ongoing assistance with low confidence in their abilities were recruited. While it is safe to assume that patients enrolled in a CRP require support in managing their disease, it is unlikely that all participants shared unvarying SE levels at the onset of the present study. Lastly, the lack of difference in SE between the two groups may be due to the difference in timing of the baseline measures. The CRP completers were recruited March 2013 to September 2013 while the CRP drop-out participants were recruited from January 2012 to January 2013. This difference in timing of the baseline measure may have lead to an attrition effect among the CRP completers and an inflation of SE among the CRP drop-out participants, narrowing the gap in SE levels between the two groups. Although SE is a fluid construct that fluctuates with time and experience, it is improbable that all CRP completers experienced a decrease in SE while all CRP drop-outs experienced an increase. Rather, we speculate the small sample size may account for the absence of differences in baseline measures.
We hypothesized that participants who previously completed CRP would report improvements in both exercise and general SE as they progressed through the program and successfully mastered physical activity regimens and prescribed rehabilitation behaviours. Contrary to our expectations the results showed no differences in change in exercise and general SE from baseline to three month follow-up in the CRP completers. One possibility is that participants were beginning to undergo changes in their confidence levels while attending CRP but the changes in SE were not detected because the program was too short in duration to significantly impact SE. Additionally, patients in these multifaceted secondary intervention programs are expected to adopt numerous health behaviours simultaneously (habitual physical activity, healthy eating, taking prescribed medication, and stress management), all of which require time to implement. Then again, previous studies found as little as one educational session (plus 10 follow-up telephone calls) significantly improved SE as did 18 educational sessions.\textsuperscript{17,22,23} In terms of length of sessions, both longer educational sessions that lasted 120 minutes as well as shorter sessions that lasted 60 minutes were found to significantly improve SE.\textsuperscript{22–24}

Alternatively, in the Extensive Lifestyle Management Intervention (ELMI) study compared UC to one year of exercise sessions, telephone follow-ups, risk factor and lifestyle counselling in 302 heart disease patients. This study was unique in that it was longer in duration (one year), with a large population (n=302), and consisted of patients who completed a CRP. The authors of this study found no significant improvements in SE, although a positive trend in overall CVD risk factors were found.\textsuperscript{19} These studies illustrate the many ways SE may (or may not) be effected. It has been suggested that more aggressive interventions drawing on behaviour theories are superior to those without, as demonstrated in technology mediated CRP research studies.\textsuperscript{25–28} In light of this, comprehensive hospital-based CRPs that provide strategic SE enhancing counselling rooted in Bandura’s Theory may elicit greater improvements in patient confidence levels.\textsuperscript{25,27,29}

Measurement errors may have existed and consequently, the actual SE levels may not have been appropriately detected. Both SE questionnaires have been used in-house for a number of projects and have been previously validated.\textsuperscript{19,20} Nevertheless, it is believed that scales that assess SE must be tailored to the particular domain and has to
be context specific. In view of that, different questionnaires may be necessary when assessing populations who have either previously discontinued CRP versus those who have successfully completed the program. Furthermore, SE is a complex psychosocial trait and extra caution in the selection of measurement tools are warranted to fully capture the multifaceted ways in which efficacy beliefs operate. Specifically, Blanchard et al (2015) found patients in a CRP demonstrated different SE trajectories including barrier SE, task SE, and patient outcome expectations that formed different subgroups of patients. These SE ‘trajectories’ have shown to have extra distinct subcategories adding to the complexity of this psycho-social construct. However, studies that have utilized more complex and multidimensional SE measurement tools have been successful in detecting changes in SE in their study populations. In respect to our study, the exercise questionnaire is considered to be specific in nature, particularly the exercise SE questionnaire. Still, it may not have been a suitable measure to compare differences between the two groups. Standardized yet specific SE questionnaires that have been validated over a range of patients attending a standard CRP as well as for those who did failed to complete the program may be helpful.

3.4.1. Limitations

The most notable limitation is the small sample size that included both CRP completers and non-completers. Furthermore, these two groups may not be comparable and future studies that takes into account the unique set of differences these populations may present is warranted. Moreover, the population was primarily Caucasian men and the results may not apply to women, older citizens, patients living in high social deprivation, and those from ethnic minorities. As the current study was part of a larger trial to test a web-based intervention, another limitation is that this group may not be representative of the general population as those with Internet access tend to be male and educated.

3.4.2. Conclusion

A deeper understanding of SE, its structure, and its various role in health behaviours will allow healthcare providers to implement strategies throughout the rehabilitation process to help participants overcome barriers to rehabilitation. Moreover,
the results of this study highlight the need for more standardized methods when testing theoretical frameworks such as Bandura’s SE Theory. Although the application of theoretical approaches in a CRP would be a merit in itself, future research should aim to improve standardization pertaining to SE questionnaires and aim to formulate a validated SE scale. In doing so, more clarity in the effectiveness of novel intervention strategies in a CRP setting with respect to SE can be evaluated. Furthermore, validated scales and measurement tools will allow healthcare providers to assess patient psychosocial profiles early on, which could help tailor CRP strategies to optimize the potential for continued rehabilitation behaviours.
3.5. References


Chapter 4.

Support for Patients Who Drop-out of a Cardiac Rehabilitation Program

4.1. Introduction

Cardiac rehabilitation programs (CRPs) have been recognized as the standard of care for patients with cardiovascular disease (CVD).\textsuperscript{1} Despite the myriad of benefits that can be acquired from engagement in a CRP, participation remains sub-optimal with drop-out rates as high as 60\%.\textsuperscript{2-4} Patient perspectives on what would be helpful during recovery from a cardiac event revealed the need for supportive, confidence building environments, as well as individualized education for the patient and for the family.\textsuperscript{3-5} In support of this, previous studies have identified self-efficacy and social support as important determinants of survival and quality of life following a coronary artery disease.\textsuperscript{6-8} These results suggest interventions that help foster patient confidence based on Albert Bandura’s Theory of Self-Efficacy, may be appropriate for some patients.\textsuperscript{9}

Self-efficacy (SE) is defined as, “beliefs in one’s capabilities to organize and execute the courses of action required to manage prospective situations.”\textsuperscript{10} There is evidence that secondary prevention strategies including CRP, educational counselling, and social support groups may help enhance SE.\textsuperscript{11-18} Furthermore, raising patient SE levels has shown to improve certain CRP outcomes including adherence to exercise prescriptions, participation in CRP, as well as physical and social functional status.\textsuperscript{19-22} Ongoing participation in a secondary prevention programs is required for these benefits to be obtained and patients who drop-out of a CRP may lack access to such supports. Consequently, opportunities for reducing CVD events and enhancing quality of life are often lost and patients are at greater risk for further cardiac events.\textsuperscript{23-25} It is therefore imperative to find alternative strategies to support this high-risk, under-treated population.\textsuperscript{25,26}

To the best of our knowledge, there are only two intervention studies that involve patients who have declined or dropped-out of a CRP, and one of the two studies is
presently ongoing.\textsuperscript{25,27} The study by Redfern et al (2008) involves patients who previously declined participation in a CRP yet notably, both intervention studies employed telecommunications technologies such as the telephone or the Internet to deliver ongoing support to patients who were not attending a CRP. This may largely be due to overcoming barriers of time and distance, which have been commonly cited among CRP drop-out patients.\textsuperscript{2–4} Telemedicine strategies, which involve the transfer and exchange of health information between patients and health-care providers through electronic devices, may present an opportunity to reach patients who are unwilling to attend a standard CRP.\textsuperscript{28} In this regard, the present study examines the feasibility of an Internet-mediated group-video-conferencing intervention to provide psycho-social support among patients who previously dropped-out of a CRP.

4.2. Methods

4.2.1. Setting

The St. Paul’s Hospital Healthy Heart Program CRP, from which participants were recruited, is a traditional multidisciplinary four-month intervention program that is supervised by cardiologists, nurses, dieticians, and American College of Sports Medicine certified exercise specialists and exercise leaders. The CRP consists of an intake clinic where the patients' social characteristics, lifestyle behaviours, and risk factors are assessed. They also receive counselling from a cardiologist and various allied health professionals. The monitored exercise program consisted of aerobic exercise and resistance training two days per week for 16 weeks. Exercise included warm up (treadmill walking, rowing, or cycling), aerobic activity with prescribed target heart rates determined by an exercise stress test, resistance training (hand weights, wall pulleys, various weight bearing machines), and cool down. The exercise and resistance training were led and supervised by nurses and exercise specialists. Additionally, patients took part in dietary counselling, a smoking cessation program, and an exit assessment clinic.
4.2.2. Recruitment

The intake staff from the St. Paul’s Hospital Healthy Heart Program CRP provided the research assistant (RA) with a list of patients who were enrolled from January 2012 to January 2013 (n=993). The RA screened patient charts from the list to identify patients who were potentially eligible to participate in the present study. Of the 993 patients, a total of 571 (58%) were ineligible as they had either completed the CRP (n=503, 51%), or the individuals' charts were inaccessible (n=68, 7%). From this, a total of 422 (42%) patients who did not complete the CRP and were previously 'discharged' by the program nurses were identified. Among these participants, only individuals who signed the Cardiac Rehabilitation and Prevention Clinic Consent form, where the patient has agreed to be contacted for future research, were screened for the study inclusion criteria (n=339, 34%).

The inclusion criteria were (1) patient of St. Paul’s Hospital Healthy Heart Program CRP, (2) signed the Cardiac Rehabilitation and Prevention Clinic Consent form to give permission for future contact for research purposes, (3) dropped out of a CRP (attended a minimum of two classes and discharged from CRP), and (4) ability to speak and understand English. As the current study was part of a larger trial to test a web-based intervention in patients dropping out of a CRP, another inclusion criterion was having regular Internet access. Participants with (1) co-morbidities at the acute stage, (2) planned surgical intervention, or (3) with significant psychiatric disease were excluded from the study.

The research assistant (RA) sent potentially eligible participants a letter of introduction and a consent form, inviting them to participate in the Barriers to Cardiac Rehabilitation Program (BCRP). Two weeks following the mailing date, the RA followed-up with a telephone call to those patients who did not respond to the letter to discuss the BCRP. Among the 339 potentially eligible participants, a total of 248 (74%) actively declined participation to the current study, and 5 (1%) were hoping to return to the Healthy Heart CRP. Some eligible participants (n=35, 10%) were considered to be 'unable to be reached' after being called five times over a four week period, others (n=13, 4%) were hospitalized, and 11 (3%) passed away before contact could be made.
Our a priori sample size of convenience was 15 participants in each intervention group, or 45 participants in total. After 12 months of recruitment a total of 27 (8%) eligible participants consented to participate in the present study and further recruitment was stopped. The intake process is illustrated in FIGURE 6.

Figure 6 Recruitment outline.
4.2.3. Study Design

4.2.3.1. Baseline Assessment

Those who provided consent, underwent a baseline assessment that consisted of a semi-structured intake interview discussing challenges living with CVD (please refer to chapter 2 for results from the intake interviews) and the following six questionnaires: 1) Exercise Self-Efficacy, 2) General Self-Efficacy, 3) Social Support Scale, 4) European Quality of Life, 5) Center for Epidemiological Studies Depression Scale, and 6) Eysenck Personality Questionnaire Revised.

Following the baseline assessment, participants were given the option to choose the intervention group (usual care, CVD handbook, Internet-based group-video-conferencing) they wished to participate in. By giving participants the freedom to choose their treatment group, we were able to test whether the intervention is feasible for future studies.

4.2.3.2. Intervention Groups

Usual Care

Participants in the usual care (UC) received care from their cardiologist who provided guidelines for safe exercising and healthy eating habits. Apart from the study follow-up assessments, there was no contact between the study personnel and participants in the UC for the duration of the study nor was there any attempt to control for the level of patient care. For the purpose of the present study, the UC group served as a control/comparison group to evaluate the effects of Internet-based video-conferencing group.

Handbook on CVD management

Participants in the information handbook (HB) group were given a CVD Information Handbook describing their disease, its progression, and suggestions for self-management behaviours. The CVD Information Handbook has been developed and used in previous pilot studies for older chronically ill adults who manage their own health, which showed favourable results for the use of this educational support.
was also considered a control/comparison group to evaluate the effects of Internet-based
video-conferencing group.

**Internet-based group-video-conferencing**

Participants in the Internet-based video-conferencing (VC) group joined an Internet
supported group-video-conferencing intervention for the purpose of addressing subjective
barriers to engage in and maintain rehabilitation behaviours. Participants in this group
were given the same CVD Information Handbook as those in the HB group. The handbook
describes CVD, its progression, and suggestions for self-management behaviours.

Web cams and audio headsets were provided to participants who did not have this
equipment. Each participant was assigned a username and password to access the
secure web-site that provided links to: a) a video conferencing link for weekly group
meetings, b) a text-based chat forum within the group-video conferencing platform, c) a
link to access an electronic version of the CVD management handbook. A function for
scheduling weekly meetings allowed the participants to go to the ‘scheduled meetings’
page and click on the date/time of their meeting. Each participant was also provided a
simplified computer-training manual to guide participants through the links available on
the web site.

The VC group consisted of five participants and the sessions were facilitated by a
health professional. The facilitator was trained in accordance with the Intervention
Guidelines that were used in previous pilot studies to assure adherence to intervention
protocol.30–32 The Guidelines specify an unstructured format, which engages group
members in a process that focuses on self-care. Participants were encouraged to lead the
sessions by sharing their recent challenges and achievements in managing CVD. The
intervention consisted of 12 one hour sessions, one session per week for 12 weeks. While
the weekly VC sessions were unstructured, the general goals of the online group
intervention included, a) promoting the development of a mutually supportive group to
maintain medically prescribed rehabilitation regimes; b) addressing multiple barriers to
making significant lifestyle changes including psychological, social, environmental, and
cultural barriers to managing CVD, and c) enhancing self-confidence through social
persuasion to engage in rehabilitation behaviours such as exercise and diet. Data from
interviews, questionnaires, and weekly VC sessions were entered and stored into a secure database on a secure server using a coded identifier for future analysis.

Follow-up Assessments

At approximately three and six months from the baseline assessment, all study participants underwent a follow-up assessment consisting of the same seven questionnaires as in the baseline assessment.

4.2.4. Measures

Exercise Self-Efficacy

Confidence in exercise behaviour adoption and maintenance was assessed using the Exercise Self-Efficacy (SE) Behaviour Scale.33,34 Each item on the Scale asks ‘how confident’ the respondent is that they could exercise under specific circumstances using a 7-point likert scale (0 = Not confident at all, 4 = Maybe, 7 = Very confident). Numeric responses were summed and then divided by the number of questions on the questionnaire to report as a general score with a minimal score of 0 and a maximal score of 84.

General Self-Efficacy

Confidence in successfully adhering to prescribed medication and diet behaviours was assessed using the General Self-Efficacy (SE) Behaviour Scale. Each item on the Scale asks ‘how confident’ the respondent is that they could adhere to prescribed medication and diet behaviours under specific circumstances on a 4-point likert scale (0 = Not at all true, 4 = Very much true). The numeric responses were summed and then divided by the number of activities on the questionnaire to provide a general score for the respective behaviours with a minimal score of 0 and a maximal score of 48. Questions that were negatively stated (i.e., “I doubt that I can manage to really carry through with a low fat diet.”) were scored reversely, where the numerical scoring scale was marked in the opposite direction. Both SE questionnaires have previously been used in-house for a number of projects.33,34
European Quality of Life

The European Quality of Life (EQ-5D) includes questions regarding five dimensions of health: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Participants were asked to indicate their state of health by selecting their perceived level of problems related to each dimension of health. The levels of perceived problems were coded for analysis purposes (no problem = 1, some problems = 2, extreme problems = 3). The second section assessed state of health with a visual analogue scale, which recorded participants’ self-rated health on a vertical scale from zero (“worst imaginable state of health”) to 100 (“best imaginable state of health”). No codes were assigned to this section.

Social Support Survey

Perceived level of social support was measured using the Social Support (SS) Survey. Each response is rated on a 4-point likert scale (0 = None of the time, 2 = Some of the time, 4 = All of the time). Numeric responses were summed for a general score, with a minimal score of zero and a maximal score of 76. There is the option to subdivide each dimension of SS (emotional, tangible, affectionate, and positive social interaction) to obtain sub-scores, however, for the purposes of this study, a total general score was used. The SS survey questionnaire is considered reliable and stable over time.

Center for Epidemiological Studies Depression Scale

Depressive symptoms were assessed by the Center for Epidemiological Studies Depression Scale (CES-D). The CES-D consists of 20 questions on depressive symptoms experienced over the past week on a 4-point likert scale: 1 = rarely or none of the time (less than 1 day a week), 2 = some or little of the time (1-2 days), 3 = some or little of the time (3-4 days), and 4 = most or all of the time (5-7 days). Depressive symptoms were reported as a total score with a minimal score of zero and a maximal score of 60. Participants with a score of 16 or more were considered to have symptoms of depression and the higher the score, the stronger the symptomatology. The CES-D was used as a measure of mood as well as a screening tool and participants who reported a score of 40
or higher, were excluded from the study. Participants who self-reported to have clinical depression were also excluded from the study.

**Eysenck Personality Questionnaire Revised**

The Eysenck Personality Questionnaire Revised (EPO-R) is a 12-item questionnaire measuring psychotism, neuroticism, and extraversion. Responses are recorded as ‘yes’ or ‘no’ and the total score can range from 0-12. Higher scores indicate higher neuroticism and for the purposes of the present study, the EPO-R as a personality measure and as a screening questionnaire.

4.2.5. **Data Analysis**

Quantitative analysis for all questionnaires was conducted using the SPSS statistical software package. Demographic differences between the UC, HB, and Internet-based VC groups were explored with the Kruskal-Wallis test for the continuous variable (age) and Pearson chi-square tests for categorical variables (gender, education, income, marital status, smoking status). All variables were tested for normality pre-analysis using the Kolmogorov-Smirnov test and all were normally distributed. However, due to the small and unequal sample size and across intervention groups, non-parametric statistical tests were used to test for baseline differences.

Qualitative content analyses of the weekly VC sessions were completed using Grounded Theory methods by Strauss and Corbin (1998). The Research Assistant (RA) transcribed the weekly online sessions verbatim. The RA then reviewed the transcribed online weekly sessions and identified general themes across responses.

4.3. **Results**

4.3.1. **Sample Characteristics**

A total of 27 participants were enrolled in the present study and selected their group as follows: UC group (n=9), HB group (n=13), and VC intervention group (n=5). However, two participants from the UC group and two participants from the HB group (total
n=4) were considered lost to follow-up after being called five times over a four week period at 6 month follow-up. A total of 23 participants completed the present study with seven participants in the UC group, 11 participants in the HB group, and five participants in the VC intervention group.

A summary of demographic characteristics describing the study participants is presented in TABLE 3. Ages ranged from 34 to 87 years, with a mean age of 61.6 ± 13.8 years. The majority of participants were men (63%), married (37%), with a reported household income $60,000 or more (51%), received post-secondary education (85%), and were former smokers (56%).

No baseline differences were found between the intervention groups in socio-demographic variables with respect to age, gender, household income, marital status, education, or in exercise SE (p=0.619), general SE (p=0.286), SS (p=0.553), EuroQol (p=0.632), and EPO-R (p=0.156) (TABLE 3). Baseline differences in the CES-D scores were found (p=0.047). Further analysis showed participants in the VC group reported greater depressive symptoms at baseline compared to those in the usual care group (p=0.029). No baseline differences were found between those who completed the study versus those who were considered lost to follow-up (data not shown). Three and six month follow-up mean exercise SE, general SE, SS, EuroQol, CES-D, and EPO-R scores are provided in TABLE 4.
Table 3  
Socio-demographic characteristics of individuals who did not complete cardiac rehabilitation program.

<table>
<thead>
<tr>
<th></th>
<th>Overall Sample (n=27)</th>
<th>Usual Care (n=9)</th>
<th>CVD Handbook (n=13)</th>
<th>Video-Counselling (n=5)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>10 (37%)</td>
<td>3 (33%)</td>
<td>4 (31%)</td>
<td>3 (60%)</td>
<td>0.496+</td>
</tr>
<tr>
<td>Age (years)</td>
<td>61.1 ± 13.8</td>
<td>60 ± 12.3</td>
<td>62 ± 14.8</td>
<td>60.4 ± 16.1</td>
<td>0.796‡</td>
</tr>
<tr>
<td>Education:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High school</td>
<td>4 (15%)</td>
<td>1 (11%)</td>
<td>3 (23%)</td>
<td>0 (20%)</td>
</tr>
<tr>
<td></td>
<td>College/Diploma</td>
<td>6 (22%)</td>
<td>2 (22%)</td>
<td>3 (23%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td></td>
<td>University/Masters/PhD</td>
<td>17 (63%)</td>
<td>6 (67%)</td>
<td>7 (54%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>Income:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>5 (18%)</td>
<td>3 (34%)</td>
<td>2 (15%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>&lt;30 000</td>
<td>6 (22%)</td>
<td>2 (22%)</td>
<td>2 (15%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td></td>
<td>30 000-60 000</td>
<td>2 (7%)</td>
<td>0 (0%)</td>
<td>1 (8%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td></td>
<td>&gt;60 000</td>
<td>14 (51%)</td>
<td>4 (44%)</td>
<td>8 (62%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>Marital Status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>8 (30%)</td>
<td>4 (44%)</td>
<td>4 (31%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>10 (37%)</td>
<td>2 (22%)</td>
<td>5 (39%)</td>
<td>3 (60%)</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>3 (11%)</td>
<td>0 (0%)</td>
<td>2 (15%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>3 (11%)</td>
<td>0 (0%)</td>
<td>2 (15%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td></td>
<td>Common Law</td>
<td>3 (11%)</td>
<td>3 (34%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Smoking Status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Never</td>
<td>9 (33%)</td>
<td>3 (34%)</td>
<td>5 (39%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td></td>
<td>Former</td>
<td>15 (56%)</td>
<td>4 (44%)</td>
<td>8 (61%)</td>
<td>3 (60%)</td>
</tr>
<tr>
<td></td>
<td>Current</td>
<td>3 (11%)</td>
<td>2 (22%)</td>
<td>0 (0%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Exercise Self-Efficacy</td>
<td></td>
<td>61 (47,75)</td>
<td>63 (42,64)</td>
<td>60 (51,77)</td>
<td>43 (26,80)</td>
</tr>
<tr>
<td>General Self-Efficacy</td>
<td></td>
<td>40 (36,45)</td>
<td>38 (32,46)</td>
<td>44 (38,46)</td>
<td>33 (32,44)</td>
</tr>
<tr>
<td>Social Support</td>
<td>58 (38,74)</td>
<td>59 (43,73)</td>
<td>67 (33,75)</td>
<td>45 (10,63)</td>
<td>0.553++</td>
</tr>
<tr>
<td>EuroQOL</td>
<td>55 (40,80)</td>
<td>70 (45,80)</td>
<td>50 (35,80)</td>
<td>60 (20,73)</td>
<td>0.632++</td>
</tr>
<tr>
<td>Depression Scale</td>
<td>10 (5,26)</td>
<td>8 (3,11)</td>
<td>10 (5,22)</td>
<td>29 (17,39)</td>
<td>0.047++</td>
</tr>
<tr>
<td>Personality Questionnaire</td>
<td></td>
<td>10 (8,12)</td>
<td>11 (8,12)</td>
<td>10 (8,12)</td>
<td>7 (5,10)</td>
</tr>
</tbody>
</table>

+ Group differences in categorical variables were explored by Chi-square test and presented as n (%).
‡Group differences in continuous variables were explored by Kruskal-Wallis test and presented as mean ± standard deviation (SD).
++Group differences in exercise self-efficacy (SE), general self-efficacy (SE), social support (SS), EuroQOL, Depression Scale (CES-D), and Personality Questionnaire (EPO-R) at baseline were explored by Kruskal-Wallis test and presented as median and inter-quartile range (IQR).
### Table 4

<table>
<thead>
<tr>
<th></th>
<th>Usual Care (n=7)</th>
<th>CVD Handbook (n=11)</th>
<th>Video-Counselling (n=5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exercise Self-Efficacy:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3ms)</td>
<td>54 ± 18</td>
<td>53 ± 19</td>
<td>47 ± 27</td>
</tr>
<tr>
<td>(6ms)</td>
<td>65 ± 14</td>
<td>49 ± 14</td>
<td>48 ± 25</td>
</tr>
<tr>
<td><strong>General Self-Efficacy:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3ms)</td>
<td>41 ± 5</td>
<td>40 ± 6</td>
<td>38 ± 7</td>
</tr>
<tr>
<td>(6ms)</td>
<td>38 ± 4</td>
<td>39 ± 5</td>
<td>37 ± 10</td>
</tr>
<tr>
<td><strong>Social Support:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3ms)</td>
<td>57 ± 12</td>
<td>54 ± 22</td>
<td>30 ± 26</td>
</tr>
<tr>
<td>(6ms)</td>
<td>67 ± 6</td>
<td>53 ± 21</td>
<td>33 ± 37</td>
</tr>
<tr>
<td><strong>EuroQOL:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3ms)</td>
<td>76 ± 11</td>
<td>67 ± 19</td>
<td>60 ± 20</td>
</tr>
<tr>
<td>(6ms)</td>
<td>87 ± 7</td>
<td>58 ± 23</td>
<td>53 ± 23</td>
</tr>
<tr>
<td><strong>Depression Scale:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3ms)</td>
<td>11 ± 9</td>
<td>14 ± 13</td>
<td>26 ± 16</td>
</tr>
<tr>
<td>(6ms)</td>
<td>7 ± 5</td>
<td>18 ± 14</td>
<td>27 ± 13</td>
</tr>
<tr>
<td><strong>Personality Questionnaire:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3ms)</td>
<td>10 ± 3</td>
<td>8 ± 4</td>
<td>5 ± 4</td>
</tr>
<tr>
<td>(6ms)</td>
<td>12 ± 1</td>
<td>8 ± 4</td>
<td>6 ± 3</td>
</tr>
</tbody>
</table>

### 4.3.2. Qualitative Content Analyses

Four out of the five participants in the VC group completed all 12 weekly online VC sessions. One participant withdrew from the weekly VC sessions due a bad Internet connection which made it difficult for the participant to log-in to the website that provided access to the weekly group VC sessions.

Participants in the weekly VC group reported that the social aspects where the participants had the opportunity to share personal challenges in managing CVD, were enjoyable. Additionally, participants reported that being part of a group that met weekly helped them feel 'supported' and 'not alone.' Participants reported challenges in managing CVD and the four main themes that were identified included: 1) challenges adjusting to new physical limitations, 2) managing symptoms of depression/anxiety, 3) making diet modifications, and 4) engaging in physical activity.

There were many discussions regarding participants’ current physical states and the challenges of having to adjust to new physical limitations. The majority of the discussions were around what the new limitations were, the participants’ reactions to their
new limitations, and how the participants were coping in response to these limitations. One participant explained, “I am fearful of raising my blood pressure… unsure how to balance my symptoms and exercises.”

The fear of having another cardiac event and that it might be fatal was common and elicited feelings of anxiety and depression among study participants. Discussions centred around how participants felt vulnerable, helpless, and anxious regarding their current disease state, ongoing symptoms, and future prognosis. One participant explained, “It’s mind over matter. But I get anxiety [at bed time] because I don’t know if I will wake up…” Another participant reported to have delayed her plans to have children due to her ongoing health issues, and reported to feel ‘defeated’ as a result.

Most participants reported that change in eating patterns was not easy to accomplish. Becoming skilled at eating healthier was a challenge because participants disliked the taste of vegetables or healthier alternatives, lacked the knowledge to prepare healthy meals, had limited access to nearby grocery stores due to geography, or had financial constraints. As one participant explained, “I know I am suppose to eat more fresh fish, but it’s expensive! Or tofu, what am I supposed to do with tofu?”

Discussions around physical activity training comprised of sharing information on the different exercises the participants were presently carrying out or had previously engaged in. Participants commonly stated that it was important to engage in more regular physical activity but admitted to feeling less motivated since their diagnosis. One participant explained, “exercise can get boring… but it’s necessary. Having someone there would help.”

4.4. Discussion

The present study is a hypothesis generating pilot study to test the feasibility of a group-VC intervention among CRP patients who previously dropped-out of CRP to promote the adoption of rehabilitation behaviours. Specifically, we used an Internet-mediated VC medium to provide peer-support and opportunities to enhance patient SE through verbal persuasion. Among the participants in the VC group, four out of the five
participants took part in all 12 weekly sessions indicating that participants accepted the VC intervention, though the sample size was small (n=4). No clinical differences were found between groups in changes in exercise SE, general SE, SS, EuroQol, CES-D, and EPO-R scores from baseline to six month follow-up.

One of the objectives of the present study was to test the feasibility of an Internet-based group-VC intervention among CRP patients who previously dropped-out of CRP. We anticipated that there would be enough potential participants to reach our target of a minimum of 15 participants per intervention group (UC, HB, VC), with a total of 45 participants. Furthermore, by giving the participants the freedom to choose their treatment group, we were able to test whether the active intervention would be feasible for future studies and programs in hospital settings. After 12 months of continuous recruitment, however, we were only able to recruit a total of 27 participants (8% of eligible participants) with nine participants in the UC group, 13 participants into the HB group, and five participants into the VC intervention group. By six month follow-up, four participants were considered lost to follow-up and there was a total of 23 participants at the end of the study. The reason for not reaching the desired target may be due to the limited number of patients who are both eligible and interested in participating. Participants who declined participation (73% of eligible participants) to the present study provided various reasons for non-participation including disinterest in a secondary prevention program or exercise classes, lack of time, some patients felt they were managing well independently, and others were interested but felt they were unable participate due to ‘health issues’. The heterogeneous reasons for declining participation makes this population a challenging group to recruit from and may necessitate the need for more individualized programs that address patient-level barriers to improve CRP adherence and participation.

Though the sample size was small, the four participants in the VC sessions reliably utilized the VC and participated in the weekly online sessions for three months of the study. The participants also stated that being part of a group that met regularly helped them feel “supported.” Furthermore, the four participants reported that they were continuing to remain in contact via email and in person even after the weekly VC sessions had ended. From this we gather that the group-VC intervention was able to provide some source of peer-support. Prior studies have found patients who share a common problem and have
resources to offer one another, may help each other feel supported and provide a sense of peer-support.\textsuperscript{39,40} However, contrary to our expectations, no clinical differences were found between groups in terms of changes in exercise SE, general SE, SS, EuroQOL, CES-D, and EPO-R scores between baseline and six month follow-up. While it is possible that our intervention was ineffective, we speculate the absence of differences in the outcome measures was due to our small sample size.

Prior studies have found patients who suffer from anxiety or depression following a cardiac event are more likely to drop-out from a secondary prevention program and are less likely to adhere to health promoting behaviours.\textsuperscript{41–43} In the present study, the baseline depression symptoms scores were higher in the HB and VC groups. It is possible that participants who dropped-out of CRP due to psychological issues chose the two intervention groups with some form of support. Patients who prematurely discontinue CRPs due to mental health reasons may benefit from intensive counselling interventions that help alleviate depression and improve patients’ mental health prior to CRP enrollment. Improving the mental and emotional wellbeing among this population may further enhance patient adherence and participation in a CRP.\textsuperscript{41,44–47}

From the results from the present study, it is unclear whether peer-group VC is helpful for patients who discontinued a secondary prevention program. However, the present study is one of the few studies involving patients who have previously discontinued a CRP. To the best of our knowledge, there is only one other intervention study that includes CRP drop-out patients and the study is currently ongoing.\textsuperscript{27} Similar to the present study, Martin and Singh are testing the feasibility of an Internet-mediated secondary intervention to overcome barriers of distance that have been commonly reported in previous systematic reviews.\textsuperscript{23,48,49} Prior studies using technology mediated strategies have improved access to health interventions and increased health behaviours among patients who face barriers of geography or who do not have access to a CRP.\textsuperscript{25,50} The application of technology may therefore provide opportunities to overcome barriers to CRP participation and serve as a useful tool for some patients. At present, the key components necessary to maximise the effectiveness of Internet-mediated CRP strategies are unclear.\textsuperscript{51} Additional research evaluating comprehensive telemedicine
strategies for CRP drop-out patients that employ all the core components of CRP and with a theoretical basis, is much needed.

4.3.1. Limitations

The most notable limitation is the small sample size. The present study was also a single site, non-randomized pilot study to test the feasibility of the Internet-based VC in CRP drop-out patients and may not be generalizable to the broader CRP populations. Moreover, the population was primarily Caucasian men and the results may not apply to women, older citizens, patients living in high social deprivation, and those from ethnic minorities.\cite{41,52,53} Another limitation is that this group may not be representative of the general population as those with Internet access tend to be male and educated.\cite{54}

4.3.2. Conclusion

Undoubtedly, CRPs are effective behavioural interventions that reduce morbidity and mortality in patients with CVD.\cite{1} However, the success of CRP depends on patient adherence to prescribed regiments. Patients who discontinue CRPs are undertreated and consequently, are at greater risk for recurrent cardiac events.\cite{23,24} Thus, alternative strategies to support this high-risk and under-treated population are warranted.

Despite our efforts to provide ongoing support, the results from the present study are insufficient and it is unclear whether peer-group VC is helpful for patients who discontinue a secondary prevention program. A larger multi-site study may have more success with recruitment and subsequently, be better able to detect significant changes in terms of whether this type of intervention is effective. A greater understanding of the mechanisms of psychosocial constructs such as SE and the influence of peer-support will allow healthcare providers to implement appropriate strategies throughout the rehabilitation process, and possibly minimize program drop-out. Patients who face ongoing psychological barriers to a CRP may benefit from interventions designed to improve emotional and mental health prior to CRP engagement. Patients who are unwilling to attend a CRP due to barriers of geography may benefit from alternative health interventions that are delivered through the use of technology. More telehealth intervention studies involving CRP drop-out patients are necessary to evaluate whether these types of interventions are feasible and cost-effective.\cite{25,26,28} Helping this population engage in the
long term attainment of healthy behaviours may improve patient outcomes and help decrease hospital utilization, morbidity, and mortality associated with CVD.\textsuperscript{41,44–47}
4.5. References


http://www.psychosomaticmedicine.org/content/60/4/473.full.pdf.


Chapter 5.

Further Discussion and Conclusions

There is consistent evidence that cardiac rehabilitation programs (CRPs) are effective in improving patient outcomes, yet up to 60% patients who have undergone a cardiac event fail to complete the program.\(^1\)\(^-\)\(^3\) Consequently, opportunities for improving cardiovascular disease (CVD) risk factors and quality of life are lost and patients are at greater risk for further cardiac events.\(^4\)\(^-\)\(^6\) It is therefore imperative to find alternative strategies to support this high-risk under-treated population.\(^6\)\(^,\)\(^7\)

5.1. Thesis Objectives and Main Findings

The objectives of this study were threefold: 1) to identify baseline characteristics of participants who previously dropped-out of a cardiac rehabilitation program (CRP) (chapter 2); to assess self-efficacy (SE) among patients who complete a CRP versus those who drop-out (chapter 3); to test the feasibility of an Internet mediated video conferencing (VC) intervention to provide ongoing psycho-social among patients who previously dropped-out of a CRP (chapter 4).

The following are the main findings from Chapter 2:

- Patients completed a range of 2 to 18 CRP classes before dropping-out, with a median of 7 completed classes.
- Participants who previously dropped-out of a CRP reported both physical and psycho-emotional difficulties in managing their health, which contributed to the premature discontinuation of CRP.
- Benefits of attending a CRP included motivation, structure, and routine to engage in rehabilitation behaviours; barriers to CRP included time constrains, distance to CRP, and dissatisfaction with exercise prescriptions, all of which contributed to program drop-out.
- More time with the cardiologist and accessible community based CRPs were desired additional supports that participants felt would help them better manage their disease.
The following are the main findings from Chapter 3:

- Participants who completed a CRP were not significantly different from CRP drop-out participants in exercise and general self-efficacy (SE) scores, at baseline and at the end of CRP.
- There were also no significant differences in changes in exercise and general SE scores from baseline to three month follow up between the two groups.

The following are the main findings from Chapter 4:

- Among the CRP drop-out participants, no baseline differences were found between the usual care (UC), handbook (HB), and Internet mediated video conferencing (VC) in socio-demographic variables with respect to age, gender, household income, marital status, education.
- There were also no differences between the intervention groups in mean exercise SE, general SE, social support (SS), quality of life (EuroQol), depression scale (CES-D), and personality questionnaire (EPO-R) over the six month follow-up, and no interaction was found between intervention and time.
- The results from the present study are insufficient and it is unclear whether VC is helpful for patients who discontinued a secondary prevention program.

The following sections provide further discussion and further address the main findings of this study.

### 5.2. Benefits and Barriers to CRP

Despite their early withdrawal, the majority of drop-out patients in the present study reported to enjoy CRP and found comfort in knowing that all patients were working towards a collective goal. A key benefit of CRP was found in group settings where participants were able to interact with healthcare professionals and other patients and the ‘motivation’ and ‘encouragement’ derived from these support networks were seen as valuable elements of attending CRP. Even among participants who reported to ‘get better exercise on their own’, they still reported to enjoy the group exercise component because it reminded them that they ‘weren’t alone’. From these findings we gather that support from peers as well as healthcare providers were reported to be helpful among the CRP drop-out participants. Accordingly, peer support groups where individuals share a common problem and have resource to offer one another have shown to be an effective intervention for patients with other chronic illnesses, though more research is needed involving cardiac
Participants in our study also stated that the CRP group exercise classes were advantageous as it provided ‘routine and structure’ and we speculate that the set time and location of the CRP exercise classes may have provided a source of routine and stability.

Disadvantages or barriers to CRP included time constrains and distance both of which contributed to program drop-out, as found in previous studies.\textsuperscript{11,12} Participants who face barriers of geography may benefit from community-based programs that are designed as ‘booster sessions’ that is offered during evenings and weekends. Alternative CRPs that are delivered predominantly by telephone or on the Internet have shown to be effective in improving patients’ CVD disease risk factors and survival following a cardiac event.\textsuperscript{13–15} Such programs would also help minimize issues of program non-attendance related to program inaccessibility and time constraints that were identified as barriers in the present study. Participants felt the exercise classes could have been better tailored to meet their individual medical and/or physical needs and the growing demand for individualized exercise programs also emerged as a theme in our study. A comprehensive program that provides group exercise classes, at different levels of physical functionality, may be more suitable for participants who are dissatisfied with the exercise intensity or prescriptions.\textsuperscript{4,16}

### 5.3. Self-Efficacy in Cardiac Patients

Research findings from the CRP literature support SE as an important component of rehabilitation behaviours and patients with low SE have been found to be less likely to engage in habitual exercise and are more likely to drop-out of a CRP; while patients with higher SE have shown to behave more efficaciously and execute a course of action even in the face of adversity (i.e. CRP).\textsuperscript{17–21} Intervention studies have also found SE levels improved post-interventions demonstrating that secondary prevention strategies can act as a vehicle to enhance patient SE levels.\textsuperscript{19,22} Based on the previous literature, we hypothesized that CRP drop-out patients would report lower SE levels at baseline; while CRP completers would report greatest improvements in SE levels at three month follow-up (Chapter 3). Among the CRP drop-out patients, we hypothesized patients who were receiving the Internet-mediated VC intervention would report greatest improvements in their SE through the provision of peer support (social/verbal persuasion) at six month
follow-up compared to those in the UC or HB intervention groups (Chapter 4). Contrary to our expectations no differences were found in both SE pre/post CRP between CRP completers and drop-outs (Chapter 3); and no differences in changes in SE were found between among the CRP drop-outs (UC, HB, and VC) from baseline to six month follow-up (Chapter 4).

It is possible that patients with high SE levels and who felt they were managing well independently declined/withdrew from CRP and patients experiencing challenges remained in the program as they recognized their need for support. While it is safe to assume that patients enrolled in a CRP require support in managing their disease, it is unlikely that all participants shared unvarying SE levels. Another possibility is that CRP drop-out participants were over-estimating their SE, however, CRP completers did not report any changes in SE outcome measures discounting this notion. Conversely, it is possible that patients who participate in research studies are different from those who don’t and only patients with high SE may have been selected for the present study. Still, no changes in SE were found between groups or across time. It is also possible that patients’ confidence in their abilities did not change in all our study participants, or there were changes and the actual SE levels may not have been appropriately detected. Both exercise and general SE questionnaires have been used in previous studies and we speculate that our small sample size was the reason for the absence of change in SE levels.23,24 Nevertheless, it is believed that scales that assess SE must be tailored to the particular domain and future studies that assess cardiac patients’ SE levels may consider using other types of questionnaires to address patients who have either previously discontinued CRP versus those who completed the program.24 More research is needed to devise a SE questionnaire that is context specific (i.e. exercise), tailored to a particular domain or a setting (i.e. CRP), and that has been validated over a range of patients (i.e. CRP attenders and drop-outs). A consensus for scoring and interpreting SE is also needed to clearly compare SE outcomes between studies and fully capture different SE constructs associated with CRP.25
5.4. Social Support in Cardiac Patients

The presence of supportive social relationships following a cardiac event have shown to help mitigate the negative consequences of CVD.\textsuperscript{26,27} Social support (SS) refers to the degree of perceived satisfaction with support provided by others; while peer support refers to the degree of perceived satisfaction with social support provided by peers.\textsuperscript{28} Evidence regarding the relationship between SS and CVD morbidity and mortality is presently inconclusive and research evaluating peer support involving cardiac patients is minimal.\textsuperscript{29–31} Nonetheless, participants in the present study valued the close social networks gained by attending CRP and patients felt ‘supported’ and ‘understood’ by the networks that were created and maintained during the group exercise classes. We also found that participants generally had difficulties managing their health and hardships reported included adjusting to physical setbacks while implementing health-promoting behaviours such as making dietary changes. Many participants also reported coping with depression and anxiety surrounding CVD re-occurrence. The presence of family, friends or partners during recovery was highly valued as it helped foster a sense of security that supported adherence to rehabilitation behaviours and participants in our study reported receiving both tangible and emotional supports that often went hand in-hand. Participants who reported having minimal support, reported to feel apologetic about accepting help from their partners, family members, or other social support network and readjusting to everyday life was deemed to be particularly challenging for these participants, both physically and emotionally. These participants reported experiencing elevated stress levels that strained close relationships, supporting the notion that SS may play an important role of overall health and well-being in cardiac patients.\textsuperscript{21,32–34}

The participants in the Internet mediated VC intervention group also stated that being part of a group that met regularly helped them feel ‘supported. Similarly, the CRP group setting where participants were able to socialize with other patients were reported to help participants feel ‘support’ and ‘assurance’ regarding their disease. The four participants in the VC intervention group reported that they were continuing to remain in contact via email and in person at six month follow-up, though the weekly VC sessions had ended. From this we gather that the VC intervention was able to provide some source of peer support and prior studies have found patients who share a common problem and
have resources to offer one another, may help each other feel supported. The development and diagnosis of CVD was a significant source of distress for participants in the present study and although no differences were found in SS among the CRP drop-out participants, support from peers as well as healthcare providers were reported to be helpful. Clark et al (2013) also found support being an important factor related to participation to CRPs and secondary programs that aim to reduce social isolation and enhance SS may, therefore, improve psychological health and increase CRP adherence among cardiac patients.

5.5. Internet-Mediated Video Conferencing

Telemedicine (TM) strategies involve the transfer and exchange of health information between patients and health-care providers through electronic devices and research investigating VC strategies in CRP are limited as they are either feasibility studies, are presently ongoing, or have demonstrated inconclusive. The present study is among the few studies that have examined the feasibility of an Internet-mediated group-VC intervention, involving patients who previously dropped-out of a CRP. The intervention consisted of 12 one hour sessions, one session per week for 12 weeks, and the goals weekly VC sessions were to provide a supportive group, address barriers to making significant life style changes, and enhancing participant’s self confidence through social persuasion. After 12 months of consistent recruitment, however, a total of 27 (8%) eligible participants consented to participate in the present study and a total of 248 (74%) eligible participants actively declined participation. From the 27 participants who provided consent to the present study, the VC group was selected the least as a treatment arm (n=5) and the inability to reach the desired target may be due to the limited number of patients who are both eligible and interested in participating in a telehealth intervention study.

Previous studies that have assessed the use of VC to support patients with CVD have also reported challenges with recruitment concluding that the value of telehealth strategies remain unclear. The growing access to the Internet may provide advantages for future studies including the capacity to reach a large number of patients and provide vast amount of information, while giving patients the flexibility to choose when they would like to interact and receive health-care information, though more research is
Based on our results, it remains unclear whether peer-group VC is an appropriate intervention for this population. Patients who fail to complete a CRP comprised of a heterogeneous group and much still needs to be learned in respect to the role of psycho-social factors as well as the feasibility of TM interventions strategies in CRP drop-out patients, as there are a limited number of intervention studies that have been conducted involving this high-risk undertreated population.

5.6. Implications

- The varied reasons for previously discontinuing CRP (as well as for declining participation to the present study) among cardiac drop-out patients, may necessitate more individualized and patient-specific intervention strategies that are designed to overcome patient-level barriers.

- Patients who report psycho-social barriers including lack of motivation, low SE, and minimal SS, may benefit from intensive counselling based strategies prior to CRP enrollment.

- Group therapy enriched with social or peer support group strategies may be a viable option for patients with very minimal support or for patients who do not wish to participate in an exercise based program, as found in previous studies.\textsuperscript{26,27,36}

- Patients who feel they are ‘managing well independently’ may lack adequate understanding regarding their medical condition or CRP, and may benefit from additional education/counselling sessions that outline the benefits and importance of participating in secondary prevention programs.

- Patients who wish to participate in a CRP but are unable due to barriers of time or geography, may benefit from ‘community-based booster CRPs’ in the attainment of health improvements.
5.7. Limitations

The most notable limitation is the small sample size. Furthermore, in a subsection of the study included both CRP completers and non-completers (Chapter 3). These two groups may not be comparable and future studies that takes into account the unique set of differences these populations may present is warranted. The present study was also a single site, non-randomized pilot study to test the feasibility of the Internet-based VC in CRP drop-out patients and may not be generalized to the broad CRP populations (Chapter 4). Moreover, the population was primarily Caucasian men and the results may not apply to women, older citizens, patients living in high social deprivation, and those from ethnic minorities. Another limitation is that this group may not be representative of the general population as those with Internet access tend to be male and educated.

5.8. Conclusions

Cardiac patients face wide range of challenges living with CVD that are complex and interrelated. Findings from our study indicate that CRP drop-out is likely a result of the interrelationship of multiple physiological and psychosocial factors such as depression, anxiety, fatigue, in conjunction to established barriers such as time, distance, and minimal social support. We believe that a key to minimizing CRP discontinuation lies in the identification of personal barriers and customization to the patient’s individual needs on a holistic level and addressing these barriers prior to starting CRP.

The results of this study highlight the need for more standardized methods when testing theoretical frameworks such as Bandura’s SE Theory and future research should aim to improve standardization pertaining to SE questionnaires and aim to formulate a validated SE scale. In doing so, more clarity in the effectiveness of novel intervention strategies in a CRP setting with respect to SE can be evaluated.

Despite our efforts to provide ongoing support, the results from the present study are insufficient and it is unclear whether peer-group VC is helpful for patients who discontinued a secondary prevention program. More telehealth intervention studies involving CRP drop-out patients is necessary to evaluate whether it is feasible and cost-
effective.\textsuperscript{6,7,37} Ultimately, programs that bridge the gap between the patient and healthcare provider for the majority of patients who discontinue a CRP may be beneficial as those who fail to attend a standard CRP are ones who are in need of it the most.\textsuperscript{12}
5.9. References


