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Investigating the Effects of a Combined Stress Management and Exercise Training Intervention in Cardiac Rehabilitation

Chelsea Rodden-Matthews
University of Windsor

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By
Chelsea Rodden-Matthews

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By

Chelsea Rodden-Matthews

APPROVED BY:

_____

S. Fox
Faculty of Nursing

_____

K. Milne
Department of Kinesiology

_____

J. Voth
Department of Kinesiology

_____

C. McGowan, Advisor
Department of Kinesiology

November 11th, 2022

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Abstract

Effective cardiac rehabilitation (CR) programming is essential to minimizing cardiovascular disease (CVD) burden. Although high levels of stress are associated with increased onset and progression of CVD, stress management training (SMT) is not routinely included in traditional CR. This dual approach study explored the potential added benefits of combining SMT with exercise-based CR from both a quantitative and qualitative perspective. First, anonymized data from 1184 participants (Mean (M) ± Standard Deviation (SD); Age: 65.1±10.4 years) were extracted from the participating CR program's database and grouped into CR-alone (n=1003; Age: 64±11.1 years) and CR+SMT (n=181; Age: 64.0±10.1 years). Significant increases (p=0.029) in the CR+SMT group (pre: 6.83±3.03 to post: 9.27±3.49) was observed in MET levels compared to the CR-alone group (pre: 6.19±2.68 to post: 8.31±3.18). Comparable improvements (all p>0.05) were found between groups in all other CR outcome measures (e.g., HDL, LDL, DBP, SBP, non-HDL, TG). Next, semi-structured interviews were conducted in a sub-set of CR+SMT participants (n=9; Age: 69.6 years±12.2 years). Following the thematic analysis, three key themes emerged. Participants: 1) had developed and sustained a healthier lifestyle, 2) valued the support provided to them, and 3) vocalized a wish for more (e.g., more flexibility in scheduling, more proof, and more guidance) throughout SMT programming. The results of this study are encouraging, demonstrating that the inclusion of SMT in CR programming may benefit participants beyond the physical and clinical outcomes, and provides an opportunity for intellectual, perceived, and social improvements. These findings indicate that the widespread inclusion of SMT offers much promise as a standard care practice and should be included routinely in CR programming.

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Abbreviations

AACPR	American Association of Cardiovascular and Pulmonary Rehabilitation
ACE	Angiotensin-Converting Enzyme
AHA	American Heart Association
AOBP	Automated Office Blood Pressure
BDI-II	The Beck Depression Inventory II
BP	Blood Pressure
CABG	Coronary Artery Bypass Graft
CACPR	Canadian Association of Cardiovascular Prevention and Rehabilitation
CAD	Coronary artery Disease
CCN	Cardiac Care Network of Ontario
COVID-19	Coronavirus Disease 2019
CR	Cardiac Rehabilitation
CSV	Comma Separated Values
CVD	Cardiovascular Disease
DBP	Diastolic Blood Pressure
ECG	Electrocardiography
GAS	General Adaptation Syndrome
GXT	Graded Exercise Stress Test
HDL	High-Density Lipoprotein
HTN	Hypertension
LDL	Low-Density Lipoprotein
M	Mean
METs	Metabolic Equivalent
MI	Myocardial Infarction
non-AOBP	Non-Automated Office Blood Pressure
non-HDL	Non-High-Density Lipoprotein
PACR	Physical Activity and Cardiovascular Research
PCI	Percutaneous Coronary Intervention
PTSD	Post-Traumatic Stress Disorder
PROMIS	Patient-Reported Outcomes Measurements Information System
QOL	Quality of Life
RM-ANOVA	Repeated Measures Analyses of Variance
SBP	Systolic Blood Pressure
SD	Standard Deviation
SMT	Stress Management Training
SPSS	Statistical Package for the Social Sciences
STAI	State-Trait Anxiety Inventory
TG	Triglycerides
VLDL	Very Low-Density Lipoprotein

WHO	World Health Organization

Chapter 1: Literature Review

1.0 Cardiovascular Disease

Cardiovascular disease (CVD), is the leading cause of death worldwide accounting for approximately 31% of all global deaths.[1-3] CVD describes a group of disorders affecting the heart, brain, blood vessels, and limbs.[1-3] Coronary artery disease (CAD) is the most common form of CVD and accounted for over 9 million deaths around the world in 2016 alone.[2] For the first four months of 2020, Coronavirus Disease 2019 (COVID-19) became the leading cause of mortality in Canada, yet by June 2020 cancer and CVD were once again the first and second leading causes of death.[4]

CAD occurs when there is narrowing of the arteries that supply blood to the heart.[1-3] Atherosclerosis is the main cause of this narrowing via the formation of plaque within the walls of the coronary arteries.[5,6] CAD is associated with numerous sequelae and non-modifiable and modifiable risk factors.[7] Importantly, various interventions exist to improve the quantity and quality of life in these individuals, including surgical (e.g., artificial pacemaker, percutaneous coronary intervention (PCI), coronary artery bypass graft (CABG)), pharmacological (e.g., anticoagulants, antiplatelet agents, angiotensin-converting enzyme inhibitors, beta-blockers, and diuretics) and lifestyle interventions (e.g., cardiac rehabilitation, CR).[5-7]

1.0.1 Coronary Artery Disease Sequelae

The coronary arteries supply blood, oxygen and nutrients to the heart.[7] With atherosclerosis, the progression of fatty plaque formation limits the amount of oxygen-rich blood being received by the heart to meet its metabolic demands.[7] This reversible (with rest and/or the vasodilating medication nitroglycerin) lack of blood flow is termed myocardial ischemia, and can be silent or accompanied by symptoms.[8] Concerning the latter, this is termed angina, and often presents itself as a pressure or squeezing in the chest which can spread to the shoulders,

arms, neck, jaw, or back.[8] CAD often develops over a prolonged period and symptoms usually do not occur until there is a significant blockage.[7] If left untreated, a rupture can occur causing the formation of a thrombus and complete blockage of blood flow.[6] This sustained reduction in blood flow can trigger a myocardial infarction (MI) and can be accompanied by myocardial cell death (necrosis).[6,7,9] In cases with large amounts of necrosis, the viable parts of the heart are left too weak to pump enough blood to meet the body's demands.[7,9] This may result in heart failure and/or arrhythmia.[7,9] Arrhythmia, or an abnormal heart rhythm, is caused by the inadequate blood supply to the heart or damage to the heart's tissues interfering with the heart's electrical impulses.[7]

1.0.2 Treatments for Cardiovascular Disease

As noted above, there are several surgical and pharmacological treatments available.[10-12] An artificial pacemaker is a small device placed under the skin to help with abnormal heart rhythms, by using electrical currents to stimulate the heart muscles.[12] PCI is used to restore the blood flow in occluded arteries (e.g., angioplasty, stent) and decrease symptoms of angina.[12-14] In situations where PCI is not possible or optimal, individuals may undergo a CABG, which treats blocked coronary arteries by taking healthy arteries or veins from other parts of the body and rerouting the blood around the occluded artery.[12,15]

Commonly prescribed pharmacological treatments include anticoagulants, antiplatelet agents, angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, and diuretics.[12] Anticoagulants ("blood thinners") are a type of drug used to decrease the clotting ability of the blood by interfering with platelets or blocking the body's production of clotting substances.[12] Antiplatelet agents stop cells in the blood from sticking together and forming a clot by reducing inflammation in the arteries (e.g., aspirin, clopidogrel, prasugrel, etc.).[12] ACE inhibitors are

commonly prescribed to reduce the work of the heart and make the heart function more efficiently by helping the body produce less angiotensin, relaxing blood vessels, and in turn, lowering blood pressure (BP).[12] Beta-blockers lower BP by reducing heart rate, the heart's workload and the heart's output of blood.[12] Lastly, diuretics cause the body to expel excess fluids and sodium through urination, which helps to reduce the heart's workload and decrease the accumulation of fluid in the lungs, ankles, and legs.[12]

1.0.3 Risk Factors for Cardiovascular Disease

Numerous non-modifiable and potentially modifiable risk factors have been identified that independently increase an individual's likelihood of disease development.[1,9,15-17] For example, non-modifiable factors for CAD include age, sex, genetics/family history, and ethnicity, whereby modifiable factors can include but are not limited to hypertension (HTN), hyperlipidemia, diabetes, obesity, physical inactivity, tobacco use, and psychological symptoms (e.g., depression, anxiety, and stress).[1,16,17]

Although individuals of all ages can theoretically develop CVD, the risk increases after the age of 45 years for men and 55 years for women.[18] Age increases risk as major organs (such as the heart) gradually become weaker and function less efficiently over time, making the pumping action of the heart, for example, more difficult and less efficient.[18] With relation to sex, middle-aged men are 5 times more likely to develop CAD than age-matched, pre-menopausal women.[19] However, this difference narrows as women reach menopause and lose the protective benefits of estrogen.[19] Although men are more likely to develop CVD, the relative risk for women of CVD morbidity and mortality is higher.[19]

Ethnicity also plays a significant role in the risk of developing CAD in Canada. Indigenous peoples (First Nations, Inuit, Metis) and people of African or Asian descent are at a higher risk of developing CAD, due in part to an increased susceptibility to HTN and diabetes.[20]

Those with a family history of heart disease linked to a first-degree relative have a significantly increased level of risk.[21] If a father or brother is diagnosed before the age of 55 years and if the mother or sister is diagnosed before the age of 65 years, the individual risk becomes that much greater.[18,21]

Modifiable risk factors are those that can theoretically be reduced or controlled by changing one's behaviour.[1,15-17] For nearly 20 years, HTN or high BP has remained the most important global risk factor for morbidity and mortality.[22] HTN is the leading CAD risk factor around the world and it is estimated that 30% of the world's population will be afflicted by 2025.[1,23] Unfortunately, only 25% of individuals diagnosed with HTN are controlled to within target BP ranges, making the risk and prevalence significantly greater.[24,25] HTN affects nearly one-quarter of Canadian adults, and is defined by Hypertension Canada as having a resting BP ≥ 135/86 mmHg measured using an automated office BP (AOBP) device and ≥ 140/90mmHg using non-automated office BP (non-AOBP) devices.[24,26]

Hyperlipidemia is the second most prominent risk factor for CAD and can be classified as isolated elevation of cholesterol, isolated elevated triglycerides, or elevations of both, and contributes to the formation and progression of atherosclerosis.[27] Hyperlipidemia affects 1 in every 250 individuals worldwide and of that ,approximately 145,000 are Canadian.[27] A blood test is used to diagnose hyperlipidemia by analyzing lipid levels.[27] In general, all non-high-density lipoprotein (non-HDL) cholesterol, particularly low-density lipoprotein (LDL) and very-low-density lipoprotein (VLDL) should be <130mg/dL.[27]

Diabetes also increases CAD-related morbidity and mortality, with evidence suggesting that atherosclerosis is accelerated in both Type 1 and Type 2 diabetes.[28] Unfortunately, 68% of adults aged 65 years and older with diabetes die from some form of CAD event and are 2-4 times more likely to die from heart disease than adults without diabetes.[29] Diabetes is diagnosed if fasting plasma glucose levels are ≥ 7.0mmol/L or glycated hemoglobin levels are ≥ 6.5% (in adults) or 2h plasma glucose in a 75g oral glucose tolerance test is ≥ 11.1mmol/L or random plasma glucose is ≥ 11.1mmol/L.[29]

Collectively, a poor diet containing concentrations of high cholesterol, trans fats, and saturated fats exacerbates the risk of these independent risk factors (e.g., HTN, hyperlipidemia, and Type 2 diabetes).[5,30]

In addition, physical inactivity is among the leading modifiable risk factors worldwide for CVD and all-cause mortality.[5,31] According to Statistics Canada, only 16% of Canadian adults get the recommended amount of physical activity of 150 minutes per week, which is concerning.[32]

Tobacco use is also among the leading preventable risk factors for CVD.[33-35] According to the new research released by World Health Organization (WHO) in 2020, every year, tobacco-induced heart disease kills more than 1.9 million people.[33] Tobacco users, whether through day to day, occasional, or second-hand contact, are more likely to experience an acute cardiovascular event at a younger age than non-smokers.[33] However, if users take immediate action and quit, they can reduce their risk by 50% after one year of not smoking.[33]

Psychological states (e.g., stress, depression, anxiety) are common, persistent, and associated with worse health-related quality of life, recurring cardiac events, and mortality.[34,35] Over the past two decades, data has accumulated to suggest that that psychological states are

more common in those diagnosed with CVD than in the general population and that they significantly contribute to cardiac-related morbidity and mortality.[35] Research focusing on the association between depression and CVD, for example, is well established and, though results are limited, associations have also been reported in regards to post-traumatic stress disorder (PTSD), anxiety, anger, hostility, and perceived stress.[34] Consistent literature reports that ongoing depressive symptoms are experienced in 50-70% of individuals before their cardiac event.[35-37] In some cases, these depressive symptoms existed and continue to exist for months and even years pre- and post-event.[35-37] Furthermore, it has been estimated that 31-45% of individuals with CAD exhibit clinically significant depressive symptoms whereas 15-20% of those meet the criteria for major depressive disorder.[35,38] Moreover, although not as well understood, anxiety disorders are associated with greater mortality, particularly sudden cardiac mortality, and greater cardiovascular morbidity and reoccurrence.[39]

Psychological stress is newly recognized as a risk factor that appears to contribute to all underlying mechanisms of cardiovascular events.[40] Research suggests that stress contributes to clustering traditional cardiovascular risk factors, tissue damage, and disease progression.[39] Although many risk factors are well established, monitored, and controlled, individuals diagnosed with CVD continue to experience cardiac events and reoccurrences.[39] Accumulated evidence now suggests that psychological stress plays a big role in the progression of CVD, necessitating a better understanding of this association.[39]

Establishing preventative measures associated with CVD risk is essential to prevent CAD, and importantly to reduce the risk of disease progression and subsequent events.[22,41] By making lifestyle modifications, in addition to surgical and pharmacological treatment if appropriate, the progression of CAD may be mitigated.[17] With early diagnosis and effective

management of these modifiable risk factors, more than 75% of the early-onset CVD burden can be prevented.[23] Lifestyle modifications may include dietary changes and weight management, elimination of smoking, increasing physical activity levels, and stress management.[22]

2.0 Psychological Stress and Cardiovascular Disease

The original concept of the term "stress" was based on the fundamental work by Hans Selye in 1936.[42-44] Selye, known for studying the effects of stress on health and the physiological integrity of biological organisms, defined stress as "the non-specific response of the body to any demand of change".[42-44] This model, now referred to as general adaptation syndrome (GAS), suggests that all stimuli are stressors that produce a general response, and cause a disruption in the balance and homeostasis of the organism.[42-44] Along with this definition, Selye adapted three phases of GAS: (1) activation, (2) adaptation, and (3) failure.[42,44] What is commonly known as the "fight, flight or freeze" response is phase 1.[42,44] Phase 2 refers to the chronic adaptation to the stimulus, and phase 3, failure, refers to the stressors that result in disease as one fails to adequately cope.[42,44] Stress can be further categorized into two main groups; (1) acute stress, which are physiological responses to short term stress (e.g., disruption of one's life) such as the death of loved ones or natural disasters, and (2) chronic stress, which is the physiological response caused over time by several stimuli leading to injury to the body.[42,43,45] Stress is now used as an umbrella term to summarize the effects of environmental and psychosocial stress on physical and mental well-being.[43] Environmental stress are incidences that are out of someone's control including sudden catastrophes (e.g., natural disasters), stressful life situations (e.g., major changes at work), daily hassles (e.g., traffic), and ambient stressors (e.g., the hum of the air conditioner).[46] Psychosocial stress can be defined as adverse forces that exceed the organism's

behavioural response, and can cause pathophysiological changes (emotional stress (e.g., depression and anxiety), and chronic stress (e.g., work and marital stress).[47-50]

Furthermore, chronic stress has been linked to the pathogenesis of CAD, MI, HTN, and Type 2 diabetes, and is of particular importance as it is one of the most common client complaints in cardiology.[51-55] Traditional risk factors such as HTN, diabetes, hyperlipidemia, and smoking have been the focus of CVD prevention and management because the research demonstrating benefit is well recognized.[52] Most individuals who develop CAD possess at least one of these traditional risk factors, however, the progression of the disease may be due to a mediator such as psychological attributes.[52] The impact of psychological stress on the progression of CVD has been vastly debated, largely due to the differences in individualized experiences and the measurement of psychological stress.[56] Chronic stress, including lack of emotional support, has been associated with increased mortality, thus emphasizing functional support and stress management as a potentially important addition to prevention and treatment plans in the cardiac population.[57]

Studies suggest that prolonged periods of stress cause activation of the hypothalamic-pituitary adrenal axis and sympathetic nervous system.[54,56,57] Prolonged activation can result in damage to blood vessels and arteries, elevated BP and increase the chance of endothelial dysfunction.[54,56,57] Consequentially, this promotes the recruitment, adhesion, and transmigration of inflammatory cells through the endothelial layer to the arterial wall, therefore, instigating atherosclerotic plaque formation.[56,57] Stress may further accelerate the progression of atherosclerosis by facilitating a chronic low-grade inflammatory response.[56] This response can further contribute to maladaptive regulation of the central autonomic network.[56]

Psychological states, such as stress, depression, and anxiety can cause complications both pre- and post-cardiac trauma and are very common among individuals who have experienced a CVD event.[58,59] Reportedly, around one in five individuals post-cardiac event meet the diagnostic criteria for depression, while one in three meet the criteria for anxiety.[58-62] Individuals who reported feelings of love and support from family members and a spouse demonstrated a lower burden of atherosclerosis and related events.[63]

Individuals affected by emotional stress, depression, and social isolation have a 3- to 10-fold increased risk of premature cardiovascular events and all-cause mortality compared to individuals not affected.[64] Additionally, stress, depression, and anxiety are common after a cardiac event and individuals who experience these psychological changes in high levels are at an increased risk of hospitalization for a subsequent event, impaired recovery, and premature death.[58,59,65,66] Mortality rates after a MI and CABG are higher in individuals whose depressive symptoms worsened 2 months post-discharge.[58] Anxiety post-event has been associated with a 2.3- to 2.8-fold increased risk of recurrent cardiac events.[58] Additionally, individuals with major depression who were 6-months post-MI had a 4-fold increased risk of premature death (independent of other factors).[67]

As noted earlier, CR is a lifestyle intervention designed to improve the quantity and quality of life in individuals living with CVD and related risk factors. While most CR programs appropriately focus on the detection and stabilization of CVD risk factors and acute events, the role psychological contributors play in these processes warrant further investigation.[66]

3.0 Cardiac Rehabilitation

CR is a comprehensive program that promotes secondary prevention for individuals living with CAD and associated risk factors and is proven as an essential component to

improving cardiac health.[67-72] Individuals are eligible for CR in Canada if they have been diagnosed with a MI, have chronic stable angina or heart failure, have undergone interventional procedures (e.g., PCI or CABG), or have a diagnosed CVD risk factor (e.g., HTN, dyslipidemia).[67-72]

Before 1960, clients were discharged from the hospital after a cardiovascular event and instructed to complete physical reconditioning at home.[73] Concerns with unsupervised exercise and the safety of the clients led to the development of a structured and supervised exercise rehabilitation program.[73] During this time, CR solely focused on the exercise component of rehabilitation.[73] To provide the most effective prevention and management for CVD, CR now uses a multifaceted approach to behavioural, psychological, and physiological risk factor management through structured programs of exercise, educational classes and/or counselling.[71,73]

3.0.1 Cardiac Rehabilitation in Canada

Over 300 CR programs exist in Canada today, approximately half of which are delivered in Ontario.[68,69] The Canadian Association of Cardiovascular Prevention and Rehabilitation (CACPR) and The Cardiac Care Network of Ontario (CCN) provide guidelines for the most effective CR programming in Canada and Ontario.[69,71,74] In Ontario, CR programs most often operate in a community setting or as part of a hospital system, and are all dedicated to "improving quality, efficiency, access, and equity in the delivery of adult cardiovascular services in Ontario".[74] In general, CR has three phases: inpatient, early outpatient, and maintenance.[68,69,74] The bulk of rehabilitation occurs in phase 2, the early outpatient phase, where clients engage in regular monitored physical activity, in addition to group and individual cardiovascular risk factor education.[68,69]

Most often, the early outpatient programs provide rehabilitation via a 6-month exercise program.[68,69] Core CR components include: (1) health behaviour change and education, (2) cardiovascular risk factor management, and (3) cardioprotective therapies.[74] On average, Canadian programs offer two sessions per week, consisting of a 1-hour exercise program (warm-up, aerobic exercise training, cool down) and a 1-hour education session.[71,75] Adapting a healthy lifestyle is key to cardiovascular improvements, and it also requires a targeted approach to understanding both heart-healthy and unhealthy behaviours and skills for this change.[74] Content provided through the risk factor management education sessions may include smoking cessation, medication use, nutrition, and the important role of physical exercise and overall heart health.[70,76,77] Where applicable, individuals may be referred to other services, off-site, if their needs go beyond those provided by the specific CR program (e.g., dietitian, social worker, psychologist).[70,76,77]

Physical activity is the cornerstone of all CR programming, and is essential to program success.[70,76,77] CR is delivered by a multidisciplinary team of health care professionals (e.g., kinesiologist, social worker, dietitian, nurses) and is structured towards stabilizing, slowing, or reversing disease progression for clients to preserve or resume an active and functional lifestyle.[69,70]

3.0.2 Benefits of Cardiac Rehabilitation

There are many benefits of CR, including improvements in cardiac function, increased exercise tolerance, decreased disease-related symptoms, improvements in psychological wellbeing, ability to return to work, and maintaining independence.[70,78] CR programs when compared to usual care, have been shown to reduce all-cause mortality by approximately 15%, cardiovascular mortality by 25%, and rehospitalizations by 18%.[70,71,76,79] However, barriers exist

that may prevent participants from attending CR.[80,81] In Canada, approximately 15%-30% of all eligible clients participate in CR, with lower rates for women and the elderly.[64,81] Barriers to participation include lack of physician referral, sociodemographic factors, lack of perceived need, lack of time, the experience of pain and fatigue while exercising, and the presence of other comorbidities including psychological contributors (e.g., depression, anxiety, PTSD).[64,80]

4.0 Stress Management Training

Individuals with depression, anxiety, and stress are more likely to drop out of CR compared to those not experiencing similar psychological diagnoses.[82] CACPR along with the American Heart Association (AHA) and the American Association of Cardiovascular and Pulmonary Rehabilitation (AACPR) have recognized the importance of incorporating psychological interventions as an essential component of CR.[64] Despite results showing the benefits of incorporating stress management training (SMT), a wide variety of CR programs do not offer SMT or provide only limited approaches to psychological interventions.[57,63,83]

SMT combines education, group support, and cognitive-behaviour therapy and is based on the cognitive-behavioural model where stress is understood as an imbalance between high demands and limited coping resources.[57,83] Although SMT components may vary between CR programs, the goal of the intervention is to reduce psychological demands and increase the individuals' coping abilities.[57,83] An initial session is primarily used to build rapport and create a safe environment to promote group cohesion and support.[57,83] Goal setting is presented to focus on prioritization, time management, identifying personal values, and avoiding stressful situations.[57,83] Early sessions focus on modifying responses to stressors or situations that are out of one's control, muscle relaxation techniques, and the use of imagery to reduce stress.[57,83] Later sessions focus on effective communication and problem solving by the use of group discussions

and role-playing.[57,83] Globally recognized stress measures such as The Beck Depression Inventory-II (BDI-II), State-Trait Anxiety Inventory (STAI), and Patient-Reported Outcomes Measurements Information System (PROMIS) are used to assess depression, anxiety, anger, and stress.[57,83]

Some early evidence suggests that a combination of exercise and stress management in CR is beneficial, including controlling lipid levels, body composition, functional capacity, and symptoms of depression and stress, and reducing cardiac morbidity and mortality.[57,63,83,84,85] For example, individuals who reported symptoms of stress and participated in a combination of SMT and exercise training had a reduction of more than 50% in clinical events compared with clients participating in exercise alone.[57,83] In accordance, Casey et al. (2009) observed greater improvements in clinical outcomes for individuals who participated in both exercise and SMT, including resting systolic BP, distress and symptoms of depression.[63] Similar results were reported by Linden et al. (2007) who provided evidence that when psychological interventions were offered in addition to the usual care, mortality was reduced by 54% for up to two years.[84] Despite the benefits outlined above, it is important to note that exercise alone may have a similar effect. For example, Campbell et al. (2012) assessed retrospective physiological and psychological data in individuals who completed a 12-week comprehensive exercise and risk factor modification CR program and a weekly 2-hour SMT session for 4 weeks, and in those who completed exercise only.[85] CR+SMT demonstrated incremental benefits on SBP and waist circumference compared to participants in the exercise only group.[85] Improvements in symptoms of depression, physical QOL, and functional capacity were found in both the CR+SMT and exercise only group, however, those in the CR+SMT group had more symptoms of depression and lower QOL at baseline, therefore these results must be interpreted with caution.[85] The

collective findings above highlight that SMT may be beneficial for both physical, psychological, and clinical outcomes and should be further explored in a CR context.[57,83]

5.0 Conclusion

CVD is a major global concern as it remains the leading cause of morbidity and mortality.[1-3,66] Traditional independent risk factors including HTN, hyperlipidemia, physical inactivity and diabetes have been the target of prevention, management, and treatment of CVD.[1,15-17,35] Evidence has accumulated to suggest that psychological risk factors, including depression, anxiety, and stress could be a prominent contributor to disease progression and rehospitalization.[1,15-17,35] Ample research supports the association between depression and CVD, suggesting that depression in cardiac disease is common, persistent, and deadly.[34,35] However, research focusing on chronic stress as an independent risk factor for CVD is lacking, despite findings showing this association.[34,35,39,40,57,83]

CR is an integral aspect of treatment for cardiac clients, incorporating supervised exercise with risk management sessions.[68-71,72,73] Evidence suggests that offering SMT together with traditional CR programming elicits greater improvements in distress, anxiety and depression, blood lipid levels and exercise capacity, and almost a 50% reduction in clinical events compared to CR alone.[57] Despite mounting epidemiological evidence that suggests elevated levels of stress are associated with an increased risk of cardiac events and premature death, SMT is not routinely included as an aspect of CR.[57] This may be a result of inconsistencies within the literature, particularly how stress is defined and measured, uncertainties about approach effectiveness, and limited supporting evidence on the effectiveness of SMT.[57,87]

More research is needed to support the benefits of incorporating SMT together with exercise-based CR before validating its addition to all Canadian CR programs.[57,87] There is also a

lack of investigation into the difference between men and women regarding psychological distress post-cardiac events, and stress levels within different ethnicities, educational levels, and socioeconomic status.[63,85,88] With respect to the latter, further research is needed to identify the effects that SMT and CR have on clinical outcomes in the above populations.[63,85,88]

Minimizing the CVD burden through CR is of great importance requiring immediate attention.[89] The addition of SMT to traditional exercise-based CR programming offers a promising intervention. If effective, this would provide support for its incorporation into CR programs across the country as standard practice.

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Chapter 2:
Investigating the Effects of a Combined Stress Management and Exercise Training Intervention in Cardiac Rehabilitation

2.1 Introduction

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality worldwide, accounting for approximately 31% of all global deaths.[1-3] CVD is associated with numerous sequelae, including atherosclerosis, angina, myocardial infarction (MI), heart failure, and arrhythmias.[4-7] Various interventions exist to improve the quantity and quality of life (QOL) in individuals with CVD, including surgical (e.g., artificial pacemaker, percutaneous coronary intervention (PCI), coronary artery bypass graft (CABG)), pharmacological (e.g., anticoagulants, antiplatelet agents, angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, and diuretics) and lifestyle interventions (e.g., cardiac rehabilitation, CR).[4,8,9]

Traditional risk factors (e.g., hypertension (HTN), dyslipidemia, diabetes, obesity, and physical inactivity, age, sex, family history, ethnicity) have been identified that promote the development and progression of CVD.[5-7] More recently, psychological states, such as depression, have been shown to contribute to the onset and progression of the disease and other comorbidities.[1,5-7,10] Psychological stress also appears to play a major role in disease progression and is associated with increased rates of rehospitalization and mortality.[10-13]

CR is an effective treatment option. Typically, CR programming combines exercise training with educational classes to teach and inform clients about a healthy lifestyle, which may include medication use, smoking cessation, nutrition, and heart health.[10,12.14-16] Where applicable, individuals may be referred for other services, if their needs go beyond those provided by the specific CR program (e.g., stress management training (SMT), dietitian, social worker, psychologist).[12,15,17-19]

SMT combines education, group support, and cognitive-behaviour theory and is based on the cognitive-behavioural model where stress is understood as an imbalance between high

demands and limited coping resources.[20,21] The main goal of the intervention is to reduce demands of stress and increase clients' coping abilities.[20,21] Additionally, SMT is used to shift away from viewing stress as negative and damaging, to viewing it (where applicable) as something positive, inevitable, and necessary.[22]

Accumulating evidence suggests that exercise alone, as well as a combination of exercise-based CR and SMT significantly improves CVD biomarkers (e.g., blood lipid levels, exercise capacity), reduced clinical cardiac events, and improves psychological states (e.g., depression, anxiety, and stress) more than usual care.[23] However, the inconsistencies within the literature, including the differences in definitions and measurement of stress, the uncertainties about what approach is most effective, and the limited supporting evidence on the effectiveness of SMT, are potentially minimizing the implementation and uptake of this training in CR.[23] Better understanding the benefits of implementing SMT may promote more widespread use in CR programming.

2.2 Purpose

The overarching purpose of this study was to evaluate the added benefits of SMT as an integral aspect of exercise-based CR. This was accomplished by conducting two concurrent study components:

- *Component One:* The goal of this retrospective quantitative component was to characterize the participants who attended a community-based CR program and were referred to SMT, and to evaluate the benefits of combining SMT and CR.

  The following research questions were explored:

  1. What was the rate of referral to SMT? Are there differences in demographic and clinical characteristics between those individuals referred and those who are not?

2. What is the rate at which individuals attend SMT? Are there differences in demographic and clinical characteristics between those individuals who were referred to the program and attended SMT versus those who were referred and did not attend SMT?
3. Does attending a combination of CR+SMT result in greater clinical benefits compared to CR-alone?
4. Is attending more SMT sessions associated with greater clinical benefits?

- *Component Two:* The purpose of this prospective component was to better understand from a qualitative perspective the benefits to including SMT as an integral part of CR.

2.3 Methodology – Component 1

Participants

Retrospective anonymized intake and discharge data were extracted for first-time participants of a community-based early, outpatient CR program. Individuals participated in and graduated from this 6-month exercise-based program between January 1st, 2018, and December 31st, 2019. Based on program admission, individuals were eligible to participate in the CR program if they had a heart attack, coronary artery bypass graft (CABG), cardiac transplant, angioplasty, stable coronary artery disease (CAD)/angina, unstable angina, valve replacement, congestive heart failure, or cardiomyopathy in the past year.[24] Eligible individuals were referred to CR by an associated physician, while individuals were referred to SMT by program staff (e.g., kinesiologist, social worker, nurse, nutritionist) or by self-referral. Please refer to Fig. 1 for a schematic of the data cleaning and eligibility procedure, Fig. 2 for a schematic overview of the CR intervention, and to Fig. 3 for a detailed description of SMT. All participants provided historical consent to having data used for research purposes. This study was cleared by the

University of Windsor's Research Ethics Board (REB #21-101) and authorized via a letter of no objection from the participating CR programs governing body.

Data Extraction

Data were extracted from the CR program's central database (Cardiologica) into a Comma Separated Values (CSV) file and imported into Statistical Package for the Social Sciences (SPSS, Version 25, IBM, Armonk USA) by one of the CR program's research associates.

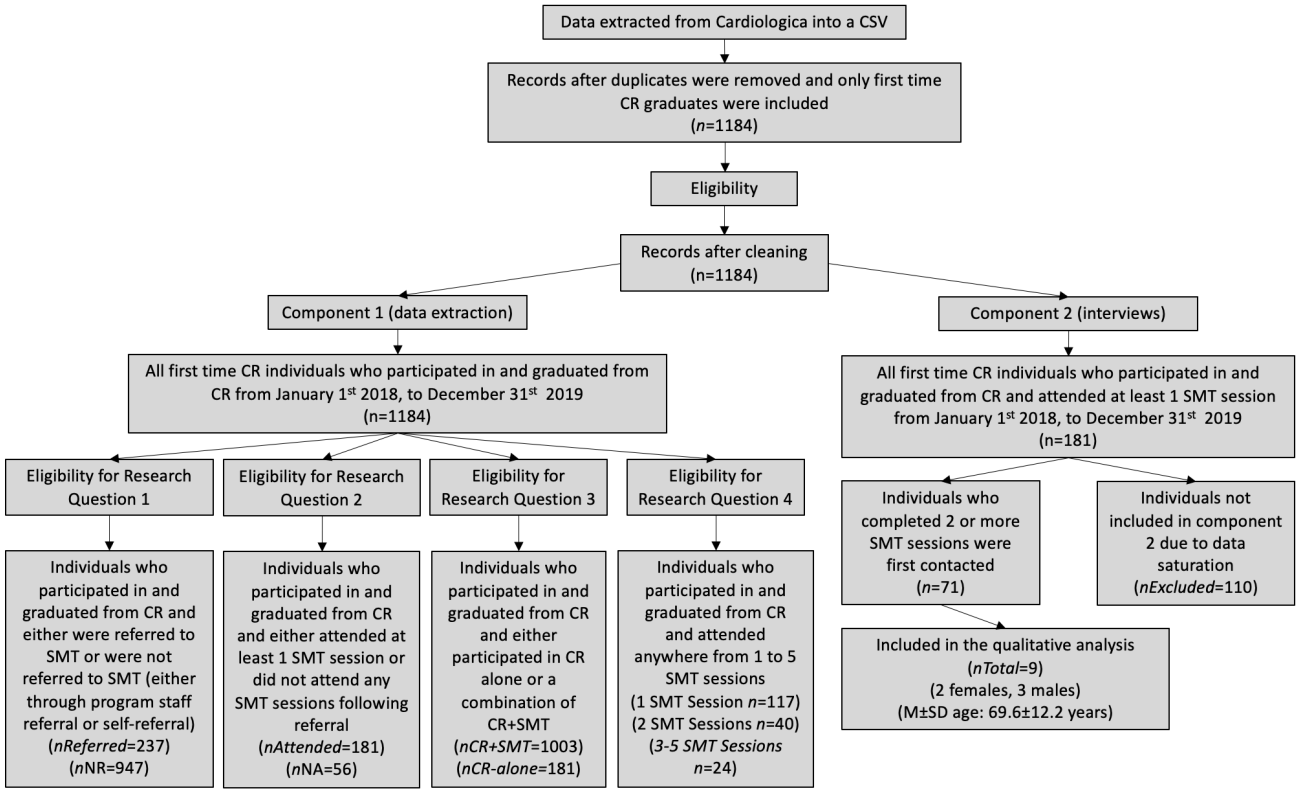


Figure 1: *Data Screening and Eligibility Process*

A visual representation of the data cleaning, screening, and eligibility process used for component 1 and component 2 data extraction prior to analysis.
Note: CSV- Comma Separated Values File; CR – cardiac rehabilitation; SMT – stress management training; NR – Not Referred; NA – Not Attended; M – mean; SD – standard deviation.

Next, the data were divided into one of two pre-determined groups to evaluate the overall benefits of attending SMT in concert with CR versus CR-alone. Group 1 included individuals who graduated from CR and attended at least 1 of 5 SMT sessions (Group 1: CR+SMT). Group 2 included individuals who graduated from CR but did not attend SMT (Group 2: CR-alone).

For those in Group 1, the number of SMT sessions attended was further subdivided into one of three pre-determined groups. Due to the number of individuals in each SMT session category the groups were divided into 1) SMT3-5 – individuals who graduated from CR and completed 3 to 5 SMT sessions, 2) SMT2 – individuals who graduated from CR and completed 2 SMT sessions, and 3) SMT1 – individuals who graduated from CR and completed 1 SMT session.

Extracted intake data included:

Demographic Characteristics (as per Cardiologica): Age, gender (male, female), ethnicity (white/Caucasian, Aboriginal, Arab/West Asian, Black, Chinese, Filipino, Japanese, Korean, Latin American, South Asian, Southeast Asian), education level (elementary: some, elementary: complete, high school: some, high school: complete, trade school: some, trade school: complete, university/college: some, university/college: complete, post-education: complete), living situation (alone, with spouse/partner, with others, with family, with friend(s)), marital status (single, married, divorced, widowed, common-law union, separated), and occupational status (full-time, part-time, unemployed, retired, short-term disability, long-term disability, not-never employed outside the home, employed – permanent restrictions, employed – modified duties).

Clinical Characteristics (as per Cardiologica): Referral type (CABG, cardiomyopathy, coronary angioplasty, myocardial infarction, stable coronary artery disease (CAD)/angina, valvular heart disease, ablation, atrial fibrillation, cardioversion, coronary heart disease, implantable

cardioverter defibrillator) and CVD risk factors at intake (diabetes, HTN, dyslipidemia, anxiety/depression, sedentary lifestyle, family history).

Extracted intake and discharge data included:

CR Outcome Measures (as per Cardiologica): Metabolic equivalent (METs), and blood lipid profile (high-density lipoprotein (HDL), low-density lipoprotein (LDL), diastolic blood pressure (DBP), systolic blood pressure (SBP), triglycerides (TG), non-high-density lipoprotein (non-HDL))**.**

Program-Related Variables: Intake and discharge dates and number of SMT and CR classes attended.

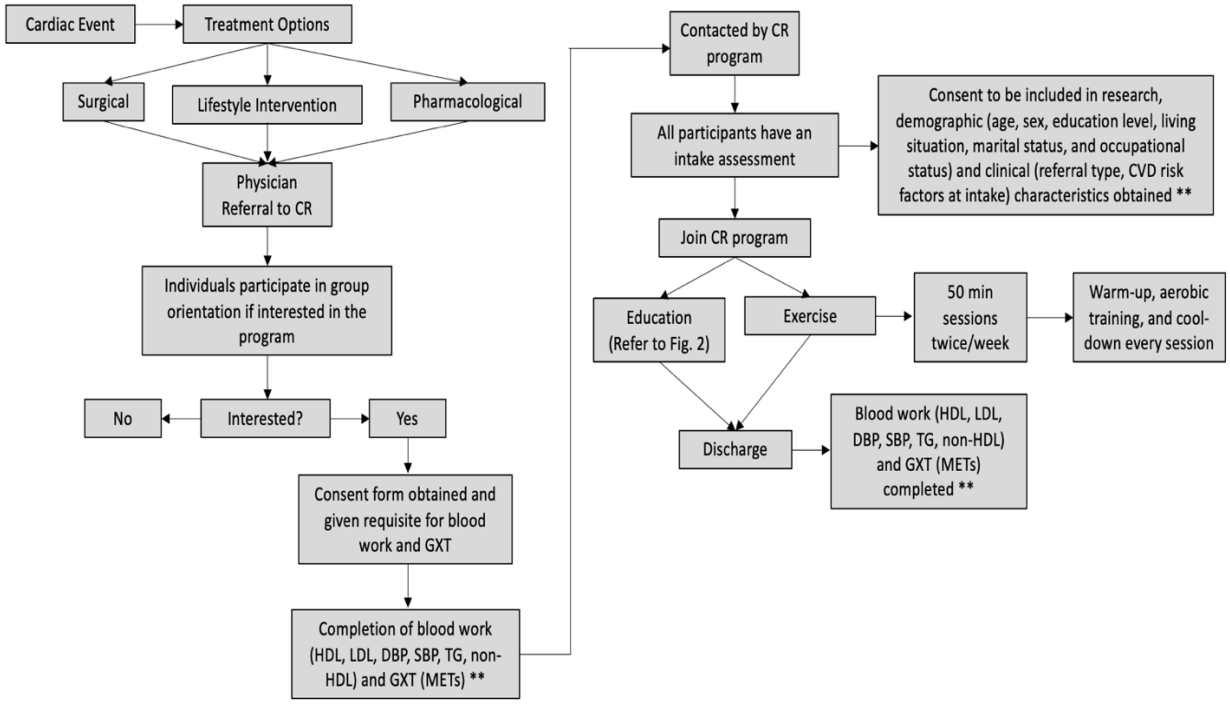


Figure 2: *Cardiac Rehabilitation Process Map*

A visualization of the CR process, including data collection and extracting timepoints.
***Data extracted for purposes of this study*
Note – CR: cardiac rehabilitation; HDL: high-density lipoprotein; LDL: low-density lipoprotein; DBP: diastolic blood pressure; SBP: systolic blood pressure; TG: triglycerides; non-HDL: non-high-density lipoprotein; GXT: graded exercise stress test; METs: metabolic equivalent; CVD: cardiovascular disease.

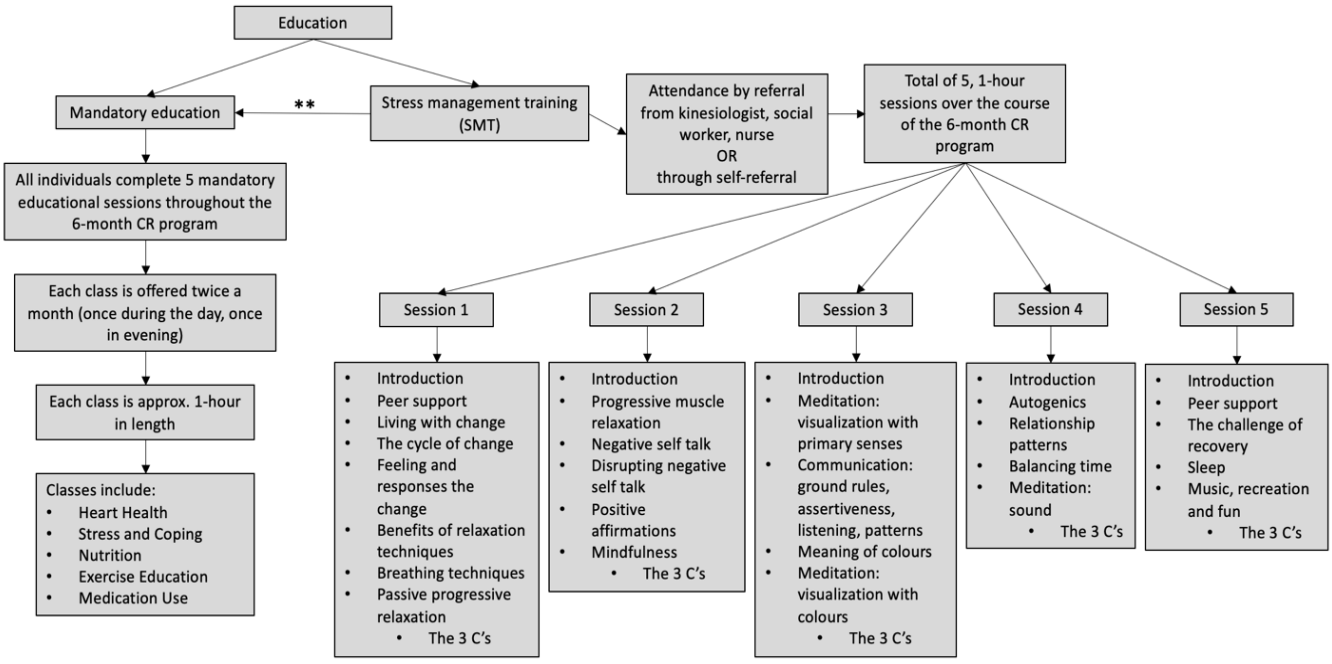


Figure 3: *Cardiac Rehabilitation Educational Classes Process Map*

A visualization schematic of the education component of CR. All individuals complete this series of mandatory education sessions together with the exercise component of CR programming. Note that the mandatory educational sessions are information sharing classes (knowledge translation), whereas SMT is a series of training courses to teach participants about applicable skills and strategies.
***Individuals attending SMT are completing the same exercise and education intervention as CR-alone individuals.*
Note – CR: cardiac rehabilitation; SMT: stress management training; The 3 C's: I didn't cause it, I can't cure it, I can't control it.

Statistical Analyses

All data were analyzed using SPSS (Version 25, IBM, Armonk USA), with a significance set at $p \leq 0.05$.

The following analyses were conducted to address the specific research questions:

1. What was the rate of referral to SMT? Are there differences in demographic and clinical characteristics between those individuals referred and those who are not?

Descriptive statistics, including mean (M), standard deviation (SD), and frequency of occurrence were first obtained to characterise the entire CR cohort (*n*=1184; CR+SMT – Group

1 and CR-alone – Group 2), on the demographic and clinical characteristics (as described above in Section 2.3, page 44). Within Group 1, the frequency of occurrence indicated the rate of referral. Next, an independent-samples t-test was conducted to assess potential differences in age between groups (referred vs. not referred). Following this, chi-squared tests of independence were used to examine the relationship between sex, ethnicity, education level, living situation, marital status, occupational status, CR referral type, and risk factors at intake in those referred and not referred to SMT. Normal distribution was assessed for both the independent-samples t-test and chi-squared test of independence by inspection of histograms, Q-Q plots, skewness, kurtosis, and Shapiro-Wilks test ($p>0.05$) and homogeneity of variance was assessed by the Levene's Test of Equality Variance ($p>0.05$). All test-specific assumptions were satisfied before the completion of the analysis.

2. What is the rate at which individuals attend SMT? Are there differences in demographic and clinical characteristics between those individuals who were referred to the program and attended SMT versus those who were referred and did not attend SMT?

Descriptive statistics, including mean (M), standard deviation (SD), and frequency of occurrence was obtained and indicated the rate of attendance. Following this, to determine differences in age in those that attended SMT versus those that did not attend, an independent-samples t-test was completed. Then to determine the relationship between sex, ethnicity, education level, living situation, marital status, occupational status, referral type, and risk factors at intake in those that attended and those that did not attend SMT, separate chi-squared t-tests of independence were completed. As per research question 1, all assumptions were satisfied before the completion of the above analyses.

3. Does attending a combination of CR+SMT result in greater clinical benefits compared to CR-alone?

Descriptive statistics were used to characterize and summarize CR outcome variables: METs, HDL, LDL, DBP, SBP, TG, non-HDL (Refer to Section 2.3, page 44). Outliers were assessed by inspection of boxplot and z-scores (±2.5 SD from the mean). There were no significant differences in groups at intake, therefore data were analyzed using two-way (group x time) RM-ANOVA. Specifically, separate RM-ANOVAs were used to determine the effect of CR+SMT on the dependent variables (METs, HDL, LDL, DBP, SBP, TG, non-HDL) versus CR-alone, from time 1 (intake) to time 2 (discharge). Partial eta squared (n^2) was used to measure the effect size or clinical significance of a variable. Effect size was calculated and interpreted based on Cohen's (2003) recommendation: a small effect = 0.01, a moderate effect = 0.09, and a large effect = 0.25.[26] All other assumptions (normality) were satisfied before the completion of the RM-ANOVA.

4. Is attending more SMT sessions associated with greater clinical benefits?

Descriptive statistics were used to characterize the CR outcome variables: METs, HDL, LDL, DBP, SBP, TG, non-HDL (Refer to Section 2.3, page 44) within those attending CR+SMT (Group 1). Outliers were identified through the inspection of histograms and removed where appropriate (n=36). Normality (identified through Shapiro-Wilks Test) was violated for METs, non-HDL, SBP, and TG, and once outliers were removed only TG violated the assumption. However, TG data was not manipulated because RM-ANOVAs are considered robust against the assumption of normality and no other assumption was violated (e.g., homogeneity and Box's Test of Equal Variance).[27] There were no significant differences in groups at intake, therefore data were analyzed using two-way (group x time) RM-ANOVA. A series of RM-ANOVAs were

completed to assess changes in the dependent variables (METs, HDL, LDL, DBP, SBP, TG, and non-HDL), from time 1 (intake) and time 2 (discharge) between the following independent variables: SMT3-5, SMT2, and SMT1. Tukey's post hoc was conducted where appropriate. Similar to research question 3, n^2 was calculated to assess effect size based on Cohen's (2003) recommendation, were applicable.[26]

2.4 Results – Component 1

There were a total of 1184 clients who completed CR between January 1st, 2018, and December 31st, 2019, (M±SD; Age: 65.1±10.4 years). However, due to missing data, each analysis was completed with an individualized sample size (*n*; see Table 1 and 2). Of the individuals who attended in CR, most were male (71%), white/Caucasian (80%), high school (39%) or university/college graduates (29%), married (75%), living with a spouse/partner (69%), and retired (49%). Additionally, the majority of individuals who attended CR had undergone a coronary angioplasty procedure (38%) and reported having dyslipidemia (64%) and hypertension (61%) at intake. Please refer to Table 1 for an overview of all demographic and clinical characteristics.

Table 1: Demographic and Clinical Characteristics of Cardiac Rehabilitation Participants.

Characteristic	Overall Sample *n*=1184
Age (years); M (SD)	65.1 (10.4)
Sex, *n* (%)	
Male	843 (71.2)
Female	291 (24.5)
Missing[+]	50 (4.3)
Ethnicity, *n* (%)	
White/Caucasian	941 (79.5)
Other[‡]	84 (7.1)
Missing[+]	159 (13.4)
Education, *n* (%)	
High school: some	49 (4.1)
High school: complete	458 (38.7)
Trade school: complete	86 (7.3)
University/college: some	27 (2.3)
University/college: complete	339 (28.6)
Post education: complete	38 (3.2)
Other[‡]	24 (2.0)
Missing[+]	163 (13.8)
Living Situation, *n* (%)	
Alone	162 (13.7)
With spouse/partner	816 (68.9)
With others	41 (3.5)
With family	39 (3.3)
Other[‡]*	- (-)
Missing[+]	122 (10.3)
Marital Status, *n* (%)	
Single	89 (8.5)
Married	783 (75.1)
Divorced	63 (6.0)
Widowed	59 (5.7)
Common-law union	33 (3.2)
Other[‡]	16 (1.5)
Occupational Status, *n* (%)	
Full-time	241 (20.4)
Part-time	67 (5.6)
Unemployed	34 (2.9)
Retired	577 (48.7)
Short term disability	74 (6.3)
Long term disability	55 (4.6)
Other[‡]	9 (0.8)
Missing[+]	127 (10.7)

Referral Type, *n* (%)	
CABG	197 (16.6)
Cardiomyopathy	24 (2.0)
Coronary Angioplasty	450 (38.0)
Myocardial Infarction	75 (6.3)
Other	13 (1.1)
Stable CAD/angina	33 (2.8)
Valvular Heart Disease	83 (7.0)
Other‡	37 (3.1)
Missing+	272 (23.1)
Risk Factors at Intake, *n* (%)	
Diabetes	323 (27.3)
Hypertension	723 (61.1)
Dyslipidemia	757 (63.9)
Anxiety/Depression	100 (8.4)
Sedentary Lifestyle	296 (25.0)

**Cell sizes less than 5 are suppressed as per the Statistics Act.*[28]
+Data is missing at random
Note: Coronary Artery Bypass Graft (CABG), Coronary Artery Disease (CAD).
Ethnicity‡: unknown, not obtained, Aboriginal, Arab/West Asian, Black, Chinese, Filipino, Japanese, Korean, Latin American, South Asian, South East Asian.
Education‡: unknown, not obtained, elementary: some, elementary: complete, trade school: some.
Living Situation‡: unknown, not obtained, with friend(s).
Marital Status‡: unknown, not obtained, separated.
Occupational Status‡: unknown, not obtained, not-never employed outside the home, employed – permanent restrictions, employed – modified duties.
Referral Type‡: Ablation, Atrial Fibrillation, Cardioversion, Coronary Heart Failure, Implantable Cardioverter Defibrillator, other (not specified).

Using the analyses described in Section 2.3, pages 46-49, answers to the following questions were then acquired:

1. What was the rate of referral to SMT? Are there differences in demographic and clinical characteristics between those individuals referred and those who are not?

The overall rate of referral to SMT was 20% (*n*=237 out of 1184). Similar to the individuals who attended CR, the majority of those referred to SMT were white/Caucasian (84%) males (66%). An independent samples t-test revealed a statistically significant difference

(t(1184)=2.234, p=.026) in age between those referred to SMT (M±SD; 64.0±10.4 years) and those not referred (66.0±10.9 years), with a mean difference of 1.8 years.

There was a significant association between reported anxiety and depression at intake and whether or not individuals were referred to SMT (χ^2(1, n=1084) = 8.744, p=.003, Cramer's V = .090 (small)), such that the proportion of individuals who were referred to SMT and reported having anxiety and depression at intake was significantly more (16%) than those who were not referred (8%). Additionally, those who were referred to SMT and did not report having anxiety and depression at intake was significantly less (84%) than those who were not referred to SMT (92%).

A significant association was also found between family history and whether or not individuals were referred to SMT, χ^2 (1, n=1184) = 3.978, p=.046, Cramer's V = .058 (small). The proportion of individuals who were referred to SMT who had a family history of CVD was significantly more (60%) than those who were not referred (52%). Those who were referred to SMT and did not a family history of CVD was significantly less (41%) than those who were not referred to SMT (48%).

Lastly, although it was not found to be statistically significant, the chi-squared test of independence revealed that education and referral status trended towards a significant association with p=0.59. No other significant differences were observed (p>0.05).

Due to the nature of the study, it is important to note that out of the entire sample (n=1184), 100 individuals reported having anxiety and depression as a risk factor at intake, only 16% of who were referred to SMT. Please refer to Table 2 and 3 for more information, and to Appendix B for SPSS outputs.

Table 2: Comparison of Non-Modifiable Participant Characteristics: Referred vs. Not Referred to Stress Management Training.

Characteristics	Referred (*n*=237) **	Not Referred (*n*=947)	*p*-value
Age (years); M (SD)	64 (10.4)	66 (10.9)	.026
Sex, *n* (%)			.093
Male	157 (66.2)	686 (72.4)	
Female	71 (29.9)	220 (23.2)	
Missing[+]	9 (3.9)	40 (4.4)	
Ethnicity, *n* (%)			.114
White/Caucasian	199 (83.9)	742 (78.3)	
Other[‡]	14 (5.9)	70 (7.3)	
Missing[+]	24 (10.2)	135 (14.4)	
Education, *n* (%)			.059
High school: some	6 (2.5)	43 (4.5)	
High school: complete	81 (34.1)	377 (39.8)	
Trade school: complete	16 (6.7)	70 (7.3)	
University/college: some	10 (4.2)	17 (1.7)	
University/college: complete	84 (35.4)	255 (26.3)	
Post education: complete	10 (4.2)	28 (2.9)	
Other[‡]*	- (-)	23 (2.4)	
Missing[+]	29 (12.5)	134 (15.1)	
Living Situation, *n* (%)			.108
Alone	29 (12.2)	133 (14.0)	
With spouse/partner	171 (72.1)	645 (68.1)	
With others	15 (6.3)	26 (2.7)	
With family	10 (4.2)	29 (3.0)	
Other[‡]*	- (-)	- (-)	
Missing[+]	11 (4.8)	112 (12.0)	
Marital Status, *n* (%)			.742
Single	23 (9.7)	66 (6.9)	
Married	163 (68.7)	620 (65.4)	
Divorced	14 (5.9)	49 (5.1)	
Widowed	10 (4.2)	49 (5.1)	
Common-law union	9 (3.7)	24 (2.5)	
Other[‡]*	- (-)	12 (1.2)	
Missing[+]	14 (6.2)	127 (13.8)	
Occupational Status, *n* (%)			.234
Full-time	49 (20.6)	192 (20.2)	
Part-time	18 (7.5)	49 (5.1)	
Unemployed	5 (2.1)	29 (3.0)	
Retired	113 (47.6)	464 (48.9)	
Short term disability	23 (9.7)	51 (5.3)	
Long term disability	14 (5.9)	41 (4.3)	

Other‡*	- (-)	6 (0.6)	
Missing+	12 (5.4)	115 (12.6)	
Referral Type, *n* (%)			.148
Valvular Heart Disease	18 (7.5)	65 (6.8)	
Stable CAD/Angina	7 (2.9)	26 (2.7)	
Myocardial Infarction	14 (5.9)	61 (6.4)	
Coronary Angioplasty	88 (37.1)	362 (38.2)	
Cardiomyopathy	6 (2.5)	18 (1.9)	
CABG	48 (20.2)	149 (15.7)	
Other‡*	16 (6.7)	32 (3.3)	
Missing+	40 (17.2)	234 (25.0)	

Results are reported from the completion of an independent-samples t-test and chi-squared test as appropriate.
p-values <.05 were considered statistically significant.
** Cell sizes less than 5 are suppressed as per the Statistics Act.[29]*
***Rate of referral to SMT = 20%.*
+Data is missing at random
Note: Coronary Artery Disease (CAD), Coronary Artery Bypass Graft (CABG).
Ethnicity‡: unknown, not obtained, Aboriginal, Arab/West Asian, Black, Chinese, Filipino, Japanese, Korean, Latin American, South Asian, southeast Asian.
Education‡: unknown, not obtained, elementary: some, elementary: complete, trade school: some, high school: some.
Living Situation‡: unknown, not obtained, with friend(s).
Marital Status‡: unknown, not obtained, separated.
Occupational Status‡: unknown, not obtained, not-never employed outside the home.
Referral Type‡: Ablation, Atrial Fibrillation, Cardioversion, Coronary Heart Failure, Implantable Cardioverter Defibrillator, Stroke, Stable Coronary Artery Disease, Pacemaker, Cardiomyopathy, Other (not specified).

Table 3: Comparison of Participant Risk Factors at Intake: Referred vs Not Referred to Stress Management Training.

Characteristics	Referred (*n*=237)	Not Referred (*n*=947)	*p*-value
Risk Factors at Intake, *n* (%)			
Diabetes			.278
Yes	58 (24.5)	265 (28.0)	
No	179 (75.5)	682 (72.0)	
Hypertension			.022
Yes	157 (66.2)	566 (59.8)	
No	79 (33.3)	381 (40.2)	
Missing[+]	1 (0.5)	0	
Dyslipidemia			.152
Yes	161 (67.9)	596 (62.9)	
No	76 (32.1)	351 (37.1)	
Anxiety/Depression			.003
Yes	22 (9.2)	78 (8.2)	
No	115 (48.5)	869 (91.8)	
Missing[+]	100 (42.3)	0	
Sedentary Lifestyle			.379
Yes	54 (22.8)	242 (25.6)	
No	183 (77.2)	705 (74.4)	
Family History			.046
Yes	141 (59.5)	495 (52.3)	
No	96 (40.5)	452 (47.7)	

Results are reported from the completion of a chi-squared tests of independence, representing participants modifiable risk factors obtained during intake.
p-values <.05 were considered statistically significant.
[+]*Data missing at random.*

2. What is the rate at which individuals attend SMT? Are there differences in demographic and clinical characteristics between those individuals who were referred to the program and attended SMT versus those who were referred and did not attend SMT?

The rate of attendance to SMT was 76% (*n*=181 out of 237). Similar to above, the majority of individuals who attended SMT following referral were white/Caucasian (87%) males (69%). An independent samples t-test did not reveal a significant difference in age between individuals who attended SMT (M±SD; 65.0±10.1 years) and individuals who did not attend (62.0±11.2 years) SMT.

A chi-squared test of independence revealed a significant association between occupational status and whether or not individuals attended SMT, χ^2 (7, n=225) = 16.353, p=.022, Cramer's V = .270 (medium). This suggests that individuals who were retired were more likely to attend (56%) SMT than to not attend (31%). Additionally, those who were on short term disability were more likely not to attend (18%) SMT than to attend (8%).

A chi-squared test of independence revealed a significant association between hypertension and whether or not individuals attended SMT, χ^2 (2, n=237) = 7.495, p=.024, Cramer's V = .178 (medium). This demonstrates that the proportion of individuals who attended SMT were more (71%) likely to have hypertension at intake, while individuals who did not have hypertension at intake were more likely not to attend (48%) SMT than attend (29%).

Lastly, a significant association was found between dyslipidemia and whether or not individuals attended SMT, χ^2 (1, n=237) = 8.776, p=.003, Cramer's V = .192 (medium). This suggests those individuals who have dyslipidemia at intake were more likely to attend (73%) SMT than not attend (52%), while those that did not have dyslipidemia at intake were more likely to not attend (48%) than attend (27%).

No other significant differences were observed (p>0.05). Please refer to Table 4 and 5 for an overview of the differences in demographic and clinical characteristics, and to Appendix C for SPSS outputs.

Table 4: Comparison of Demographic and Clinical Characteristics: Referred and Attended vs. Did Not Attend Stress Management Training.

Characteristic	Attended (*n*=181) **	Did not Attend (*n*=56)	*p*-value
Age (years); M (SD)	65 (10.1)	62 (11.2)	.074
Sex, *n* (%)			.081
Male	125 (69.1)	32 (57.1)	
Female	49 (27.0)	22 (39.3)	
Missing[+]	7 (3.9)	2 (3.6)	
Ethnicity, *n* (%)			.712
White/Caucasian	157 (86.7)	42 (75.0)	
Other[‡]*	11 (6.1)	- (-)	
Missing[+]	13 (7.2)	11 (19.6)	
Education, *n* (%)			.296
High school: complete	64 (35.4)	17 (30.4)	
University/college: complete	62 (34.3)	22 (39.3)	
Other[‡]*	35 (19.3)	8 (14.2)	
Missing[+]	20 (11.0)	9 (16.1)	
Living Situation, *n* (%)			.162
Alone	24 (13.3)	5 (8.9)	
With spouse/partner	134 (74.0)	37 (66.1)	
Other[‡]*	19 (10.5)	7 (12.5)	
Missing[+]	4 (2.2)	7 (12.5)	
Marital Status, *n* (%)			.301
Married	129 (71.3)	34 (60.7)	
Other[‡]*	45 (24.8)	15 (26.8)	
Missing[+]	7 (3.9)	7 (12.5)	
Occupational Status, *n* (%)			.022
Full-time	38 (21.0)	11 (19.6)	
Part-time	13 (7.2)	5 (9.0)	
Retired	98 (54.1)	15 (26.8)	
Short term disability	14 (7.7)	9 (16.1)	
Long term disability	9 (5.0)	5 (8.9)	
Other[‡]*	- (-)	4 (0.7)	
Missing[+]	5 (4.8)	7 (18.9)	
Referral Type, *n* (%)			.189
Valvular Heart Disease	13 (7.2)	5 (8.9)	
Coronary Angioplasty	70 (38.7)	18 (32.1)	
CABG	38 (21.0)	10 (17.9)	
Other[‡]*	35 (19.3)	8 (14.3)	
Missing[+]	25 (13.8)	15 (26.8)	

Results are reported from the completion of an independent-samples t-test and chi-squared test as appropriate.

p-values <.05 were considered statistically significant.

** Cell sizes less than 5 are suppressed as per the Statistics Act.*[29]

***Rate of attendance to SMT = 76%.*
[+]Data missing at random.
Note: Coronary Artery Bypass Graft (CABG).
Ethnicity[‡]: unknown, not obtained, Aboriginal, Arab/West Asian, Black, Chinese, Filipino, Japanese, Korean, Latin American, South Asian, South East Asian.
Education[‡]: unknown, not obtained, elementary: some, elementary: complete, high school: some, trade school: some, trade school: complete, university/college: some, post education: complete.
Living Situation[‡]: unknown, not obtained, with others, with friend(s), with family.
Marital Status[‡]: unknown, not obtained, single, divorced, widowed, common-law union, separated.
Occupational Status[‡]: unknown, not obtained, unemployed, not-never employed outside the home.
Referral Type[‡]: Ablation, Atrial Fibrillation, Cardiomyopathy, Cardioversion, Coronary Heart Failure, Implantable Cardioverter Defibrillator, Myocardial Infarction, other, Pacemaker, Stroke, Stable CAD/angina, other (not specified).

Table 5: Comparison of Participant Risk Factors at Intake: Attended vs. Did Not Attend Stress Management Training.

Characteristic	**Attended (*n*=181)**	**Did not Attend (*n*=56)**	***p*-value**
Risk Factors at Intake, *n* (%)			
Diabetes			.188
Yes	48 (26.5)	10 (17.8)	
No	133 (73.4)	46 (82.1)	
Hypertension			.024
Yes	128 (70.7)	29 (51.8)	
No	52 (28.7)	27 (48.2)	
Missing[+]	1 (0.6)	0	
Dyslipidemia			.003
Yes	132 (72.9)	29 (51.8)	
No	49 (27.0)	27 (48.2)	
Anxiety/Depression			.342
Yes	15 (8.2)	7 (12.5)	
No	166 (91.7)	49 (87.5)	
Sedentary Lifestyle			.651
Yes	40 (22.0)	14 (25.0)	
No	141 (77.9)	42 (75.0)	
Family History			.471
Yes	110 (60.7)	31 (55.3)	
No	71 (39.2)	25 (44.6)	

Results are reported from the completion of a chi-squared tests of independence, representing participants modifiable risk factors obtained during intake.
p-values <.05 were considered statistically significant.
[+]Data missing at random.

3. Does attending a combination of CR+SMT result in greater clinical benefits compared to CR-alone?

A series of RM-ANOVAs was used to evaluate research question 3 to determine if participating in a combination of CR+SMT resulted in greater clinical benefits. A main effect for time, $F(1,1)=1003.164$, $p=0.000$, partial eta squared = 0.573 (large) and a main effect for group, $F(1,1)=8.806$, $p=0.003$, partial eta squared = 0.012 (small) were observed for MET levels such that there was a significant interaction effect between referral status and time (pre/post) for MET improvements, $F(1,1)=4.799$, $p=0.029$, partial eta squared = 0.006 (small). This indicated that participating in a combination of CR+SMT had greater clinical effects on MET levels from intake (M±SD: 6.8±3.0) to discharge (9.3±3.5) than CR-alone (intake: 6.2±2.7; discharge: 8.3±3.2), demonstrating a 0.4 MET difference. Refer to Figure 4 for a visual schematic of this interaction.

RM-ANOVA revealed a statistically significant main effect for time ($F(1,1)=86.697$, $p=0.000$, partial eta squared = 0.106 (medium)) for HDL, such that HDL levels were significantly higher at discharge (1.2±0.01 mmol/L) than at intake (1.1±0.01 mmol/L). There was a significant main effect for group ($F(1,1)=9.048$, $p=0.003$, partial eta squared = 0.012 (small)) for HDL, such that CR+SMT (1.2±0.02 mmol/L) presented higher HDL levels than CR-alone (1.1±0.01 mmol/L). However, HDL did not present a significant interaction effect, $p>0.05$.

DBP did not present a significant interaction effect ($p>0.05$), but revealed a main effect for time, $F(1,1)=7.525$, $p=0.006$, partial eta squared = 0.01 (small), such that DBP levels showed a reduction from intake (79.9±0.5 mmHg) to discharge (78.6±0.5 mmHg), and a significant main effect for group, ($F(1,1)=8.932$, $p=0.003$, partial eta squared = 0.012 (small)), where CR+SMT (80.6±0.8 mmHg) presented higher DBP than CR-alone (77.9±0.4 mmHg).

SBP and TG did not reveal a interaction effect, however, SBP revealed a main effect for group ($F(1,1)=5.753$, $p=0.017$, partial eta squared = 0.008 (small)), where CR+SMT (133.5±0.7 mmHg) had lower SBP levels than CR-alone (137.1±1.4 mmHg), and TG showed a significant main effect for time, $F(1,1)=4.862$, $p=0.028$, partial eta squared = 0.007 (small), presenting a reduction from intake (1.5±0.03 mmol/L) to discharge (1.4±0.03 mmol/L).

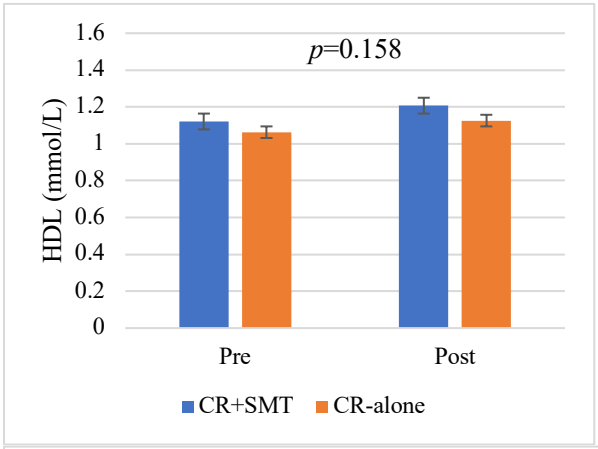
No other statistically significant interactions were noted for the remaining CR outcome measures ($p>0.05$). Please refer to Table 4 for additional information on the interaction effects for each CR outcome measure, and to Appendix D for SPSS outputs.

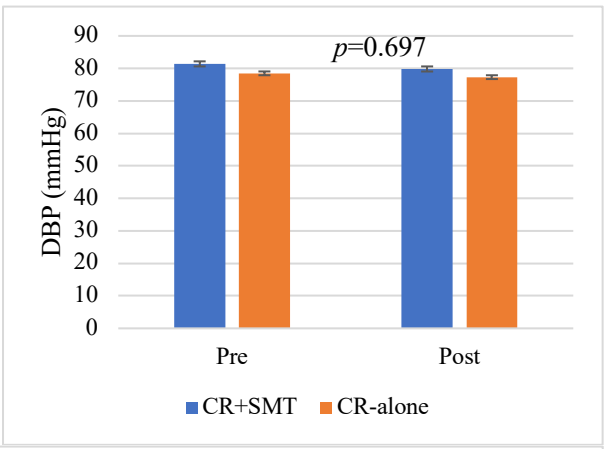
Table 6: Clinical Effects of Completing a Cardiac Rehabilitation Program and Participating in Stress Management Training Between Intake and Discharge.

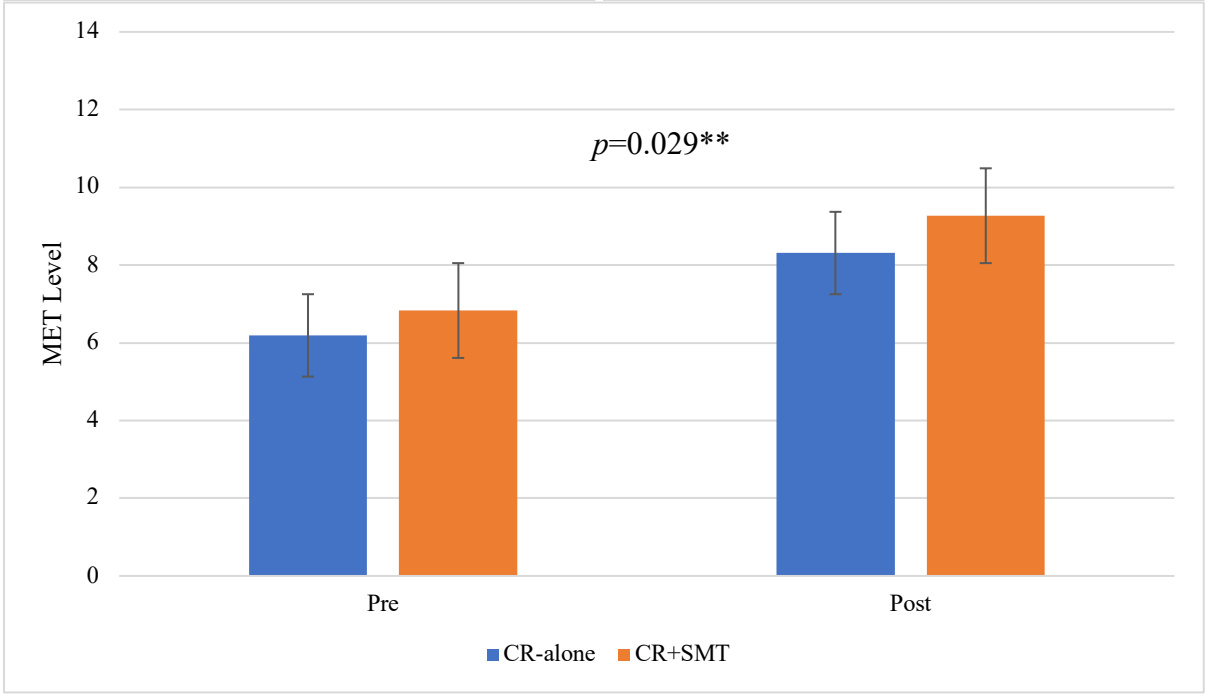
Clinical Outcomes	**CR-alone (*n*=1003)**	**CR+SMT (*n*=181)**	***p*-value of Interaction**
HDL (mmol/L); M (SD)			0.158
Pre	1.06 (0.25)	1.12 (0.26)	
Post	1.13 (0.27)	1.21 (0.28)	
Missing[+], *n* (%)	414 (41.3)	37 (20.4)	
DBP (mmHg); M (SD)			0.697
Pre	78.48 (10.94)	81.39 (11.51)	
Post	77.3 (10.95)	79.83 (10.81)	
Missing[+], *n* (%)	420 (41.9)	42 (23.2)	
METs; M (SD)			0.029
Pre	6.19 (2.68)	6.83 (3.03)	
Post	8.31 (3.18)	9.27 (3.49)	
Missing[+], *n* (%)	399 (39.8)	34 (18.8)	
non-HDL (mmol/L); M (SD)			0.415
Pre	2.20 (0.68)	2.25 (0.76)	
Post	2.20 (0.64)	2.21 (0.67)	
Missing[+], *n* (%)	436 (43.5)	43 (23.8)	
SBP (mmHg); M (SD)			0.871
Pre	133.58 (19.15)	137.33 (19.52)	
Post	133.34 (17.44)	136.82 (17.72	
Missing[+], *n* (%)	430 (43.9)	40 (22.1)	
TG (mmol/L); M (SD)			0.621
Pre	1.56 (0.70)	1.47 (0.67)	
Post	1.51 (0.68)	1.39 (0.62)	
Missing[+], *n* (%)	417 (41.6)	39 (21.5)	
LDL (mmol/L); M (SD)			0.187

Pre	1.87 (0.63)	1.96 (0.73)	
Post	1.89 (0.57)	1.91 (0.64)	
Missing[+], *n* (%)	428 (42.7)	38 (21.0)	

Results are reported from the completion of a series of RM-ANOVAs, for the interaction between CR-alone and CR+SMT at intake and discharge.
**Excluding duplicate individuals (patients who attended the program two or more times) (n=5).*
[+]Data missing at random.
p-values <.05 were considered statistically significant.
Note: High-density lipoprotein (HDL), diastolic blood pressure (DBP), metabolic equivalent of task (METs), non-high-density lipoprotein (non-HDL), systolic blood pressure (SBP), triglycerides (TG), low-density lipoprotein (LDL), standard deviation (SD).







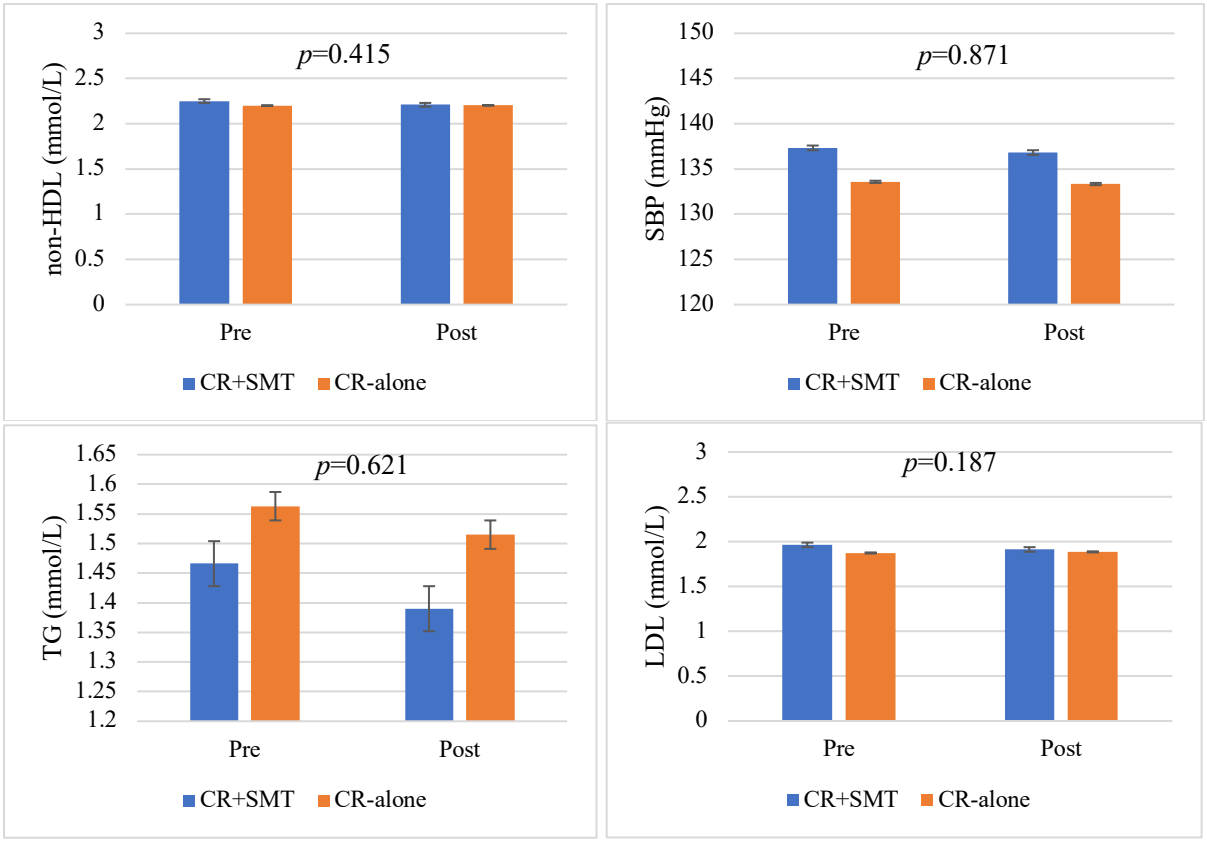


Figure 4: *Changes in Clinical Outcomes Over Time, Between Cardiac Rehabilitation Alone and Cardiac Rehabilitation in Concert with Stress Management Training*

Visual representations of Table 4 – the clinical benefits of CR outcome measures for CR individuals from pre to post.
***p-values <.05 were considered statistically significant (i.e., MET level p=0.029)*
All values presented as M±SD.

4. Is attending more SMT sessions associated with greater clinical benefits?

A series of RM-ANOVAs were used to evaluate research question 4 to determine if attending a greater number of SMT sessions results in greater clinical benefits. No significant interactions were observed (p>0.05) in any of the CR outcome measures (e.g., HDL, DBP, METs, non-HDL, SBP, TG, and LDL) across SMT attendance.

There was a significant main effect for time such that HDL levels significantly increased from intake (Mean±SD: 1.1±0.02 mmol/l) to discharge (1.2±0.03 mmol/l), F(1,2)=26.185, p=0.000, partial eta squared = 0.157 (medium). Additionally, there was a main effect for time for

MET levels, $F(1,2)=157.505$, $p=0.000$, partial eta squared = 0.020 (small), where MET levels increased from intake (6.7±0.3) to discharge (9.0±0.3). A main effect for time was also observed for TG, $F(1,2)=4.245$, $p=.041$, partial eta squared = 0.030, such that TG significantly decreased from intake (1.5±0.6) to discharge (1.4±0.5).

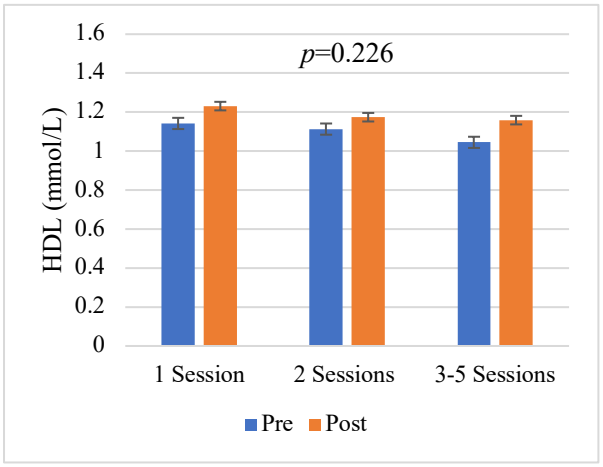
No other significant main effects or interactions were observed for the remaining variables ($p>0.05$). Please refer to Table 5 for additional information, and to Appendix D for SPSS outputs.

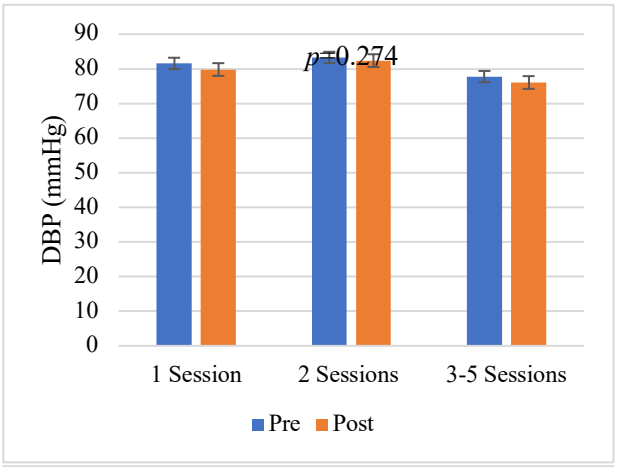
Table 7: Clinical Effects of Attending Stress Management Training Sessions Between Intake and Discharge.

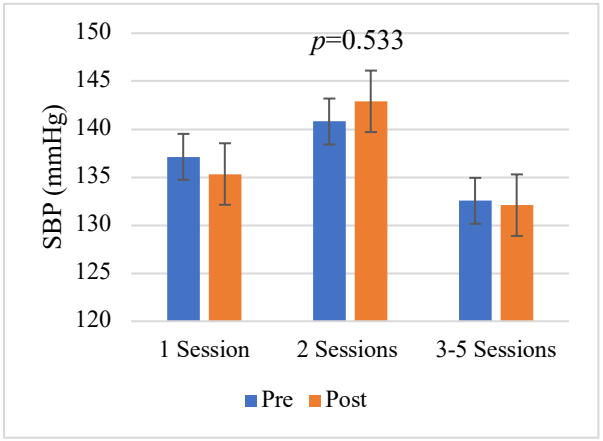
Clinical Outcomes	**1 Sessions (*n*=117)**	**2 Sessions (*n*=40)**	**3-5 Sessions (*n*=24)**	***p*-value of Interaction**
HDL (mmol/L); M (SD)				0.533
Pre	1.14 (0.03)	1.11 (0.05)	1.04 (0.06)	
Post	1.23 (0.03)	1.17 (0.05)	1.16 (0.06)	
DBP (mmHg); M (SD)				0.914
Pre	81.57 (1.24)	83.28 (2.03)	77.76 (2.50)	
Post	79.80 (1.16)	82.37 (1.89)	76.05 (2.34)	
METs; M (SD)				0.226
Pre	6.93 (0.32)	7.03 (0.53)	6.15 (0.63)	
Post	9.54 (0.37)	8.97 (0.61)	8.59 (0.73)	
non-HDL (mmol/L); M (SD)				0.274
Pre	2.18 (0.08)	2.40 (0.13)	2.22 (0.16)	
Post	2.17 (0.07)	2.22 (0.12)	2.25 (0.14)	
SBP (mmHg); M (SD)				0.543
Pre	137.12 (2.09)	140.80 (3.51)	132.54 (4.16)	
Post	135.33 (1.83)	142.90 (3.08)	132.09 (3.65)	
TG (mmol/L); M (SD)				0.279
Pre	1.35 (0.68)	1.68 (0.12)	1.51 (0.14)	
Post	1.29 (.058)	1.43 (0.09)	1.45 (0.12)	
LDL (mmol/L); M (SD)				0.369
Pre	1.93 (0.076)	2.05 (0.13)	1.90 (0.16)	
Post	1.89 (0.067)	1.89 (0.11)	1.93 (0.14)	

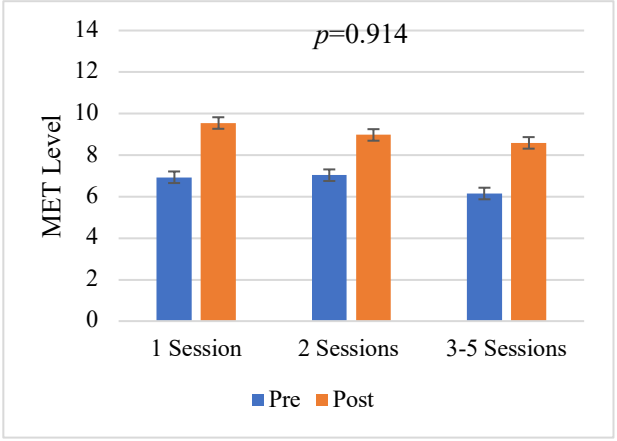
Results are reported from the completion of a series of RM-ANOVAs, for the main interaction between SMT sessions between intake and discharge.
**Excluding duplicate individuals (patients who attended the program two or more times) (n=5).*
p-values <.05 were considered statistically significant.
There were no missing cases present for the above variables.

Note: High-density lipoprotein (HDL), diastolic blood pressure (DBP), metabolic equivalent of task (METs), non-high-density lipoprotein (non-HDL), systolic blood pressure (SBP), triglycerides (TG), low-density lipoprotein (LDL), standard deviation (SD).









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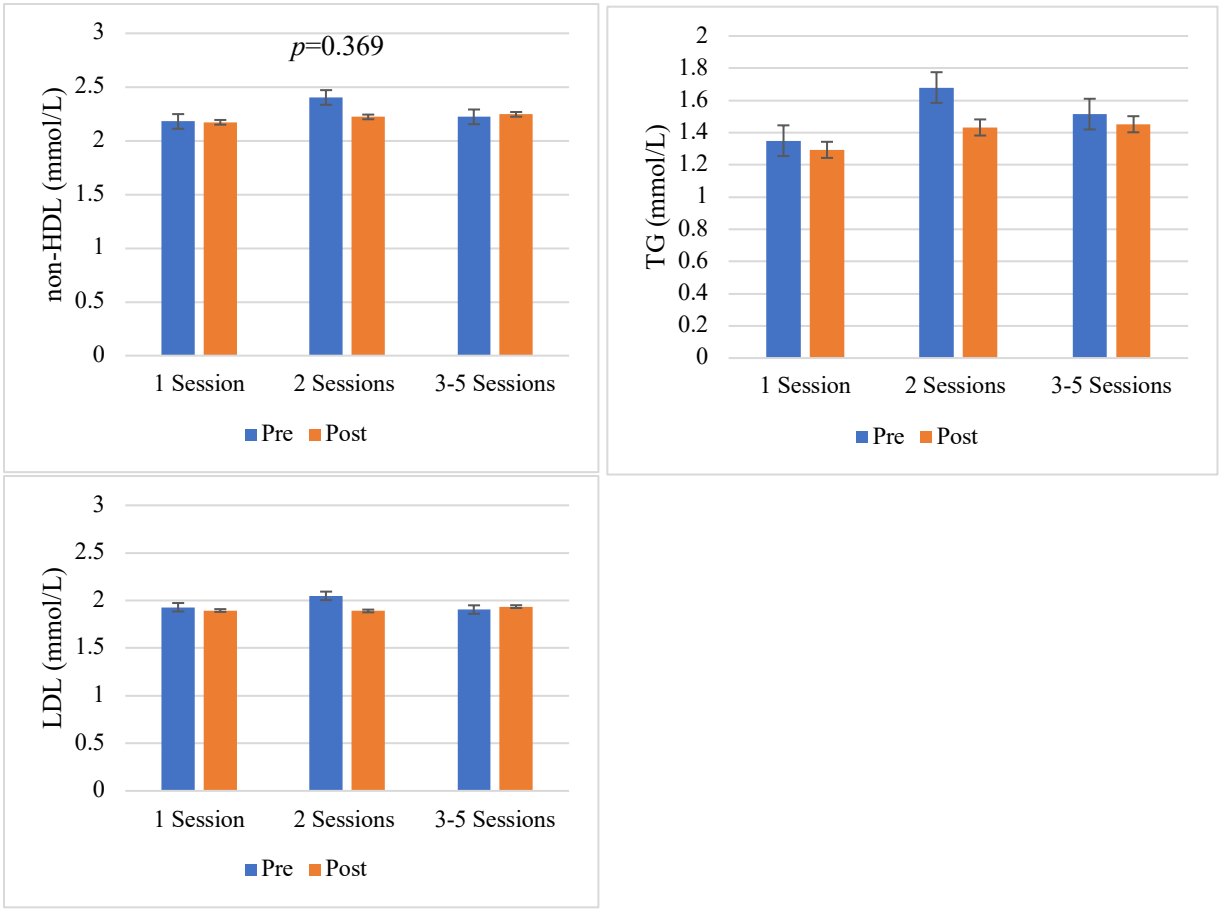

Figure 5*: Changes in Clinical Outcomes Over Time for Individuals Participating in Stress Management Training*

Visual representations of Table 5 – the clinical benefits of CR outcome measures for individuals who participated in SMT from pre to post CR.
p-values <.05 were considered statistically significant.
All values presented as M±SE.

2.5 Methodology – Component 2

The purpose of this component was to better understand the benefits to including SMT as an integral part of CR from a qualitative perspective. Individuals who participated in SMT in concert with exercise-based CR (refer to Figure 2 and 3) were eligible to participate in Component 2 (Refer to Fig. 1 for the eligibility criteria). Data (participant names, phone numbers, and number of SMT session) from individuals who were referred to SMT were extracted from Cardiologica and compiled and organized into a master participant log

(Microsoft® Excel) by one of the CR programs research associates. Participant names were coded for confidentiality and anonymity purposes and will be referred to by a pseudonym (Barb, Ron, Kyle, Janice, Tim, Mark) within the present paper and in accordance with recommended practice.[30]

Interviews were conducted via land-line telephone in the CR's research centre. Eligible participants were first contacted via telephone to gauge their interest in participating in a potential study. During this call, individuals were reminded that they had consented to be contacted for future research, and that an opportunity had arisen. They were also reminded that their decision to participate in the study would not have any influence on their treatment, or relationship with the CR centre, and that their involvement was completely voluntary and confidential. If the individual was interested in hearing more about the study, they either provided verbal consent (via telephone) to hear more about the study at the present time or provided verbal consent to be contacted by the study's primary investigator at another day and time agreed upon by both parties during the initial call.

Individuals interested in participating in the study underwent a semi-structured interview. At the time of interview, the investigator first explained the purpose of the study, and obtained verbal consent to 1) participate in the study and 2) have the interview be audio-recorded for maximum retention of information provided. Interviews were recorded using a Sony Digital Recorder (version ICD-PX370). It was important to establish trust with the participants as some information they shared had the potential to bring back painful memories of their time within the program, including potential discomforts and risks associated with psychological and emotional distress. To develop this trust, the researcher gave the participants opportunities to pause when

needed, and all participants were provided with contact information for their community crisis services.

Interviews followed a semi-structured interview guide with open-ended questions (see Appendix F). Interviews took approximately 20-30 minutes to complete depending on conversation flow. In brief, the interviews consisted of 8 questions, with prompts to allow for expansion where appropriate. The interview questions were first piloted by the primary investigator with a current CR kinesiologist associated with the program to become familiar with the interview procedure and questions, test the safety of the questions, ensure questions were written at an appropriate level for all participants to clearly understand, and to confirm there were no problems with wording or terminology.

The primary investigator was given remote access to the data computer in the Physical Activity and Cardiovascular Research (PACR) Laboratory at the University of Windsor (Department of Kinesiology, Faculty of Human Kinesiology, Windsor, Ontario, Canada). Remote access allowed for all interviews to be manually transcribed by the primary investigator and were kept secure on the PACR Lab computer. Interviews were analyzed electronically via remote access using thematic analysis in order to identify, analyze, and report on patterns within the data.[30] Using the six steps of thematic analysis outlined by Braun and Clarke (2006), the primary investigator read the transcripts and created themes outlining the benefits of SMT. The six steps of thematic analysis include: 1) data familiarization (data is transcribed, read, and re-read in order to familiarize yourself with the data), 2) generating initial codes (coding interesting features and then collecting data relevant to each code), 3) searching for themes (taking the codes established from step one and two and organizing them into potential themes), 4) reviewing themes (checking the themes to make sure they work in relation to the codes), 5) defining and

naming themes (generating clear definitions for each theme and naming the themes), and 6) producing the report (the final analysis is completed, relating it back to the research questions and the literature, and then producing the final report).[31] Thematic analysis helped the investigator organize and interpret the data set in rich detail and allowed for the opportunity to highlight similarities and differences across the qualitative data set.[31]

2.6 Results – Component 2

Of the 237 individuals who were referred to SMT between January 1st, 2018, and December 31st, 2019, 181 attended between 1 and 5 sessions of the scheduled five session SMT series, while 56 did not attend. Individuals who participated in 2 or more sessions were contacted first (n=71). Of these individuals, 72% did not answer the telephone, and of the remainder, only 12.6% (n=9; M±SD age: 69.6±12.2 years) agreed to participate. As it became apparent there was a lack of recall from this cohort, the decision was made to not contact any individuals who participated in 1 session.

Thus, 9 previously graduated CR clients (2 females, 7 males) who attended SMT within the indicated time frame volunteered to participate and were interviewed. Of these, 3 participants completed 3 of 5 SMT sessions and 6 individuals completed 2 of 5 SMT sessions. From these interviews, regardless of other content or questions asked, every individual responded positively to the importance of including SMT in all CR programs in Canada (Question 8; Appendix F). Through these interviews, information pertaining to the SMT structure, programming, and content were discussed. Clear themes emerged that highlighted the benefits of the program, as did strategies for improvements. These findings will be discussed further in the following paragraphs.

Themes and Sub-themes

Participants were asked about experiences, barriers, influences, coping strategies, and the overall effectiveness of the SMT sessions. From the interview battery, three themes were uncovered, whereby participants: (a) developed and sustained a healthier lifestyle, with sub-themes including *gaining knowledge, perceiving improved overall health,* and using *coping strategies*; (b) emphasized the value of support, including sub-themes which alluded to the specific role of *mentor-to-participant, peer-to-peer,* and *external supports;* and (c) expressed a wish for more, including sub-themes of wanting *more flexibility in scheduling, more proof,* and *more guidance*. These themes and sub-themes will be explored below.

Table 8 provides a schematic representation of the identified themes and the ways they connect to the importance of the program.

Table 8: Overview of Qualitative Themes and Sub-themes.

Themes	Sub-themes
Developed and Sustained a Healthier Lifestyle • Participants' ability to improve and maintain their physical and mental health long after completion of the program	*Gaining Knowledge* • Positive developments in participants awareness and understanding of their recovery process
	Perceiving Overall Improved Health • Participants perceived health benefits experienced from attending CR+SMT
	Coping Strategies • Tools taught during SMT that helped participants maintain a healthy physical and mental life
The Value of Support • Participants expressed that their outcomes were strongly linked to social influencers	*Mentor-to-Participant* • Relationships built with staff members who guided and pushed them throughout the course of the program
	Peer-to-Peer

	• Interactions with peers during SMT programming and the day-to-day structure of CR
	External Support • Support provided by a spouse, partner, family member, and/or support worker (among others)
A Wish for More • Participants provided feedback to improve upon the structure and programming of CR+SMT	*More Flexibility in Scheduling* • The barrier of time was indicated as a needed change allowing more individuals to attend the program
	More Proof • Participants indicated a wish for more evidence on the benefits of SMT coping strategies
	More Guidance • More emphasis needed on the importance of SMT and more encouragement to participate in the program

Developed and Sustained a Healthier Lifestyle

The theme of "developed and sustained a healthier lifestyle" was present in all interviews whereby participants alluded to the importance that SMT programming had on their ability to improve and maintain a better daily regimen (e.g., increased daily exercise, smoking cessation, healthier diet) long after completion of the program. Participants brought up specific experiences within the SMT program that they believed benefitted their recovery (e.g., increased the ability to perform activities of daily living). Recurring sub-themes included *gaining knowledge* from SMT sessions, *perceiving improved overall health*, and employing *coping strategies*.

Gaining Knowledge

This sub-theme emerged as five participants expressed positive developments in their awareness and understanding of their recovery. Additionally, this sub-theme underlines the

lasting psychological impacts of SMT on participants' ability to apply this knowledge even following completion of the program. SMT encouraged individuals to take better care of themselves by providing an improved understanding of the physical and mental aspects of exercising, and the positive health outcomes associated with leading a healthier lifestyle, including necessary behavioural modifications. Through the interviews, SMT program content was repeatedly emphasized by participants as an encouraging element of their recovery, and it gave them a sense of accomplishment "… I thought it would be something that would be another thing I could get a handle on". Participants believed the information shared in the SMT classes (e.g., the importance of both stress management and exercise to success; other health improvements) significantly contributed to this knowledge improvement. For example, Ron shared, "the stress management program shed a light on the fact that yeah, I could be handling things an awful lot better".

Eight participants noted that the knowledge gained from SMT supported their desire to continue with exercise long after completion of the structured CR program. SMT also provided a sense of confidence to exercise safely and without supervision. Importantly, when reflecting on these improvements, participants stressed that what they learned in SMT made it easier for them to live a healthier lifestyle long after graduation, "… I'm taking better care of that [stress and exercising] now, because of what I learned at the program [SMT]," explained Kyle. Barb highlighted that "… it [SMT] was very good, helping me in terms of putting me at ease with doing exercise. … as I had my heart attack after doing exercises at home. Okay, so that was something I was quite, you know, wary of. … So that was very good". Other participants alluded to the same idea, mentioning that learning how to "monitor one's health, by properly taking

blood pressure and heart rate", improved their overall confidence to maintain an exercise regimen once graduated from the program.

It was further expressed that the impacts of SMT go beyond merely that of increasing one's knowledge. For example, by addressing the underlying, multi-faceted impact of mental health/psychological influences, SMT provided a "different perspective" about the importance of exercise and recovery. Many participants enjoyed this dual approach to recovery, one that was both mental and physical. Janice reflected on this point stating, "it was nice to do something that wasn't physically oriented, … put my focus elsewhere other than blood tests, and doing the physical therapy". Different perspectives were vocalized throughout the interviews as an important addition to the success of recovery and outcomes within SMT and the CR program. Collectively, participants expressed there "isn't a lot of thinking involved in exercising, … you follow a warm-up and cool-down and there isn't a lot of thinking. … SMT made us think". Kyle mentioned the dynamics of SMT helped him understand what caused his problem and what he could do to lengthen his life. Barb expressed that the "body-mind connection is very primal [to success in exercise]". Both Kyle and Barb seemed to graduate from CR with a greater understanding of the way the mind and body work, acknowledging that their health outcomes significantly improved with the addition of SMT in their CR programming.

SMT provided CR programming impact beyond the primary physical component. As such, based on the variety of comments related to *gaining knowledge*, the overall perception of the SMT sessions was positive, useful, and effective.

Perceiving Improved Overall Health

The sub-theme *perceiving improved overall health* refers to anytime a participant reflected on personal health outcomes experienced during the program and post-graduation. For

example, four participants stated that SMT was beneficial in improving and maintaining their physical health. These improvements included the ability to perform activities of daily living and exercise without the worry of adverse consequences on the heart, stating "… I'm probably in better shape now than I was before I had my surgery" and "my heart, it is much better after I finished the [CR] program, and I've been able to maintain an exercise regimen where I'm actually running now". It was expressed by multiple participants that the experiences had within the program continue to influence their daily life, as they now know the "importance of exercise and what living a healthy lifestyle really means". Tim was excited to reveal that "my heart doctor says, he can't do anything for me, you're good … keep on the path you're going on," stating that "the program [CR and SMT] is very important".

When asked if SMT had any influence on their outcome in CR, six participants could not recall anything "earth-shattering" but remembered that getting a grasp on stress and stress management allowed them to "work harder" and "participate fully" within the [CR and SMT] program. It is also important to note that many individuals, although they could not recall the program fully, were reminded how helpful SMT was in getting them to this point and overcoming a very difficult time.

Overall, this subtheme was an overwhelmingly important aspect that led to an increased engagement in the exercise portion of the program. Kyle expressed "I thought the class provided an intellectual rehab or an intellectual improvement … gave me reasons to keep going on, to improve my health … it gave me some understanding. … I have general understanding of good health, but this was more specific, and it was helpful to motivate me". The importance of SMT was emphasized through statements such as 1) "stress had an awful lot to do with it [cardiac event], and SMT helped me recognize it", 2) "[SMT] gave me the ability to recognize it", and 3)

"that [SMT] was a major contributing factor for me [in recovery]". Multiple participants highlighted positive outcomes, lasting results, and memorable experiences had within the program and expressed that SMT should be mandatory for all CR participants.

Coping Strategies

Six participants expressed that they left SMT with range of knowledge of tangible ways to manage stress. Although not all individuals continued to use specific tools identified in SMT, the majority of individuals expressed that coping strategies were and continued to be important in their recovery [from cardiac event] and maintenance. Janice explained, "I learned to see things a little differently. … I know people hear the words meditation and relaxation all the time, but you really don't assign any meaning to it until you actually do some of it. … and I still use some of these today". These skills became an important part of participants' lives, providing them different resources or strategies for dealing with adversities. For example, Janice stated "take it easy, don't be afraid to manage the fear rather than just sit there with it, try to process it and try to work on it" when asked about how she applies her learnings day-to-day.

Beyond understanding the importance of coping strategies as a result of the program, participants learned various means of managing their emotions and finding balance. When stressed, Kyle explains that he would "get out of [his] head and do something physical that helps to relieve some of the stress so you're not thinking about it all the time". In some instances, participants did not apply particular skills, instead opting to find a sense of calm through other means stating, "I use distraction quite a bit and I'm able to calm myself down". Through the program, participants were able to grasp the importance of finding ways to alleviate their stresses. For some participants, this meant finding a physical outlet. Tim explained he would "go

on [his] bike, and go for a walk, and use a speed bag… punch the bag and get rid of the aggravations".

Although many did benefit, it is important to acknowledge that a few individuals struggled with recalling the program [SMT] and when asked to explain the coping strategies learned they stated they "didn't remember anything". As the goal of SMT is to teach individuals how to manage stress and stressful situations, coping strategies are a major area of discussion within the program and unfortunately, leaving the program with a lack of knowledge is an issue. As mentioned by one individual who did not retain any coping strategies, their goal was to just continue on the path they were on stating "ahh not really, just try to not go back to how things were before the heart attack".

These three sub-themes (gaining knowledge, perceiving improved overall health, and coping strategies) emerged as participants repeatedly emphasized the importance of SMT. SMT helped individuals gain a better understanding of their cardiac event, helped them recognize the importance of exercise and mental health to recovery, and showed the value of perceived improvements in health. In addition, it is clear that effective coping strategies are essential for continued mental and physical health management.

The Value of Support

The theme "the value of support" was present in most interviews, whereby participant experiences and outcomes were strongly linked to social influencers and motivators encountered throughout the CR process. Many highlighted the importance of a good support system and having knowledgeable individuals actively participating in their recovery journey. These included mentors (e.g., kinesiologists, nurses, social workers, physicians), peers (e.g., other clients in the program, friends, and families of clients), and external sources (e.g., spouse, family,

co-workers). Participants highlighted the impact that a support system had on their recovery claiming this was “phenomenal” or “extremely powerful”. Recurring sub-themes included *mentor-to-participant* support, *peer-to-peer* support, and *external support*.

Mentor-to-Participant

When reflecting on their interactions, participants noted that the relationships they built with staff members were extremely beneficial and far beyond their expectations. Participants described the mentors associated with the [CR] program as “enlightening, beneficial, and encouraging”. Tim mentioned, “they’re not just there for the paycheck … they genuinely care about the people that come into the program”. This was also clear in Kyle’s experience with staff members stating, “I really thought they were interested in my recovery, they were empathetic, genuine, and knowledgeable”. As Tim explains, the relationships built with staff members provided a feeling of security, stating “from the moment I stepped foot into the program I felt a belonging, a community, a sense of comfort”.

Beyond this, the support given to each participant was unique to the needs of the individual. This was evident when Tim stated, “[they] pushed me when they thought I could do more, the rapport we had was really good”. Furthermore, when asked why a participant decided to take part in SMT, it was mentioned that “[I] was impressed with the program itself, so I figured they’d probably had something to teach me… they gave me some sort of confidence in the program… the influence of those people, I think motivated me to sign up for as many classes as I could”.

Mentor support provided assurance and increased self-confidence in many of these individuals, “I wouldn’t be here today, healthier than ever, if it wasn’t for the kinesiologists I worked within the program” said one participant. Although mentor support was only one topic

discussed during the interviews, it was a main point of discussion for many participants, always referring back to their amazement of not only staff professionalism, but also their kindness, rapport, and knowledge.

Peer-to-Peer

Three participants expressed that the "group component" and the "interaction with other people" in the program were very beneficial and added a level of encouragement to participate fully in the exercise and educational components. Kyle felt supported through group interactions during SMT stating, "it was interesting to talk with and sit with other cardiac patients … there was a good small group component where three or four of us would talk about our experiences. And I found that really enriching".

Peer-to-peer support was also largely relevant in the day-to-day structure of CR programming. Barb mentioned, "when new people came into the class, often they were unaware of just like the really basic stuff with their first day and I would help and that would get me talking to other people". Barb experienced social peer-to peer-support through vicarious experiences as she explained, "[to] see other people who've been through some of the same issues … it's encouraging … look how well they are doing".

Overall, the benefits of peer-to-peer support (e.g., improving one's mood, being more engaged in attending and participating, increased social interaction and social support) were shown to be extremely important for some individuals and provided improved mental health, leading to involvement in SMT and CR. Finding a common ground through which to connect with other members of the program alleviated some of the stress for participants, providing them with the support they needed on top of the support they received outside of the program.

External Support

Although it was not mentioned often, a few participants noted that caregivers were extremely important. These individuals played a role by driving participants to their classes, providing emotional and mental support, and attending classes alongside their loved ones. Kyle states, “my wife came along with me, and we enjoyed the perspective that they had, it was very helpful”.

External support provided by a spouse during SMT sessions allowed for additional encouragement for recovering family members, and an opportunity for the couple to grow and develop together. Janice explains that “there were a lot of variables in just one room, so speaking from my experience, I was able to bring my husband. It was good to have them there with you, and he got something out of the program too. So, it’s good that others can get something from it even though they weren’t there for that purpose”. A few individuals alluded to the idea that being able to have a partner accompany them to SMT allowed for a better opportunity to retain information gathered. For example, if information (from SMT) was forgotten by the participant, the hope was that the spouse could recall the material and guide the participant through a potentially difficult time.

The theme “the value of support” demonstrates the importance that mentors, peers, and external supports have on one’s recovery journey. Many participants highlighted that these different support systems were encouraging and a significant feature in the success and outcomes within the CR program. Mentor-to-participant, peer-to-peer, and external support were explained as providing a sense of calm, a safe place, reassurance, and confidence booster. In addition, it is clear that having a good support system is essential for sustained mental and physical health management.

A Wish for More

The theme "a wish for more" emerged as participants indicated a wish for more flexibility in scheduling to attend [CR and SMT] the program, more proof about the benefits of SMT coping strategies, and more guidance in stressing the importance of attending SMT. The information provided by the participants may significantly improve SMT programming. Three main sub-themes identified were the need for *more flexibility in scheduling, more guidance*, and *more proof*.

More Flexibility in Scheduling

When asked if there were any improvements needed within the CR and SMT sessions five participants expressed the issue of time. Additionally, when asked why individuals failed to complete all 5 sessions, again the barrier of time was paramount. Reflecting on their experiences in SMT, various individuals expressed how difficult they found it to participate in both CR and the educational classes (e.g., SMT). Many participants explained that working a full-time job and finding time in their day to attend CR and educational classes was very challenging.

Two other participants alluded to the same concept, expressing that living a busy life makes participating in CR and SMT to the fullest very difficult. One participant expressed that "I guess the biggest barrier would be just finding time in the schedule and shifting my schedule weekly makes it difficult to attend all the required classes". Additionally, it was mentioned that the latest education class (including stress management, nutrition, medication use, etc.) was held at 5 p.m., making it much harder for some full-time employed individuals to attend. Mark expressed this point by stating "I work construction, so for me 7 a.m. till 5 p.m. I'm tied up". He also discussed the potential that "something in the evening … so I can go home, have dinner, and still have time to attend the class" would be beneficial to increase attendance of many

individuals. There was a concern expressed about having to take more time off work after already being away from work due to their cardiac hospitalization.

Overall, participants wanted to take part in the program and wanted to experience everything that it had to offer. However, finding the time was a challenge for some individuals, forcing them to either miss some of the classes or drop out of the program entirely. Participants expressed a need for more time in the day, or at the very least, a more flexible schedule to allow them the ability to fully commit to the program.

More Proof

A few individuals noticed a need for more proof regarding the content being taught and more evidence on the benefits of SMT. It was expressed that going to the sessions is all "fine and dandy" but to understand the benefits of SMT, how the strategies work, and how they are useful is much more valuable.

One individual mentioned that instead of just gaining introductory knowledge and understanding of how coping strategies work, it would have been more useful to also get "hands-on applied feedback" (e.g., hands-on, physical, and visual learning). He explained that for him "seeing is believing" and seeing the strategies in action would have been helpful. A technique he mentioned was "if someone was physically hooked up to some kind of heart monitor or ECG [electrocardiography] monitor and demonstrated some techniques and showed how effective they were that might be worthwhile". Similar ideas were brought forward by two other participants sharing that providing some form of tangible examples (in the moment feedback) to demonstrate the effectiveness of the program could serve as a powerful tool to promote program attendance and adherence.

This sub-theme portrays a missing element of SMT that participants would have benefitted from both during and after their time in the program. Participants shared their want for more tangible examples and experiences to learn more readily and apply more easily the skills being taught. This sub-theme underlines the importance of appropriate teaching as well as adequate evidence to foster participant buy-in and encourage continued participation.

More Guidance

Most individuals expressed that there was a need for more guidance before enrolling in SMT. Participants noted that they were unaware of the importance of SMT or what the program entailed. Many participants wished that the kinesiologist would have emphasized the benefits of SMT more and would have encouraged them to partake in the program: “I think a valuable change would be if they could stress more the benefits of that stress management program, this may increase the attendance and completion of the program”.

One participant mentioned how new clients are like “scared little rabbits”, thus highlighting the need for more guidance to “ground people” on this important opportunity. Before starting the CR program, itself, it was mentioned that individuals seemed to be unaware of basic first-day procedures including where the bathrooms were, where they can put their bags, and where/how to set up. This provided an unnecessary fear for new clients, that could easily be diminished by the program administrators (e.g., kinesiologists) with a tour of the facilities before the start of the program. Although this was initially mentioned as a negative, it was demonstrated to be an important component of social interactions faced within the program, as it was a time for peer-to-peer mentorship.

The lack of guidance is also seen during the exercise portion of CR, as participants were unaware if and when they could add the use of resistance training into their programming. Barb

explains “I wasn’t sure whether I should be able to use them [weights] at this stage. I think maybe more encouragement for individuals if you’d be able to safely use this now and maybe that would help people to move a little further along in terms of exercise”. For this specific CR program, weights are introduced to a select few who demonstrate an overall ability depending on the cardiac event experienced, MET levels obtained during the initial graded exercise stress test, and previous/current joint and muscle injuries. However, sometimes administrators wait until a participant comes to them with a desire to start resistance training instead of the administrator introducing it to the participant.

There are many benefits and positive aspects of the CR and SMT programs. Improvements such as more flexibility in scheduling, more proof, and more guidance may significantly improve participation, engagement, and attendance rates.

2.7 Discussion

To recap, CR is a comprehensive program that improves QOL, decreases the chance of hospital re-admissions, and reduces cardiac-induced mortality for individuals with CVD.[18] To achieve this, eligible clients generally attend outpatient sessions, consisting of structured exercise training and educational classes (e.g., nutrition, smoking cessation, medication use, and SMT). Concerning the latter, the main goal of SMT is to reduce the demands of stress and increase clients’ coping abilities, where participants learn how to view stress as positive, inevitable, and necessary instead of negative and damaging.[22-24] Despite mounting epidemiological evidence that elevated levels of stress are associated with an increased risk of cardiac events and premature death, SMT is not routinely included in CR.[20] The purpose of the present study was to better understand the impact of SMT within CR programming. Answers to the research questions were as follows:

1) What was the rate of referral to SMT? Are there differences in demographic and clinical characteristics between those individuals referred and those who are not?
    - Less than a quarter of clients were referred to SMT.
    - There were minimal differences in demographic and clinical characteristics, such that individuals who were referred to SMT were younger, had HTN, were more likely to report anxiety/depression at intake, and more likely to have a family history of CVD.
2) What is the rate at which individuals attend SMT? Are there differences in demographic and clinical characteristics between those individuals who were referred to the program and attended SMT versus those who were referred and did not attend SMT?
    - Over 75% of clients attended at least 1 SMT session following referral.
    - Slight differences were seen in demographic and clinical characteristics, such that individuals who attended SMT were more likely to have HTN and dyslipidemia, be retired, and if they had a short-term disability were less likely to attend.
3) Does attending a combination of CR+SMT result in greater clinical benefits compared to CR-alone?
    - Attending the combination of CR+SMT resulted in greater MET improvements versus CR-alone.
4) Is attending more SMT sessions associated with greater clinical benefits?
    - Findings suggested no greater benefits.

Other patterns emerged that advance the literature in several novel and important ways:

1) Of those reporting having anxiety and depression at intake:
    - Less than a quarter were referred to SMT.
    - Encouragingly of those clients with anxiety and depression who were referred to SMT, over half attended at least 1 session.
2) CR+SMT elicits greater improvements in MET levels than CR-alone.
3) Individuals participating in SMT were able to:
    - Develop and sustain a healthier lifestyle long after completion of the structured CR program.
    - Better understand the importance of a valued support system in their recovery.
4) Suggestions for future programming:
    - Provide more flexible scheduling for SMT sessions to increase uptake and completion.
    - Include more comprehensive and tangible information at intake about SMT as standard knowledge translation within the program.
    - Continually emphasize the importance of SMT to motivate more individuals to enroll and participate in the structured SMT programming.

Taken together the emergent findings highlight the promising clinical benefit of SMT, its encouraging influence on overall wellness, and provides insight into how future programming could be improved. These findings will be discussed in detail below.

Improvements Needed in the Stress Management Training Referral and Uptake

Despite the Canadian Cardiovascular Society's CR referral target of 85%, considerably fewer individuals are actually referred to CR.[32] In the present study, referral to SMT echoes this

trend. For example, of the 1184 individuals who attended CR, only 20% were referred to SMT. Encouragingly, there was a 76% retention rate of individuals who attended SMT following referral. Importantly, of those individuals who reported having anxiety and depression at intake, only 5% were referred to the program. Despite SMT being available, targeted towards individuals with anxiety and depression, and important for all CR individuals, the majority were white/Caucasian males who graduated high school, university, or college, were married, and retired. Language barriers, lack of communication (e.g., nervous, shy, quiet), and/or a pre-determined bias may have caused a decrease in referral and attendance to SMT.

Unfortunately, as seen in this study there is still a gap in the referral process to SMT even with individuals answering yes to having anxiety and depression at intake. As noted above, only 5% of individuals who reported having anxiety and depression were referred to SMT. This is problematic as it has been previously reported that 15% to 30% of those with CVD have clinical depression, with even higher percentages (40%) in individuals following an acute MI, demonstrating SMT importance.[33] This prevalence has been shown to be much greater in women and despite these statistics, women are still getting referred to CR and SMT at a lower rate than men.[33] A correlation has been seen between depression and non-adherence to prescribed medication, healthcare provider recommendations in clinical management, and health promoting practices.[33] In addition, the majority of individuals who attended SMT failed to complete all 5 sessions, with only 10% having full attendance. This along with the patterns seen in demographic characteristics, demonstrate the need for implementing strategies to encourage referral and participation of a diverse population (e.g., women, ethnocultural minorities, broad occupational status, and those with underlying mental health issues).

Previous studies focusing on enrolment and adherence to CR have provided the following suggestions for successful improvements, which may be important for both CR and SMT referral, attendance, and adherence within the current CR program. These include structured healthcare provider-led contacts, earlier CR appointments after discharge, motivational letters, gender-specific programs, self-monitoring of activity, action planning, tailored counselling by CR staff, and automatic referral.[32] Although all of these potential strategies may offer solutions for SMT uptake, automatic referral for all individuals at intake or having targeted automatic referral for those citing anxiety and depression, is particularly promising.

Positive Clinical Effects of a Combined Cardiac Rehabilitation and Stress Management Training Structure

Several benefits have been reported for individuals who complete a combination of CR+SMT. Previous randomized control trials have demonstrated that CR+SMT improves resting systolic BP, distress, and depression, and significantly reduces mortality rates by 54% for up to two years.[21,35] Additionally, it has been shown that both CR-alone and CR+SMT contribute to improved exercise capacity and patient-reported physical functioning.[36] Following standard CR programming, participants typically exhibit an increase of 1.6 METs.[37] Notably, in this study, individuals who participated in a combination of CR+SMT exhibited a 1.5-fold MET increase compared to that mentioned above and a 1-fold increase compared to individuals in the CR-alone group. Of note, the current work extends these findings by demonstrating that individuals in the CR+SMT group experienced significantly greater improvements in exercise capacity (measured as METs during a graded-exercise stress test) than those participating in CR-alone. These collective findings are important as METs are a major independent predictor for all-cause mortality in individuals with CVD, and even small increases in fitness are associated with

improved symptoms of depression and stress and augmented functional independence.[37] Importantly, with each 1-MET increase or an overall 8 to 10 MET post- CR level, there is a significant reduction in re-hospitalization and mortality.[36-38] The MET levels reported at intake for this present study were as follows: 6.19 METs for CR-alone and 6.83 METs for CR+SMT. Upon graduation, both groups elevated their MET levels into that 8 to 10 MET range. These findings potentially reduce the risk for death and disability across participants and speak to the enhanced benefit of SMT. However, it is important to note that it is unclear whether or not the positive improvements found it MET levels were the result of the combination of CR+SMT or if it was due to day-to-day error when performing a GXT and/or measuring METs.[39] There is evidence to suggest that age, weight, and gender, specifically in those who are older, overweight, and who are female, may cause inaccurate estimates of METs.[39] Despite the potential error, it is still encouraging that participants who underwent SMT demonstrated clinical improvements over and above CR-alone, while also providing qualitative insight into the benefits of SMT that extended the objective, quantitative evidence described above.

Fostered the Ability to Sustain a Healthier Lifestyle

Previous work in this area shows that participants had positive perceptions about participating in comprehensive CR.[40] Importantly, the current study findings support this but also demonstrate that the addition of SMT promotes improvements in both health and knowledge, perceived health benefits, and the development of coping strategies. It is possible that SMT provided an opportunity for participants to think about something other than exercise, blood work, and their physical recovery. It provided a platform for them to learn how to manage stress, by acquiring and practicing coping strategies and techniques, socializing with peers and mentors, and understanding the importance of the body-mind connection. With a better understanding of

the importance of a healthy recovery, many individuals were able to better develop their mental health skills and physical activity levels, focusing on their overall journey and necessary behavioural modifications. This is particularly noteworthy as it demonstrates the significance of SMT, providing individuals with the necessary knowledge needed to participate fully in the exercise portion of CR with confidence and without supervision. This allowed for many positive experiences within the program, as participants expressed their perceived health improvements beyond the quantitative improvements (e.g., MET improvements, as mentioned in section 2.4). As previously noted, CR+SMT was shown to be a major factor for tangible improvements in participants' health and well-being, demonstrating its overall importance.[20,22,40,41]

Tying this back to the positive effects on MET levels, it is possible that SMT significantly influenced these improvements, by providing an opportunity for individuals to gain the knowledge and understanding of the importance of physical activity and mental health. When participants reflected on their experiences in SMT, they described it as a tool that helped them improve their intellectual, psychological, and perceived physical functioning. Participants used words like "work harder", "participate fully", and "stay motivated", when describing the effects SMT had on their participation in the exercise portion of the program. SMT gave them the ability to recognize their physical, behavioural, and emotional limitations and demonstrated the importance of behavioural and lifestyle modifications. Additionally, participants were able to understand and gain personal control over their treatment ("I thought it would be something that would be another thing I could get a handle on"), becoming an active member in their recovery. In addition to benefits within the program, it appears that SMT had important influences on the participants post-graduation. Evidence suggests that adherence to exercise decreases once an individual has graduated from CR.[38] In the current work, participants reflected on the role SMT

played in their ability to maintain an exercise regimen long after completion of the CR program, as reflected in the statement, “I’m probably in better shape now, because of what I learned at the program”.

With the respect to psychological functioning, SMT appeared to have an important influence as well. Participants expressed how their mental health impacted their cardiac event and vice versa, in many instances, without their knowledge. Participants discussed the significant impact SMT played and described SMT as a key aspect in helping them realize the importance of a healthy recovery, including mental well-being. These findings complement the work by Turner et al. 2017, where participants expressed the significant emotional impact their cardiac event had on them and described the importance of psychological support offered by attending SMT.[41] These observations are particularly important given the challenge of participation, adherence, and early dropout rates in early CR programming. SMT allowed participants in the current study to understand the importance and applicability of psychological management and helped them to incorporate this into their physical recovery and daily life.

When reflecting on coping strategies learned while in the program, both positive and negative revelations were reported. As a positive aspect of the SMT program, participants described coping strategies as techniques used during stressful situations. For participants who continued to use these strategies, they explained them to be an important aspect of their recovery. Unfortunately, some individuals could not recall any strategies learned during SMT, identifying a gap or problem within SMT programming and delivery. First, this may be due to a limited number of individuals finishing all 5 SMT sessions, therefore missing valuable information in the latter sessions. Second, this demonstrates a potential issue with the delivery of the program. Those who learned and continue to use these coping strategies believe it helped improve their

adherence to the program and has benefitted them long after graduation. Thus, the lack of recall for some participants highlights a potential area for improvement in SMT delivery.

The Gained Value of Support

The benefits of a supportive multidisciplinary CR team and fellow CR peers have been repeatedly demonstrated,[37,38,40] and the current findings add additional support. For example, this was evident in the following quote from a participant in the current study: "they gave me some sort of confidence in the program … the influence of these people I think motivated me". The encouragement and guidance provided to individuals to work harder and translate the knowledge learned into action seemed very important to these participants. This type of support has been shown to empower individuals with a sense of control over their health and has been identified as influential in determining attendance rates.[36,42] It is important to note that a lack of social support is associated with an increase in cardiovascular risk.[37,38]

Mentorship by program administrators was described as "enlightening", "beneficial", and "encouraging". The multidisciplinary team and CR participants work closely together for 6-months and built a positive rapport. During the interviews, participants mentioned that the relationships they built with staff members were extremely beneficial and far beyond their expectations. Additionally, it was mentioned that "they're not just there for the paycheck, they genuinely care" and "really thought they were interested in my recovery". This is important to note as the multidisciplinary team was able to enhance the CR environment allowing individuals to feel a sense of belonging, community, and comfort. Physical activity in public spaces presents many challenges, especially for women and individuals with mental health issues, as participation rates and intensity levels are largely related to comfort levels.[41] Those who feel comfortable in a space are more likely to engage in physical activity at a much higher rate and

with more intensity, as well they are more willing to try new things (e.g., equipment, movements).[40] Thus, the improvements seen in this current study for MET levels may have been influenced by the support and environment created by the CR multidisciplinary team.

Peer-to-peer support also seemed important for this group as it provided an insider perspective and represented someone relatable. Previous work has suggested the importance peer support plays for those with CVD, as it is common for family and friends to show a lack of understanding of recovery needs, experiences, and unique challenges.[42] CR participants may more readily identify with fellow peers rather than health professionals as the support they provide may be considered more relatable, efficient, and accessible. Answers to questions or concerns, addressing uncertainty about the program and/or recovery are examples of how a peer support person could help. In addition, as many individuals participating in SMT were either retired or on leave from work (Refer to Component 1 results for a demographic overview), having social support from fellow peers may be more meaningful. For example, it could supplement a level of social interaction that may be missing from their usual occupational environment. Although not all participants explicitly identified peer-to-peer support experiences, the benefit of this camaraderie was worth noting. Bringing peers together in CR is a beneficial opportunity for participants to connect and learn together.

Additionally, the involvement of partners in the rehabilitation process is a crucial factor in CR effectiveness.[43,44] The support offered by external sources, whether it be a spouse, family member, or friend, can continuously provide an extra motivator throughout the course of recovery, which extends beyond graduation. Murdaugh et al. (1988) found that social support, particularly from a spouse, allows for lifestyle changes and the recovery period following a cardiac event to occur at a more successful rate.[44] Many individuals brought partners, including

spouses, along to SMT, which likely influenced participation and offered a second perspective on recovery, coping strategies, and skill development. Participation in SMT also benefits relationships with spouses, family members, and friends.[38] With various physical, emotional, and financial difficulties that may occur following a cardiac event, participants, partners, and family members may experience a reduction in QOL and may require support themselves.[38] Ensuring partners/spouses/caregivers are knowledgeable, engaged, and well supported may also be an important strategy in CVD recovery. This support is increasingly important as it provides an opportunity for participants to grow and continue to learn outside of the program and allows family members to develop together. The support provided external to the program, though only identified by a few participants, represents an interesting point of discussion and potential development going forward with CR+SMT programming.

These findings demonstrate the importance of a good support system, whether it be with mentors, fellow peers, or partners. Based on participant feedback, support systems played a valuable role in their success in and after the program and their overall recovery.

Suggestions to Maximize the Impact of Stress Management Training

Participants provided tangible strategies for increasing SMT uptake and attendance, specifically related to including more flexible scheduling for SMT sessions and communicating the importance of SMT. Time is a well-known barrier to exercise, where perceived barriers, including work/time conflicts, are associated with non-enrollment and lower attendance rates.[43] Many individuals discussed the difficulties they had when trying to incorporate SMT classes into their schedule, and it was clear that time was the prominent barrier to participation. With the SMT classes generally occurring between 9 a.m. to 5 p.m. there was not a lot of flexibility for participants to balance the program with the demands of their work lives. Moving forward

program administrators may want to work with participants to create a more flexible SMT schedule. MET Variability having issue finding a good quality source and if he could direct me to an appropriate support

In this study, it was expressed that participants would have appreciated more evidence of and emphasis on the effectiveness and applicability of SMT (e.g., how the coping strategies work). Some individuals mentioned that "seeing is believing" and requested more hands-on applied feedback when being taught these strategies. With this request, the participants explained that this would allow them to grasp and retain the program content more vividly. It is an important strategy to consider as it may provide participants with more tangible knowledge of the impact of SMT, a further understanding of how the techniques work, and the ability to recall SMT strategies after graduation. Additionally, participants noted that they were often unaware of the advantages of SMT, revealing that they did not have a full understanding of what types of benefits they could gain from attending the program. Providing a clearer rationale, identifying the key elements, and explaining the program components at the beginning of CR could encourage more participants to engage in the training. This lack of guidance may also be linked to a lack of confidence seen in individuals as they begin their journey in the program. For example, many participants were unaware of basic first-day procedures and were self-described as "scared little rabbits" when entering the program. Self-efficacy (i.e., people's judgement of their capabilities necessary to achieve success) has been discussed as a characteristic seen in individuals who succeed in and complete CR, as it is an additional predictor of successful behaviour change.[45,46] A study by Blumenthal et al. (2016) eluded to the idea that similar to exercise which does not target only patients with low levels of physical fitness, SMT could be beneficial for all cardiac patients.[20] With this in mind, program administrators should consider

increasing the emphasis on the importance of SMT at intake and during early CR programming, by providing more details about the training and clearly communicating why all CR participants could benefit from attending all SMT sessions. Taken together, these strategies may encourage more individuals to engage in and complete SMT programming.

2.8 Limitations and Future Directions

The current research provided valuable insight into the benefits of including SMT in CR using a quantitative and qualitative approach, however, there are a few limitations to note. First, for component 1 (quantitative), the demographic homogeneity of referred (to SMT) individuals and also with the entire sample, could potentially have influenced the findings. Although a possible strength of the study, both groups consisted of more men than women, had a mean age of 64.5 years, were mostly Caucasian, retired, married, living with spouses or partners, and completed high school, university, or college. This is important for a few reasons. First, the findings may not be generalizable beyond the current population. Second, in line with previous work in the field, [20-23] the similar demographic characteristics raise the question of why a more diverse population of individuals are not getting referred to the program. These findings highlight the importance of replicating the current work in a large and diverse sample, while also confirming the need for targeted recruitment and SMT participation strategies.

With respect to the quantitative section, it is important to address the aspect of missing data. Data was tracked for administrative purposes, not research, which may explain non-responses and input error. Missing data within the current study contributed to a lower sample size, however, it is important to recognize that the majority of outcome variables did not exceed 30% with respect to omitted data. This is important as 90% of studies in the field across a 3-year period had an average amount of missingness that exceeded 30%.[47] Anxiety/depression was the

only item for the referred individuals which surpasses 30%, with 42% of missing data. Additionally, is it important to note that because missing data was only present for anxiety/ depression within the referred cohort and not the attended cohort, there may be a systemic bias towards assessing anxiety/depression for those referred to SMT. This could indicate that there is information collected at intake that triggers this assessment for certain individuals and not others. Although the beneficial observations noted above can be considered a strength with respect to anxiety/depression (Refer to section 2.4, pg. 49), as a significant result was observed with this smaller sample, this amount of missingness should not have a big impact on statistical power.[47] Having said that it, the observations can be spurious and needs to be replicated in a prospective study with a robust sample.

In addition to missing data, there were several other limitations to note for component 2 (qualitative). Firstly, psychological questionnaires were not required prior to or on completion of SMT. This form of assessment could demonstrate the positive benefits of the program, providing more encouragement for others to participate. Additionally, the information gathered from a psychological questionnaire could have been helpful in the evaluation of the effect of SMT, while providing additional information to strengthen the findings of the current study and the importance of participating in SMT programming. Secondly, although data saturation was reached and considered a study strength, the delivery method of the interview and the time frame for program participation may have promoted a bias sample. The length of the interview made it difficult for individuals working or for those with extra-curricular activities to participate. Many individuals also indicated that they did not want to participate because they could not remember the details for the training as it had been so long ago. Additionally, in terms of difficulty with program recall, many participants also found it difficult to distinguish the difference between

SMT and the mandatory stress and coping educational class provided by the CR program (Refer to fig. 3). To differentiate between the two, the researcher provided clear details about the differences between the mandatory class (which was simply knowledge sharing) and SMT (which was an outlined program of training over multiple sessions). The researcher received confirmation from the participant that they understand which class is being discussed during the interviews. Despite this is possible that participants provided answers regarding SMT that were in fact from knowledge gained during the mandatory stress and coping class. With this in mind, it may be important for future studies to conduct interviews immediately following the completion of SMT.

Taken together, future work should include a large, randomized control trial using a dual in-person quantitative and qualitative approach to address these limitations.

2.9 Conclusion

Using a unique approach that combined quantitative and qualitative methods to evaluate the impact of including SMT in CR programming, the findings of the current study demonstrate clear benefits. This work provides a platform for a future randomized controlled trial across diverse populations to replicate and expand upon the findings. Minimizing the CVD burden through effective CR programming is essential. If successful, the widespread inclusion of SMT as part of standard CR offers much promise.

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Appendices

Appendix A*:* Study Data Dictionary

Data fields that were extracted from Cardiologica.

Participant and Clinical Characteristics

- Client Name
- Client telephone number

- Personal information (will be stored in a master client list for those who were referred to SMT)
    - Client Name
    - Client telephone number
- Demographic Characteristics
    - Age
    - Gender (male/female)
    - Ethnicity
    - Education level
    - Marital status
    - Occupational status
    - Living situation
- Clinical Characteristics
    - Referral type (e.g., myocardial infarction, coronary artery disease, etc.)
    - CVD risk factors at intake (e.g., hypertension, hyperlipidemia, diabetes, psychological factors)

Program Related Variables

- Intake and discharge dates
- Number of classes attended (CR and SMT)

CR Outcome Measures

- METs
- Blood lipid profile (e.g., low-density lipoprotein, non-high-density lipoprotein, triglycerides, high-density lipoprotein)

Appendix B: SPSS Outputs for Research Question 1

Independent Samples T-Test for Age

Group Statistics

	Referredvsnot	N	Mean	Std. Deviation	Std. Error Mean
p_age	0	947	65.994076029567010	10.901848489735864	.354262475094290
	1	237	64.240126582278490	10.433999082246260	.677761072273954

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
p_age	Equal variances assumed	.026	1.753949447288520	.785153527222212	.213499422910260
	Equal variances not assumed	.022	1.753949447288520	.764762690218261	.250196283819123

Chi-Squared Test of Independence for Sex

Crosstab

			Referredvsnot		
			0	1	Total
p_sex	0	Count	1_a	0_a	1
		% within p_sex	100.0%	0.0%	100.0%
		% within Referredvsnot	0.1%	0.0%	0.1%
		Adjusted Residual	.5	-.5	
	1	Count	686_a	157_b	843
		% within p_sex	81.4%	18.6%	100.0%
		% within Referredvsnot	75.6%	68.9%	74.3%
		Adjusted Residual	2.1	-2.1	
	2	Count	220_a	71_b	291
		% within p_sex	75.6%	24.4%	100.0%
		% within Referredvsnot	24.3%	31.1%	25.6%
		Adjusted Residual	-2.1	2.1	
Total		Count	907	228	1135
		% within p_sex	79.9%	20.1%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.745[a]	2	.093
Likelihood Ratio	4.802	2	.091
Linear-by-Linear Association	4.639	1	.031
N of Valid Cases	1135		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .20.

Chi-Squared Test of Independence for Ethnicity

Crosstab

			Referredvsnot		
			0	1	Total
h_ethnic_group	1	Count	3_a	1_a	4
		% within h_ethnic_group	75.0%	25.0%	100.0%
		% within Referredvsnot	0.4%	0.5%	0.4%
		Adjusted Residual	-.2	.2	
	2	Count	0_a	1_a	1
		% within h_ethnic_group	0.0%	100.0%	100.0%
		% within Referredvsnot	0.0%	0.5%	0.1%
		Adjusted Residual	-2.0	2.0	
	3	Count	1_a	0_a	1
		% within h_ethnic_group	100.0%	0.0%	100.0%
		% within Referredvsnot	0.1%	0.0%	0.1%
		Adjusted Residual	.5	-.5	
	4	Count	26_a	3_a	29
		% within h_ethnic_group	89.7%	10.3%	100.0%
		% within Referredvsnot	3.2%	1.4%	2.8%
		Adjusted Residual	1.4	-1.4	
	5	Count	15_a	1_a	16
		% within h_ethnic_group	93.8%	6.3%	100.0%
		% within Referredvsnot	1.8%	0.5%	1.6%
		Adjusted Residual	1.4	-1.4	
	6	Count	7_a	1_a	8
		% within h_ethnic_group	87.5%	12.5%	100.0%
		% within Referredvsnot	0.9%	0.5%	0.8%
		Adjusted Residual	.6	-.6	
	7	Count	3_a	1_a	4
		% within h_ethnic_group	75.0%	25.0%	100.0%
		% within Referredvsnot	0.4%	0.5%	0.4%
		Adjusted Residual	-.2	.2	
	9	Count	0_a	1_a	1

		% within h_ethnic_group	0.0%	100.0%	100.0%
		% within Referredvsnot	0.0%	0.5%	0.1%
		Adjusted Residual	-2.0	2.0	
	10	Count	1_a	2_b	3
		% within h_ethnic_group	33.3%	66.7%	100.0%
		% within Referredvsnot	0.1%	0.9%	0.3%
		Adjusted Residual	-2.0	2.0	
	11	Count	6_a	2_a	8
		% within h_ethnic_group	75.0%	25.0%	100.0%
		% within Referredvsnot	0.7%	0.9%	0.8%
		Adjusted Residual	-.3	.3	
	12	Count	8_a	1_a	9
		% within h_ethnic_group	88.9%	11.1%	100.0%
		% within Referredvsnot	1.0%	0.5%	0.9%
		Adjusted Residual	.7	-.7	
	13	Count	742_a	199_a	941
		% within h_ethnic_group	78.9%	21.1%	100.0%
		% within Referredvsnot	91.4%	93.4%	91.8%
		Adjusted Residual	-1.0	1.0	
Total		Count	812	213	1025
		% within h_ethnic_group	79.2%	20.8%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.789[a]	11	.114
Likelihood Ratio	15.789	11	.149
Linear-by-Linear Association	1.543	1	.214
N of Valid Cases	1025		

a. 16 cells (66.7%) have expected count less than 5. The minimum expected count is .21.

Chi-Squared Test of Independence for Education

Crosstab

			Referredvsnot		
			0	1	Total
h_education	1	Count	1[a]	0[a]	1
		% within h_education	100.0%	0.0%	100.0%
		% within Referredvsnot	0.1%	0.0%	0.1%
		Adjusted Residual	.5	-.5	
	2	Count	1[a]	0[a]	1
		% within h_education	100.0%	0.0%	100.0%
		% within Referredvsnot	0.1%	0.0%	0.1%
		Adjusted Residual	.5	-.5	
	3	Count	3[a]	0[a]	3
		% within h_education	100.0%	0.0%	100.0%
		% within Referredvsnot	0.4%	0.0%	0.3%
		Adjusted Residual	.9	-.9	
	4	Count	14[a]	1[a]	15
		% within h_education	93.3%	6.7%	100.0%
		% within Referredvsnot	1.7%	0.5%	1.5%
		Adjusted Residual	1.3	-1.3	
	5	Count	43[a]	6[a]	49
		% within h_education	87.8%	12.2%	100.0%
		% within Referredvsnot	5.3%	2.9%	4.8%
		Adjusted Residual	1.4	-1.4	
	6	Count	377[a]	81[a]	458
		% within h_education	82.3%	17.7%	100.0%
		% within Referredvsnot	46.4%	38.9%	44.9%
		Adjusted Residual	1.9	-1.9	
	7	Count	4[a]	0[a]	4
		% within h_education	100.0%	0.0%	100.0%
		% within Referredvsnot	0.5%	0.0%	0.4%
		Adjusted Residual	1.0	-1.0	
	8	Count	70[a]	16[a]	86
		% within h_education	81.4%	18.6%	100.0%
		% within Referredvsnot	8.6%	7.7%	8.4%
		Adjusted Residual	.4	-.4	
	9	Count	17[a]	10[b]	27

		% within h_education	63.0%	37.0%	100.0%
		% within Referredvsnot	2.1%	4.8%	2.6%
		Adjusted Residual	-2.2	2.2	
	10	Count	255$_a$	84$_b$	339
		% within h_education	75.2%	24.8%	100.0%
		% within Referredvsnot	31.4%	40.4%	33.2%
		Adjusted Residual	-2.5	2.5	
	11	Count	28$_a$	10$_a$	38
		% within h_education	73.7%	26.3%	100.0%
		% within Referredvsnot	3.4%	4.8%	3.7%
		Adjusted Residual	-.9	.9	
Total		Count	813	208	1021
		% within h_education	79.6%	20.4%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.746[a]	10	.059
Likelihood Ratio	19.451	10	.035
Linear-by-Linear Association	12.266	1	.000
N of Valid Cases	1021		

a. 9 cells (40.9%) have expected count less than 5. The minimum expected count is .20.

Chi-Squared Test of Independence for Living Situation

Crosstab

			Referredvsnot		
			0	1	To
h_living_situation	3	Count	133$_a$	29$_a$	
		% within h_living_situation	82.1%	17.9%	1
		% within Referredvsnot	15.9%	12.8%	
		Adjusted Residual	1.1	-1.1	
	4	Count	645$_a$	171$_a$	
		% within h_living_situation	79.0%	21.0%	1
		% within Referredvsnot	77.2%	75.7%	
		Adjusted Residual	.5	-.5	
	5	Count	26$_a$	15$_b$	
		% within h_living_situation	63.4%	36.6%	1
		% within Referredvsnot	3.1%	6.6%	
		Adjusted Residual	-2.4	2.4	
	6	Count	2$_a$	1$_a$	
		% within h_living_situation	66.7%	33.3%	1
		% within Referredvsnot	0.2%	0.4%	
		Adjusted Residual	-.5	.5	
	7	Count	29$_a$	10$_a$	
		% within h_living_situation	74.4%	25.6%	1
		% within Referredvsnot	3.5%	4.4%	
		Adjusted Residual	-.7	.7	
Total		Count	835	226	
		% within h_living_situation	78.7%	21.3%	1
		% within Referredvsnot	100.0%	100.0%	1

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.586[a]	4	.108
Likelihood Ratio	6.871	4	.143
Linear-by-Linear Association	3.252	1	.071
N of Valid Cases	1061		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is .64.

Chi-Squared Test of Independence for Marital Status

Crosstab

			Referredvsnot	
			0	1
h_marital_status	1	Count	66[a]	23
		% within h_marital_status	74.2%	25.8%
		% within Referredvsnot	8.0%	10.3%
		Adjusted Residual	-1.1	1.1
	2	Count	620[a]	163
		% within h_marital_status	79.2%	20.8%
		% within Referredvsnot	75.6%	73.1%
		Adjusted Residual	.8	-.8
	3	Count	49[a]	14
		% within h_marital_status	77.8%	22.2%
		% within Referredvsnot	6.0%	6.3%
		Adjusted Residual	-.2	.2
	4	Count	49[a]	10
		% within h_marital_status	83.1%	16.9%
		% within Referredvsnot	6.0%	4.5%
		Adjusted Residual	.9	-.9
	5	Count	24[a]	9
		% within h_marital_status	72.7%	27.3%
		% within Referredvsnot	2.9%	4.0%
		Adjusted Residual	-.8	.8
	6	Count	12[a]	4
		% within h_marital_status	75.0%	25.0%
		% within Referredvsnot	1.5%	1.8%
		Adjusted Residual	-.4	.4
Total		Count	820	223
		% within h_marital_status	78.6%	21.4%
		% within Referredvsnot	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.724[a]	5	.742
Likelihood Ratio	2.672	5	.750
Linear-by-Linear Association	.002	1	.966
N of Valid Cases	1043		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 3.42.

Chi-Squared Test of Independence for Occupational Status

Crosstab

			Referredvsnot		
			0	1	Total
h_occupational_status	1	Count	1[a]	1[a]	2
		% within h_occupational_status	50.0%	50.0%	100.0%
		% within Referredvsnot	0.1%	0.4%	0.2%
		Adjusted Residual	-1.0	1.0	
	3	Count	192[a]	49[a]	241
		% within h_occupational_status	79.7%	20.3%	100.0%
		% within Referredvsnot	23.1%	21.8%	22.8%
		Adjusted Residual	.4	-.4	
	4	Count	49[a]	18[a]	67
		% within h_occupational_status	73.1%	26.9%	100.0%
		% within Referredvsnot	5.9%	8.0%	6.3%
		Adjusted Residual	-1.2	1.2	
	5	Count	29[a]	5[a]	34
		% within h_occupational_status	85.3%	14.7%	100.0%
		% within Referredvsnot	3.5%	2.2%	3.2%
		Adjusted Residual	1.0	-1.0	
	6	Count	464[a]	113[a]	577
		% within h_occupational_status	80.4%	19.6%	100.0%
		% within Referredvsnot	55.8%	50.2%	54.6%
		Adjusted Residual	1.5	-1.5	
	7	Count	5[a]	2[a]	7
		% within h_occupational_status	71.4%	28.6%	100.0%
		% within Referredvsnot	0.6%	0.9%	0.7%
		Adjusted Residual	-.5	.5	
	8	Count	51[a]	23[b]	74
		% within h_occupational_status	68.9%	31.1%	100.0%

		% within Referredvsnot	6.1%	10.2%	7.0%
		Adjusted Residual	-2.1	2.1	
	9	Count	41$_a$	14$_a$	55
		% within h_occupational_status	74.5%	25.5%	100.0%
		% within Referredvsnot	4.9%	6.2%	5.2%
		Adjusted Residual	-.8	.8	
Total		Count	832	225	1057
		% within h_occupational_status	78.7%	21.3%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.266[a]	7	.234
Likelihood Ratio	8.695	7	.275
Linear-by-Linear Association	.850	1	.357
N of Valid Cases	1057		

a. 3 cells (18.8%) have expected count less than 5. The minimum expected count is .43.

Chi-Squared Test of Independence for Referral Type

Crosstab

			Referredvsnot		
			0	1	Total
ref_event	1	Count	65[a]	18[a]	8
		% within ref_event	78.3%	21.7%	100.0%
		% within Referredvsnot	9.1%	9.1%	9.1%
		Adjusted Residual	.0	.0	
	2	Count	2[a]	2[a]	
		% within ref_event	50.0%	50.0%	100.0%
		% within Referredvsnot	0.3%	1.0%	0.4%
		Adjusted Residual	-1.4	1.4	
	3	Count	26[a]	7[a]	3
		% within ref_event	78.8%	21.2%	100.0%
		% within Referredvsnot	3.6%	3.6%	3.6%
		Adjusted Residual	.1	-.1	
	4	Count	8[a]	1[a]	
		% within ref_event	88.9%	11.1%	100.0%
		% within Referredvsnot	1.1%	0.5%	1.0%
		Adjusted Residual	.8	-.8	
	5	Count	61[a]	14[a]	7
		% within ref_event	81.3%	18.7%	100.0%
		% within Referredvsnot	8.5%	7.1%	8.2%
		Adjusted Residual	.6	-.6	
	6	Count	7[a]	1[a]	
		% within ref_event	87.5%	12.5%	100.0%
		% within Referredvsnot	1.0%	0.5%	0.9%
		Adjusted Residual	.6	-.6	
	7	Count	362[a]	88[a]	45
		% within ref_event	80.4%	19.6%	100.0%
		% within Referredvsnot	50.6%	44.7%	49.3%
		Adjusted Residual	1.5	-1.5	
	8	Count	7[a]	3[a]	1
		% within ref_event	70.0%	30.0%	100.0%
		% within Referredvsnot	1.0%	1.5%	1.1%
		Adjusted Residual	-.6	.6	
	9	Count	0[a]	1[a]	

		% within ref_event	0.0%	100.0%	100.0%
		% within Referredvsnot	0.0%	0.5%	0.1%
		Adjusted Residual	-1.9	1.9	
	10	Count	18_a	6_a	24
		% within ref_event	75.0%	25.0%	100.0%
		% within Referredvsnot	2.5%	3.0%	2.6%
		Adjusted Residual	-.4	.4	
	11	Count	149_a	48_a	197
		% within ref_event	75.6%	24.4%	100.0%
		% within Referredvsnot	20.8%	24.4%	21.6%
		Adjusted Residual	-1.1	1.1	
	12	Count	2_a	0_a	2
		% within ref_event	100.0%	0.0%	100.0%
		% within Referredvsnot	0.3%	0.0%	0.2%
		Adjusted Residual	.7	-.7	
	13	Count	2_a	1_a	3
		% within ref_event	66.7%	33.3%	100.0%
		% within Referredvsnot	0.3%	0.5%	0.3%
		Adjusted Residual	-.5	.5	
	14	Count	6_a	7_b	13
		% within ref_event	46.2%	53.8%	100.0%
		% within Referredvsnot	0.8%	3.6%	1.4%
		Adjusted Residual	-2.8	2.8	
Total		Count	715	197	912
		% within ref_event	78.4%	21.6%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.253[a]	13	.148
Likelihood Ratio	16.311	13	.233
Linear-by-Linear Association	2.459	1	.117
N of Valid Cases	912		

a. 12 cells (42.9%) have expected count less than 5. The minimum expected count is .22.

Chi-Squared Test of Independence for Diabetes

Crosstab

			Referredvsnot		
			0	1	Total
h_diabetes	0	Count	682[a]	179[a]	861
		% within h_diabetes	79.2%	20.8%	100.0%
		% within Referredvsnot	72.0%	75.5%	72.7%
		Adjusted Residual	-1.1	1.1	
	1	Count	265[a]	58[a]	323
		% within h_diabetes	82.0%	18.0%	100.0%
		% within Referredvsnot	28.0%	24.5%	27.3%
		Adjusted Residual	1.1	-1.1	
Total		Count	947	237	1184
		% within h_diabetes	80.0%	20.0%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.178[a]	1	.278		
Continuity Correction[b]	1.007	1	.316		
Likelihood Ratio	1.198	1	.274		
Fisher's Exact Test				.290	.158
Linear-by-Linear Association	1.177	1	.278		
N of Valid Cases	1184				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 64.65.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Hypertension

Crosstab

			Referredvsnot		
			0	1	Total
h_hypertension	0	Count	381[a]	79[a]	460
		% within h_hypertension	82.8%	17.2%	100.0%
		% within Referredvsnot	40.2%	33.3%	38.9%
		Adjusted Residual	1.9	-1.9	
	1	Count	566[a]	157[a]	723
		% within h_hypertension	78.3%	21.7%	100.0%
		% within Referredvsnot	59.8%	66.2%	61.1%
		Adjusted Residual	-1.8	1.8	
	2	Count	0[a]	1[b]	1
		% within h_hypertension	0.0%	100.0%	100.0%
		% within Referredvsnot	0.0%	0.4%	0.1%
		Adjusted Residual	-2.0	2.0	
Total		Count	947	237	1184
		% within h_hypertension	80.0%	20.0%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.620[a]	2	.022
Likelihood Ratio	6.905	2	.032
Linear-by-Linear Association	4.246	1	.039
N of Valid Cases	1184		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .20.

Chi-Squared Test of Independence for Dyslipidemia

Crosstab

			Referredvsnot		
			0	1	Total
h_dyslipidemia	0	Count	351$_a$	76$_a$	427
		% within h_dyslipidemia	82.2%	17.8%	100.0%
		% within Referredvsnot	37.1%	32.1%	36.1%
		Adjusted Residual	1.4	-1.4	
	1	Count	596$_a$	161$_a$	757
		% within h_dyslipidemia	78.7%	21.3%	100.0%
		% within Referredvsnot	62.9%	67.9%	63.9%
		Adjusted Residual	-1.4	1.4	
Total		Count	947	237	1184
		% within h_dyslipidemia	80.0%	20.0%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.053[a]	1	.152		
Continuity Correction[b]	1.842	1	.175		
Likelihood Ratio	2.080	1	.149		
Fisher's Exact Test				.173	.087
Linear-by-Linear Association	2.051	1	.152		
N of Valid Cases	1184				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 85.47.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Anxiety/Depression

Crosstab

			Referredvsnot		
			0	1	Total
h_anxiety_depression	0	Count	869$_a$	115$_b$	984
		% within h_anxiety_depression	88.3%	11.7%	100.0%
		% within Referredvsnot	91.8%	83.9%	90.8%
		Adjusted Residual	3.0	-3.0	
	1	Count	78$_a$	22$_b$	100
		% within h_anxiety_depression	78.0%	22.0%	100.0%
		% within Referredvsnot	8.2%	16.1%	9.2%
		Adjusted Residual	-3.0	3.0	
Total		Count	947	137	1084
		% within h_anxiety_depression	87.4%	12.6%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.744[a]	1	.003		
Continuity Correction[b]	7.835	1	.005		
Likelihood Ratio	7.532	1	.006		
Fisher's Exact Test				.006	.004
Linear-by-Linear Association	8.736	1	.003		
N of Valid Cases	1084				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.64.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Sedentary Lifestyle

Crosstab

			Referredvsnot		
			0	1	Total
h_sedentary_lifestyle	0	Count	705[a]	183[a]	888
		% within h_sedentary_lifestyle	79.4%	20.6%	100.0%
		% within Referredvsnot	74.4%	77.2%	75.0%
		Adjusted Residual	-.9	.9	
	1	Count	242[a]	54[a]	296
		% within h_sedentary_lifestyle	81.8%	18.2%	100.0%
		% within Referredvsnot	25.6%	22.8%	25.0%
		Adjusted Residual	.9	-.9	
Total		Count	947	237	1184
		% within h_sedentary_lifestyle	80.0%	20.0%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.775[a]	1	.379		
Continuity Correction[b]	.635	1	.426		
Likelihood Ratio	.788	1	.375		
Fisher's Exact Test				.402	.214
Linear-by-Linear Association	.775	1	.379		
N of Valid Cases	1184				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 59.25.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Family History

Crosstab

			Referredvsnot		
			0	1	Total
h_family_history	0	Count	452[a]	96[b]	548
		% within h_family_history	82.5%	17.5%	100.0%
		% within Referredvsnot	47.7%	40.5%	46.3%
		Adjusted Residual	2.0	-2.0	
	1	Count	495[a]	141[b]	636
		% within h_family_history	77.8%	22.2%	100.0%
		% within Referredvsnot	52.3%	59.5%	53.7%
		Adjusted Residual	-2.0	2.0	
Total		Count	947	237	1184
		% within h_family_history	80.0%	20.0%	100.0%
		% within Referredvsnot	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of Referredvsnot categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.978[a]	1	.046		
Continuity Correction[b]	3.693	1	.055		
Likelihood Ratio	4.003	1	.045		
Fisher's Exact Test				.049	.027
Linear-by-Linear Association	3.975	1	.046		
N of Valid Cases	1184				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 109.69.

b. Computed only for a 2x2 table

Appendix C: SPSS Outputs for Research Question 2

Independent Samples T-Test for Age

Group Statistics

	AttendedVSno	N	Mean	Std. Deviation	Std. Error Mean
p_age	Did not attend	56	62.060357142857136	11.183590245499017	1.494470109025871
	Attended	181	64.914530386740340	10.128488119348994	.752844592944608

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
p_age	Equal variances assumed	.074	-2.854173243883203	1.587994650670864	-5.982697483997040
	Equal variances not assumed	.092	-2.854173243883203	1.673384560672690	-6.181430194901630

Chi-Squared Test of Independence for Sex

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
p_sex	1	Count	32_a	125_a	157
		% within AttendedVSno	59.3%	71.8%	68.9%
	2	Count	22_a	49_a	71
		% within AttendedVSno	40.7%	28.2%	31.1%
Total		Count	54	174	228
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.041[a]	1	.081		
Continuity Correction[b]	2.483	1	.115		
Likelihood Ratio	2.948	1	.086		
Fisher's Exact Test				.093	.059
Linear-by-Linear Association	3.028	1	.082		
N of Valid Cases	228				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.82.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Ethnicity

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_ethnic_group	1	Count	1_a	0_a	1
		% within AttendedVSno	2.2%	0.0%	0.5%
	2	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	4	Count	1_a	2_a	3
		% within AttendedVSno	2.2%	1.2%	1.4%
	5	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	6	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	7	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	9	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	10	Count	0_a	2_a	2
		% within AttendedVSno	0.0%	1.2%	0.9%
	11	Count	1_a	1_a	2
		% within AttendedVSno	2.2%	0.6%	0.9%
	12	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	13	Count	42_a	157_a	199
		% within AttendedVSno	93.3%	93.5%	93.4%
Total		Count	45	168	213
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.145[a]	10	.712
Likelihood Ratio	7.957	10	.633
Linear-by-Linear Association	.210	1	.647
N of Valid Cases	213		

a. 20 cells (90.9%) have expected count less than 5. The minimum expected count is .21.

Chi-Squared Test of Independence for Education

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_education	4	Count	1[a]	0[a]	1
		% within AttendedVSno	2.1%	0.0%	0.5%
	5	Count	0[a]	6[a]	6
		% within AttendedVSno	0.0%	3.7%	2.9%
	6	Count	17[a]	64[a]	81
		% within AttendedVSno	36.2%	39.8%	38.9%
	8	Count	3[a]	13[a]	16
		% within AttendedVSno	6.4%	8.1%	7.7%
	9	Count	1[a]	9[a]	10
		% within AttendedVSno	2.1%	5.6%	4.8%
	10	Count	22[a]	62[a]	84
		% within AttendedVSno	46.8%	38.5%	40.4%
	11	Count	3[a]	7[a]	10
		% within AttendedVSno	6.4%	4.3%	4.8%
Total		Count	47	161	208
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.273[a]	6	.296
Likelihood Ratio	8.287	6	.218
Linear-by-Linear Association	.769	1	.380
N of Valid Cases	208		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is .23.

Chi-Squared Test of Independence for Living Situation

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_living_situation	3	Count	5_a	24_a	29
		% within AttendedVSno	10.2%	13.6%	12.8%
	4	Count	37_a	134_a	171
		% within AttendedVSno	75.5%	75.7%	75.7%
	5	Count	2_a	13_a	15
		% within AttendedVSno	4.1%	7.3%	6.6%
	6	Count	1_a	0_a	1
		% within AttendedVSno	2.0%	0.0%	0.4%
	7	Count	4_a	6_a	10
		% within AttendedVSno	8.2%	3.4%	4.4%
Total		Count	49	177	226
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.541[a]	4	.162
Likelihood Ratio	5.804	4	.214
Linear-by-Linear Association	2.163	1	.141
N of Valid Cases	226		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .22.

Chi-Squared Test of Independence for Marital Status

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_marital_status	1	Count	3_a	20_a	23
		% within AttendedVSno	6.1%	11.5%	10.3%
	2	Count	34_a	129_a	163
		% within AttendedVSno	69.4%	74.1%	73.1%
	3	Count	3_a	11_a	14
		% within AttendedVSno	6.1%	6.3%	6.3%
	4	Count	3_a	7_a	10
		% within AttendedVSno	6.1%	4.0%	4.5%
	5	Count	4_a	5_a	9
		% within AttendedVSno	8.2%	2.9%	4.0%
	6	Count	2_a	2_a	4
		% within AttendedVSno	4.1%	1.1%	1.8%
Total		Count	49	174	223
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.049[a]	5	.301
Likelihood Ratio	5.423	5	.366
Linear-by-Linear Association	5.552	1	.018
N of Valid Cases	223		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .88.

Chi-Squared Test of Independence for Occupational Status

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_occupational_status	1	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.4%
	3	Count	11_a	38_a	49
		% within AttendedVSno	22.4%	21.6%	21.8%
	4	Count	5_a	13_a	18
		% within AttendedVSno	10.2%	7.4%	8.0%
	5	Count	3_a	2_b	5
		% within AttendedVSno	6.1%	1.1%	2.2%
	6	Count	15_a	98_b	113
		% within AttendedVSno	30.6%	55.7%	50.2%
	7	Count	1_a	1_a	2
		% within AttendedVSno	2.0%	0.6%	0.9%
	8	Count	9_a	14_b	23
		% within AttendedVSno	18.4%	8.0%	10.2%
	9	Count	5_a	9_a	14
		% within AttendedVSno	10.2%	5.1%	6.2%
Total		Count	49	176	225
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.353[a]	7	.022
Likelihood Ratio	15.342	7	.032
Linear-by-Linear Association	.888	1	.346
N of Valid Cases	225		

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .22.

Chi-Squared Test of Independence for Referral Type

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
Refer_event	1	Count	5_a	13_a	18
		% within AttendedVSno	12.2%	8.3%	9.1%
	2	Count	0_a	2_a	2
		% within AttendedVSno	0.0%	1.3%	1.0%
	3	Count	0_a	7_a	7
		% within AttendedVSno	0.0%	4.5%	3.6%
	4	Count	1_a	0_a	1
		% within AttendedVSno	2.4%	0.0%	0.5%
	5	Count	1_a	13_a	14
		% within AttendedVSno	2.4%	8.3%	7.1%
	6	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	7	Count	18_a	70_a	88
		% within AttendedVSno	43.9%	44.9%	44.7%
	8	Count	0_a	3_a	3
		% within AttendedVSno	0.0%	1.9%	1.5%
	9	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	10	Count	2_a	4_a	6
		% within AttendedVSno	4.9%	2.6%	3.0%
	11	Count	10_a	38_a	48
		% within AttendedVSno	24.4%	24.4%	24.4%
	13	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.5%
	14	Count	4_a	3_b	7
		% within AttendedVSno	9.8%	1.9%	3.6%
Total		Count	41	156	197
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.048[a]	12	.189
Likelihood Ratio	17.545	12	.130
Linear-by-Linear Association	1.166	1	.280
N of Valid Cases	197		

a. 18 cells (69.2%) have expected count less than 5. The minimum expected count is .21.

Chi-Squared Test of Independence for Diabetes

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_diabetes	0	Count	46_a	133_a	179
		% within AttendedVSno	82.1%	73.5%	75.5%
	1	Count	10_a	48_a	58
		% within AttendedVSno	17.9%	26.5%	24.5%
Total		Count	56	181	237
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.736[a]	1	.188		
Continuity Correction[b]	1.299	1	.254		
Likelihood Ratio	1.825	1	.177		
Fisher's Exact Test				.216	.126
Linear-by-Linear Association	1.729	1	.189		
N of Valid Cases	237				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.70.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Hypertension

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_hypertension	0	Count	27_a	52_b	79
		% within AttendedVSno	48.2%	28.7%	33.3%
	1	Count	29_a	128_b	157
		% within AttendedVSno	51.8%	70.7%	66.2%
	2	Count	0_a	1_a	1
		% within AttendedVSno	0.0%	0.6%	0.4%
Total		Count	56	181	237
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.495[a]	2	.024
Likelihood Ratio	7.459	2	.024
Linear-by-Linear Association	7.459	1	.006
N of Valid Cases	237		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .24.

Chi-Squared Test of Independence for Dyslipidemia

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_dyslipidemia	0	Count	27_a	49_b	76
		% within AttendedVSno	48.2%	27.1%	32.1%
	1	Count	29_a	132_b	161
		% within AttendedVSno	51.8%	72.9%	67.9%
Total		Count	56	181	237
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.776[a]	1	.003		
Continuity Correction[b]	7.832	1	.005		
Likelihood Ratio	8.418	1	.004		
Fisher's Exact Test				.005	.003
Linear-by-Linear Association	8.739	1	.003		
N of Valid Cases	237				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 17.96.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Anxiety/Depression

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_anxiety_depression	0	Count	49$_a$	166$_a$	215
		% within AttendedVSno	87.5%	91.7%	90.7%
	1	Count	7$_a$	15$_a$	22
		% within AttendedVSno	12.5%	8.3%	9.3%
Total		Count	56	181	237
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.901[a]	1	.342		
Continuity Correction[b]	.470	1	.493		
Likelihood Ratio	.848	1	.357		
Fisher's Exact Test				.428	.240
Linear-by-Linear Association	.898	1	.343		
N of Valid Cases	237				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.20.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Sedentary Lifestyle

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_sedentary_lifestyle	0	Count	42$_a$	141$_a$	183
		% within AttendedVSno	75.0%	77.9%	77.2%
	1	Count	14$_a$	40$_a$	54
		% within AttendedVSno	25.0%	22.1%	22.8%
Total		Count	56	181	237
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.205[a]	1	.651		
Continuity Correction[b]	.073	1	.787		
Likelihood Ratio	.201	1	.654		
Fisher's Exact Test				.716	.387
Linear-by-Linear Association	.204	1	.652		
N of Valid Cases	237				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.76.

b. Computed only for a 2x2 table

Chi-Squared Test of Independence for Family History

Crosstab

			AttendedVSno		
			Did not attend	Attended	Total
h_family_history	0	Count	25[a]	71[a]	96
		% within AttendedVSno	44.6%	39.2%	40.5%
	1	Count	31[a]	110[a]	141
		% within AttendedVSno	55.4%	60.8%	59.5%
Total		Count	56	181	237
		% within AttendedVSno	100.0%	100.0%	100.0%

Each subscript letter denotes a subset of AttendedVSno categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.521[a]	1	.471		
Continuity Correction[b]	.320	1	.572		
Likelihood Ratio	.517	1	.472		
Fisher's Exact Test				.534	.285
Linear-by-Linear Association	.518	1	.472		
N of Valid Cases	237				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.68.

b. Computed only for a 2x2 table

Appendix D: SPSS Outputs for Research Question 3

Repeated Measures ANOVA for HDL

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	1.292	1	1.292	86.697	0	0.106
	Greenhouse-Geisser	1.292	1	1.292	86.697	0	0.106
	Huynh-Feldt	1.292	1	1.292	86.697	0	0.106
	Lower-bound	1.292	1	1.292	86.697	0	0.106
Time * CR_SMT	Sphericity Assumed	0.03	1	0.03	1.994	0.158	0.003
	Greenhouse-Geisser	0.03	1	0.03	1.994	0.158	0.003
	Huynh-Feldt	0.03	1	0.03	1.994	0.158	0.003
	Lower-bound	0.03	1	0.03	1.994	0.158	0.003
Error(Time)	Sphericity Assumed	10.891	731	0.015			
	Greenhouse-Geisser	10.891	731	0.015			
	Huynh-Feldt	10.891	731	0.015			
	Lower-bound	10.891	731	0.015			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	1180.165	1	1180.165	9714.953	0	0.93
CR_SMT	1.099	1	1.099	9.048	0.003	0.012
Error	88.801	731	0.121			

Estimates: Group				
CR_SMT	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
CR alone	1.095	0.01	1.075	1.115
CR+SMT	1.164	0.021	1.123	1.204

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	1.092	0.012	1.069	1.115
Post	1.166	0.013	1.142	1.191

Estimates: Group*Time					
CR_SMT * Time	Time	Mean	Std. Error	95% Confidence Interval	
CR-alone	Pre	1.063	0.01	1.043	1.083
	Post	1.126	0.011	1.105	1.148
CR+SMT	Pre	1.121	0.021	1.079	1.162
	Post	1.207	0.022	1.162	1.251

Repeated Measures ANOVA for DBP

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	419.602	1	419.6	7.525	0.006	0.01
	Greenhouse-Geisser	419.602	1	419.6	7.525	0.006	0.01
	Huynh-Feldt	419.602	1	419.6	7.525	0.006	0.01
	Lower-bound	419.602	1	419.6	7.525	0.006	0.01
Time * CR_SMT	Sphericity Assumed	8.445	1	8.445	0.151	0.697	0
	Greenhouse-Geisser	8.445	1	8.445	0.151	0.697	0
	Huynh-Feldt	8.445	1	8.445	0.151	0.697	0
	Lower-bound	8.445	1	8.445	0.151	0.697	0
Error(Time)	Sphericity Assumed	40149.866	720	55.76			
	Greenhouse-Geisser	40149.866	720	55.76			
	Huynh-Feldt	40149.866	720	55.76			
	Lower-bound	40149.866	720	55.76			

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	5639291	1	5639291	30380.54	0	0.977
CR_SMT	1657.968	1	1657.968	8.932	0.003	0.012
Error	133647.7	720	185.622			

Estimates: Group				
CR_SMT	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
CR-alone	77.89	0.399	77.107	78.674
CR+SMT	80.608	0.817	79.004	82.212

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	79.933	0.522	78.909	80.957
Post	78.565	0.515	77.554	79.577

Estimates: Group*Time					
CR_SMT	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
CR-alone	**Pre**	78.477	0.458	77.578	79.375
	Post	77.304	0.452	76.416	78.191
CR+SMT	**Pre**	81.388	0.937	79.548	83.229
	Post	79.827	0.926	78.009	81.646

Repeated Measures ANOVA for METs

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	1226.148	1	1226.148	1003.164	0	0.573
	Greenhouse-Geisser	1226.148	1	1226.148	1003.164	0	0.573
	Huynh-Feldt	1226.148	1	1226.148	1003.164	0	0.573
	Lower-bound	1226.148	1	1226.148	1003.164	0	0.573
Time * CR_SMT	Sphericity Assumed	5.866	1	5.866	4.799	0.029	0.006
	Greenhouse-Geisser	5.866	1	5.866	4.799	0.029	0.006
	Huynh-Feldt	5.866	1	5.866	4.799	0.029	0.006
	Lower-bound	5.866	1	5.866	4.799	0.029	0.006
Error(Time)	Sphericity Assumed	915.488	749	1.222			
	Greenhouse-Geisser	915.488	749	1.222			
	Huynh-Feldt	915.488	749	1.222			
	Lower-bound	915.488	749	1.222			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	55368.62	1	55368.62	3274.88	0	0.814
CR_SMT	148.886	1	148.886	8.806	0.003	0.012
Error	12663.39	749	16.907			

Estimates: Group				
CR_SMT	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
CR-alone	7.254	0.118	7.022	7.487
CR+SMT	8.048	0.24	7.577	8.519

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	6.513	0.127	6.264	6.761
Post	8.79	0.149	8.497	9.083

Estimates: Group*Time					
CR_SMT	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
CR-alone	**Pre**	6.195	0.112	5.975	6.415
	Post	8.314	0.132	8.055	8.574
CR+SMT	**Pre**	6.831	0.227	6.384	7.277
	Post	9.265	0.268	8.74	9.791

Repeated Measures ANOVA for non-HDL

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	0.084	1	0.084	0.549	0.459	0.001
	Greenhouse-Geisser	0.084	1	0.084	0.549	0.459	0.001
	Huynh-Feldt	0.084	1	0.084	0.549	0.459	0.001
	Lower-bound	0.084	1	0.084	0.549	0.459	0.001
Time * CR_SMT	Sphericity Assumed	0.101	1	0.101	0.666	0.415	0.001
	Greenhouse-Geisser	0.101	1	0.101	0.666	0.415	0.001
	Huynh-Feldt	0.101	1	0.101	0.666	0.415	0.001
	Lower-bound	0.101	1	0.101	0.666	0.415	0.001
Error(Time)	Sphericity Assumed	107.071	703	0.152			
	Greenhouse-Geisser	107.071	703	0.152			
	Huynh-Feldt	107.071	703	0.152			
	Lower-bound	107.071	703	0.152			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	4361.374	1	4361.374	5762.233	0	0.891
CR_SMT	0.171	1	0.171	0.226	0.635	0
Error	532.093	703	0.757			

Estimates: Group				
CR_SMT	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
CR-alone	2.202	0.026	2.152	2.253
CR+SMT	2.23	0.052	2.127	2.333

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	2.226	0.033	2.161	2.291
Post	2.207	0.031	2.146	2.267

Estimates: Group*Time					
CR_SMT	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
CR-alone	**Pre**	2.201	0.029	2.144	2.259
	Post	2.203	0.027	2.15	2.257
CR+SMT	**Pre**	2.251	0.06	2.134	2.367
	Post	2.21	0.055	2.101	2.318

Repeated Measures ANOVA for SBP

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	32.857	1	32.857	0.204	0.652	0
	Greenhouse-Geisser	32.857	1	32.857	0.204	0.652	0
	Huynh-Feldt	32.857	1	32.857	0.204	0.652	0
	Lower-bound	32.857	1	32.857	0.204	0.652	0
Time * CR_SMT	Sphericity Assumed	4.229	1	4.229	0.026	0.871	0
	Greenhouse-Geisser	4.229	1	4.229	0.026	0.871	0
	Huynh-Feldt	4.229	1	4.229	0.026	0.871	0
	Lower-bound	4.229	1	4.229	0.026	0.871	0
Error(Time)	Sphericity Assumed	114610.5	712	160.97			
	Greenhouse-Geisser	114610.5	712	160.97			
	Huynh-Feldt	114610.5	712	160.97			
	Lower-bound	114610.5	712	160.97			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	16563109.6	1	16563109.6	32179.34	0	0.978
CR_SMT	2961.125	1	2961.125	5.753	0.017	0.008
Error	366475.341	712	514.713			

Estimates: Group				
CR_SMT	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
CR-alone	133.457	0.67	132.141	134.773
CR+SMT	137.074	1.351	134.422	139.727

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	135.456	0.904	133.682	137.23
Post	135.075	0.822	133.461	136.69

Estimates: Group*Time					
CR_SMT	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
CR-alone	**Pre**	133.579	0.803	132.003	135.156
	Post	133.335	0.731	131.9	134.77
CR+SMT	**Pre**	137.333	1.619	134.155	140.512
	Post	136.816	1.473	133.923	139.708

Repeated Measures ANOVA for TG

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	0.87	1	0.87	4.862	0.028	0.007
	Greenhouse-Geisser	0.87	1	0.87	4.862	0.028	0.007
	Huynh-Feldt	0.87	1	0.87	4.862	0.028	0.007
	Lower-bound	0.87	1	0.87	4.862	0.028	0.007
Time * CR_SMT	Sphericity Assumed	0.044	1	0.044	0.246	0.62	0
	Greenhouse-Geisser	0.044	1	0.044	0.246	0.62	0
	Huynh-Feldt	0.044	1	0.044	0.246	0.62	0
	Lower-bound	0.044	1	0.044	0.246	0.62	0
Error(Time)	Sphericity Assumed	129.943	726	0.179			
	Greenhouse-Geisser	129.943	726	0.179			
	Huynh-Feldt	129.943	726	0.179			
	Lower-bound	129.943	726	0.179			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	2012.331	1	2012.331	2669.152	0	0.786
CR_SMT	2.8	1	2.8	3.713	0.054	0.005
Error	547.347	726	0.754			

Estimates: Group				
CR_SMT	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
CR-alone	1.539	0.025	1.489	1.589
CR+SMT	1.428	0.052	1.327	1.529

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	1.514	0.032	1.451	1.578
Post	1.453	0.031	1.391	1.514

Estimates: Group*Time					
CR_SMT	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
CR-alone	**Pre**	1.563	0.029	1.506	1.619
	Post	1.515	0.028	1.46	1.569
CR+SMT	**Pre**	1.466	0.058	1.351	1.58
	Post	1.39	0.056	1.28	1.501

Repeated Measures ANOVA for LDL

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	0.088	1	0.088	0.679	0.41	0.001
	Greenhouse-Geisser	0.088	1	0.088	0.679	0.41	0.001
	Huynh-Feldt	0.088	1	0.088	0.679	0.41	0.001
	Lower-bound	0.088	1	0.088	0.679	0.41	0.001
Time * CR_SMT	Sphericity Assumed	0.225	1	0.225	1.748	0.187	0.002
	Greenhouse-Geisser	0.225	1	0.225	1.748	0.187	0.002
	Huynh-Feldt	0.225	1	0.225	1.748	0.187	0.002
	Lower-bound	0.225	1	0.225	1.748	0.187	0.002
Error(Time)	Sphericity Assumed	92.35	716	0.129			
	Greenhouse-Geisser	92.35	716	0.129			
	Huynh-Feldt	92.35	716	0.129			
	Lower-bound	92.35	716	0.129			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	3339.347	1	3339.347	5198.931	0	0.879
CR_SMT	0.795	1	0.795	1.238	0.266	0.002
Error	459.897	716	0.642			

Estimates: Group				
CR_SMT	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
CR-alone	1.88	0.024	1.833	1.926
CR+SMT	1.939	0.047	1.846	2.032

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	1.919	0.03	1.859	1.979
Post	1.899	0.028	1.845	1.953

Estimates: Group*Time					
CR_SMT	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
CR-alone	**Pre**	1.874	0.027	1.82	1.927
	Post	1.886	0.025	1.837	1.934
CR+SMT	**Pre**	1.964	0.055	1.857	2.071
	Post	1.913	0.049	1.817	2.01

Appendix E: SPSS Outputs for Research Question 4

Repeated Measures ANOVA for HDL

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	.396	1	.396	26.185	.000	.157
	Greenhouse-Geisser	.396	1.000	.396	26.185	.000	.157
	Huynh-Feldt	.396	1.000	.396	26.185	.000	.157
	Lower-bound	.396	1.000	.396	26.185	.000	.157
Time * attended.10	Sphericity Assumed	.019	2	.010	.631	.533	.009
	Greenhouse-Geisser	.019	2.000	.010	.631	.533	.009
	Huynh-Feldt	.019	2.000	.010	.631	.533	.009
	Lower-bound	.019	2.000	.010	.631	.533	.009
Error(Time)	Sphericity Assumed	2.133	141	.015			
	Greenhouse-Geisser	2.133	141.000	.015			
	Huynh-Feldt	2.133	141.000	.015			
	Lower-bound	2.133	141.000	.015			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	270.741	1	270.741	2085.470	.000	.937
attended.10	.285	2	.143	1.100	.336	.015
Error	18.305	141	.130			

Estimates: Group				
attended.10	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
1 Session	1.186	.027	1.133	1.240
2 Session	1.143	.044	1.056	1.231
3 or more Sessions	1.102	.054	.995	1.209

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	1.100	.025	1.050	1.151
Post	1.188	.027	1.133	1.242

Estimates: Group*Time					
attended.10	Time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1 Session	Pre	1.142	.027	1.088	1.196
	Post	1.231	.030	1.172	1.289
2 Sessions	Pre	1.113	.045	1.024	1.202
	Post	1.174	.049	1.078	1.270
3 or more Sessions	Pre	1.045	.055	.936	1.155
	Post	1.159	.059	1.041	1.276

Repeated Measures ANOVA for DBP

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	106.381	1	106.381	2.141	.146	.016
	Greenhouse-Geisser	106.381	1	106.381	2.141	.146	.016
	Huynh-Feldt	106.381	1	106.381	2.141	.146	.016
	Lower-bound	106.381	1	106.381	2.141	.146	.016
Time * attended.10	Sphericity Assumed	8.938	2	4.469	0.090	.914	0.001
	Greenhouse-Geisser	8.938	2	4.469	0.090	.914	0.001
	Huynh-Feldt	8.938	2	4.469	0.090	.914	0.001
	Lower-bound	8.938	2	4.469	0.090	.914	0.001
Error(Time)	Sphericity Assumed	6756.177	136	49.678			
	Greenhouse-Geisser	6756.177	136	49.678			
	Huynh-Feldt	6756.177	136	49.678			
	Lower-bound	6756.177	136	49.678			

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	1277418.976	1	1277418.976	6494.717	.000	.979
attended.10	892.488	2	446.244	2.269	.107	.032
Error	26749.275	136	1916.686			

Estimates: Group				
attended.10	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1 Session	80.686	1.069	78.571	82.801
2 Sessions	82.828	1.753	79.361	86.295
3 or more Sessions	76.905	2.164	72.625	81.184

Estimates: Time				
Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Pre	80.871	1.150	78.596	83.146
Post	79.408	1.074	77.284	81.533

Estimates: Group*Time					
attended.10	Time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1 Session	Pre	81.570	1.237	79.123	84.016
	Post	79.802	1.155	77.518	82.087
2 Sessions	Pre	83.281	2.028	79.271	87.292
	Post	82.375	1.894	78.630	86.120
3 or more Sessions	Pre	77.762	2.503	72.811	82.712
	Post	76.048	2.338	71.425	80.671

Repeated Measures ANOVA for METs

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	288.332	1	288.332	157.505	0.000	.552
	Greenhouse-Geisser	288.332	1	288.332	157.505	0.000	.552
	Huynh-Feldt	288.332	1	288.332	157.505	0.000	.552
	Lower-bound	288.332	1	288.332	157.505	0.000	.552
Time * attended.10	Sphericity Assumed	5.498	2	2.749	1.502	.226	.020
	Greenhouse-Geisser	5.498	2	2.749	1.502	.226	.020
	Huynh-Feldt	5.498	2	2.749	1.502	.226	.020
	Lower-bound	5.498	2	2.749	1.502	.226	.020
Error(Time)	Sphericity Assumed	263.609	144	1.831			
	Greenhouse-Geisser	263.609	144	1.831			
	Huynh-Feldt	263.609	144	1.831			
	Lower-bound	263.609	144	1.831			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	13145.745	1	13145.745	671.322	.000	.823
attended.10	27.987	2	13.993	.715	.491	.010
Error	2819.792	144	19.582			

Estimates: Group				
attended.10	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
1 Session	8.237	.328	7.589	8.886
2 Sessions	8.000	.545	6.923	9.077
3 or more Sessions	7.367	.652	6.078	8.657

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	6.703	.295	6.120	7.286
Post	9.034	.339	8.364	9.703

Estimates: Group*Time					
attended.10	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
1 Session	**Pre**	6.931	.318	6.301	7.560
	Post	9.544	.366	8.821	10.267
2 Sessions	**Pre**	7.030	.529	5.985	8.075
	Post	8.970	.608	7.768	10.171
3 or more Sessions	**Pre**	6.148	.633	4.896	7.400
	Post	8.587	.728	7.148	10.026

Repeated Measures ANOVA for non-HDL

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	.150	1	.150	.988	.322	.007
	Greenhouse-Geisser	.150	1	.150	.988	.322	.007
	Huynh-Feldt	.150	1	.150	.988	.322	.007
	Lower-bound	.150	1	.150	.988	.322	.007
Time * attended.10	Sphericity Assumed	.398	2	.199	1.306	.274	.019
	Greenhouse-Geisser	.398	2	.199	1.306	.274	.019
	Huynh-Feldt	.398	2	.199	1.306	.274	.019
	Lower-bound	.398	2	.199	1.306	.274	.019
Error(Time)	Sphericity Assumed	20.400	134	.152			
	Greenhouse-Geisser	20.400	134	.152			
	Huynh-Feldt	20.400	134	.152			
	Lower-bound	20.400	134	.152			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	986.437	1	986.437	1184.587	.000	.898
attended.10	.865	2	.432	.519	.596	.008
Error	111.585	134	.833			

Estimates: Group				
attended.10	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
1 Session	2.176	.070	2.037	2.314
2 Sessions	2.312	.116	2.083	2.542
3 or more Sessions	2.235	.141	1.956	2.513

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	2.269	.075	2.120	2.417
Post	2.213	.066	2.082	2.344

Estimates: Group*Time					
attended.10	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
1 Session	**Pre**	2.189	.081	2.020	2.339
	Post	2.172	.071	2.032	2.313
2 Sessions	**Pre**	2.403	.134	2.139	2.668
	Post	2.222	.118	1.989	2.445
3 or more Sessions	**Pre**	2.223	.163	1.902	2.545
	Post	2.246	.143	1.963	2.529

Repeated Measures ANOVA for SBP

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	.128	1	.128	.001	.976	0.001
	Greenhouse-Geisser	.128	1	.128	.001	.976	0.001
	Huynh-Feldt	.128	1	.128	.001	.976	0.001
	Lower-bound	.128	1	.128	.001	.976	0.001
Time * attended.10	Sphericity Assumed	173.848	2	86.924	.613	.543	1.225
	Greenhouse-Geisser	173.848	2	86.924	.613	.543	1.225
	Huynh-Feldt	173.848	2	86.924	.613	.543	1.225
	Lower-bound	173.848	2	86.924	.613	.543	1.225
Error(Time)	Sphericity Assumed	19441.220	137	141.907			
	Greenhouse-Geisser	19441.220	137	141.907			
	Huynh-Feldt	19441.220	137	141.907			
	Lower-bound	19441.220	137	141.907			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	3776179.086	1	3776179.086	7093.746	.000	0.981
attended.10	2523.524	2	1261.762	2.370	.097	0.033
Error	72928.544	137	532.325			

Estimates: Group				
attended.10	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
1 Session	136.230	1.749	132.771	139.689
2 Session	142.855	2.930	136.061	147.649
3 or more Sessions	132.318	3.478	125.440	139.196

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	136.826	1.943	132.984	140.669
Post	136.776	1.705	133.404	140.147

Estimates: Group*Time					
attended.10	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
1 Session	**Pre**	137.126	2.093	132.989	141.264
	Post	135.333	1.836	131.703	138.964
2 Sessions	**Pre**	140.806	3.506	133.874	147.736
	Post	142.903	3.076	136.821	148.985
3 or more Sessions	**Pre**	132.545	4.161	124.317	140.774
	Post	132.091	3.651	124.871	139.311

Repeated Measures ANOVA for TG

Tests of Within-Subjects Effects							
Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Time	Sphericity Assumed	.721	1	.721	4.245	.041	.030
	Greenhouse-Geisser	.721	1	.721	4.245	.041	.030
	Huynh-Feldt	.721	1	.721	4.245	.041	.030
	Lower-bound	.721	1	.721	4.245	.041	.030
Time * attended.10	Sphericity Assumed	.438	2	.219	1.290	.279	.019
	Greenhouse-Geisser	.438	2	.219	1.290	.279	.019
	Huynh-Feldt	.438	2	.219	1.290	.279	.019
	Lower-bound	.438	2	.219	1.290	.279	.019
Error(Time)	Sphericity Assumed	23.107	134	.170			
	Greenhouse-Geisser	23.107	134	.170			
	Huynh-Feldt	23.107	134	.170			
	Lower-bound	23.107	134	.170			

Tests of Between-Subjects Effects						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Intercept	406.296	1	406.296	754.013	.000	.847
attended.10	2.865	2	1.433	2.659	0.074	.038
Error	73.283	134	.536			

Estimates: Group				
attended.10	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
1 Session	1.322	.005	1.212	1.431
2 Session	1.556	.093	1.372	1.740
3 or more Sessions	1.483	.116	1.254	1.713

Estimates: Time				
Time	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	Upper Bound
Pre	1.515	.066	1.385	1.645
Post	1.392	.055	1.283	1.502

Estimates: Group*Time					
attended.10	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
1 Session	**Pre**	1.350	.068	1.215	1.485
	Post	1.293	.058	1.179	1.408
2 Sessions	**Pre**	1.680	.115	1.452	1.909
	Post	1.432	.098	1.239	1.625
3 or more Sessions	**Pre**	1.515	.144	1.230	1.799
	Post	1.452	.122	1.211	1.693

Repeated Measures ANOVA for LDL

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	.146	1	.146	1.091	.298	.008
	Greenhouse-Geisser	.146	1	.146	1.091	.298	.008
	Huynh-Feldt	.146	1	.146	1.091	.298	.008
	Lower-bound	.146	1	.146	1.091	.298	.008
Time * attended.10	Sphericity Assumed	.269	2	.135	1.004	.369	.014
	Greenhouse-Geisser	.269	5	.135	1.004	.369	.014
	Huynh-Feldt	.269	5	.135	1.004	.369	.014
	Lower-bound	.269	5	.135	1.004	.369	.014
Error(Time)	Sphericity Assumed	18.639	139	.134			
	Greenhouse-Geisser	18.639	139	.134			
	Huynh-Feldt	18.639	139	.134			
	Lower-bound	18.639	139	.134			

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	747.182	1	747.182	957.382	.000	.873
attended.10	.156	2	.078	.100	.905	.001
Error	108.482	139	.780			

Estimates: Group				
attended.10	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1 Session	1.912	.066	1.781	2.043
2 Session	1.969	.110	1.751	2.188
3 or more Sessions	1.921	.136	1.651	2.190

Estimates: Time				
Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Pre	1.961	.072	1.819	2.103
Post	1.907	.063	1.782	2,032

Estimates: Group*Time					
attended.10	**Time**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	Upper Bound
1 Session	**Pre**	1.929	.076	1.778	2.080
	Post	1.895	.067	1.763	2.027
2 Sessions	**Pre**	2.049	.127	1.798	2.300
	Post	1.890	.112	1.669	2.110
3 or more Sessions	**Pre**	1.905	.157	1.595	2.216
	Post	1.936	.138	1.664	2.208

Appendix F: Interview Guide

Thank you again for agreeing to participate in the interview.

Please remember that you can choose to or not to answer any questions of your choosing at any time during the interview. You can also withdrawal from the interview at any time and choose to withdraw your consent to participate up until PARTICULAR DATE (one week after interview is complete).

Do you have any questions before we begin? If at any point you have any questions or need clarification throughout the interview, please stop me and ask.

1. During your participation in the Cardiac Wellness program, you were referred to the stress management component of the program. Were you told anything about the class prior to attending?
   Prompt: Did you get all the information you needed before attending? If not, what information was missing in your opinion?

2. What influenced your decision to attend stress management training? (If applicable) What influenced your decision to stop attending stress management training?

3. Describe to me how the stress management series met or did not meet your expectations?
   Prompt: How? What was your overall experience like?

4. Please tell me about any tools or coping strategies that you learned and use in your everyday life or at work.
   Prompt: How useful did you find them? What about them did you find most useful? Do you continue to use these tools today?

5. (Regardless of completion) What sorts of barriers did you face when attending the program?
   Prompt: What was your main barrier? Did you overcome these barriers? How?

6. Describe if attending stress management influenced your participation in cardiac rehabilitation. Did it influence your overall end result in cardiac rehabilitation (e.g., exercise capacity, body composition, and blood lipid profile)?

7. What did you like about the program?
   Prompts: Were there any areas that needed improvements that you noticed? What was missing from the program?

8. In your opinion, would stress management training be a valuable inclusion to all cardiac rehabilitation programs in Canada?

Vita Auctoris

NAME:	Chelsea Rodden-Matthews
EDUCATION:	St. Mary's Catholic High School, Woodstock, ON, 2012
	Sheridan College, BHSc (Honours) Kinesiology and Health Promotion, Brampton, ON, 2017
	University of Windsor, MHK., Windsor, ON, 2022