Assessing Public Perceptions of Cardiopulmonary Resuscitation and Bystander Willingness to Act in Out-of-Hospital Cardiac Arrest

by

Lindsay Sarah Cheskes

A thesis submitted in conformity with the requirements for the degree of Master of Science

Institute of Medical Science
University of Toronto

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2014

Abstract

Low survival rates following out-of-hospital cardiac arrest (OHCA) remain a serious health concern internationally. Early bystander cardiopulmonary resuscitation (CPR) and rapid defibrillation can increase the chances of survival dramatically. However, the number of OHCA patients who receive these interventions remains low. This study sought to characterize Canadian public knowledge, attitudes and willingness to perform both traditional and chest-compression-only CPR using a two-phase, mixed methods approach. Twenty-one qualitative interviews were conducted, the results of which informed an online, scenario-based, Canada-wide survey. Significant knowledge gaps regarding recognition of cardiac arrest, the precise steps of CPR and perceived survival rate were identified and common to both phases. A larger proportion of survey respondents demonstrated a willingness to perform chest-compression-only CPR compared to traditional CPR in general, and specifically in situations involving strangers and unkempt individuals. Knowledge gaps and misconceptions seem to dominate the public perspective, leading to the recommendation for a tailored knowledge translation solution.
Acknowledgments

“No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude.”
— Alfred North Whitehead

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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>2005 AHA Guidelines</td>
<td>2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care</td>
</tr>
<tr>
<td>2010 AHA Guidelines</td>
<td>2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care</td>
</tr>
<tr>
<td>ABC</td>
<td>Airway Breathing Circulation</td>
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<tr>
<td>ACT Foundation</td>
<td>Advanced Coronary Treatment Foundation</td>
</tr>
<tr>
<td>AED</td>
<td>Automated external defibrillator</td>
</tr>
<tr>
<td>AHA</td>
<td>American Heart Association</td>
</tr>
<tr>
<td>ALS</td>
<td>Advanced life support</td>
</tr>
<tr>
<td>BLS</td>
<td>Basic life support</td>
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<tr>
<td>CA</td>
<td>Cardiac arrest</td>
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<tr>
<td>CAB</td>
<td>Compressions Airway Breathing</td>
</tr>
<tr>
<td>CAEP</td>
<td>Canadian Association of Emergency Physicians</td>
</tr>
<tr>
<td>CPR</td>
<td>Cardiopulmonary resuscitation</td>
</tr>
<tr>
<td>Chest-compression-only CPR</td>
<td>Chest-compression-only cardiopulmonary resuscitation</td>
</tr>
<tr>
<td>CIHR</td>
<td>Canadian Institute of Health Research</td>
</tr>
<tr>
<td>DA-CPR</td>
<td>Dispatch-Assisted CPR</td>
</tr>
<tr>
<td>EBM</td>
<td>Evidence-based Medicine</td>
</tr>
<tr>
<td>ECC</td>
<td>Emergency cardiac care</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>EMS</td>
<td>Emergency medical service</td>
</tr>
<tr>
<td>HSFC</td>
<td>Heart and Stroke Foundation of Canada</td>
</tr>
<tr>
<td>IAED</td>
<td>International Academies of Emergency Dispatch</td>
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<tr>
<td>IHCA</td>
<td>In-hospital cardiac arrest</td>
</tr>
<tr>
<td>ILCOR</td>
<td>International Liaison Committee on Resuscitation</td>
</tr>
<tr>
<td>KT</td>
<td>Knowledge Translation</td>
</tr>
<tr>
<td>MPDS</td>
<td>Medical Priority Dispatch System</td>
</tr>
<tr>
<td>OHCA</td>
<td>Out-of-hospital cardiac arrest</td>
</tr>
<tr>
<td>PEA</td>
<td>Pulseless Electrical Activity</td>
</tr>
<tr>
<td>REB</td>
<td>Research Ethics Boards</td>
</tr>
<tr>
<td>SIDS</td>
<td>Sudden Infant Death Syndrome</td>
</tr>
<tr>
<td>VF</td>
<td>Ventricular fibrillation</td>
</tr>
<tr>
<td>VT</td>
<td>Ventricular tachycardia</td>
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Chapter 1
Introduction and Thesis Outline

1 Introduction and Thesis Outline

The purpose of this chapter is to provide the reader with an introduction to the topic of this thesis; out-of-hospital cardiac arrest (OHCA) and bystander cardiopulmonary resuscitation (CPR). I begin by introducing these topics to orient those who may be unfamiliar with the field of resuscitation science. I present a brief overview of the purpose, objectives and methodology of the research to follow. Subsequently, I detail my particular interest in this topic, how it has developed, influenced and shaped the remainder of this thesis. Finally, a brief overview of the thesis is provided.

1.1 Understanding the Problem

Cardiac arrest refers to a medical emergency whereby an individual’s heart suddenly and unexpectedly stops beating. If not treated immediately, cardiac arrest ultimately leads to death. The majority of cardiac arrests occur outside of the hospital environment and, as such, are termed out-of-hospital cardiac arrests (OHCA). Survival following OHCA remains a significant and serious health concern in North America. Unfortunately, in many communities, less than 8% of OHCA patients survive\(^1\). International resuscitation councils and organizations such as the Heart and Stroke Foundation of Canada (HSFC) and the American Heart Association (AHA) have put forth and promoted a concept known as the Chain of Survival, which illustrates a system of integrated actions aimed at maximizing survival from OHCA. Two of these steps, early bystander CPR and rapid defibrillation have been distinguished as the two most important links in the Chain of Survival\(^2,3\). Bystander CPR is an intervention performed on cardiac arrest patients by a passerby or witness of the event, who is not part of a formal Emergency Medical Services (EMS) system of response\(^4-6\). Bystander CPR is comprised of chest compressions defined as manually compressing the patient’s chest to maintain blood circulation and oxygenation until advanced medical assistance is available or EMS arrives\(^7\). CPR may also involve the provision of ventilations, whereby air is pushed into the lungs though a direct mouth-to-mouth breath delivered from the rescuer to the patient\(^7\). Mouth-to-mouth ventilations are recommended for instances of
OHCA involving children or those associated with drownings. Defibrillators, typically Automated External Defibrillators (AED), are small machines that analyze a patient’s heart rhythm. Heart rhythms are classified as shockable or not shockable rhythms based upon the electrocardiogram (ECG), which records the electrical activity of the heart. If the AED detects a shockable heart rhythm, which is limited to pulseless ventricular arrhythmias such as ventricular fibrillation (VF) and ventricular tachycardia (VT), then it will provide an electric shock to the chest in an attempt to reestablish a normal heart rhythm.

The early application of these two interventions, bystander CPR and early defibrillation, substantially improves the chance of survival from OHCA. The combination of bystander CPR and the use of an AED may increase the likelihood of survival by 75% or more.

Despite the long-standing recognition of the importance of early CPR and defibrillation and the continuing focus on CPR education to the community at large, less than one third of OHCA patients receive bystander CPR. Given that bystander CPR is known to improve survival from OHCA and have a direct influence on patient outcome, it is imperative that the underlying reasons why so few OHCA patients are receiving bystander CPR be identified.

Recent evidence has indicated that a modified CPR technique, termed chest-compression-only CPR, is associated with similar outcomes in adult OHCA when compared to traditional CPR involving chest compressions with mouth-to-mouth ventilations at the recommended rate of 30:2. Chest-compression-only CPR emphasizes the chest compression component of conventional CPR and stresses the importance of ‘pushing hard’ and ‘pushing fast’ in the centre of the patient’s chest. As such, the most recent guidelines for bystander CPR published in 2010 by the AHA instruct lay rescuers to provide chest-compression-only CPR in OHCA. Public knowledge and interpretation of the new guidelines, and willingness to act in OHCA based on these guidelines remains unknown.

### 1.2 Rationale and Thesis Objectives

There is an abundance of clinical evidence to suggest that bystander intervention at the point of care, via the provision of CPR and administration of electrical shocks from a defibrillator, markedly improves the chances of survival from OHCA. In his landmark paper, Larsen et al. (1993) found that every one-minute delay in time to first shock in OHCA translates to a 7-
10% decrease in the chance of survival. This is reduced to a 3-4% decrease per minute if bystander CPR is provided prior to defibrillation. Other estimates in the literature suggest that the delivery of bystander CPR alone can increase the chances of survival 2-3 fold. Recently, a group of researchers from the Canadian Association of Emergency Physicians (CAEP) published a position statement in which they estimate that increasing Canadian bystander CPR rates to 50%, could result in an additional 2000 lives saved throughout Canada per annum. These data provide sufficient evidence that early bystander action is critical and has a profound impact on OHCA outcomes.

Through various partnerships and collaborations both local and nationwide, the resuscitation science community has put forth a strong effort to enhance bystander CPR rates. Popular strategies have involved the integration of effective dispatch-assisted telephone CPR instructions, the implementation of CPR education in schools, the organization of mass CPR training events, targeted CPR training for family members of individuals with known cardiovascular disease, and recently, the promotion of a simplified chest-compression-only CPR technique for bystanders. However, these efforts have largely been unsuccessful, in that bystander CPR rates in OHCA remain unchanged. The relative impact of each of these interventions on layperson willingness and ability to perform CPR remains unclear and poorly characterized. While a considerable amount of time and resources have been dedicated to investigating ways to optimize bystander CPR, an obvious disconnect exists between those endeavours and bystander actions at the frontlines in OHCA.

Several international studies have attempted to evaluate attitudes, perceptions and understanding of cardiac arrest and CPR. The majority of these international studies were conducted in the United States, Europe, Asia, Australia and New Zealand. These studies, which will be reviewed in depth in the chapter to follow, indicate that barriers to the provision of bystander CPR are not universal, but rather, they vary with regional context. To date, no studies investigating this issue in a Canadian context have been conducted. Furthermore, it has been documented in the literature that bystander CPR and cardiac arrest survival rates are considerably lower in most Canadian communities as compared to their international counterparts. A recent AHA science advisory paper emphasizes that more research is required to identify local barriers to bystander CPR delivery and to develop strategies to address those barriers that incorporate societal and cultural
Given the limited applicability and transferability of international findings into a Canadian setting, it was important to characterize Canadian attitudes, perceptions and understanding of cardiac arrest resuscitation in this research.

This thesis employed a mixed-methods approach involving distinct, yet interconnected qualitative and quantitative phases. The two interrelated phases of the study were as follows:

1) **Phase One- Qualitative Study:** Phase one employed a qualitative descriptive approach, whereby in-depth, semi-structured interviews were used to better understand public knowledge, perceptions and willingness to engage in resuscitative efforts.

2) **Phase Two: Quantitative study:** Phase two involved an online, scenario based survey exploring similar concepts on a larger, nation-wide level.

In his discussion of mixed methods research models, Creswell (1994) notes that the form, structure and language of qualitative study objectives and goals differ from quantitative purpose statements, research question and hypotheses. The global research question for this project was to determine if members of the general, lay public are more inclined to perform bystander CPR with the change in the guidelines (i.e. the switch from traditional CPR involving mouth-to-mouth ventilation to the recommendation for chest-compression-only CPR). Furthermore, since this project involved two sequential phases of research, it is both appropriate and necessary to present two sets of research aims and objectives:

1) **Phase One- Qualitative Study Objectives**
   - Objective 1: To explore lay public knowledge, attitudes, and understanding of OHCA
   - Objective 2: To explore public perceived willingness to perform CPR and to elucidate reasons why members of the general public may be willing and/or unwilling to perform CPR in OHCA with a view towards informing a larger, Canada-wide population survey

2) **Phase Two- Quantitative Study Research Question and Objectives**
   - Objective 1: To describe population-representative perceived behavioural intentions, knowledge and attitudes towards OHCA, traditional CPR involving mouth-to-mouth ventilation and chest-compression-only CPR.
   - Objective 2: To confirm or disconfirm common themes elucidated in Phase one on a more widespread scale by surveying a broader, representative sample of Canadians.
The information gathered from this project will hopefully be used in several key ways:

a) To direct future research in the field of resuscitation towards improving bystander CPR rates

b) To provide insights to inform modification of existing and/or development of new community interventions aimed at improving public willingness and capacity to act in OHCA.

1.3 Reflexivity, Personal Experiences and Assumptions

According to Hammell (2002), qualitative researchers believe that all researchers bring their backgrounds, experiences and values to their work and, as such, it is not possible to be objective in their interpretation of reality. Similarly, speaking to the principle of reflexivity, Green and Thorogood (2009) assert that any field of research is not value-free and researchers must critically consider and put forth their subjectivities related to their research. As I will explore in more depth in Chapters 3 and 5, I primarily used the qualitative tradition as a lens and foundation for the design of this study. In keeping with this, it is important that as a qualitative researcher, I am transparent about my personal experiences and assumptions at the outset of my research and how this shapes the approach to my work. As such, I will declare my a priori beliefs, attitudes, and preconceived notions pertaining to this research topic.

My particular interest in cardiac arrest, resuscitation and related research has stemmed from a variety of past experiences. These experiences have primarily been my educational background in basic and clinical science, previous research I have conducted in the field of cardiac arrest, my extensive involvement in swim instruction, as well as my training as a lifeguard. Together, these experiences have taught me about the significance of CPR, why it is so critical and how I am influencing a patient’s outcome in providing such a vital, lifesaving treatment.

This research project examined attitudes towards cardiac arrest and resuscitation from the lay public perspective. I imagined that this perspective would differ considerably if I limited my population of interest to health care professionals or even those with a general interest in science and medicine. Furthermore, I suspected that an individual who is trained in CPR or
first aid would have a different perspective on resuscitation compared to an individual who has never had prior CPR or first aid training. I myself am an individual with a background in the field of science and who is trained in CPR, and my attitude towards performing CPR on a cardiac arrest patient may differ from a lay bystander who possesses limited knowledge on CPR and its importance.

A key assumption I had at the outset of this study and that I share here as my a priori stance, was that most people would be more inclined to perform chest-compression-only CPR when compared to traditional CPR involving mouth-to-mouth ventilations. I assumed that the primary reason people might not want to perform CPR is because they do not want to perform mouth-to-mouth ventilation due to the intimate nature of the method and perceived risk of infection. If this is the case then, logically, the elimination of mouth-to-mouth ventilation should result in an increase in bystander CPR rates. However, this might not be the case. What if lay bystanders are comfortable with performing mouth-to-mouth resuscitation and rather it is some other obstacle, underlying belief or expectation that is preventing them from acting? I would be particularly surprised if, as a result of this research, I learned that the general public believes that bystander action and CPR are not necessary and individuals do not want to help simply “just because.” Similarly, I would be shocked to hear the response: “I don’t think I would help because hopefully there are other people around to do it instead.” Perhaps there are certain social or cultural factors at play that require further investigation.

In addition to exploring the level of public knowledge with respect to cardiac arrest and CPR in this study, I was particularly interested in exploring the accuracy of knowledge amongst laypersons. Previous research has shown that public knowledge with respect to cardiac arrest and CPR is extremely limited and misconstrued. Members of the general public are the first potential responders to engage in resuscitation efforts in OHCA. A better understanding of their perspectives can help us improve and perhaps modify how we approach, teach and implement resuscitation techniques within the public domain.
1.4 The Existing Public Knowledge Environment

It should be noted that members of the Canadian general public are not wholly ignorant concerning the heart, cardiovascular health and related issues. The Heart and Stroke Foundation of Canada (HSFC) is a volunteer-based health charity whose goals centre around improving cardiovascular health nationwide through education, advocacy and the advancement of medical research in this field. Founded over 60 years ago, the Foundation is one of Canada’s largest and most effective health charities having invested over $1.3 billion in research related to stroke and cardiovascular disease. As a result of the Foundation’s work and its collaboration with healthcare professionals and researchers, we have been able to witness a decrease in mortality of over 75% attributed to heart disease and stroke, an enormous and drastic change.

The Foundation aims to eliminate heart disease by encouraging Canadians to make lifestyle changes that have an enormous impact in terms of their longevity and health. The HSFC’s nationwide media campaign labeled ‘Make Death Wait’ was both provocative and effective in raising awareness about the dangers of heart disease and stroke\textsuperscript{53}. The campaign included two television advertisements; one broadcasting the statistic that one in three people will die from heart disease and the other targeting women, revealing that heart disease is the number one killer of women in Canada. Additionally, the campaign included print advertisements in newspapers and magazines, radio advertisements and the incorporation of social media conveying the same facts. While many viewed the campaign as edgy and disturbing, it was effective in provoking change. The campaign reached 12.5 million Canadians between November 2011 and February 2012 and motivated more than 100,000 people to evaluate their risk for heart disease and stroke, make recommended lifestyle changes to improve their health and longevity and share their stories\textsuperscript{54}. More than 113,000 people took the Foundation’s online Risk Assessment, engaging in the first step towards a healthy future\textsuperscript{54}. In sharp contrast to the ‘Make Death Wait’ campaign, the HSFC has recently launched their ‘Make Health Last’ campaign, which adopted a more positive tone in comparison to the previous campaign. This movement shed light on the fact that while Canadians may be living longer, they were not necessarily living healthier. The Foundation asked Canadians to look to the future and reflect on what the last ten years of life might look like. It encouraged the public
to assess their risks and make proactive choices to lead a strong and healthy lives using their online tools and tips. In addition to public advertising, the HSFC endorsed a national campaign called ‘Heart Month’, whereby more than 70,000 dedicated volunteers canvass their local neighbourhoods to raise awareness and funds for cutting edge heart and stroke research. With respect to cardiac arrest, CPR and AEDs, the HSFC along with its international partners, continues to promote increased public awareness, education and training in basic resuscitation. It is estimated that more than 1.2 million Canadians are trained or retrained in CPR and AED use annually. The Foundation recognizes and notes that while training is important, anyone can do CPR and use an AED without training.

Similar to the HSFC, the American Heart Association (AHA) has taken an active role in reducing cardiovascular disease worldwide by providing lifesaving tools and information to help people enhance their health and wellbeing. Founded nearly a century ago, the AHA is the largest non-profit organization devoted to fighting cardiovascular disease and stroke. Although they are an American-based organization, their public health efforts and initiatives have a global influence. Recently, the AHA has used a novel media approach, involving a viral YouTube video clip, to promote the recently recommended, chest-compression-only or ‘hands only’ CPR technique. The AHA developed and disseminated an innovative, online campaign with the intention of raising national awareness about cardiac arrest and CPR, promoting hands-only CPR and empowering bystanders to act in OHCA. Their video featured Ken Jeong who was both an internal medicine physician and a well-known comedic actor. The video depicted a middle-aged man who unexpectedly collapsed from a cardiac arrest. To save him, Jeong instructed viewers to call 911 immediately and perform hands only CPR by pushing hard and fast in the centre of his chest to the beat of ‘Stayin’ Alive’- a song that provided the optimal rate for performing chest compressions. This video was exceptionally successful, receiving over one million hits on YouTube alone. It functioned as yet another opportunity to increase public awareness around the importance of CPR and attempts to demonstrate the simplicity and effectiveness of this technique.

In addition to leveraging innovative media platforms, the AHA is working to pass state laws to mandate CPR education in high schools. The HSFC is also working to ensure that high schools across the country make early CPR education a priority and embed training courses into the high school curriculum. Training high school students in CPR offers a number of
advantages. First, educators can introduce and reinforce the importance of early recognition of cardiac arrest and basic life support skills within an established educational environment. Second, by educating children, they begin to foster not only the skills, but the confidence in those skills, early on. Finally, this can be accomplished with minimal investment in time and cost and has the potential to reach a large number of individuals. One example from a school in New York illustrates the potential impact schools can have in improving cardiac arrest outcomes. In 1994, Pierson High school in Sag Harbor, New York began its CPR education program and since then, sixteen lives have been saved because students from this school used their CPR skills in a real life cardiac arrest emergency\(^58\). Thus, mandating CPR education in high schools has the potential to make an enormous difference in CPR performance and cardiac arrest outcomes.

To summarize, the public is not in a ‘void’ when it comes to knowledge about cardiovascular disease, cardiac arrest and resuscitation. The HSFC and AHA are just two examples of the many international organizations that promote strong health initiatives through education and public awareness. It is important to recognize this current public knowledge environment as it provides some context for the research to follow.

### 1.5 Thesis Outline

This dissertation is a paper-based thesis that is organized into six chapters. I have outlined the structure of the remainder of the thesis below:

- Chapter 1 provides an introduction to the study, including; a rationale for its undertaking, the objectives of this research, a reflexive discussion of my assumptions and personal experiences, the existing public knowledge environment and an overview of the thesis and its layout.
- Chapter 2 synthesizes the background literature on bystander CPR informing the study.
- Chapter 3 provides a detailed description of the study’s mixed-methods design and rationale for using this approach.
- Chapter 4 reports on the methods and results of Phase one, the qualitative study.
- Chapter 5 is reports on the methods and results of Phase two, the quantitative study.
Chapter 6 is the Discussion chapter and concludes this thesis. It summarizes the key findings of the study, offers further interpretation and synthesis of both phases of the study, and considers the implications of the study’s findings for Canadian resuscitation science. Finally, I end by proposing a strategy for future improvements in this area.

1.6 Summary

Cardiac arrest is a serious and prevalent medical condition. It is critical that care begin in the field with the bystander, however, in a majority of OHCA cases, bystander action is limited. The research presented in this dissertation assesses lay public understanding of OHCA and willingness to perform CPR within a Canadian context. Findings from this research have the potential to impact CPR education and emergency response systems across the nation.
Chapter 2
Background and Literature Review

"He went to him and bandaged his wounds, pouring on oil and wine. Then he put the man on his own donkey, took him to an inn and took care of him."
- Luke 10:34 (NIV)
The parable of the Good Samaritan

2 Background and Literature Review

The purpose of this chapter is to provide a detailed overview of the literature pertinent to the research topic. This chapter will focus on cardiac arrest etiology and epidemiology and introduce bystander CPR as a central strategy to optimize survival from OHCA. A section of this chapter will present a comprehensive summary of the various issues and concerns that have emerged in documented studies and the current strategies for increasing those efforts.

CPR is a lifesaving, emergency procedure performed on CA patients. The goal of CPR is to maintain the patient’s blood flow and oxygenation by manually pressing on their chest, essentially mimicking the normal function of the heart. For the purposes of this thesis, the term ‘bystander CPR’ will be defined as CPR performed by a person who is not responding as part of an organized emergency response system approach to a cardiac arrest and typically refers to the untrained, lay public.4-6

2.1 The Etiology of Cardiac Arrest

A cardiac arrest refers to the sudden and unexpected cessation of normal, mechanical activity of the heart. The heart ceases to pump blood effectively to the body’s vital organs and, as a result of limited cardiac function, the victim collapses. If normal blood flow is not restored in a timely manner, body tissue begins to die due to insufficient oxygenation caused by inadequate perfusion.

There are numerous causes of cardiac arrest both cardiac and non-cardiac in origin. The most common cardiac causes include ischemic heart disease, non-atherosclerotic disease of the coronary arteries, cardiomyopathies, valvular heart disease, infiltrative and inflammatory myocardial disease, congenital heart disease and primary electrical abnormalities and
arrhythmias. Non-cardiac causes include non-traumatic bleeding, pulmonary embolism, intracranial processes, pneumonia, asthma, convulsions, malignancy, Sudden Infant Death Syndrome (SIDS), hemorrhagic pancreatitis, intoxication, trauma, drowning, choking and carbon monoxide poisoning. Nonetheless, the predominant underlying etiology of cardiac arrest is coronary artery disease. Cardiac arrest is also classified into two broad categories based on the location of the arrest: in-hospital cardiac arrest (IHCA) and out-of-hospital cardiac arrest (OHCA). The focus of this dissertation will be OHCA. OHCA can be further categorized into two types based on where the arrest occurs: private and public cardiac arrests. Private arrests refer to those arrests that occur in the patient’s place of residence, for example a home or an apartment, retirement home or long term care facility. Public arrests refer to arrests that occur in public environments such as streets, parks, airports, community, shopping, sports and entertainment centres. Differences in patient and bystander characteristics between private and public locations may affect the implementation of key time-sensitive interventions and survival rates.

2.1.1 The Epidemiology of Cardiac Arrest

Survival from OHCA remains a significant and serious international health concern and leading cause of death. In Canada and the United States, the incidence of cardiac arrest is approximately 350 000 per year. This estimate includes both IHCA and OHCA and excludes those cardiac arrests that do not receive some form of resuscitation. Furthermore, the estimated incidence of EMS-treated OHCA is approximately 50-55 per 100 000 in Canada and the United States. Survival rates for the most part remain dismal despite advances in cardiac arrest treatment and prevention. Several observational studies have demonstrated that survival rates vary widely amongst different communities, ranging from less than 1% in some communities to 16% in others. A considerable amount of research has focused on identifying potential factors affecting survival and which may explain existing disparities amongst emergency response systems. These include age, gender, witness status of the arrest (i.e. witnessed versus unwitnessed), etiology, location of arrest, initial cardiac rhythm, EMS response time and the provision of bystander CPR and electrical shocks from a defibrillator.
Table 1: OHCA Survival to Hospital Discharge by Jurisdiction

<table>
<thead>
<tr>
<th>Location</th>
<th>OHCA Survival To Hospital Discharge (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detroit</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Chicago</td>
<td>2.0</td>
</tr>
<tr>
<td>Alabama</td>
<td>3.0</td>
</tr>
<tr>
<td>Dallas</td>
<td>4.5</td>
</tr>
<tr>
<td>Ottawa</td>
<td>5.3</td>
</tr>
<tr>
<td>Toronto</td>
<td>5.5</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>7.0</td>
</tr>
<tr>
<td>Amsterdam</td>
<td>9.0</td>
</tr>
<tr>
<td>Milwaukee</td>
<td>9.7</td>
</tr>
<tr>
<td>Vancouver</td>
<td>9.7</td>
</tr>
<tr>
<td>Portland</td>
<td>10.6</td>
</tr>
<tr>
<td>Iowa</td>
<td>11.0</td>
</tr>
<tr>
<td>Seattle</td>
<td>16.3</td>
</tr>
</tbody>
</table>

2.2 The Chain of Survival

In an effort to improve survival from OHCA, the Chain of Survival was developed and has been actively promoted worldwide\(^8,55,73\). The Chain of Survival concept illustrates a system of five integrated actions aimed at maximizing survival from cardiac arrest and optimizing patient outcome\(^74,75\). Since its inception nearly 25 years ago, it has become widely accepted and promoted as the fundamental basis for the treatment of cardiac arrest in out-of-hospital settings. The chain metaphor implies that the chain in its entirety can only be as strong as its weakest link. Thus, the likelihood of surviving an out-of-hospital cardiac event increases when all of the steps in the Chain of Survival are employed during a particular resuscitation\(^74\).

Every five years, the American Heart Association (AHA) publishes a set of documents, known as the AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care (AHA guidelines for short). As part of the 2005 AHA Guidelines, the proposed Chain of Survival was comprised of four critical interventions: 1) early recognition and activation of EMS; 2) early CPR; 3) early defibrillation using an AED; and 4) effective Advanced Life Support (ALS) (Figure 1)\(^76\). On the basis of emerging supportive evidence highlighting the importance of post arrest care, the Chain of Survival was expanded to include a fifth link in the 2010 AHA Guidelines (Figure 2)\(^8\). Essentially, the terminal link in the previous version of the chain, broadly termed ‘post resuscitation care’, was divided into two distinct and separate steps: effective advanced life support and integrated post–cardiac arrest care. The first three links, early recognition, early CPR and early delivery of an
electrical shock from a defibrillator, are most relevant to this research and common to both Chains of Survival.

**Figure 1: 2005 Chain of Survival**

![2005 Chain of Survival](image1)

**Figure 2: 2010 Chain of Survival**

![2010 Chain of Survival](image2)

### 2.2.1 Early Recognition and Activation of EMS

The first step in the Chain of Survival is early recognition of the cardiac arrest and early activation of emergency medical systems. Cardiac arrest victims are unconscious and unresponsive with either no breathing or no normal breathing (i.e. only agonal respiration). Agonal respiration is an abnormal pattern of breathing presenting in nearly half of cardiac arrest cases. It is often described to EMS dispatchers as barely breathing, heaving or labored breathing, problems breathing, noisy breathing, gasping, snorting, gurgling, moaning and groaning. Once the rescuer identifies that the patient has the symptoms mentioned above, they are instructed to immediately call 911 for help.

Recognition of a cardiac arrest by the lay rescuer is often not a simple task and may cause additional stress and anxiety. For example, the presence of agonal respiration may confuse
the rescuer, likely resulting in the rescuer not performing CPR since they perceive the person to be still breathing. Strategies aimed at improving this link in particular are educational in nature\textsuperscript{74}, ensuring that the public is well informed about cardiac arrest warning signs and symptoms, how to appropriately recognize and appreciate when a person has suffered a cardiac arrest and to call 911 and initiate CPR immediately.

2.2.2 Early CPR

After recognizing that the person is having a cardiac arrest, CPR should be initiated immediately. While the procedure itself is a life-saving medical intervention, it can be performed by anyone anywhere. The purpose of CPR is to preserve brain function and tissue viability by manually circulating blood and oxygen around the individual’s body, a function normally provided by a beating heart\textsuperscript{6}. The central goal is to postpone tissue death during the period of time where the patient lacks perfusion\textsuperscript{80}. One should continue to provide CPR until more advanced medical care can be provided to restore spontaneous blood circulation and normal breathing\textsuperscript{64}.

At a minimum, CPR involves chest compressions, whereby the rescuer pushes deep (at least 5 cm) and fast (at a rate of at least 100 per minute) on the patient’s chest\textsuperscript{79}. In the past, resuscitation guidelines have recommended the provision of ventilations in order to substitute the normal function of the lungs and oxygenate the patient’s blood\textsuperscript{76}. However, recent evidence and current recommendations focus on the provision of high quality chest compressions and the endorsement of a simplified chest-compression-only CPR method for lay rescuers\textsuperscript{8}. This is discussed in depth later in this chapter.

2.2.3 Early Defibrillation

The next and arguably one of the most critical steps in the Chain of Survival is rapid defibrillation. Typically in OHCA, an Automated External Defibrillator (AED) is used. AEDs are small, portable, user-friendly devices that can assess the patient’s heart rhythm, determine if the rhythm will respond to an electric shock and if so, will deliver an electric shock to their heart. ‘Shockable’ heart rhythms are limited to pulseless ventricular arrhythmias, particularly ventricular fibrillation (VF) or ventricular tachycardia (VT) and are present in ~25% of EMS-treated, OHCAs in North America\textsuperscript{8}. OHCA patients who present
with VF or VT have significantly better outcomes compared to those who present with pulseless electrical activity (PEA) or asystole as VF and VT rhythms are responsive to defibrillation\textsuperscript{8,81,82}. The importance of delivering the shock as fast as possible was highlighted in the Larsen paper mentioned earlier: every one-minute delay in time to first shock in OHCA translates to a 7-10\% decrease in the chance of survival\textsuperscript{16}. This is reduced to a 3-4\% decrease per minute if bystander CPR is provided prior to defibrillation\textsuperscript{16}. The purpose of defibrillation is to provide electric current to the heart to allow it to return to a normal, perfusing rhythm. If the rhythm is non-shockable and an electric shock is not advised, the rescuer is encouraged to continue providing CPR until advanced medical care arrives\textsuperscript{8}. Public access defibrillator programs have been initiated all over North America and several research groups have investigated the spatio-temporal optimization of AED placement using complex mathematical models\textsuperscript{83-85}. Now, AEDs can be readily found in a variety of public locations including shopping centres, airports, restaurants, casinos, hotels, schools, community, fitness and health centres. AEDs are safe and easy to operate by members of the general public who have no medical background, prior knowledge or experience using them.

### 2.3 American Heart Association Guidelines for Cardiac Arrest Resuscitation

Beginning with its inception in 1974, the American Heart Association has published guidelines contain evidence-based recommendations for treatment of sudden cardiac arrest and highlights gaps in our current knowledge and understanding of emergency cardiopulmonary treatment. Recommendations are formed on the basis of a thorough and systematic evaluation of current scientific evidence. This extensive review of the literature is conducted in collaboration with the International Liaison Committee on Resuscitation (ILCOR), which are task forces comprised of highly knowledgeable experts in the field of resuscitation science from around the globe\textsuperscript{64,86}. In developing the guidelines, task force authors assess and summarize the current evidence and draft appropriate treatment recommendations on the basis of their evaluation. HSFC partners with the AHA to produce the evidence reviewed guidelines every five years. The HSFC sanctions the AHA guidelines for implementation in Canada.
Annual guidelines are reported in several distinct areas: ethics, CPR and associated techniques, BLS, defibrillators and electrical therapies, ALS, post-arrest care, acute coronary syndromes, stroke, pediatric and neonatal resuscitation, and education and implementation strategies. Moreover, expert recommendations are made for three types of rescuers: untrained lay rescuers, trained lay rescuers and healthcare providers. This thesis focuses on lay public knowledge, beliefs, attitudes towards and perceptions of cardiac arrest and bystander resuscitation efforts. Thus, the following discussion will highlight prehospital treatment recommendations for trained and untrained laypersons and specifically, the major changes and new developments that were part of the 2010 update.

2.3.1 Major Changes from the 2005 to the 2010 guidelines

One of the more provocative developments in the 2010 guidelines was the change in the CPR sequence\textsuperscript{64}. In the previous 2005 guidelines, the general approach to CPR was “A-B-C”: Airway, Breathing, Circulation. The new 2010 AHA guidelines recommend an inverted sequence of “C-A-B”: Compressions, Airway, Breathing\textsuperscript{64} (Figure 3). This particular change was recommended for a number of reasons.

Survival from cardiac arrest is highest for witnessed, adult cardiac arrests presenting with certain initial heart rhythms, specifically VF or VT\textsuperscript{71}. For these patients in particular, early chest compressions and early defibrillation are critical. Second, with the A-B-C treatment algorithm, there is a delay in the initiation of chest compression due to time required to open the victim’s airway, retrieve a barrier device if one is available and deliver rescue breaths. By reversing the order of the steps, compressions are delivered sooner and management of the airway is done without interrupting chest compressions. Third, it has been proposed that initiating CPR with a less difficult step, chest compressions, rather than a more difficult step, opening the airway and delivering of rescue breaths, may increase the bystander CPR rate. Guideline authors note that the key determinant in survival from cardiac arrest is a trained rescuer who is equipped with the skills to help and who are willing and able to do so\textsuperscript{86}. Over the past decade, one of the principal objectives in the development of these guidelines is to simplify the steps of CPR, making it easier for a rescuer to recall and execute, or perform with coaching over the phone from an EMS dispatcher. This major change from ABC to CAB was one step in the simplification process.
Moreover, the 2005 Adult Basic Life Support (BLS) Algorithm was further refined and simplified in the 2010 guidelines. The purpose of this was to present the steps of BLS in a concise manner, such that it is easy to learn, remember and execute for all types of rescuers, both trained and untrained\textsuperscript{79}. Figure 4 depicts the simplified Adult BLS Algorithm.

**Figure 4: 2010 Adult Basic Life Support Algorithm\textsuperscript{8}**

In comparison to the meticulous, step-wise 2005 BLS Algorithm, the 2010 BLS sequence is much more straightforward. Due to the inherent difficulty of detecting a pulse, lay
bystanders are now instructed not to check for a pulse and to assume that a cardiac arrest has occurred if the adult suddenly collapses or is unresponsive to shaking and yelling (eg. ‘Annie Annie, are you all right?!?’) and not breathing normally. The latter is left to the discretion of the bystander, erring on the side of starting chest compressions if they are unsure. The rescuer should then call for emergency medical assistance and follow instructions provided by the dispatcher over the phone, which includes initiating chest compressions and obtaining an AED, if one is available, and attaching it to the patient and following the prompts.

The order of the steps of CPR has changed from the 2005 to the 2010 guidelines. In the 2005 guidelines, bystander CPR begins with opening the airway, checking for normal breathing and the delivery two rescue breaths. In the 2010 guidelines, CPR begins with the provision of high quality chest compressions and the focus is on continuous high quality. To provide chest compressions, rescuers are instructed to push hard and push fast in the centre of the patient’s chest, in order to maximize the number of chest compressions provided per minute. In the guidelines, effective chest compressions are defined as 100 compressions per minute, at a depth of 2 inches (5 centimetres) per compression. At a minimum, the lay rescuer should provide high quality chest compressions, regardless of whether they were trained or not. As previously mentioned, this technique is most commonly known as chest-compression-only CPR or ‘hands-only’ CPR. The rescuer should stop providing chest compressions if the AED prompts to check for a shockable rhythm or healthcare providers take over care. If no AED is present, the rescuer should provide chest-compression-only CPR until healthcare providers take over care.

The provision of rescue breathing has been a controversial component of CPR over the years. The 2005 guidelines proposed a universal compression-ventilation ratio of 30:2 for all single rescuers, including lay rescuers, for all cardiac arrest victim types excluding newborns. It should be noted that this recommendation is based on expert opinion rather than clear-cut scientific evidence. The 30:2 compression-ventilation ratio was thought to serve several functions: 1) increase the number of chest compressions delivered and reduce interruptions in chest compressions, 2) minimize the chance of hyperventilation and 3) simplify the CPR process for the lay rescuer. While the importance of early and continuous chest compressions was noted in 2005, a considerable amount of focus was placed on the breathing component of CPR. One of the major changes in the 2010 guidelines was shifting that focus
from the breathing to the circulation component and the promotion of chest-compression-only CPR. In the 2010 guidelines, untrained lay rescuers are instructed to perform chest-compression-only CPR, focusing on pushing hard and fast in the centre of the patient’s chest. There was no recommendation made for untrained lay rescuers with respect to rescue breathing. Slightly different recommendations were made for trained lay rescuers. Trained, laypersons were also encouraged to focus on the chest compression component of CPR. Furthermore, if the trained rescuer was confident, comfortable and able to, they were instructed to provide rescue breaths in a ratio of 30 compressions to 2 breaths. In summary, the 2010 guidelines recommended that lay bystanders, both trained and untrained, should provide chest-compression-only CPR at a minimum.

2.4 Understanding the Barriers to Optimal Bystander CPR Rates

In a recent science advisory published by the AHA, Sasson (2013) reported several challenges to achieving early and effective bystander CPR. Figure 5 identifies the sequence of actions a bystander must undertake at the point of care in OHCA. First, the bystander must recognize the event, the bystander must then call 911 or the equivalent emergency contact number, the dispatcher must correctly identify over the telephone that an OHCA has occurred and provide effective CPR instruction to the bystander and finally, the bystander must perform CPR on the patient. Significant challenges can arise during one or more steps involving the bystander. These barriers vary in nature; some are knowledge and recognition complications, others are familiarity, comfort and willingness concerns while some stem from various anxieties and fears. In the following section, I provide a comprehensive review of the literature on the barriers to bystander CPR and public willingness to act in OHCA.
Figure 5: Four critical steps to the performance of cardiopulmonary resuscitation (CPR) by a bystander

It is important to note some key points when examining this body of research. First, CPR education guidelines vary slightly among national and international resuscitation councils. Although programs are similar in content, no one program can be considered superior to another at this point in time. Second, the studies conducted have examined different populations of interest. For example, some studies assessed students’ attitudes towards CPR and resuscitation, others examined only those who have received some basic life support training, and still others looked more broadly at the ‘general public’. Finally, the studies varied with respect to their goals, methods and approach. Taking all of these factors into consideration, it makes it difficult to compare studies within the literature and draw any sort of generalizable conclusion that is considered to be representative of a local population.

A- Accuracy of Knowledge of Members of the Public

There is evidence to suggest that public knowledge with respect to cardiac arrest, its treatment and associated survival rate is limited and misconstrued. In a study conducted in London, England, Donohoe et al. (2006) reported that only 57% of survey respondents had previously heard of the term CPR and 65% of respondents assumed at least half of the patients who suffer cardiac arrest actually survive, which is a significant overestimation of the true survival rate. Several other studies have demonstrated similar overestimations of the chances of survival. Thorén et al. (2004) reported a study investigating cardiac care patients attitudes towards CPR and CPR education in Sweden, in which 91% of participants had heard of CPR, yet only 64% of individuals were aware of its content. A study of high school students from New Zealand reported a poor understanding of resuscitation related acronyms; 22% of surveyed students understood the acronym CPR and only 32% understood
the acronym ABC. Likewise, in another paper from New Zealand investigating toddler parents’ knowledge of CPR, only 18.5% were able to correctly report the current recommended ratios for adult CPR. This number dropped to 12.2% with regards to child CPR ratios. Kuramoto et al. (2008) reported that less than half of their study’s survey respondents, members of the general public of Japan, understood the importance of immediate CPR. An investigation in Hong Kong found that a mere 21/357 (6%) lay public individuals surveyed would initiate chest compressions if they could not detect a pulse. These findings clearly demonstrate that a lack of awareness and limited knowledge regarding cardiac arrest identification and core CPR processes exist in at least some regions around the world.

B- Relationship between the Bystander and the Patient

Willingness to perform bystander CPR seems to be influenced by the relationship between the bystander performing CPR and the victim. Kuramoto et al. (2008) found that 13% of the survey sample of the Japanese general public would be willing to attempt CPR on a family member or a friend. This number decreased to 7% when asked about willingness to initiated CPR on a collapsed stranger. In another Japanese study of the general public, Taniguchi et al. (2012) observed an increased willingness to perform both traditional and chest-compression-only CPR on victims who were children or relatives and a decreased willingness was noted for trauma victims and strangers. Researchers from New Zealand also found that 84% of high school students reported that they would perform CPR on a family member compared to only 63% who would perform CPR on a complete stranger. Similar findings were reported in a study of medical and dental students’ willingness to perform bystander CPR in Malaysia; while 86.7% of participants indicated ‘definitely yes’ to performing conventional CPR on a family member, this decreased to 58.6% for a close friend and even further to 12.3% for a stranger of a different gender and 12.8% for a stranger of a different race.

Although the literature indicates a trend towards an increased willingness to perform CPR on family members, barriers and concerns also exist with family-member initiated CPR. In Queensland, Australia, Dwyer (2008) found that the majority of survey respondents (68.4%) either agreed or strongly agreed that they were confident in initiating CPR if their relative
were to collapse. However, a third of respondents (35%) also expressed a fear of failing and another third of respondents (34%) expressed anxiety about performing CPR properly.\(^{46}\)

**C- Impact of Prior CPR Training or Certification**

The goal of CPR training and certification is to provide bystanders both with the necessary skills and confidence to execute CPR in emergency situations. In Western Australia, Jelinek and colleagues (2001) reported that willingness by members of the general public to provide conventional CPR was influenced by prior training experience; specifically how recent the training was, the number of times trained, and whether CPR skills had ever been practiced in a real life scenario.\(^{45}\) In a nation-wide survey in Japan, willingness to attempt CPR was associated with having prior training in CPR.\(^{43}\) Likewise, Cho et al. (2010) found both increased layperson confidence and willingness to provide both traditional and chest-compression-only CPR after BLS training.\(^{40}\) Furthermore, a logistic regression analysis from Arizona demonstrated that prior CPR training was a significant predictor of willingness to perform CPR on a family member (OR: 14.348, \(p<0.0001\)) and on a stranger (OR: 5.052, \(p<0.0001\))\(^{11}\).

A lack of knowledge and/or skills has been documented as a central barrier to the delivery of CPR. Skill performance was the main concern perceived by lay rescuers in Riegel et al’s study, conducted in the United States.\(^{95}\) Shiabata et al (2000) reported that 80% of respondents, members of the general public of Ishikawa, Japan, claimed that they would not perform CPR due to a lack of knowledge/ fear of performing CPR incorrectly.\(^{42}\) Kanstad and colleagues (2011) corroborated this finding in a study of high school students in Norway; 79% of respondents indicated they would not perform BLS in a cardiac arrest situation because they felt they had too little knowledge in BLS.\(^{36}\) Likewise, 67% of high school respondents in Taniguchi’s survey study reported a poor knowledge of CPR and a fear of performing CPR incorrectly as the central barrier to the delivery of CPR.\(^{41}\) Thus, the literature suggests that being equipped with the appropriate CPR knowledge and skills facilitates willingness to act in OHCA and that keeping those skills up to date through retraining is important.

Despite the apparent impact of CPR training on both willingness and confidence, very few people engage in training renewals. Furthermore, CPR skills are not kept up to date and/or
not practiced routinely. In Moran and Stanley’s (2008) investigation of toddler parents’ understanding and perceptions of CPR in Auckland, New Zealand, only 64% of parents in the study reported having received formal CPR training; 68% of the trained parents had received their training 3 or more years prior to the study. Moreover, 56% and 62% of parents felt ‘anxious’ or ‘very anxious’ about their ability to perform CPR on an adult and child respectively.48 In Australia, Jelinek et al. (2001) also observed a trend that individuals more recently trained in CPR were more likely to perform chest compressions and mouth-to-mouth on a friend, relative and stranger45. In Canada, the HSFC estimates that approximately 60% of Canadians have been trained in CPR at least once and that over 300,000 Canadians are trained in basic or advanced life support per year96. The proportion of these individuals who are engaging in a training renewal, however, is not known.

D- Fear of Disease Transmission as a result of performing mouth-to-mouth ventilations

Fear of disease transmission and infection as a result of performing mouth-to-mouth ventilation has been documented in the literature as a barrier to performing bystander CPR.7,49 In reality, there is a very small risk of acquiring disease as a result of performing mouth-to-mouth ventilation97. Despite this, it is a commonly reported barrier but varies considerably. For instance, Jelinek et al. (2001) reported that fear of contracting a disease was a central concern for members of the general public of Western Australia in the decision to perform ventilations45. Moreover, 34.8% of North Carolina high school students in Hubble’s study were not willing to perform mouth-to-mouth ventilation due to fear of infections2. In Arizona, Coons and colleagues (2009) noted that 19.4% of the time, fear/concern about mouth-to-mouth contact was cited by laypersons as the most important reason for not wanting to intervene11. In contrast, only 10% of students expressed concern about disease transmission in Omi’s study of Japanese high school students13. Similarly, in Axelsson and colleagues’ paper (2000) reporting a survey of Swedish laypersons, a mere 1% of surveyed individuals perceived a large risk of disease transmission as a result of performing mouth-to-mouth ventilation, while the remaining 99% of surveyed individuals believed there was a small chance or no risk of serious infection10. The precise explanation for such discrepancies in perceptions of mouth-to-mouth ventilation has yet to be elucidated and may be influenced by regional factors (such as disease prevalence) and/or social, cultural or situational factors (such as who the victim is and their appearance).
E- Fear of Litigation or Legal Consequence

Some investigations have highlighted a fear of being sued, liability risk or prompting litigation as an influential factor in the provision of bystander CPR in OHCA. Coons et al. (2009) reported a fear of legal consequence as the most important reason for not providing CPR on a stranger by 21.6% of survey respondents in Arizona\textsuperscript{11}. This was slightly higher compared to Hubble’s (2003) statistics, in which 16.48% and 13.06% of high school students in North Carolina feared legal consequence in performing mouth-to-mouth resuscitation and chest compressions respectively\textsuperscript{2}. In his survey of non-medical personnel in Korea, Cho et al. (2010) found that of the respondents who declined to perform CPR before their training (n=539), the majority, 54.9%, indicated fear of legal liability as the deciding factor. Interestingly, of the respondents who declined to perform CPR even after training (n=137), 47.4% noted fear of legal liability as the deciding factor\textsuperscript{40}. In contrast, only 2% of respondents in Johnston’s study (2003) in Queensland, Australia reported that fear of legal consequence would deter them from performing CPR\textsuperscript{44}. It has been suggested in the literature that the prevalence of this barrier may be heavily influenced by the presence or absence of the protective laws enforced in a particular jurisdiction and public awareness and knowledge of these laws\textsuperscript{49}.

In nearly all regions in Canada, there is no legal obligation for a bystander or witness of a cardiac arrest to intervene, provide assistance and perform CPR. Authors of a recent position statement put forth by the Canadian Association of Emergency Physicians (CAEP) note that the delivery of CPR should be viewed as a moral obligation and social expectation by bystanders\textsuperscript{20}. With regard to legal consequence, any bystander who offers reasonable assistance to those who are injured, harmed, ill or incapacitated is protected from legal repercussion under the Good Samaritan Law. For example, subsection 1 of the Ontario Good Samaritan Act sanctions the following:

\begin{quote}
\textquote{Despite the rules of common law, a person described in subsection (2)\textsuperscript{i} who voluntarily and without reasonable expectation of compensation or reward provides the services...}
\end{quote}

\textsuperscript{i} Subsection (2): Subsection (1) applies to, (a) a health care professional who provides emergency health care services or first aid assistance to a person who is ill, injured or unconscious as a result of an accident or other emergency, if the health care professional does not provide the services or assistance at a hospital or other place having appropriate health care facilities and equipment for that purpose; and (b) an individual, other than a health care professional described in clause (a), who provides emergency first aid assistance to a person who is ill, injured or
described in that subsection is not liable for damages that result from the person’s negligence in acting or failing to act while providing the services, unless it is established that the damages were caused by the gross negligence of the person. 2001, c. 2, s. 2 (1).”

Therefore, a bystander who attempts to provide CPR in OHCA or uses an AED to help save a victim is protected from litigation under the Good Samaritan Law in the event of a negative outcome or backlash from the patient’s relatives or immediate family.

In most parts of Canada, including Ontario, Nova Scotia, Saskatchewan, Alberta, British Columbia, Yukon and the Northwest Territories, a Good Samaritan Law or an equivalent act is established that protects bystanders who provide help in OHCA. The exceptions are Newfoundland and Labrador, Prince Edward Island, New Brunswick, Manitoba and Nunavut, where there is no specific legislation in place. Quebec is unique in that it is the only province in Canada that actually imposes a duty or obligation to help a person in danger. The fact that Good Samaritan laws are provincial legislation and are not uniform amongst jurisdictions may lead to confusion and disparities in legality concerns throughout the nation.

F- Summary of the Barriers to Bystander CPR Performance

In summary, the literature suggests that there are a number of reasons why people may hesitate to deliver bystander CPR in OHCA. The host of potential barriers stem from different issues. For instance, some of the concerns were knowledge-based, such as a misconstrued understanding of cardiac arrest and resuscitation. Others were personal safety fears, for example the contraction of disease or infection as a result of performing mouth-to-mouth ventilation or the possibility or perception of being sued as a consequence of attempting to help. Finally, other factors include lack of knowledge and skills confidence, and situational considerations, such as patient characteristics and relationship of bystander to patient. This review highlights the critical importance of investigating these issues within a Canadian context, as they may play an influential role in determining bystander CPR rates in OHCA.
2.5 What Does it Mean to be a Bystander?

I have just presented a comprehensive review of the barriers to bystander performance of CPR documented in the literature. This review suggests that, for the most part, these barriers inhibit the delivery of bystander CPR in situations of OHCA. However, we have yet to consider another situation, namely bystander responsiveness and willingness to act regardless of barriers; what enables bystander intervention in an emergency situation? What does it mean to be a bystander and what is the impetus for acting?

Unfortunately, historical examples of bystander intervention in instances other than cardiac arrest, have for the most part demonstrated bystander inaction. One of the most famous examples of bystander inaction is that of Kitty Genovese, a 28-year-old woman who was brutally raped and murdered in Queens, New York just steps away from her apartment on March 13, 1964\textsuperscript{99}. Several witnesses looked on and failed to intervene until it was too late. Nevertheless, some counter-examples exist, which demonstrate voluntary bystander helping behaviour. One recent example was the immediate reaction to the Boston Marathon bombings. On April 15, 2013, two homemade bombs were detonated and exploded near the finish line at the Boston Marathon, resulting in three casualties and injuring nearly two hundred people\textsuperscript{100}. In the immediate aftermath, one may presume that the vast number of onlookers would run away from the blasts and area full of flying debris. Rather, the exact opposite happened; numerous bystanders ran bravely towards the scene to help those wounded and affected by the blast. In this moment, these bystanders had no idea if more bombs were to be detonated or what kind of danger they were putting their own lives in by running into the explosion site\textsuperscript{101,102}.

For decades, social psychology researchers have investigated the factors and conditions associated with helping behavior. Some elements have been shown to individually and/or collectively impact bystander action in emergencies. In most emergencies, at least in the beginning, are ambiguous events\textsuperscript{103} that may be confusing to the bystander. In order to engage in some helping action, the bystander must first be able to rapidly observe, interpret and classify the situation as an emergency that requires help\textsuperscript{103-105}. Furthermore, the number of bystanders at the scene of an emergency influences individual decision-making. An individual’s likelihood of helping a person in an emergency situation is related to the number
of witnesses present\textsuperscript{103,105,106}. That is, the more witnesses there are, the less likely any one witness will provide assistance. The presence of other people seems to reduce individual feelings of responsibility. Thus, if there is a single witness, all of the responsibility rests with him; whereas with multiple individuals, that responsibility becomes diffused and shared amongst the group.

The study of altruism and altruistic behavior has been long standing. Definitions of altruism began with pioneers in the field of sociology such as Sorokin and Comte\textsuperscript{107,108}. Sociologist Pitirim Sorokin defined altruism as the action that produces and maintains the physical and/or psychological goods of others; it is formed by love and empathy and in its extreme form, altruism may require the free sacrifice of one’s self for another\textsuperscript{107}. Another traditional perspective was held by Auguste Comte, who defined altruism as the desire or tendency to live for others and refers to behaviours displayed in both private and public contexts that are driven by a sincere desire to do good\textsuperscript{108}. More contemporary literature defines altruism as acting with the goal of benefiting another\textsuperscript{109}. In referring to altruistic behavior in this thesis, I will be using this, contemporary definition.

While there are many historical examples of altruistic bystander behavior, both resuscitation and non-resuscitation related, a deeper understanding of the underlying motivation to help in emergency situations is lacking. In their paper discussing public first aid training, Eisenburger and Safar (1999) indicate that there is a paucity of research on what exactly stimulates bystander action in emergencies and that increasing layperson willingness to apply their skills may improve the proportion of lives saved\textsuperscript{110}. In light of such poor characterization of bystanders’ motivations, Axelsson (2000) sought to explore this further within the context of bystander CPR. Using qualitative methods, their paper reported on nineteen qualitative interviews with voluntary bystanders who performed CPR in OHCA in Sweden, investigating bystanders’ perceptions of their CPR interventions. Results from their study indicate that it is primarily humanitarian values that constitute the foundation of bystander actions. Humanitarian values were expressed as a desire to help other human beings who are in distress and the wish to save a life\textsuperscript{34}. Thus, the provision of CPR was characterized as a natural and instinctive manifestation of innate humanitarian values. This finding complements a statement that social psychologists and seminal researchers Bibb Latané and John Darley made in one of their earlier papers. They asserted that while it may be surprising that anyone ever intervenes
in an emergency situation in which they are not directly involved, there is a cultural norm or expectation that individuals should intervene to relieve the distress of others.\textsuperscript{103}

To summarize, the decision to voluntarily provide assistance or not can be a complex and difficult experience. It is evidently multi-faceted and dynamic, and bystander presence does not necessarily imply bystander action. Decision-making regarding whether to help or not seems to entail weighing situational influences with individual fears and cultural norms.

### 2.6 Strategies to Improve Bystander CPR Rates

In addition to simplifying the CPR process with the recommendation of chest-compression-only CPR, a variety of strategic initiatives have been endorsed to diminish the aforementioned challenges, enhance bystander CPR rates, and ultimately, save more lives in OHCA. These strategies, the implementation of dispatch-assisted CPR instruction and various educational approaches, are considered in the following section.

#### 2.6.1 Dispatch Assisted CPR

With a view towards increasing bystander CPR rates, several recommendations have been made in the 2010 guidelines.\textsuperscript{79} One of these recommendations is that bystander CPR be performed with the help of a 911 dispatcher’s verbal cues until further medical assistance has arrived.\textsuperscript{79} This endorsement has been termed dispatch-assisted CPR (DA-CPR). Also known as telephone-assisted CPR, DA-CPR provides verbal instructions to the bystander to guide and direct them through the CPR process.

The literature supports the implementation of DA-CPR for a number of reasons. First, DA-CPR protocols facilitate early recognition and accurate identification of cardiac arrest. Studies have demonstrated that the ability of dispatchers to accurately detect cardiac arrest over the telephone ranges between 68\% to 90\%.\textsuperscript{4,22,111} Timely identification of cardiac arrest is particularly important to ensure that bystander CPR is initiated as early as possible, to minimize “hands-off time” (the proportion of time where no resuscitation is being administered to the patient). Second, DA-CPR can increase survival from OHCA. Kuisma et al. (2005) demonstrated improved survival to discharge when DA-CPR instruction was given compared to no instruction (p=0.0453).\textsuperscript{112} An additional three studies demonstrated a trend
towards increased survival with DA-CPR instruction\textsuperscript{21,113,114}. Thirdly, DA-CPR has been shown to increase bystander CPR rates. For instance, in a before/after observational study, Vaillancourt et al. (2007) demonstrated an increase in bystander CPR rates from 16.7\% during the control period to 26.4\% during the DA-CPR intervention period\textsuperscript{4}. Thus, DA-CPR has the potential to increase widespread bystander CPR rates that have remained largely unchanged over the last several decades.

Despite the benefits of DA-CPR noted in the literature, an optimal method and instruction protocol have yet to be determined. One of the widely used dispatch protocols is the Medical Priority Dispatch System\textsuperscript{TM} (MPDS), which was developed by Dr. Jeff Clawson and is recommended by the International Academies of Emergency Dispatch (IAED)\textsuperscript{115}. The MPDS\textsuperscript{TM} is designed to improve the emergency medical response system by triaging patients via telephone\textsuperscript{116}. The dispatcher asks various questions that will allow him/her to classify the call based on the chief complaint and severity of the patient’s condition. Once the call has been designated an MPDS\textsuperscript{TM} code, an appropriate course of action can be triggered. Despite employing this triage system, Flynn et al. (2006) reported that the MPDS\textsuperscript{TM} correctly identified 76.7\% of cardiac arrest cases in their study\textsuperscript{117}. This suggests that the MPDS\textsuperscript{TM}, specifically for cardiac arrest identification, can be improved.

To investigate potential improvements to the MPDS\textsuperscript{TM} protocol, a number of studies have evaluated simplified DA-CPR instructions compared to the MPDS\textsuperscript{TM} and have demonstrated a number of positive outcomes. Dias et al. (2007) studied the MPDS\textsuperscript{TM} compared to a simplified protocol for chest-compression-only CPR instruction in a simulated, randomized, double-blind controlled trial. The results indicated significant improvements in the proportion of chest compressions that achieved target depth, mean compression depth, time to first chest compression and average ‘hands off’ time with the simplified protocol\textsuperscript{3}. Similar findings with respect to compression depth were found in a study by Mirza (2008), whereby instructions were simply changed from “push down firmly 2 inches (5 cm)” to a simpler, “push as hard as you can.”\textsuperscript{23} Simplified DA-CPR instructions may be more effective than the more complex MPDS\textsuperscript{TM} protocol.

Furthermore, some research groups have taken DA-CPR one step further and incorporated advanced video technology. In addition to verbal instruction, this allows for real time
demonstration of CPR by the dispatcher and the opportunity to provide real time feedback to the bystander throughout the resuscitation. Yang et al. (2009) evaluated the effect of adding interactive video communication to standard DA-CPR protocol instructions on the quality of chest-compression-only CPR in a simulated cardiac arrest environment\textsuperscript{118}. In this study, individuals who had not been trained in CPR within the last 5 years were randomized into one of two groups, a voice only group and a video group that received voice instruction, video demonstration and real time feedback from the dispatcher. Data indicated that the addition of the video component to DA-CPR lead to improved quality of chest compressions by the bystander. The video group compressed significantly faster (95.5 chest compressions/min vs. 63 chest compressions/min $p<0.001$) and deeper (36 mm vs 25 mm $p<0.001$) compared to the voice only group\textsuperscript{118}. Moreover, the video group had a greater percentage of chest compressions that achieved target depth. Despite better overall performance by the video group, the video group also had longer time to first compression and more hands off time compared to the voice group. In a similar study, Lee et al. (2011) also found a faster mean chest compression rate in the video group compared to the voice group (99.5 chest compressions/min vs. 77.4 chest compressions/min $p<0.001$)\textsuperscript{119}. There was no significant difference in chest compression depth, percentage of compressions that achieved the appropriate depth and mean hands off time between the two groups. Lee’s study also demonstrated that time to first chest compression was shorter in the video group compared to the audio group (184 sec vs. 211 sec $p<0.001$)\textsuperscript{119}, which disagrees with Yang’s findings noted above. It should be noted that these studies compared and evaluated metrics of CPR performance between the two groups. While the data indicates that video groups performed CPR better, these studies did not examine differences in overall survival between the groups. Thus, the impact of video DA-CPR instruction on overall survival from OHCA remains unclear.

In summary, while DA-CPR instruction may considerably influence bystander CPR performance and resuscitation related outcomes, the most effective verbal cues and technological format of DA-CPR remain unclear.

2.6.2 CPR Education

A number of different CPR educational strategies have been investigated. Traditional,
classroom-based sessions for CPR and AED education are widely available and promoted by a number of local and national establishments throughout Canada. In Canada, the most common institutions that offer CPR training resources include the Heart and Stroke Foundation (both national and local sectors), St. John’s Ambulance, the Red Cross, the Canadian Ski Patrol and the Advanced Coronary Treatment (ACT) Foundation, which focuses specifically on free CPR education in Canadian high schools. Local organizations that offer CPR training may include lifeguarding and swim schools, summer camps and local EMS agencies. These various institutions offer several types of classes that vary in content, duration, target audience and cost. For instance, St. John’s Ambulance offers a Level A course, which focuses strictly on one rescuer adult CPR instruction and an introduction to AED use\(^\text{120}\), and is intended for members of the general public looking to build a foundation in Basic Life Support skills. In contrast, the institution also offers a Level C course, which also involves child and infant CPR instruction and artificial respiration with a pocket mask and is recommended for individuals who anticipate working with or who have children\(^\text{120}\). The AHA and HSFC promote an equivalent type of course called Heartsaver® CPR and AED, also designed for lay rescuers.

Instructor based CPR training has been portrayed to the lay rescuer as a formal and often a time-consuming, inconvenient and costly endeavor. In order to pass a course and receive a certification card, one must complete either a written exam or a practical skills test, depending on the course level. The notion that one needs to pass a test to become CPR certified could have a number of potential implications for the learner. To some, a test may suggest that the CPR technique needs to be executed perfectly in order for it to be effective. This could have a profound impact on bystander willingness to perform CPR, since they may get too anxious about the details of the execution, rather than focusing on doing whatever they can to help the patient. Furthermore, some individuals may be intimidated by tests. Rather than providing a realistic scenario and empowering them to act, the test may make them more apprehensive. Potts (2006) notes that one of the potential pitfalls of these courses is that learners may feel they have not mastered the technique enough to perform it effectively. Because there are few opportunities for practice and refreshers, they may perceive that the only option is to retake the course\(^\text{121}\). Finally, a typical course-based session can be costly, in terms of both time and money\(^\text{122,123}\), which may be prohibitive and dissuade
some potential learners of CPR.

To minimize or eliminate many of these challenges and issues, there has been a recent and dramatic shift in the approach to CPR education. Bearing in mind factors such as cost effectiveness, audience, accessibility and feasibility, innovative approaches such as computer-based or video-based interactive instruction and practice have been developed, implemented and assessed in certain settings\textsuperscript{122,124-128}. Currently, the AHA and HSFC promote one of these tools, CPR Anytime\textsuperscript{TM} \textsuperscript{121}. CPR Anytime\textsuperscript{TM} is a personal, self-directed learning program that teaches fundamental skills, including choking management, CPR and AED use. The kit contains a bilingual instruction booklet, a bilingual DVD instruction video and an inflatable CPR mannequin to practice on. The advantages of the CPR Anytime\textsuperscript{TM} instruction method are fourfold. First, the CPR Anytime\textsuperscript{TM} kit is portable and, as the name implies, CPR can be learned anytime, anywhere and at the learner’s convenience. This would address location and accessibility issues, which have been documented as a barrier to the attendance of a CPR training course\textsuperscript{121}. Second, one instruction video can be used to educate many individuals in important BLS skills. Conventional, instructor-based courses present several issues in terms of educating larger populations. Class sizes are limited by availability of space, number of certified instructors to facilitate the sessions and number of mannequins available to support the 3:1 participant-to- mannequin recommended ratio\textsuperscript{129}, whereas the video based course is limited by the ability to see the screen, hear the audio track and have sufficient space to practice. Third, the CPR Anytime\textsuperscript{TM} kit addresses key issues of cost-efficiency\textsuperscript{30}, time and opportunity concerns\textsuperscript{121,123} noted in the literature. The kit can be conveniently purchased online and is less expensive compared to traditional courses. Finally, this program portrays CPR as a life-saving skill that is easy for anyone to learn and do. It emphasizes the simplicity of the intervention and the lack of a requirement to be certified in any skill.

Several studies have demonstrated that the quality of CPR and retention of techniques are accomplished at least as well as, or in some cases more effectively, through the use of video-based tools when compared to traditional CPR courses\textsuperscript{127,130}. Moreover, in a study conducted in Portland, Oregon, Lynch et al. (2005) found equal or better CPR performance amongst layperson adults who were trained using a thirty minute self-training video compared to those who were trained by a traditional Heartsaver\textsupersaver®, three to four hour long, instructor-lead CPR
In this study, CPR performance was measured using five criteria demonstrating CPR skills: assessing responsiveness, calling 911, ventilations to chest rise, chest compressions of adequate depth and proper hand placement during chest compressions. Even more importantly, Lynch’s paper reported that the average number of individuals trained at home using the CPR Anytime™ kit was 2.3 higher, highlighting the potential value in educating many people with one simple tool. Research has also shown that untrained adults who view a brief (5 minute) or ultrabrief (60 seconds) message on chest-compression-only CPR can learn, demonstrate and retain effective chest-compression-only CPR skills. The results from this study indicate that individuals in the brief or ultrabrief messaging experimental groups had a significantly higher average compression rate and greater average compression depth compared to the control group who did not receive any training. These findings provide an opportunity for effective, widespread increased public awareness and the potential future utilization of novel educational modalities and popular social media platforms, such as Facebook and Twitter.

Other CPR education strategies that have been documented in the literature include mass CPR training events, targeted CPR training for family members of individuals with known cardiovascular disease, and CPR instruction in schools. No single strategy has proven to be superior and comprehensive on its own in terms of increasing bystander CPR rates in a given community. Thus, experts in the field have suggested that multiple strategies should be used concurrently to advance CPR education within communities and that an optimal approach would leverage the variety of currently available strategies.

2.7 Summary

Cardiac arrest is a serious, life-threatening condition that requires immediate medical attention. Early bystander CPR and defibrillation are recommended and promoted as critical interventions in OHCA resuscitation, yet they are often not executed for a variety of reasons. Despite ongoing Canadian research in the field of resuscitation science, there is a clear deficiency in research aimed at understanding why bystander CPR rates have consistently remained low and unimproved. The study to follow sought specifically to understand why this may be the case, by exploring public perceptions and understanding of cardiac arrest and resuscitation and investigating public willingness to provide CPR in OHCA using a mixed
methods approach. The next chapter will provide a detailed overview of the methodology used and a strong rationale for the study design.
Chapter 3
Methodology

3 Methodology

3.1 Introduction

The purpose of this chapter is to introduce the mixed methods approach to research and specifically, why I used mixed methods for my study. I will begin by providing a brief overview of qualitative and quantitative approaches to scientific inquiry. In particular, I will consider their strengths and differences and the value of using both methods to investigate my research objectives. Subsequently, I outline several approaches to mixed methods study designs documented in the literature. Finally, I provide a strong rationale and explanation of how I used qualitative and quantitative methodologies synergistically to investigate the proposed research goals. Subsequently, Chapters 4 and 5 will detail the specific methodology, results and findings from the qualitative and quantitative phases of the study respectively.

3.2 Qualitative and Quantitative Scientific Inquiry

Qualitative and quantitative approaches to scientific inquiry are fundamentally different. Differences in design and methodology stem from divergent assumptions about the nature of reality. In quantitative research, reality is objective, singular and externally ‘out there’, independent of the researcher\(^5\). Thus, reality is something that can be studied and measured objectively using a tool or instrument. On the contrary, in qualitative research, reality is seen as subjectively interpreted and socially constructed\(^5\). In a given situation, multiple realities exist and the individuals who are involved in the research construct reality. As a result of this core difference, the features, designs and techniques employed in qualitative and quantitative approaches to research are dissimilar and serve different purposes. The literature suggests that a lack of understanding of the core tenets of the two approaches has tended to polarize qualitatively and quantitatively oriented readers into two camps\(^132-135\). Furthermore, Marshall (1996) writes that the choice between qualitative and quantitative approaches should be determined by the research question and topic and not by the researcher’s methodological preferences\(^136\). In this chapter, I will argue that both methods were equally valuable and appropriate for studying this research topic, which is why I employed a mixed methods
approach to investigate bystander CPR. First, an understanding of the goals and strengths of qualitative and quantitative research and their differences across several domains is required, as it forms the foundation and logic underpinning my decision to use both methods within this study.

A- Purpose and Aims

Qualitative scientific inquiry focuses on understanding and developing a holistic picture of participant experiences and how they view a particular topic in great depth. There is an outright commitment to view events, actions, norms, values and reality from the perspectives of the individuals involved in the research. Merriam (1988) notes that qualitative research is interested in meaning and process - how people make sense of their lives and experiences. In contrast, quantitative scientific approaches seek to identify trends, relationships and to understand phenomena on a broader scale. Quantitative research focuses on amounts: more or less, larger or smaller, often or seldom, similar or different. This type of research relies on statistics and numbers to measure the characteristics displayed by individuals or events that are studied.

B- Sampling

In qualitative research, sampling is purposeful and depends upon selecting information-rich cases for study. Information-rich cases are those from which the researcher can learn the most about the research topic. While sample sizes may be small, the strength and goal is to focus on achieving great depth and richness of the accounts provided by the participants in order to illuminate the topic under study. Conversely, probability constitutes the logic behind quantitative sampling. Sampling depends on selecting a random and representative sample that will provide the best opportunity to generalize the results from the sample to a larger population. While qualitative sampling typically focuses on a smaller number of information-rich cases to explore a phenomenon or topic in depth, quantitative sampling strives for an increased number of participants to achieve representation and generalizability.
C- Data Collection

In qualitative research, data collection is context-bound and occurs in a natural setting. Techniques typically include observations or interviews, which are used to generate rich descriptions and explore complex human issues in depth\textsuperscript{132,136}. Conversely, quantitative data collection techniques depend on the research topic and domain, and usually involve a step-wise, predetermined study plan\textsuperscript{136} that strives for reliable measurement of variables, predictors and indicators\textsuperscript{132}. Methods for collecting data typically involve controlled experiments, trials, observational studies and surveys\textsuperscript{138}.

D- Data Analysis

In accordance with the ontological stance underpinning qualitative research that multiple perspectives on realities exist and are co-constructed by the participants in the research, analytic strategies are for the most part emergent, inductive and data-driven\textsuperscript{136}. Analyses and themes are derived from patterns that emerge from the data itself to provide rich, context-bound information that may help explain a phenomenon from the participants’ perspective\textsuperscript{50}. In contrast, quantitative research employs statistical analyses to accurately observe relationships, measure trends and test hypotheses\textsuperscript{50}. Emphasis is placed on these statistical tests as they capture the ‘reality’ and provide evidence to prove or disprove a predetermined hypothesis\textsuperscript{132}.

E- Role of the Researcher

Finally, the researcher plays an integral and active part of the qualitative research process by interacting with the participants of the research, recognizing the value-laden nature of the research, and reporting a priori values, beliefs and assumptions. This is also reflected in the language used in qualitative studies. The study is typically written in the first person and qualitative rhetoric has been characterized as personal and less formal\textsuperscript{50}. In quantitative research however, the role of the researcher is quite different. Within the quantitative realm, the researcher remains distant and independent of those being studied, in an attempt to establish as ‘controlled’ and as ‘objective’ an assessment environment as possible\textsuperscript{50,136}. In keeping with the detached role of the quantitative researcher, the rhetoric and language of quantitative papers is impersonal, formal and reports evidence and ‘facts’ from the study\textsuperscript{50}.
Summary

In summary, I have presented some broad differences between qualitative and quantitative paradigms and approaches to research, illustrating their individual methodological strengths. Divergent assumptions about reality underpin both qualitative and quantitative study designs, data collection, analytic techniques and rhetoric. Despite these apparent differences, it is possible to combine both methods within one study in an effective and robust manner. In the sections to follow, I will describe how I combined the two methods in my study, and specifically how I capitalized on the differences and fundamental characteristics mentioned above to understand bystander knowledge and perceptions related to CPR.

3.3 Mixed Methods Research

Mixed methods research is considered by some to be a controversial subject. There has been much debate within the methodological literature with regards to the advantages, disadvantages, strengths, and weaknesses of mixing two dissimilar methods within the same research study. Sale (2002) notes that: “Qualitative and quantitative methods have grown out of, and still represent, different paradigms. However, the fact that the approaches are incommensurate does not mean that multiple methods cannot be combined in a single study if it is done for complementary purposes” (p. 50). Along similar lines, several researchers have proposed the term triangulation to describe the combination of two or more elements within one study; for instance, multiple theoretical or analytic approaches, data sources or investigators. Specifically, methodological triangulation refers to the use of qualitative and quantitative methods to address the same research problem within a single study. The purpose of using both methods is to counterbalance the limitations of one of the methodological approaches by playing upon the strengths of the other to ultimately better understand the problem under investigation. Thus, there are certain instances where it is both appropriate and warranted to use both qualitative and quantitative methods within one study. In the following section, I will provide an account of the study’s design and my rationale for using both methods to investigate this research topic.
3.3.1 Mixed Methods Study Designs

The literature describes several ways that researchers can design mixed methods studies. One classification that Morse proposes for designing mixed methods research studies refers to the order in which the methods are used; simultaneous or sequential triangulation. Simultaneous triangulation describes a study that uses both qualitative and quantitative methods at the same time. She distinguishes this from sequential triangulation, which refers to a study that uses the results from one phase to plan or inform the next phase. This particular study is classified as a sequential triangulation design. In this study, the results from the qualitative exploratory work were used to directly inform the design and specific questions pursued in the subsequent quantitative survey. This was significant as it allowed the survey to explore important concepts emerging from the qualitative study across a larger sample.

Similar to Morse’s classification based on triangulation, Creswell (1994) outlines three ways to combine the qualitative and quantitative paradigms in a single study. These include: the dominant-less dominant design, the mixed methodology design and the two-phase design. In the dominant-less dominant design, the study roots itself within a single dominant paradigm and a small component of the overall study is rooted in the alternative paradigm. Creswell notes that the issue with this type of design is that methodological ‘purists’, those who believe that methods and paradigms should not be mixed, could view this as a misuse of the less dominant paradigm. There would be concern that the data collection methods and approach do not match the central assumptions of the study. Thus, this particular approach to combining methods is challenging to execute in a robust and effective way.

The second way of combining the two approaches is the mixed methodology design whereby the researchers mix the two paradigms throughout several or all of the steps during the study. For example, mixture might be demonstrated in the introduction, the purpose and research questions and the analysis. While this approach may add complexity to the overall design, it requires the researcher to be knowledgeable and demonstrate sufficient expertise in both paradigms. Of the designs Creswell proposed, the mixed methodology design characterizes the highest extent of integration so to speak, and arguably generates the most debate within the literature.
The final design Creswell proposes and the design employed for this study is the two-phase design. In this design, the researcher conducts a qualitative study and a quantitative study that are separate and distinct, yet connected or linked in some manner. The two-phase mixed-methods design is essentially synonymous with Morse’s sequential triangulation design\(^{146}\). My research can be classified in either of these terms. This particular design has been well documented within the literature as an accepted method for combining the two differing paradigms\(^{40,142,146,149}\). The advantage is that since the two paradigms are kept separate, the researcher is able to present clearly and distinctly the methods and assumptions of each phase of the study. However, one possible disadvantage is that the reader may overlook the connection between the two phases. Thus, it is critically important that the researcher articulate an explicit relationship between the qualitative and quantitative phases. In Chapter 5, I will clearly connect the first, qualitative phase and the second, quantitative phase of this study. I will specifically explain how the results from the qualitative study directly informed both the content and design of the quantitative survey tool.

3.3.2 Rationale for using Mixed Methods

As described above, my research employed a two-phase, or sequential triangulation design; an in-depth qualitative study, the results of which directly influenced the content and structure of a larger, population-based survey. I primarily used the qualitative tradition as the foundation for this study’s design as the two phases focused first on ‘depth’ and then ‘breadth’. The qualitative approach employed in phase one allowed for a rich and in depth exploration of participants’ perceptions and perspectives on the topic. In the subsequent quantitative phase of this study, I determined the breadth of those perceptions and perspectives; how widespread they were and to what extent were they shared by others in an expanded survey sample.

Green and Thorogood (2009) note that qualitative work can precede quantitative work if it is preparatory or exploratory work or if the researcher aims to refine aspects of quantitative study or generate hypotheses on the basis of the qualitative findings\(^5\). Similarly, Doyle et al (2009) note that qualitative research may be used to generate items for inclusion in a survey and direct lines of inquiry pursued in the questionnaire\(^15\). This formed the foundation for the rationale to employ a multi-method study design in this specific project. Despite the fact that
a considerable amount of research has been conducted on the barriers and facilitators of bystander CPR performance internationally, very little research exists on this topic within a Canadian context. Furthermore, as seen in the comprehensive review provided in Chapter 2, within this body of literature, there exists a wide variation amongst international communities in terms of the reasons why individuals may be unwilling to perform CPR. While the goal of this particular research project was to better understand Canadian perspectives on cardiac arrest, resuscitation and willingness to perform CPR on a large scale, there were no Canadian-specific research results to inform the survey design and content. Thus, the exploratory, qualitative portion of this study allowed for the development of a deeper understanding of current public knowledge of cardiac arrest, the accuracy of that knowledge and their fears, motivations and intentions underpinning their potential behaviours in OHCA. In accordance with Green and Thorogood’s assertions, the results from the qualitative phase provided essential information for developing a survey that is capable of generating reliable and valid data across the population. Moreover, the qualitative findings directly informed the focus of the survey, allowing for the refinement of its content and specific questions. As a result of the in-depth, exploratory work presented in Chapter 3, a robust and well-informed survey tool was designed.

The literature also suggests that a central motivation to mix methods is that researchers will be able to learn more about the research topic by combining the strengths of both research paradigms to compensate for their respective weaknesses. In this study, the strengths of each paradigm are very clearly connected to the goals and aims of the study as a whole. Punch (2009) writes that one of the strengths of qualitative research is that it brings sensitivity to meaning and context and the methodology is flexible, which enables the researcher to explore the research topic in great depth with a small sample. Accordingly, qualitative methods were deemed both ideal and appropriate for better understanding the underlying motivations and barriers to performing bystander CPR in rich detail. The strengths of quantitative research methods are quite different. Rather than attempting to understand a topic in great depth, quantitative research seeks to identify trends and relationships, draw comparisons between different groups of interest and understand the research topic on a large scale. It was important to investigate how widespread concepts explored in the qualitative work were in a
larger, representative sample. Therefore, I needed to design a well-informed survey that I could distribute nation-wide to develop a quantifiable, Canadian perspective on this topic.

3.4 Summary

Quantitative and qualitative traditions have different philosophical underpinnings and assumptions regarding reality, which result in unique research methods and techniques for each. The combination of both qualitative and quantitative methods in this study using the two-phase or sequential mixed methods design was appropriate and justified. Both methodologies were suitable to investigate the research topic as the qualitative offered the strength of ‘depth’, and the quantitative allowed for the exploration of ‘breadth’. The combination of the two approaches really allowed for the development of a robust and comprehensive understanding this particular topic. In the following two chapters, I present the specific methods and results from phase one and phase two of this research project.
4 Phase One: Qualitative Study

4.1 Introduction

In this chapter, I present phase one of this research; the qualitative study. The specific objectives and aims of phase one were: 1) to obtain a rich and comprehensive understanding of public knowledge of cardiac arrest; 2) to explore perceived willingness to engage in resuscitation efforts; and 3) to better understand public perceptions and experiences with CPR education. These areas were explored in depth with members of the general public to illuminate matters that they felt were significant and important including any facilitators or enablers, issues, impediments or concerns. As previously mentioned in Chapter 1, there is a paucity of research assessing public understanding and perceptions of OHCA and willingness to perform CPR within a Canadian context. The following exploratory, qualitative study was conducted to address the above goals and inform the design and development of a larger, Canada-wide, population based survey (Chapter 5 of thesis).

4.2 Methods

4.2.1 Study Design

This investigation employed qualitative research methodology; specifically a descriptive qualitative approach, as outlined by Sandelowski. To date, the literature on qualitative methods has become vast and the methods available to qualitative researchers are heterogeneous in terms of their complexity, foundation and approach to exploring and understanding phenomena in question. Amongst the more complex, theoretically-based and sophisticated methodologies, qualitative description has been somewhat overshadowed, in part due to the lack of a clear-cut definition, description and consensus on the method itself. Sandelowski (2000) notes that qualitative description is one of the most frequently employed methods within the qualitative realm, yet remains one of the least well-articulated methods. Caelli (2003) further describes qualitative description as research that aims to discover and understand a phenomenon, a process and the perspectives of individuals.
This approach allows for the development of a rich, comprehensive and thick
description\textsuperscript{154,155} and in this case to understand participants’ perspectives on cardiac arrest
and resuscitation in depth. Thus, qualitative descriptive methods were best-suited and most
appropriate to investigate the specific aims and objectives of phase one.

4.2.2 Data Collection

Data collection was accomplished using one-on-one semi-structured interviews. Interviews are
the most widely used approaches to the production of qualitative data\textsuperscript{156}. Interviewing is a
methodological technique used to gather data from an informant by asking them questions and
allowing them to react verbally\textsuperscript{157}. The goal of a one-on-one research interview is to produce
an authentic account and description of experience or understanding of phenomena from the
first-person perspective\textsuperscript{156,158}. For this research project, I employed one-on-one interviews to
collect in-depth qualitative data exploring participant knowledge of cardiac arrest, views on
CPR education and perceived willingness to perform CPR.

Interviews followed a semi-structured format. This means that the researcher knows in
advance the topic, phenomenon or experience he/she wants the participant to describe so they
prepare a preliminary set of questions that provide a framework for the discussion that
develops with the participant\textsuperscript{156}. This semi-structured design offered some direction around
certain topics but allowed the participant to guide the conversation and discuss matters that
they believed were of particular importance and relevance\textsuperscript{159}.

I developed an interview guide (Appendix A) that was directly informed by the literature and
study objectives, and was in keeping with the exploratory nature of the investigation\textsuperscript{160}. The
guide contained three overarching topic areas: 1) knowledge of cardiac arrest and CPR; 2)
barriers and facilitators to the performance of CPR; and 3) training experiences and CPR
education. Questions were general and open-ended to avoid leading participants to answer in a
particular way and to allow the interviewer to guide conversation opened up by the interviewee
\textsuperscript{156}. For instance, interviewees were posed a general question, such as: ‘If you were in a public
place and someone were to collapse, what are some of the things you would think
about/consider in deciding whether or not you would help?’ This allowed individuals to talk
about specific scenarios that were meaningful to them.
Data analysis occurred in conjunction with data collection in order to ensure that emerging themes were fully investigated and to identify additional topic areas requiring further investigation\(^{50,161}\). After ten interviews were completed and transcribed, I conducted an interim analysis of the data. I also consulted a member of my thesis committee to discuss the initial coding framework, emerging analysis and different approaches to framing certain questions that were sensitive or participants found challenging to answer. The interview questions were then refined based on this initial analysis and discussion.\(^{50,162}\)

Appendix A contains the two iterations of the interview guide, which reflect the changes made following the interim analysis. First, the ordering of questions posed was altered slightly. During the first ten interviews, I found that conversations moved fluidly from knowledge to barriers/enablers to past educational experiences rather than from knowledge to education to barriers/enablers. Thus, the overall order of the three lines of inquiry was reversed in the subsequent iteration of the interview guide. Second, some questions were added to the knowledge section of the interview guide. One question aimed to explore a disconnect between the definition of, and the signs and symptoms of a cardiac arrest, which emerged from the first set of interviews and developing analysis. Furthermore, two questions were added to better understand perceived psychological emotions and reactions to witnessing a cardiac arrest. Finally, one probe was added regarding the actions the participant would take had they witnessed a cardiac arrest. Instead of imposing a particular relationship with the cardiac arrest victim (for example, indicating that they were a family member or a stranger or a child) I asked if their actions might change depending on who the person was who collapsed. This way, the participant could lead the conversation and talk about different types of victims in their own way. In relation to this, some interesting lines of discussion and issues (which are discussed in detail in the following sections) were brought to the surface. For instance, during their interviews, many participants indicated an increased willingness to act for children compared to adults. If this was brought up in the discussion, I probed as to why that might be the case. Some individuals struggled to articulate an answer within the context of themselves. One strategy I adopted to get around this was to probe in a more general sense; rather than asking the participant specifically why they would be more inclined to do CPR on a child, I explained that this seemed to be something others had discussed and asked them to speculate as to why they, along with others, might feel this way. This strategy was effective as participants were
noticeably more comfortable speaking about this topic in the general sense compared to when it was more ‘personalized’.

Interviews lasted between 15-52 minutes in duration and typically were between 30 and 40 minutes in length. Interviews were conducted via telephone. A number of factors were considered in the decision to conduct interviews via telephone rather than face-to-face for this particular study. The central concern in adopting this mode was ensuring that the quality of the dataset collected via telephone would be comparable to that collected in person. Literature suggests that telephone interviewing is both an acceptable and valuable mode of data collection\textsuperscript{163}, is effective in terms of obtaining complete interviews\textsuperscript{164}, and gathering sensitive data\textsuperscript{165,166}. Sturges et al (2004) conducted a study that, due to methodological limitations, employed both face-to-face and telephone interviews within the same study to understand how correctional officers and visitors in county jails view their roles and make sense of their role during the visiting period at the jail\textsuperscript{167}. Upon comparison of the two types of transcripts, the researchers found no significant differences in the quality of the transcripts. They also considered specific limitations with telephone interviewing such as the absence of visual and non-verbal cues. However, they noted that the interviewer can note verbal cues (hesitations, sighs, rushed answers) and make notes to guide the use of the data and focus on the interviewee's responses\textsuperscript{167}. Sturges et al (2004) concluded that telephone interviewing can be used productively as a qualitative data collection mode. They proposed four issues that are central to mode selection when conducting qualitative interviews: sensitivity of the topic, access to hard-to-reach respondent groups, interviewer safety and financial considerations\textsuperscript{167}. Telephone interviews provide a heightened sense of anonymity for participants who are discussing more sensitive topics and provide the opportunity to interview those who may be reluctant if the interview was face-to-face. Further, in studies where the researcher’s interests are more narrowly focused, immersion in the environment may not be necessary or impact the quality and depth of the information collection. Moreover, telephone interviews ensure the researchers’ safety as they do not need to conduct interviews in potentially unsafe or harmful environments and they are cost-effective\textsuperscript{167}. Considering all of these factors, I had sufficient reason to believe that conducting the interviews for this study via telephone would be equally as reliable, rich and robust compared to conducting the interviews in person.
4.2.3 Sampling and Recruitment

A public recruitment strategy was employed and was facilitated by an external marketing company, Canadian Viewpoint\textsuperscript{168}. Prior to seeking assistance from Canadian Viewpoint\textsuperscript{168}, I experimented with two alternative recruitment strategies. First, I attempted to recruit individuals into the study from the busy streets of downtown Toronto. This proved to be an unfeasible strategy and recruitment rates were persistently low. Next, I attempted to recruit individuals from waiting rooms in St. Michael’s Hospital. However, the research team noted that this particular group of people, who were already within a healthcare setting, may have a particular set of concerns that would influence their views and responses to interview questions. Thus, public recruitment that was facilitated by an external marketing company was felt to be the most appropriate approach. Canadian Viewpoint’s\textsuperscript{168} well-established, representative, public research panel provided us with access to a sample that could be used to tap into the views of the general public. Furthermore, since Canadian Viewpoint\textsuperscript{168} had profiles of their panel members, this made it feasible to conduct maximum variation sampling, which I describe in detail below. For the qualitative phase, Canadian Viewpoint\textsuperscript{168} assisted with sampling, recruitment and scheduling of participants from the general population through their well-established, representative research panels. The use of online panels as a recruitment platform is becoming increasingly prevalent and has been well documented in the literature across varying research disciplines such as medical\textsuperscript{169}, social\textsuperscript{170} and psychological research\textsuperscript{171}. Recruitment facilitated via research panels offers certain advantages for researchers such as pre-screening of the sample based on panelist profiles and variables of interest, reduced cost and field time\textsuperscript{171}. These benefits have made online panels a distinguished and desirable mode of recruitment. For this study, all potential participants had to be 18 years of age or older, speak English and be registered with the Canadian Viewpoint\textsuperscript{168} research panel to be eligible for inclusion. All interviewees were members of the general public of Toronto.

Individuals were sampled purposefully using a maximum variation sampling technique\textsuperscript{161}. Maximum variation sampling involves identifying characteristics for constructing the sample that might lead to differing experiences or perspectives towards the phenomena under study\textsuperscript{141}. By sampling across these characteristics, the researcher is able to thoroughly
investigate, describe and understand variations in accounts, while also examining shared and common findings. Therefore, this technique ensured that a wide range of relevant experiences and opinions were explored, and that a broad range of perspectives on the topic were captured\(^{152,50,161}\). The final sample included a roughly equal number of individuals in each of three categories: 1) those who have never had CPR training, 2) those who have been trained in CPR recently, and 3) those who had been trained in CPR, but not recently. Based on the literature review, I anticipated that the presence or absence of prior CPR training would impact knowledge and understanding, willingness and perceptions. Furthermore, for those who had been trained, I felt that exposure to different sets of guidelines might influence perspectives. For the purposes of this study, ‘recently’ was defined as any training received within the last three years, in accordance with the change to the 2010 guidelines and the endorsement of chest-compression-only CPR. Individuals who were trained in CPR but greater than three years ago (i.e. prior to the establishment of the 2010 guidelines) were grouped into the ‘not recently’ trained subgroup. Within each subgroup, there was approximately an equal number of men and women and a strong mixture of ages. As per accepted research practice in maximum variation sampling\(^{161}\), five to eight sampling units or interviewees per subgroup is usually considered sufficient to achieve thematic saturation, the point at which new data no longer brings additional insights to the research questions and the primary themes developed\(^{161}\). Therefore, the anticipated sample size was approximately eighteen to twenty-five individuals. The sample size recommended in the literature was only used as a guide and rule of thumb and sampling continued until thematic saturation was achieved.

4.2.4 Data Analysis

Data analysis occurred in conjunction with data collection in order to ensure that emerging themes were fully investigated and to monitor general areas requiring further investigation\(^{50,161}\). Once all interviews were completed, an inductive thematic analysis of the data corpus was then undertaken, as outlined by Braun and Clarke\(^{162}\). This strategy for data analysis was in keeping with the qualitative descriptive approach as outlined by Sandelowski. Sandelowski (2000) noted that descriptive analysis is data-driven and more interpretive, as it goes beyond measuring frequencies and means and examines the latent content of the data\(^{152}\).
The inductive thematic analytic approach outlined by Braun and Clarke and described below provided a systematic method for undertaking such content analysis.

A thematic analytic approach provided a method for recognizing, organizing, categorizing, analyzing and finally, reporting repeated patterns of meaning within the data corpus. Inductive thematic analysis, also known as the ‘bottom up approach’\textsuperscript{162}, involves the identification of themes that are strongly linked to the data and allows for themes to emerge that are important, relevant and grounded in the data itself\textsuperscript{162}. This differs from a deductive or ‘top down’ thematic analysis whereby the analysis is driven by the researchers’ theoretical or analytic interests. In adopting an inductive analytic approach, I initially coded the data corpus without the use of a pre-existing coding framework. The themes identified are rooted within the data and the analytic procedure is data driven. As a qualitative researcher, I was aware of my personal experiences and what I bring to my research throughout the analytic process and how they shaped the emerging analysis. Furthermore, the inductive approach allows for the development and presentation of a rich description of the entire dataset, so the reader obtains an accurate reflection of the content of the data.

As per Braun and Clarke, the first phase of inductive thematic analysis involves becoming familiar with the data. In the literature, transcription is viewed as a central phase of qualitative data analysis and engaging in transcription is actually an interpretive act, whereby meaning is generated to some extent\textsuperscript{172}. The immersion process within the data allows one to explore the breadth and depth of the content of the data\textsuperscript{162}. Recognizing the significance of the transcription process, I personally transcribed each interview audio file. Subsequently, I actively read and reread the entire dataset to begin to identify potential patterns within and between transcripts.

After becoming sufficiently familiar with the content, I developed a list of preliminary codes\textsuperscript{162}. Codes are the most rudimentary analytic element. They identify a specific aspect or idea embedded within the data that appears interesting, relevant and sheds light on the topic\textsuperscript{162,173}. I employed manual coding whereby I wrote notes along the margins of the interview transcripts. In the early stages of analysis, I adopted a broad analytic scope in an attempt to code for as many themes or patterns as possible. Also, I coded and included excerpts of data that departed from the dominant pattern or story.
Next, I sorted and organized codes into potential overarching themes. Themes differ from codes in that they are broader entities of analysis where interpretation and critical analysis take place. Within this stage, I considered the relationship between codes, and different subthemes that potentially could comprise a particular theme. I excised chunks of coded data from their donor transcript and collated them to their theme. This resulted in a compendium of candidate themes and subthemes with illustrative excerpts. This phase culminated with the development of an initial thematic map.

I then reviewed and refined candidate themes and subthemes. The refining process took place at two levels: the coded data extracts and the entire dataset as a whole. In examining a particular theme, I questioned whether the extracts belonging to that theme formed a coherent and meaningful pattern. Likewise, I examined whether subthemes were grouped together to articulate the broader theme. Certain candidate themes did not have enough supporting data and were subsequently collapsed or rearranged within the map as a whole. I reconsidered the significance and relationships between themes and sub-themes in developing the final thematic map.

The remaining two phases included refining the names of each theme and developing a concise, complete, non-repetitive account of the story as a whole. A detailed account of each theme within the final thematic map is provided below. Interview excerpts are included to illustrate each theme. In addition to describing the themes in detail, I drew connections between and amongst different concepts to generate a global, holistic and rich picture of the phenomenon under investigation.

Thematic maps and their iterations were critical throughout the analytic process. Thematic mapping offered a method for integrating, visualizing and graphically representing the knowledge that emerged from this study. Furthermore, thematic maps allowed for simple and seamless modification of the relationship between themes and subthemes as the analysis progressed. In this study, I adopted a “mind map” approach as proposed by Buzan. Mind maps are image-centred, radial diagrams that represent connections between portions of the ideas or concepts hierarchically. Key or main domains are more central and branches are used to represent the core concepts that constitute a particular domain. Sequential drafts of the mind maps demonstrate its evolution throughout the iterative analytic
and refining process and are included in Appendix B. These maps exclude the supporting interview excerpts for the purposes of clarity. The final map developed is found below in Figure 6.

4.2.5 Methodological and Analytic Rigour

To ensure rigour in qualitative research, Pope and Mays (1995) argue that researchers should strive to generate a detailed account of both the method and data, such that another researcher could follow the analysis and arrive at essentially the same conclusions, and to construct a reasonable and coherent explanation of the phenomena investigated. They also note that many qualitative researchers fail to execute this effectively and in sufficient detail. To address these assertions, I attempted to provide a thorough and detailed account of the research processes and methodological decisions I made throughout the study.

I employed a number of different strategies to establish analytic rigour. To ensure consistency throughout the entire research process, I personally conducted all twenty-one interviews. Of the twenty-one interviews conducted during the study, two participants, participants #1 and #5, did not wish to be audio-taped. They did not provide specific reasons explaining their reluctance. However, they did express that they wished to participate in the study, but did not wish to be audio-taped specifically. As such, I took diligent field notes during each of these conversations and the participants’ consent to partake in the interview was noted in the field notes. I drafted thorough and comprehensive summaries of these two conversations immediately after completing each interview. The remaining nineteen interviews were audio-taped and I carefully transcribed each of them. Accurate word for word transcription is central to ensuring the authenticity of the data, scientific and ethical integrity, and sets the stage for the subsequent analysis. Of note, I transcribed meticulously, listening and re-listening to the audio-tapes several times. The two interviews that were not tape-recorded were not qualitatively different in their content from the remaining nineteen taped interviews conducted.

Members of my thesis committee were consulted to discuss the developing coding framework, emerging results and iterations of the concept map. It should be noted that the committee did not actively execute any of the analytic steps described above. Rather, I engaged in the analytic processes and made my own interpretive decisions and choices. The members of my committee functioned as validity checks and sources of analytic discussion regarding the data.
These discussions helped confirm that the codes were data-driven and the emerging analysis presented a logical and authentic account of the story that the data were telling. Consultations with my committee also helped me view the data from a different perspective and the possibility of alternative explanations\(^{155}\). Finally, I adopted a broad coding framework early on and examined ‘negative’ or ‘deviant’ cases closely\(^{155,176}\). ‘Negative’ or ‘deviant’ cases are those that depart from the main story or explanatory scheme. In the sections to follow, I detail some of these divergent data to ensure that I present the reader with a well-rounded and truthful account of the data.

### 4.2.6 Consent Procedure and Protection of Human Subjects

During recruitment, a formal letter of information regarding the study and invitation to participate was sent to each individual participant. Prior to agreeing to partake in the study, participants were given a minimum of twenty-four hours time to read this letter, ask any questions or verbalize any concerns they may have had. Upon agreeing to participate, the recruitment company, Canadian Viewpoint\(^{168}\), provided me with a spreadsheet containing the name of the participant, the scheduled interview date and time and their contact information. This spreadsheet was kept on a password-protected computer to which I was the only one to have access. Upon completion of the study, this Excel spreadsheet was destroyed to protect participants’ personal contact information.

As mentioned previously, I conducted all interviews by telephone. I audio-taped and transcribed each interview verbatim for the purposes of transcription and analysis\(^{160}\). At the beginning of each interview, I ensured that each participant had received the letter described above and reiterated the main points of this letter to them. The purpose and goals of the study were clearly described in a consistent way to each participant. Procedures surrounding privacy and confidentiality, anonymity, documentation alternatives to audio-taping and the voluntary nature of participation were all clearly explained to ensure participant comfort during the interview and promote open and honest discussion. Subsequently, verbal consent was obtained (either on audio record or noted in the field notes) and I proceeded with the interview. This study was granted approval by both the St. Michael’s Hospital and University of Toronto Research Ethics Boards (REB).
4.3 Results

The characteristics of the interview sample can be found in Appendix C. A total of twenty-one in depth interviews were completed; eleven women and ten men. Participants’ ages ranged from 19-62. Most participants had completed some post-secondary education (university or college education) and a mix of ethnic backgrounds existed in the sample. Based on previous research, the literature suggests that the presence or absence of prior CPR training influences one’s perceived willingness to provide CPR in OHCA. Thus, the sample was recruited based on the primary characteristic of interest; the presence or absence of prior CPR training and how long ago CPR training took place. Table 2 below displays the distribution of interviewees based on these eligibility criteria. For simplicity’s sake during the analysis, groups were given a letter designation: group A was never trained in CPR, group B was recently trained in CPR within the last three years and group C was previously training in CPR but three or more years ago, as indicated below. For the purposes of privacy, confidentiality and anonymity, interviewees will be referred to by interview number and training group (ex. interviewee #2A).

Throughout recruitment, Canadian Viewpoint\textsuperscript{168} aimed to enroll participants based on three training groupings, so that the distribution between the groups was roughly equal in size. As previously mentioned, five to eight participants per group, per characteristic of interest is typically considered sufficient to achieve thematic saturation, the point at which new data no longer brings additional insight into the research questions and objectives\textsuperscript{161}. After completion of twenty-one interviews and consultation with my thesis committee, I felt that thematic saturation had been achieved and more interviews would prove to be redundant and not provide additional, insightful information\textsuperscript{147,179,180}. 
Table 2: Distribution of interviewees (by interview number) based on Prior CPR Training Group

<table>
<thead>
<tr>
<th>Group A- Untrained in CPR</th>
<th>Group B- Recently trained in CPR (&lt;= 3 years ago)</th>
<th>Group C- Not recently trained in CPR (&gt; 4 years ago)</th>
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Upon analysis, five major themes emerged: 1) Knowledge; 2) Barriers; 3) Social Obligation and Responsibility; 4) Psychological Factors; and Implications; and 5) Education. Each of these themes is comprised of several, interrelated sub-themes. A visual representation of these themes and subthemes can be found in the concept map in Figure 6. Interview excerpts were selected and included throughout this chapter to illustrate each theme and illuminate key concepts.
**Figure 6: Final Concept Map**

**Knowledge**
- Most important step of CPR and chest-compression-only CPR
- Estimation of the survival rate from OHCA
- AEDs

**Barriers**
- Doing it wrong/missing a step
- Helping vs. hurting
- Personal safety
- Don’t have the knowledge or training
- Lawsuit/litigation
- Importance of context and patient characteristics
- Mouth-to-mouth ventilations

**Psychological factors and implications**
- ‘Life vs. Death’
- Being in the spotlight
- Emotional/psychological reactions

**Social Obligation and Responsibility**
- Culture and responsibility
- Looking to others

**Education**
- Reasons for re/training or not
- Educational focus and structure
- Public awareness and advertising
- False representation of the real life

**Self-perception of knowledge and recognition of cardiac arrest**
4.3.1 Knowledge

Throughout this theme of ‘Knowledge’, we begin to see how members of the general public conceptualize cardiac arrest and resuscitation based on their own knowledge (or lack thereof) and perceptions. ‘Knowledge’ is comprised of 5 sub-themes: 1) Self-perception of knowledge and recognition of cardiac arrest; 2) Estimation of Survival Rate from OHCA; 3) Knowledge of CPR, its purpose and the techniques involved; 4) Most important step of CPR and Chest-Compression-Only CPR; and 5) AEDs. Each of these sub-themes will be explored in depth in the following sections.

Sub-themes:

A- Self-perception of knowledge and recognition of cardiac arrest

The first portion of the interview was designed to assess the participants’ level of knowledge with regards to cardiac arrest and CPR. For the most part, interviewees stated that their perceived level of knowledge was average or below average. There were some participants who felt that they knew a “fair deal” or more than average due to their past involvement with swimming programs or prior training experiences. In terms of participants’ understanding of what cardiac arrest is, most people recognized that it entailed something malfunctioning with the heart and that the heart stopped beating. Some participants used the terms cardiac arrest and heart attack interchangeably and went on to describe a heart attack. As mentioned previously, a cardiac arrest refers to the sudden and unexpected cessation of normal, mechanical activity of the heart\(^{59}\). A heart attack, medically known as a myocardial infarction, occurs when the blood supply to the heart muscle itself is reduced or completely blocked, causing damage to the heart muscle\(^{181}\). In contrast to a cardiac arrest where the heart stops beating, during a heart attack, the heart continues to beat albeit at a slower rate. Most importantly, the medical management of a cardiac arrest and a heart attack are different. With regards to cardiac arrest symptoms, participants noted signs such as “chest pains”, “pains in the left arm and/or neck”, “sweating”, “nausea”, “shortness of breath” and “discomfort”. Very few informants mentioned the terms “unconscious” or “collapse” or “pulseless”; if these were mentioned, they were described as things that might occur, but not in every instance of cardiac arrest. For example, one participant answered in the following manner:
“Not a lot… Probably about average [knowledge of cardiac arrest]… well basically, there’s a problem with the heart and it’s not beating… That would be my understanding there… I think they would be in some sort of distress, probably some pain. Some chest pains involved, apparently. Possibly pains to the, I think it’s the left arm and neck there… I think the person would be upset and worried… As I said, chest pains….something along those lines I would expect.” (Interviewee #14A-untrained)

“Cardiac arrest…in my words would be when blood stops flowing through the heart as a result of, I’m not sure maybe, I don’t know if there’s numerous different ways in which that can happen. But as far as I can tell, arteries get clogged up to the point where blood isn’t flowing smoothly anymore and eventually the blood flow through the heart arrests and you end up having a cardiac arrest…[Cardiac arrest] feels like a lot of pressure in your chest. Sometimes, obviously the blood’s not flowing, so you start getting numbness numbness, numbness you know like in your fingers, numbness in your toes or you know, your entire left side or whatever, blood’s just no flowing anymore. It’s not, I know it’s not how it works in TV. In TV all of a sudden somebody falls over ‘oh my G-d he’s having a heart attack’, that’s not the way it works.” (Interviewee #9B-trained)

Along similar lines, participants expressed difficulty in terms of recognizing when a cardiac arrest has actually occurred and distinguishing cardiac arrest from other medical emergencies.

“I mean some people just suffer from fainting spells. So like how do you actually know that the person has gone into cardiac arrest or if they just fainted? Like this is why I would call 911 first because here they would say take a pulse or do something and they could determine over the phone what is happening to the person.” (Interviewee #2A-untrained)

The first step in the initiation of resuscitation care is the ability for someone to recognize when a cardiac arrest has occurred. While some were able to understand the ‘dictionary definition’ of a cardiac arrest so to speak, few were able to link this to the appropriate symptoms. Conflation between the terms cardiac arrest and heart attack poses similar issues. Thus, while a cardiac arrest may actually be taking place, participants might not be initiating the right course of action since they are unable to decipher that a cardiac arrest has actually occurred. It is possible that people are well-equipped and trained to act, yet are not providing CPR simply because they are unable to recognize that it is required.

**B- Estimation of Survival Rate from OHCA**

Interviewees were asked to estimate what they perceive to be the survival rate from OHCA, i.e. out of ten people who suffer OHCA, how many would survive? A global overestimation of the survival rate from OHCA was offered by participants. Twelve out of twenty-one participants indicated a survival rate of 50% or more and, of these twelve, five guessed 70%
or higher. An additional five participants estimated within the 10-30% range and only one participant correctly cited a less than 10% survival rate. It should be noted that this participant had previous experience volunteering for an ambulance service, and therefore could be considered to have more expertise than the ‘average’ layperson.

Potential bystanders may be misguided in their knowledge about the seriousness of cardiac arrest as a medical problem and the potential impact of early and effective CPR on the patient’s outcome. If people assume and believe that the majority of OHCA patients survive, they may be less inclined to provide CPR as they might not see a clear need for it.

C- Knowledge of CPR, its purpose and the techniques involved

Overall, participants demonstrated a good understanding of CPR technique. For the most part, they were able to articulate that the term CPR stood for ‘cardiopulmonary resuscitation’, with only a few participants struggling with one or more parts of the acronym. Participants provided detailed descriptions, understood the purpose of CPR and what actions were involved. Several participants alluded to the interim nature of CPR; that it essentially ‘buys the patient time’ until more advanced medical care arrives.

“So ‘cardio’ obviously meaning your heart. ‘Pulmonary’ has to do with your lungs and breathing. And then ‘resuscitation’ is like to rescue, like to bring back type thing. So obviously it all entails your heart, your lungs and bringing back. I know…your brain dies I think within, after six minutes so the earlier you get help or intervention obviously, the chances of survival are much higher.” (Interviewee #11C-trained)

“To get the, the blood flowing the heart, not heart beating necessarily…but to get it going enough to sustain until medical attention can get to the person, in order to really assist them. So it’s just kind of, it’s like a temporary thing to try and keep the person alive long enough to get the medical attention that they need.” (Interviewee #15C-trained)

Nearly all participants expressed that CPR had something to do with the heart, lungs, restoring circulation and oxygenation. In terms of the actual steps involved in CPR, there were a broad range of responses within the group. Several participants recognized the importance of calling for help as the first crucial step. Participants noted many other steps including checking a pulse, checking breathing, mouth-to-mouth ventilations and ‘pumping’ on the chest or chest compressions in various combinations. Some participants struggled to recall the steps in the correct order and no one specified the correct, recommended ratios.
“If I was the lead, I would get somebody to be, somebody would be on the phone with 911 in like two seconds flat…somebody taking pulses and keeping other things going and trading off because I mean, you can’t keep it going, you know, for however long it’s gonna take the ambulance to go, your body can’t necessarily do that…I would be trading off and making sure that everything, the situation was under control when I wasn’t doing the compressions, but I would also be doing pulses and breathing and airway and that kind of stuff, that kind of secondary…” (Interviewee #3B- trained)

Untrained participants struggled with the steps of CPR. In contrast, for the most part, the trained participants demonstrated a good general understanding of CPR. However, issues surrounding the complexity of the CPR process were highlighted. The number of steps involved, trying to recall the order of the steps and specify how much to do of each step was difficult for participants to articulate. Following this, it would be reasonable to presume that bystanders, trained and untrained, would find it challenging to recall and execute CPR in a real cardiac arrest emergency.

D- Most important step of CPR and Chest-Compression-Only CPR

When probed with regards to the most important step of CPR, participants demonstrated a strong understanding that chest compressions were critically important. Participant #5B stated that the reason the chest compressions were so important was because in doing them, you are trying to massage the heart and once the heart functions again, then so will the lungs. Along similar lines, a number of participants expressed that the chest compressions were more important than ventilations since they would circulate already oxygenated blood around the person’s body.

“…if you had seen someone on the street you could just easily start with the chest compressions ‘cause you’re still circulating the blood um that still does have oxygen, you’re still circulating that through the body, like through the heart, through the lungs. So there’s still, you’re still keeping, you know, like the brain and the heart tissue alive somewhat…” (Interviewee #7B- trained)

Despite having this knowledge, very few participants were aware of the current endorsement for chest-compression-only CPR. When mentioned, participants noted they would be more willing to perform chest-compression-only CPR compared to traditional CPR, given that they did not have to give ventilations. Issues specific to the performance of mouth-to-mouth ventilations will be presented in the following theme.
E- AEDs

Although there were no specific questions in the interview guide surrounding the use and knowledge of AEDs, a number of participants raised the topic independently in their interviews. Several participants articulated the general function and purpose of the defibrillator:

“[an AED] it’s also reviving, but its more using that machine to you know… You put [it] on the chest and it will turn on like electricity and it just, trying to revive the unconscious person.” (Interviewee #10C- trained)

However, many would hesitate to use one since they had never used one previously and did not know when or how to use one.

“I remember that inside of the box [AED] had several steps outlining where to put the contacts on the body, what to do if they’re not responsive, and things like that. I don’t wanna get too far into it, but I remember it was, it was laid out in a way that your average person should be able to open this box up, review the steps in a few seconds and be able to execute the steps without, like without causing harm… I don’t think many people have actually seen one, like actually have seen one open to know what, what’s in store for them when they open this box. Right, it’s kind of like going to Ikea and buying some furniture. You have no idea what the instructions…like I bought a table and I thought it would just be like a piece of wood and 4 legs. It was like seventeen thousand pieces of crap where you know, so I wasn’t, I didn’t know what was in store. Me seeing this box [the AED], I at least have an idea and it seems pretty straightforward.” (Interviewee #20C- trained)

This quote really captured many of the participants’ perceptions of AED. Despite articulating their importance, participants seemed to lack an understanding of when to use AED and expressed serious concerns about how to use one. AEDs were perceived to be complex medical devices that require prior training and knowledge to be able to use. To this end, participants advocated for increased awareness surrounding the placement and the rules regarding the use of the AED, and better understanding of how to operate them.

Summary of theme- Knowledge:

Within this theme, a number of interesting findings emerged that may significantly influence willingness and capability to provide bystander CPR. Gaps in knowledge were elucidated within a number of key domains: recognition of cardiac arrest, the survival rate from OHCA, the particular steps of CPR, and AEDs. Knowledge seems to play an important role in how
people perceive cardiac arrest and resuscitation. The central findings from the ‘Knowledge’ theme provide perspective and context for the remaining themes.

4.3.2 Barriers

Several barriers were identified and explored by participants that could prevent or hinder bystanders from performing CPR on OHCA patients: (1) Litigation or lawsuit; (2) Mouth-to-Mouth Ventilation; (3) Personal Safety; (4) Helping vs. Hurting; (5) Doing it wrong or missing a step; (6) Don’t have the knowledge or training; (7) The Importance of Patient Characteristics and Relationships. These seven concepts are described in further detail below.

Sub-themes:

A- Litigation or Lawsuit

Participants spoke about the fear of being sued as a result of providing assistance in the form of CPR. Several participants articulated that liability concerns may be preventing laypeople from acting.

“Yeah ‘cause maybe people don’t feel comfortable because they don’t want to be legally obligated to, you know, if something goes wrong that you know, they’re gonna be arrested or somebody’s gonna try and sue them or something ‘cause they weren’t able to help. That could be a problem too” (Interviewee #16C-trained)

“I think that there’s not a general public willingness to do it ‘cause I think people are so terrified of liability issues, ‘cause they think they’re gonna, you know get sued or something. And unfortunately that culture’s moving here from the United States. There’s a huge fear that, oh if I help somebody and something happens they’re going to sue me.” (Interviewee #15C-trained)

While several participants spoke about liability concerns within the context of the public in general, some expressed their own personal fears. For instance, respondent #5B who had been trained in CPR within the last year, mentioned that in the event of an OHCA, she would rather call 911 and wait for someone else to come because she did not feel legally protected if she were to step in and do something.

The idea of potentially doing something that might get you into trouble after the fact is an interesting issue, especially after consideration of where these interviews took place. In Ontario, Good Samaritan laws are in place to protect bystanders who attempt CPR or provide
assistance in OHCA situations. However, as participant #15 noted above in her quote, perhaps the mentality of being liable or sued if one attempts CPR is strongly influenced by other more litigious jurisdictions, such as the United States, and there may be a lack of awareness of the Good Samaritan laws. Those participants who were aware of these enactments called for better dissemination and awareness of the Good Samaritan laws to dispel possible fears of being sued.

**B- Mouth-to-mouth Ventilation**

Concerns surrounding the performance of mouth-to-mouth ventilation were nearly universal amongst participants. Several participants articulated a fear of contracting a communicable disease or infection as a result of performing mouth-to-mouth ventilations on a patient. In addition to this, participants noted the personal and intimate nature of mouth-to-mouth ventilation as an explanation for their unwillingness to perform it.

“It’s [mouth-to-mouth ventilation] something that might put me at risk. If that person has an infection, and was infected, then it would put my life at risk. Well if that person has contracted some infection and I’m putting my mouth in his mouth or her mouth that would possibly bring on possible infection…. That would make me nervous, yes. ‘Cause it’s very personal when you are putting your mouth in somebody’s mouth.” (Interviewee #8C-trained)

Some participants noted that how the patient looked and who the patient was would impact their decision to perform ventilations.

“Like I ‘m trying to think, if it was a homeless dirty disgusting person, I mean if I had to give them actual CPR I don't know if I’d do the mouth–to-mouth thing but… I would be scared of you know, just putting my, or getting their saliva on mine, or something in case they had something. I would be, I would be a bit scared of that. It might hold me back. I don't know, if it was somebody on the street that was pretty disgusting looking, you know, it might hold me back, I don’t know if it would, but it might. It might certainly make me stop and think for a second, right.” (Interviewee #4C-trained)

A number of interrelated conditions seem to influence the decision to perform mouth-to-mouth ventilations. The perception of contracting a disease or infection and the risk to personal health and safety, taken together with the personal nature of the action and dependency on who the victim is seem to inform the decision-making process.

However, not all participants characterized mouth-to-mouth ventilation as something they would be reluctant to perform. Only one participant perceived a minimal risk for disease
contraction associated with performing mouth-to-mouth ventilations. It should be noted that this individual works with homeless youth and offered a unique perspective and worldview that he thought differed from most people in society. Another participant, who had never been trained in CPR before, explained that she would be more willing to perform ventilations compared to chest compressions because she perceived that chest compressions may harm the patient more than mouth-to-mouth ventilation. The perception of harming the patient by providing chest compressions was common amongst participants and will be explored in detail below.

C- Personal Safety

Environmental or situational hazards that could put the rescuer in harm’s way were raised as a concern.

“I’d probably look around to make sure it’s not a safety hazard, like it’s you know, they went into cardiac arrest and there’s a whole bunch of other stuff going on, there’s a fire, there’s, you know, some crazy situation, I wouldn't want to do it.” (Interviewee #6C-trained)

Additionally, a trained participant, respondent #7B, referred to the hypothetical example of a cardiac arrest victim collapsing in the middle of the street and stated that she would consider her own personal safety first and then contemplate getting assistance to bring the person to a safer environment where she could provide CPR. While there may be an underlying altruistic desire to help (which is discussed below in a separate theme) perhaps a physical barrier, danger or harm might ultimately be preventing that person from providing assistance. Thus, the presence of environmental or contextual hazards might ‘trump’ other factors one may consider in the decision to intervene or not.

D- Helping vs. Hurting

Participants expressed a deep fear of causing more harm to the patient than good and that rather than helping them, they are actually hurting them more. The majority of participants that voiced this concern had never been trained in CPR before. When probed as to what kind of damage they thought could be done to the person, most of these participants’ concerns centred on fears about breaking the victim’s ribcage.
“Yeah I wouldn’t, just because I do know that with chest compressions if you push too hard then you can, you can damage their chest cavity. It’s the fear of hurting somebody else. Like I know that they’re already, you know like their heart is stopped, but I’d just be scared of hurting them even further.” (Interviewee #13A- untrained)

Some participants were worried that they could be causing internal damage to other organs, as a consequence of breaking the ribs:

“The possibility of something puncturing something else, you know like break a rib for instance, if it were to puncture the heart. I think that could be a little bit worse than it just having stopped.” (Interviewee #14A- untrained)

These notions were explored by participants across all training groups. They also speak to the first theme of ‘Knowledge’ and how knowledge truly forms the foundation for beliefs and perceptions. Here, it is interesting that the participants who have never been trained in CPR perceive rib fracture to be more serious than the heart actually stopping. Similar to overestimation of the survival rates, this seems to indicate that people are underestimating the seriousness of cardiac arrest as a medical condition.

**E- Doing it wrong or missing a step**

The possibility of not performing CPR correctly, not doing the ‘right thing’ or forgetting a step in the process troubled several informants. Participants expressed this concern in the context of making things worse for the patient, doing something that will ultimately fail and fear of not being able to do the right thing for the patient.

“I’d probably worry that I did something wrong. Like thinking ‘oh my gosh, am I gonna remember everything, am I gonna remember the right steps, am I gonna remember the right…’ you know that type of thing. Is my information up to date enough or do I remember enough to at least try to help this person rather than do harm to this person.” (Interviewee #11C- trained)

The phenomena explored here are related to a number of concepts previously presented. The complexity of the CPR process and the ability to recall all of the steps in the correct order is now being linked to doing the right thing for the patient, ensuring that this is the right course of action and not causing unnecessary harm to the patient. Through voicing concerns about the specifics of CPR, the participants are really drawing attention to the details and missing some of the ‘bigger picture’ rationale and importance of providing early CPR to the patient.
F- Don’t have the knowledge or training

Several participants indicated that they would not provide CPR simply because they did not have the knowledge or training. In the words of participant #18:

“Well not really [willing to do CPR], because I don't know anything. Like I don't want to be doing something I don't know.” (Interviewee #18A- untrained)

Specifically within the untrained group, many understood what CPR involved but expressed that even despite this knowledge, they still would not do CPR because they did not know how to execute the procedure.

“I don’t know properly, which is why I wouldn’t attempt it right now. I know it involves some mouth-to-mouth resuscitation to get the lungs going there. I know there’s some pressure on the chest there to help trying to get the heart restarted. So, pushing on the chest there.”(Interviewee #14A- untrained)

Not being trained in CPR seems to be only one component of the ‘lacking knowledge and training’ issue. Within the trained individuals, there was the perception that their knowledge and training is ‘outdated’, and this impacts the decision to intervene. For instance, participant #16C noted that it has been so long since their past CPR training experience that they would not feel comfortable enough to act due to their longstanding lack of involvement with and awareness of CPR.

G- The Importance of Patient Characteristics and Relationships

On several occasions, participants expressed differential willingness to intervene depending on who the OHCA patient was. For example, participant #5B, who was trained in CPR, would not hesitate to step in to help a child, yet when it came to helping the elderly, she would have to think about this multiple times before acting. In a similar manner, participant #6C stated:

“I think I would probably be more likely to do it on a young, if it was like a child or a younger person. I can’t say, you know I don't know why. It’s just sort of a feeling that I have… I think that my heart would probably go out to a child more, maybe more.” (Interviewee #6C- trained)

A number of participants explored this feeling of a heightened obligation to act for a child and tried to provide an explanation for an increased willingness to act for children.
Participant #17C, along with others, spoke to the perceived increased shock of seeing a child in cardiac arrest:

“…yeah it seems that people might be more willing to help children than say the elderly, which is kind of strange considering all life has value no matter the age. But I guess people don’t…I don’t know I guess maybe it’s the size of the person too. You know, you see somebody much smaller all of a sudden lifeless, might be more frightening and you would want to act.” (Interviewee #17C-trained)

Furthermore, a number of participants spoke to the duration of life a child has left to live as well as the impact of a parental mentality.

“I think its people’s parental instinct. I think most people, not all people, but I think most people kind of feel that you know it’s worse if a younger person dies than an older person and because they have their whole lives ahead of them. You know it’s a maternal or paternal instinct that I think a lot of humans have.” (Interviewee #19C-trained)

In addition to the child scenario, a number of participants differentiated between stranger versus family member patients. For the most part, participants in this study voiced that they would more likely act for their family compared to people they don’t know and strangers. Informant #1A, who was not trained in CPR, claimed that it would be more natural for her to do something for her family than for a stranger, since it hits closer to home. Likewise, participant #11C commented:

“…it probably depends who it was to be honest. If it was my family, I wouldn’t hesitate obviously, but if I was in a strange environment um for example at a mall or whatever and somebody just collapsed or whatever, I would probably have a quick survey around to see if anybody else is intervening first, yeah, before I jumped in.” (Interviewee #11C-trained)

However, not all participants felt this way. A few participants noted increased feelings of distress if they were to be rescuing a family member. This would ultimately make the situation harder for them. Respondent #9B stated:

“I think if it was like, if it was a family member, I think it would freak me out a little bit more. If it was a friend it would freak me out a little bit more compared to if I just saw just some random person in the street, or in the subway or in a store and he fell and I had to do that, I’d be a little bit more scared if it was somebody that was close to me. ‘Cause I would obviously, you know, it would be a little bit more close to home if it was somebody that I cared about and if this doesn’t go right, they might die. But if it was just some stranger that I saw, I mean I would still feel pretty similar to it, obviously I’m not
attached to that person in any kind of way, so I think it would, I don’t know, maybe I would be a little more ok with it if it was somebody other than my family. ‘Cause, it sounds kinda crappy to say it, but if they live or die it might really not have that much of an impact on my life, it might trip me up a little bit after the fact and I might have a little trauma after the fact about the fact that I was involved in that situation, but yeah, I think if it was family it would be very different, it would be, it would be harder, it would be more stressful, I would probably be a little more scared about doing the wrong thing.”
(Interviewee #9B- trained)

The role fear plays in the decision to provide help seems interesting and non-uniform across participants and different situations of OHCA patients. Above, participant #17C perceived increased fear to be associated with witnessing a child suddenly collapse and this fear would act as a catalyst rather than a deterrent to providing help. While many participants felt an increased duty to help family compared to strangers, some noted that if the victim were a family member, fear would really be around trying to the right thing and trying to save their life.

**Summary of theme- Barriers:**

A host of barriers to the performance of bystander CPR were identified. Some of these deterrents stem from lack of training or knowledge, or misconstrued knowledge regarding one or more parts of the CPR process; for example, contracting a disease or infection as a result of performing mouth-to-mouth ventilations or causing more harm to the patient by breaking ribs during chest compressions. Finally, situational factors such as patient characteristics and personal safety concerns in potentially hazardous environments seem to play a role as well.

**4.3.3 Social Obligation and Responsibility**

The theme ‘Social Obligation and Responsibility’ deals with the culture of being in a group, how participants perceive their role or actions in that type of a situation. Another component is the idea of being responsible for the lives of others and, as you will see below, many of the participants reflected upon this topic within the context of the larger community. This theme is comprised of two sub-themes: 1) Looking to Others; and 2) Culture and Responsibility.
A- Looking to Others

Participants across all training backgrounds stated that they would look around for others to step in and help first, before intervening themselves. Interviewee #20C said:

“…well kinda back to that statistic you used earlier today, one in ten would survive, I think there might be, you know, one in ten out of the group of people that are around may be, may be willing to help that person.” (Interviewee #20C- trained)

Similarly, participant #5B believed that people are reluctant to help in public spaces; when other people are around they look around for someone else to help first. Several respondents suggested that they would look to others that are more highly qualified (whether it be another bystander or a medical professional) to help since they did not really see themselves as an adequate first responder.

“Yeah I think the problem is maybe is that people don't take it that seriously because they just think, ‘well somebody’s heart stopped, like what good is it, what good am I really doing you know?’ What they really need is urgent medical attention, they need a defibr, defib…defibrillator they need like, you know they need to be in a hospital. So like whatever I’m going to do isn’t really gonna help. I think, maybe it’s just my speculation, but I tend to think that that’s the idea that’s out there” (Interviewee #6C- trained)

“As far as I know, you have to be certified trained, certified to be able to do… to do this CPR and this thing. If help is on the way, right? If there’s no help, then I will step in. If there’s help on the way, I will just keep space around the person.” (Interviewee #10C-trained).

This provides further support for an earlier finding where participants expressed the idea that you can only perform CPR if you are trained in the skill, and if your skills and knowledge are current and ‘up to date’. Participants seem to feel like they would be inadequate first responders and that it is better to look to someone else who is more highly qualified to provide the help instead. Additionally, the bystander’s perceived futility of their efforts (i.e. “what good is it?”) seems to inhibit the performance of CPR. Taken together, these two beliefs appear to have significant implications in the decision-making process to intervene or not.
B- Culture and Responsibility

Some participants explored the concept of a diluted sense of individual responsibility within a group setting, commonly known as the bystander effect\(^{103}\), as something that would deter them from providing help:

“I think generally speaking, like people just they get so wrapped up around themselves that they don’t think to stop and offer for help because they always think somebody else will help… And it’s not just with cardiac arrest situations, it’s like any type of situation in an emergency, where people, if there’s more people around, they just think automatically that somebody else will help… The only really way to do it like is just to educate people, that it doesn’t matter how many people are around, just jump in and help if you’re able to and you’re trained to be able to.” (Interviewee #13A- untrained)

Along similar lines, several informants explored the concept of being responsible for someone else’s life, in terms of social responsibility. More specifically, they perceived this responsibility to be more of a weight or a burden, rather than as a motivator for someone to provide help.

“I think that’s the way the majority of human beings in our culture think, people don’t really want to be responsible. They want to be responsible for themselves and the people close to them and anybody else they don’t really give a shit. As much as they pretend that they do and like to think that they do, I think most people just don’t care and I know that sounds terrible but that’s just, that’s just the take I have on our culture.” (Interviewee #9B- trained)

“There’s so much ignorance, root of ignorance is ignore. A lot of people ignore things…IGNORE. That this is a, this happens, cardiac arrest happens and ignorance, ignore. We are ignoring these situations and not learning how to deal with them, they are busy dealing with making money or whatever they’re doing. They’re ignoring the possibility that we, someone needs trust in front of us and its life or death for that person where you could save them. You just look around and don’t know what to do.” (Interviewee #8C- trained)

These quotes illustrate a powerful perception and allude to higher order social influences that might be at play. Participants seemed to focus their comments on the ‘who should be responsible for this’ component of the problem. Rather than automatically jumping in to start helping deal with the problem, people first ask themselves whose problem this is and who should be taking the responsibility for it. Participants perceived this to be common in our culture. In relation to this issue, several participants advocated for educational initiatives to place more emphasis on a community-wide, shared duty and the social and moral obligation to provide assistance.
Summary of theme- Social Obligation and Responsibility

This theme focused on how potential bystanders position themselves amongst the group and what role they play. A number of important perceptions were illuminated in this theme. First, participants felt that their actions will likely not help the patient and what someone else can do, for example someone who is more experienced or trained, might work better. Second, participants perceived there to be a dilution of responsibility within a group. In general, participants felt that people internally question who should be responsible for the situation and ultimately, shy away from taking responsibility and providing help.

4.3.4 Psychological Factors and Implications

Participants explored a number of psychological factors and potential implications that would influence their decision to intervene or not. This theme is comprised of four sub-themes: 1) ‘Life vs. Death’; 2) Being in the Spotlight; 3) Burden of ‘Knowing’ CPR; and 4) Emotional/Psychological Reactions.

Sub-themes:

A- ‘Life vs. Death’

In sharp contrast to the theme above, on a number of occasions participants explained that the fact that someone’s life was at stake would supersede all other factors in terms of their willingness to step in and help. Respondent #2A, who never had been trained in CPR before stated: “…sure if someone was possibly going to die I would do whatever I could, yeah…. No, no it wouldn't matter who it was. If they were in trouble I would try and help them if I could.” In a similar manner, respondent #17C did not want to “just stand there like a bump on a log” when somebody’s life was in her hands and she could help. The idea of not wanting to feel useless in the situation where someone’s life was on the line was emphasized by participant #3B as follows:

“I don't think ever I would question doing it [CPR]. I’ve been brought up, right from when I was little, with the first aid background, CPR whatever, with the family and whatnot, Brownies and all that…so it’s kind of just something that is part of me that if somebody needs it, I’m going to be there, I’m trained, I can do it… Just knowing that you could help and not being there and being useless, you know what I mean? Just not… it’s
kind of a weird, why are you just gonna stand by and see somebody die when you can possibly save their life.” (Interviewee #3B- trained)

Participants characterized this as a compulsion to help another person who may die without help. Some suggested that this may stem from a sense of reciprocity; that if they had been in that situation, they would want someone else to be willing to do CPR for them and save their life. Nevertheless, it seems as though the imminent threat that the cardiac arrest situation poses to someone’s life acts as motivation or reason to provide help.

**B- Being in the Spotlight**

A number of participants voiced concern about being in the spotlight as a rescuer amongst a larger crowd of people. Interviewee #1A expressed the idea that people are perfectionists and that one may feel ridiculous if they felt that they were not performing CPR correctly or didn’t know what to do with a group of people watching. Furthermore, participants expressed that they would feel more pressure amongst a group of people compared to if they were alone.

“I don’t know, if I was in like a really crowded public place and there were all these people like watching me and I really didn’t know what I was doing, I might feel a bit more pressure or...like pressure not to mess it up or pressure to know what to do or something.” (Interviewee #16C- trained)

Likewise, participant #19C reiterated the heightened nervousness or anxiety that comes with being watched as follows:

“If there are other people around, one might feel nervous because in a sense other people are watching what you’re doing and maybe that puts a bit of pressure on you. Whereas, if you’re by yourself, um you have to do it, you know. I feel you just have to do it. But if other people are around, I think some people wouldn’t get involved because it’s just not the kinda person they are, to get involved, they don’t wanna, for whatever their reasons might be, and other people will just jump right in, and other people might be sort of like, well let’s figure out whether I need to jump in or not. And I’m sort of between, I’m sort of in the middle group, I guess.” (Interviewee #19C- trained)

The fear of being in the spotlight, where behaviours and actions are being watched and judged by others is similar to the idea of performance anxiety. While the bystander should be focused on providing any help they can to the patient, they are worried about how others may perceive their actions. As a result, this may cause added pressure, fear, nervousness and anxiety that may impede or delay the execution of lifesaving interventions.
C- Burden of knowing CPR

Participants across all three groups characterized knowing CPR as a burden. The central idea articulated was that having the knowledge of CPR compels one to act. If someone possessed CPR skills yet chose not to act, they said they would feel guilty and feared others would question their inaction.

“I was more scared after [CPR training] because now I knew that I knew. I had this little card in my wallet that said that I was, you know, ‘CPR trained’. So now it was like, ok now, it’s a jump to responsibility, right. It becomes a little bit of a weight on your shoulders ‘cause now it’s like ok, if something happens to someone, you are trained, you should, you know, help right…. I mean if you don’t know, you could easily say, ‘well I don’t know, I don’t know what to do, so I can’t help them.’ But obviously if you do know, you need to help right.” (Interviewee #4C-trained)

 “…to be trained to be put into it, it’s kinda…scary…I guess, yes, because you would feel that, ok well if I don’t know it then, the guilt, I don’t feel guilty cuz there’s nothing I could have done. But knowing it…then…I would, I would feel guilty if I didn’t do anything.” (Interviewee #17C-trained)

Although this particular subtheme is very closely related to the ‘Knowledge’ theme I presented previously, it encompasses a slightly different, more psychological idea. This subtheme does not speak to the specific components or aspects of knowledge or education, for instance having the knowledge and skills to perform chest compressions. Rather, this subtheme speaks to participants’ perceptions of either having or not having CPR knowledge, what that means to them and how that may influence their subsequent decision to provide CPR in OHCA. Thus, it is distinguished from concrete facts or educational structure, and more appropriately fits with the psychological factors and potential implications of those factors on behaviour.

This perception about ‘knowing CPR’ and exploring what that meant to participants was particularly interesting. It seems as though becoming trained in CPR is a scary thing for people. Rather than feeling empowered with the knowledge and primarily using it to facilitate action in OHCA, participants seem to be viewing their education as a burden or weight. This may be important in how organization that promote and encourage CPR training frame CPR education to potential bystanders, as this may influence how they translate that knowledge into actions in OHCA.
D- Emotional/ Psychological Reactions

Participants highlighted that witnessing a cardiac arrest was an emotionally charged situation. When presented with a cardiac arrest scenario, participants expressed that it would be a traumatic experience and they would certainly be scared and in shock. Feelings of guilt were common and attributed to different aspects of the situation.

“Without acting, that would kind of, I would feel guilty for not acting. But then, if I acted and they didn’t make it, I would probably feel just as guilty, or more. So, it’s kind of, it’s kind of a double edge sword there; if I didn’t help then I’d feel bad and if I helped I probably would feel bad too.” (Interviewee #17C- trained)

By chance, the sample contained a few interviewees who had previously performed CPR in OHCA situation. In accordance with the perception mentioned above, some of these individuals noted that coping with their involvement in OHCA was challenging, stressful and traumatic, yet resources to assist them in managing the psychological ‘residue’ of such experiences were lacking. The opportunity for debriefing after the fact, whether with someone in the circle of care, such as a physician or paramedic, or a psychologist, were not made available to any of the bystanders who were interviewed. The interview was perceived by many of the participants as an opportunity for debriefing or perhaps closure that would have been inaccessible otherwise.

Participants also thought they would question their actions after the fact. Participants associated a failed attempt at resuscitation with a potential error in their efforts or something they may have omitted.

“…if I did step in and they didn’t make it, I’m sure there would be a bit of a grieving process for me I think…I think [I would feel] obviously sadness, yeah for sure, and then I’d probably wonder if I did it right, if they didn’t survive. I would wonder, did I do something wrong or did I forget something. I’d probably start questioning my own personal ability in providing CPR.” (Interviewee #11C- trained)

Again, this connects back to the first theme of ‘Knowledge.’ If a bystander had optimistic expectations with regards to the patient’s outcome and chance at survival and then their efforts proved unsuccessful, they might and blame themselves or feel guilty. This could have significant implications for CPR education and suggests that better management of trainee’s expectations may be required.
Summary of theme- Psychological Factors and Implications

This particular theme illustrates the myriad of psychological processes that influence the decision to intervene. It appears as though strong feelings to save the patient’s life act as a central motivator to provide CPR, yet participants also expressed concerns regarding ‘CPR performance anxiety’ when in a group setting. This theme also highlights some of the anticipated psychological and emotional responses to witnessing and intervening in cardiac arrest. Participants expressed concerns such as guilt and the need to grieve had the patient not survived. More specifically, they spoke to the impact of these internal psychological factors in the decision to provide bystander CPR.

4.3.5 Education

Finally, I have titled the last theme ‘Education’. This theme differs from the first theme, ‘Knowledge’, as it focuses on training experiences and educational structure. In discussing their past CPR experiences (or lack thereof), participants spoke about four key domains related to CPR training: 1) Reasons for Re/Training or Not; 2) Educational Focus and Structure; 3) False Representation of Real Life; and 4) Public Awareness and Advertising.

A- Reasons for Re/Training or Not

Reasons for not obtaining CPR training included courses being too expensive, not being aware of or thinking about it, and not seeing a need for it. For example, a number of participants previously had jobs that required them to be trained in CPR. They stated that they have since left those jobs and no longer felt a need to get recertified. When asked about what motivated them to seek training, most participants stated that CPR training was a requirement for a job or school. Very few participants noted ‘personal interest’ as a motivator for engaging in CPR training. In keeping with this topic, several interviewees requested more free courses, reminders and recertifications when it comes to CPR education. In order to train as many people in CPR as possible, participants suggested that CPR training should be made mandatory.
B- Educational Focus and Structure

The majority of participants noted that CPR education should be taught to young trainees who were likely to engage in swimming lessons, sports teams, Scouts and youth programs. High school students were considered excellent candidates for CPR training.

“Personally, I think it would help if CPR was taught like in high school early and then constantly taught, do you know what I mean? Or updated, where it was included in some type of health class or something like that. So children early on feel comfortable performing it and doing it so then as an adult…’cause coming in at 40 and taking a CPR class I’m sure would be very different if I learned it when I was 18 in school and then continued. Your confidence I think would be a lot higher and you would probably have more people obviously willing to help I think.” (Interviewee #11C- trained)

A number of participants suggested both the workplace and the community in general, as avenues to reach and train the general public in CPR. Furthermore, some participants mentioned targeted training of parents or parents-to-be as another avenue for increasing awareness around cardiac arrest and CPR within the community.

In terms of the content of and structure of educational sessions, participants noted that sessions should contain two components: 1) a basic understanding of the science behind cardiac arrest, the signs and symptoms and how CPR helps, and 2) hands-on CPR practice.

“I think what maybe be helpful for you guys would be just more of a focus on the physiology of the body and the way the body actually works and the purpose of the heart, what the heart is actually doing and what the lungs are actually doing in conjunction to the heart and the reason that keeps you alive…I think a lot of people have a basic understanding of how their body works but I don’t think a lot of people have thorough understanding of how their body works and I don’t think, I don’t think people really get how everything works together. And I think maybe that’s something that could be helpful… So given the situation where the body was working and now all of a sudden the body is not working, what is something that you can do to try and help…So, maybe that’s something that will help, just a little bit more education on the basic physiology of how the human body works.” (Interviewee #9B- trained)

“I would definitely want the hands-on because, just to know what to do if I was ever in a situation where I ran across somebody…the hands-on, like if you practice it, like you don’t have to think so much about it, you just kinda just go by instinct.” (Interviewee #15C- trained)
Several informants also suggested streamlining the educational process; making CPR less complex and focusing on the basics.

“I think people wanna help, I think what prevents people from doing things like learning CPR is like ‘oh my G-d CPR that’s like this BIG thing’ and I don't know think I could learn that and I don't know if I’d remember it and there’s expense involved and training involved, you know. But if it was kinda like, hey, here’s three little things you need to know in this kinda situation. And start with three and you know work your way up, I think you would get more people interested in learning the basics and moving on from there.” (Interviewee #19 - trained)

An understanding of the science behind cardiac arrest and CPR, hands-on practice and simplicity seem to be particularly important in terms of what people want to see in a CPR training session. While participants asked for more knowledge about CPR, they simultaneously asked for the delivery to be simple and broken down to convey the basics. Thus, the information contained in a course and the manner in which that information is conveyed should positively impact bystander preparedness to perform CPR in a real life situation.

C- False Representation of the Real Life

Despite the desire to engage in hands-on practice during an educational session, a number of participants who had been previously trained in CPR commented that practicing on the dummy is not the same as performing CPR in a real life situation. Participant #15 reflected upon this, illustrating a real life experience:

“…you take these courses and they tell you what to do, but when I was actually physically doing it [CPR] , I didn’t know like, like you can feel, when you’re doing compressions, you can feel like the bones snapping. And it was like, oh my gosh! And like the partner, person I was with was like no that’s what you’re supposed to feel, it’s ok, keep going, its ok. I was like, oooookk…like it freaked me out! Because I wasn’t taught that part, like that, like you know…It scared me! Cuz I’m used to that little Resuscitation Anne just going hoohooohoo, you know, like that’s all you hear, right?” (Interviewee #15 - trained)

Although it is unrealistic to practice CPR on humans during a lesson, the difference between practicing on the mannequin and performing CPR on a person needs to be addressed by educators. For instance, learners need to be able to gauge the force required to perform high quality chest compressions and break ribs in real life. New and creative platforms such as
short video messaging may be leveraged in this type of learning environment to convey such information.

Furthermore, some participants commented on the stress and anxiety that they anticipated in the real life situation and how this was lacking in the teaching environment.

“...[the class] it’s a very relaxed environment. It’s more, you know, it’s more of like a training class. But maybe if they actually had where they set the scene a little bit more and where you could feel a little bit more anxious because you want to kind of mimic the situation where you would have to use it... it was more relaxed. It was more, take your time, don’t worry, you know, we’re all here and practicing. I think if maybe it was a little bit more, a little bit more stressful, you would kinda feel more prepared at the end of it. Ok, I can handle anything, sorta thing.” (Interviewee #17C- trained)

A better effort to simulate the real life environment in the classroom is required. In an earlier theme, participants explored this notion of ‘performance anxiety’ or being in the spotlight as something that would cause them to hesitate or question their actions. Perhaps classroom courses can better simulate this situation to potentially help the learners overcome this fear of performing CPR in front of a group of people.

D- Public Awareness and Advertising

Finally, nearly all participants called for increased public awareness regarding cardiac arrest and CPR. When probed as to how to best to access and engage the public, very few people could offer a specific approach. Suggestions were made involving TV, radio and print media options such as subway monitors and newspapers. Furthermore, integrating social media into the CPR educational system was suggested on a number of occasions.

“...the only thing that I really can think of is like there really isn’t enough education like in the media like especially with social media become such like a huge part of today’s culture, um you just don’t see enough of it. Like you see so much on other issues and other, other topics needing awareness, you just don’t see enough. And that’s the one thing that I’d like to see like different, is just more awareness brought around it.” (Interviewee #13A- untrained)

Despite not being able to offer a specific strategy to address this perceived lack of public awareness, participants agreed on one point: there is not enough awareness around cardiac arrest CPR and education. Considering all of the findings that emerged from this study, more needs to be done to make the public aware of the realities of cardiac arrest and what they can
do to help. A combination of platforms may be used concurrently to better disseminate knowledge and increase awareness to cultivate a well-informed community of potential bystanders who are willing, confident and able to act.

**Summary of theme- Education**

Knowledge and education were characterized by participants as critically important aspects of bystander CPR. Participants noted that educational strategies should provide the learner with the necessary knowledge, skills and confidence to perform CPR in a real life situation. To accomplish this, participants articulated that education should focus on the basic science behind the problem and hands-on practice of the skills in a simple and effective way that is as similar as possible to the real life situation. Finally, participants of this study recommended that more education and awareness around cardiac arrest be implemented.

**4.4 Discussion**

The current study sought to characterize lay public knowledge and attitudes towards cardiac arrest, as well as their perceived willingness to perform CPR in situations of OHCA. Prior to this work, in-depth qualitative research investigating this topic in a Canadian context had not been undertaken, but was thought to be important in light of persistently low rates of bystander CPR and survival from OHCA in this country. The qualitative data presented above begins to shed light on the perspectives of members of the general public and provides us with a better understanding of the potential reasons for low bystander CPR rates. The implications of these issues must be considered to devise an optimal strategy moving forward.

It is obvious that the decision for a bystander to provide CPR at the point of care is complex and multi-faceted. Sasson et al. (2013) noted that bystanders are required to execute a number of steps in order to perform CPR and significant delays can occur in the execution of one or more of these steps. Findings from the present study further support this notion as we identified a host of barriers ranging from gaps in knowledge and recognition of cardiac arrest to technical difficulties and psychological barriers.
Interview data indicated that laypersons overestimated OHCA survival rates; over half of the interviewees estimated a survival rate of 50% or greater. This was comparable to Donohoe et al.’s statistic, where 65% of survey respondents from the United Kingdom assumed that at least half of the individuals who suffer cardiac arrest survive\textsuperscript{35}. Interestingly, similar survival optimism has been documented in the healthcare literature regarding the accuracy of physician prognoses of terminally ill patients. Christakis et al. (2000) found only 20% of doctor’s prognoses for terminally ill patients in the study were accurate and 63% of doctor’s predictions were overestimated\textsuperscript{182}. Overall, physicians overestimated survival by a factor of about five\textsuperscript{182}, which is not inconsequential. Authors note that doctor’s undue optimism about how long these patients have left to live may negatively implicate treatment plans and cause the physician to miss an opportunity to enhance the quality of the remaining part of the patient’s life\textsuperscript{182}. This is not unlike the overestimation of cardiac arrest survival rates, and may help explain why we are not observing higher bystander CPR rates. The fact that laypersons are incorrectly optimistic about cardiac arrest survival may cause them to overlook the fact that they can and should be providing help at that time.

It is also possible that public beliefs and optimism are strongly shaped by images and portrayals of cardiac arrest and CPR in the media. For example, Diem et al. (1996) analyzed how three popular television programs depict CPR and found a large discrepancy between TV representations and the reality of cardiac arrest\textsuperscript{183}. They found that 77% of patients receiving CPR on Chicago Hope, ER and Rescue 911 survived their arrest\textsuperscript{183}, which is significantly higher than the survival rates documented in the medical literature. Furthermore, the researchers found that 65% of the patients who got CPR on these programs were children, teenagers and young adults who had experienced acute, traumatic injuries. Such misrepresentations of CPR in the media may cause laypersons to develop unrealistic impressions from these depictions and then generalize them to the real life situation. This could be one explanation as to why participants in this study were so optimistic about the survival from OHCA in real life.

Despite this, participants were able to demonstrate a good understanding of what CPR is, generally what it involves and that chest compressions were a critical component. In a number of instances, participants attempted to recall the steps of CPR in their descriptions, yet struggled with the correct order of the steps, stating they were unsure or did not
remember. Dwyer et al. (2008) reported a similar confusion amongst participants in her study of toddler parents in Australia. Only 18.5% of individuals were able to correctly report the recommended ratios for adult CPR. This number dropped to 12.2% with regards to child CPR ratios\(^4\). In the present study, several participants articulated concerns about missing a step, not being able to execute CPR properly or not being able to do the right thing to help the person. Many other international studies from Asia\(^{13,41,42,184}\), Europe\(^{36,185}\), the United States\(^{11,33,95}\) and Australia\(^{45,46}\) investigating perceived bystander actions have documented similar findings. A qualitative study from Sweden that looked at actual bystanders’ perceptions of their CPR experience also reported these concerns\(^{34}\).

The performance of mouth-to-mouth ventilations was a significant concern throughout the interviews. Participants expressed concerns surrounded the possibility of disease transmission related to mouth-to-mouth ventilation as well as discomfort over the intimate nature of this act. Fear of disease transmission and infection as a result of performing mouth-to-mouth ventilation is one of the more inconsistently reported barriers to performing bystander CPR in the literature. For instance, in a study conducted in Arizona, Coons et al. (2009) noted that 19.4% of the time, fear/concern about mouth-to-mouth contact was cited as the most important reason for not wanting to intervene\(^{11}\). Similar findings have been documented in other studies from the United States\(^2\), Asia\(^{40}\) and Australia\(^{45}\). Surprisingly, concern about contracting an infection by performing ventilations has also been found in surveys of nurses and medical students in Japan\(^{41}\). On the contrary, in a Swedish study, a mere 1% of surveyed individuals considered the risk of disease transmission as a result of mouth-to-mouth ventilation as large, while the remaining 99% of surveyed individuals believed there was a small chance or no risk of serious infection\(^{10}\). Studies from Europe\(^{36}\) and Asia\(^{13,186}\) have demonstrated a similar minor concern about mouth-to-mouth ventilations. It is very clear that there is no real pattern in the literature regarding the prevalence of mouth-to-mouth ventilation concerns. In reality, the risk of contracting an infection as a result of performing ventilations in CPR is minimal\(^{97}\). However, the findings presented above indicate that the perception of contracting a disease or infection is very real. Some studies on this topic have advocated for more effective efforts to dispel this common misconception\(^2,10\) yet they did not propose a specific approach to implementation. Current methods for dispelling this misconception are poorly characterized and their effectiveness needs to be measured. I
propose that, in addition to an attempt to dispel misconceptions, a better solution would be the development well-informed knowledge translation strategy with a focus on the basic science of disease transmission as well as chest-compression-only CPR. I will further develop this proposal in the final Chapter of this thesis.

While incomplete knowledge, fears and apprehensions may prevent the delivery of bystander CPR, the data suggest that additional, larger social and cultural issues and innate humanistic values are also involved. Surprisingly, two competing issues emerged from this study; one that may facilitate the performance of CPR while the other may hinder performance. First, is the notion that I term as the ‘life vs. death’ concept. The idea behind the ‘life vs. death’ notion is that individuals feel compelled to help others who are in distress no matter who they are. At the same time, individuals articulated that they would look to others to help first. They perceived a lack of responsibility for others within our larger society when it comes to providing help in cardiac arrest. This idea is supported by the finding that participants were readily inclined and willing to help family, friends and children; for those beyond that circle, an equivalent, heightened inclination to provide aid seemed to be somewhat lacking. The disparity in willingness based on who the cardiac arrest patient is concordant with findings documented in the international literature from Asia\textsuperscript{39-41,43}, the United States\textsuperscript{11}, Europe\textsuperscript{10} and Australia\textsuperscript{44,45}. To evaluate why this might be the case, I will explore these two competing concepts, ‘life vs. death’ and a lack of social responsibility, in depth below.

Throughout the interviews, participants emphasized that they would do anything they could to help; they said they would feel guilty standing there, watching a person die in front of them without doing anything to help. This in itself was claimed to supersede any other considerations and would impose a certain obligation to help. Variations of this concept have been documented in the psychology literature as prosocial behaviour. Prosocial behavior is an umbrella term used to describe a wide range of actions that are “intended to improve the situation of the help-recipient, the actor is not motivated by the fulfillment of professional obligations, and the recipient is a person and not an organization” (pg 9)\textsuperscript{187}. Essentially, these are voluntary behaviours that benefit another person or seek to foster harmonious relations with others\textsuperscript{188-192}. Seminal researcher Eisenberg further clarifies that the two terms, prosocial and altruistic behaviours, although seemingly synonymous are slightly different. She describes prosocial behaviours as voluntary and intentional behaviours that lead to a beneficial outcome
for another and that are motivated by positive and/or negative intentions\textsuperscript{193-195}. She distinguishes altruistic behaviours as a subtype of prosocial behaviour that is not performed with the expectation of receiving a reward\textsuperscript{193}. Thus, for the purposes of this discussion, I will classify bystander CPR as an altruistic, prosocial behaviour. Bierhoff articulates that the frequency of helping probably depends on the form of helping behavior required. He distinguishes three dimensions of behaviours; the social setting (planned-formal help vs. spontaneous informal help), the needs of the recipient (serious vs. non-serious situations) and the type of help required (direct vs. indirect help)\textsuperscript{187}. Thus, while prosocial behaviors are demonstrated in daily life, they are non-uniform in nature and this in itself influences willingness to help. For example, stopping to pick up a hitchhiker on the side of the road is inherently different from donating money to a charity box, which is very different from helping someone (either directly or indirectly) who was electrocuted by accident or drowning. Based on the different dimensions and the heterogeneity of possible situations, it is therefore hard to answer the very general question of how helpful are human beings.\textsuperscript{187}

In terms of OHCA, few studies have alluded to the provision of bystander CPR as a prosocial, helping behavior. One Swedish qualitative study involving nineteen voluntary rescuers illustrated findings comparable to the ‘life vs. death’ concept. Interviewed participants in their study expressed the desire to save a life or the wish to help another human being\textsuperscript{34}. Similarly, in a study conducted with members of the general population of Queensland, Australia, one of the most commonly reported facilitators to the performance of bystander CPR was that the victim would die without help\textsuperscript{44}. The presence of an innate moral and/or social obligation to help seems to have been demonstrated in a few, but certainly not all places around the world\textsuperscript{34,44}. Findings from the present study seem to agree with this. However, upon reflection of consistently low and unimproved bystander CPR around the world, these humanitarian values seem to be informing intent rather than behavior. Education and public health efforts should focus on fostering a connection between the positive intent demonstrated and actual behavior.

Issues directly contradictory to this ‘life vs. death’ phenomenon and altruistic, prosocial nature of bystander CPR were also articulated. Many individuals reported looking around to others to help first before stepping in. Furthermore, a number of participants went so far to assert that within the broader community, most individuals would not want the responsibility
associated with this type of situation. As such, they would prefer to distance themselves and not provide assistance.

Unfortunately, history has been replete with analogous situations; serious circumstances requiring immediate attention, yet witnesses opting to turn a blind eye. One example is the unfortunate circumstances played out during the infamous and catastrophic 1995 Chicago heat wave\textsuperscript{196}. It has been estimated that during one week of the blistering heat wave, nearly eight hundred Chicagoan’s lost their lives to heat-related deaths. In his book, \textit{Heat Wave: A social autopsy of disaster in Chicago}, Eric Klinenberg unpacks the social conditions that left thousands of Chicagoans vulnerable and defenseless against the heat. Interestingly, Klinenberg notes that the extreme death toll was largely attributed to preexisting dangers within Chicago’s social environment. For instance, there was an increased population of seniors who lived in isolation. They died alone in single, low-income dwellings, out of contact with friends, family, and neighbors, unaided by the community or local agencies. There was a persistent culture of abandonment by city dwellers, businesses, and service providers, resulting in hundreds of people forgotten and left behind. A deep-rooted fear shaped how people acted, causing them to be reluctant to trust other the community at large to the point where people were afraid to leave their homes\textsuperscript{196}. As such, Klinenberg argues: “[M]edical science can tell us little about the social conditions that affect the course of our lives and the context of our deaths. Excessive use of the medical microscope obscures or makes invisible the social pathologies that generate illness and disease (pg 243).”\textsuperscript{196} The social ecology and mentality that spurred many of the fatalities of the Chicago heat wave may be applicable to poor bystander CPR rates and could explain the lack of social responsibility perceived by many in the current study. Both situations involve individuals that have the opportunity to help someone in need, yet turn a blind eye, walk away and refuse to help that individual. When examined through this lens, this seems to suggest that our larger community may not be as interpersonally connected as we may hope or perceive and causes us to contemplate how far does our moral and social responsibility extend within our larger community.

Interestingly, a few participants in this study articulated both that they wanted to do anything they could to help save a person’s life, but they might also look to others to help first. One possible explanation for this ambivalence is that the interview participants may feel the need
to answer in a way that they think they ought to feel, rather than how they actually feel. For example, in a general context many say they would want to do anything to help save a person’s life, expressing the altruistic, prosocial nature of this behaviour. However, when put into a specific situation and asked how they might respond to that situation, a different answer may have emerged. An alternative possible explanation for this contradiction is that the positive intent to provide help is there, but when actually put in a scenario where they can step in and help, the person is either not equipped with the skills or is not confident in the skills they do possess. Thus, the result is that they feel compelled to look to another person. To address such uncertainty and ambivalence, every effort must be made to foster the positive intent to provide help and reduce situation-specific barriers.

To summarize, let us envision our bystander CPR rates in terms of a balancing scale, with the facilitators on one scale and the barriers on another (Figure 7). The data demonstrate that enablers to the performance of CPR include the “life vs. death” notion, underlying prosocial helping behaviours and a heightened inclination to assist victims who are family and children versus strangers. The current low and unimproved bystander CPR rates suggest that despite this humanitarian inclination the collective ‘weight’ of the barriers to bystander intervention exceeds that of the enablers or facilitators.
Reversing this trend will take a multi-pronged approach. First, the specific components of educational sessions and larger engagement strategies need to be considered. As Vaillancourt (2011) notes, we have strived to educate anyone and everyone in CPR, being only moderately successful\textsuperscript{20}. Attempting to educate everyone within the broader community may not be adequate and we have fallen short in educating most. While we may be training some people in CPR skills, it appears that we are not spending adequate time teaching them what a cardiac arrest is and empowering them to act. Individual sessions may not be highlighting key facets requiring direct emphasis and this should be considered in designing effective CPR educational initiatives. For instance, these results suggest that education should incorporate both hands on practice as well as basic knowledge about cardiac arrest and CPR in as realistic
an environment as possible. Highlighting the low survival rate, the critical importance and impact of providing CPR and how it can make a difference in survival, in understandable language, may further compel bystanders to act. Particular emphasis should be placed on the fact that doing something, even if it might not be perfectly executed, is better than doing nothing at all.

Second, in this study, the respondents collectively were unable to recognize cardiac arrest symptoms and to identify when a cardiac event had taken place. The interviewees demonstrated poor knowledge of the symptoms of cardiac arrest, suggesting laypersons may struggle with the identification of cardiac arrest and as a result, not provide CPR. This was a surprising finding and highlights the importance of arrest recognition in community education and awareness initiatives. Research has demonstrated positive results from the utilization of brief and ultrabrief videos, as short as one minute, in teaching basic CPR skills to laypersons\textsuperscript{131}. This novel resource may help educate laypersons on how to recognize cardiac arrest, and in particular the identification of irregular or agonal breathing as a symptom.

Third, we need to actively dispel misconceptions such as perceived legal consequence, the risk of disease transmission and notions of causing more harm to the patient. This will necessitate revamping the way CPR is portrayed to the public. Similar to other studies published in the literature\textsuperscript{11,34,35}, patterns throughout the data indicate that the public perceives CPR as a complicated skill to master; participants thought that it can only be effective if executed correctly and that you need to be trained and up to date with your skills to deliver it in emergency situations. To address this, I advocate for better awareness around chest-compression-only CPR. Chest-compression-only CPR is a simpler procedure, requiring the bystander to only push hard and fast in the centre of the patient’s chest. This may be easier for laypersons to both remember and subsequently perform in OHCA. It would require them to recall fewer, less complicated steps and the perceived anxiety about delivering certain actions in the correct order would be eliminated. Further, the technique diminishes the widespread concerns about performing mouth-to-mouth ventilations for lay bystanders. This approach would provide an opportunity to portray CPR as a simple skill that can be executed by anyone. In doing so, this may reduce or eliminate the perception that to provide CPR performance, one must being trained in the skill and ensure that their skills are kept ‘up
to date.’ Again, reinforcing the notion that doing something at all is better than doing nothing might help address this issue as well.

Finally, we need to consider the implications of larger psychological and social factors and concentrate on enhancing emotional and psychological preparedness. In an experimental study of the importance of competence to provide help in emergency situations, Shotland reported that competence influenced participants to give direct and correct help but it did not influence the decision to provide help\textsuperscript{197}, therefore suggesting that training people in CPR skills alone may not increase intervention rates unless the will to help is already established. While many people in this study expressed prosocial and altruistic intention, claiming that they would do anything they could for someone in distress, especially those who may die if they do not get help (i.e. the ‘life vs. death’ notion), there was also a strong faction that would look to others first, thereby diffusing personal responsibility and decision-making. It seems that to get bystanders to act, we must focus on cultivating and nurturing underlying humanitarian and altruistic values and the positive intent to provide help, in addition to hands-on training in technical skills. Further research is required to identify the optimal method for accomplishing this with respect to teaching CPR.

4.5 Limitations

As with any research, this study has limitations. First, participants were asked to report their behavioural intentions in hypothetical scenarios with regards to bystander CPR rather than actual behaviours. While behavioural intentions are a predictor of actual behavior, under certain circumstances, they might not be completely concordant\textsuperscript{198}. Nevertheless, behavioural intentions in part reflect the attitudes and beliefs that contribute to a certain behavior\textsuperscript{199}, in this instance, bystander CPR.

This study by design sampled a group of potential bystanders as a registry of bystanders who have actually performed CPR in OHCA currently does not exist in Toronto. By chance, the sample contained a few interviewees who had previously performed CPR and during the interviews, they drew on their past experiences. Participation in this study could have triggered negative or positive emotional responses for these bystanders with a history of responding to a cardiac arrest. I was confident that none of these individuals felt
uncomfortable at the time of the interview as none of the interviews were terminated prematurely and all participants were comprehensive in their responses without any apparent emotional consequences at the time of the interview. In fact, the interview was perceived by many of the participants as an opportunity for debriefing or perhaps closure that would have been inaccessible otherwise. Debriefing opportunities for those who respond to emergency situations may be valuable and potentially beneficial, however, its practice remains controversial\textsuperscript{200}. Regular surveillance of bystanders in the form of a registry would be advantageous as it would allow us to investigate unanswered research questions that were previously not possible due to limited access to this specific sub-population.

Furthermore, this exploratory work focused on depth rather than breadth. One of the strengths of the methodology of this study as it permitted inquiry into a specified topic in depth, allowing us to gain a rich and enhanced understanding of the nuances and contextual aspects of a subjective experience\textsuperscript{136,180}. As a result of the sampling technique and framework, results from twenty-one in-depth interviews are felt to be representative and a broad range of viewpoints on this topic were explored\textsuperscript{136,141}. Further research is required to investigate if the perspectives offered by the participants of this study are shared more broadly within Canada. Thus, the results from this in-depth work have been considered and integrated into the development of a Canada-wide survey (presented in Chapter 5), exploring the extent to which these findings (and the perspectives of these participants) hold for a larger number of people.

4.6 Summary

In this study, a total of twenty-one semi-structured qualitative interviews were conducted to explore public attitudes towards cardiac arrest and CPR in greater depth. Results indicate that a number of factors may facilitate the delivery of CPR: the heightened desire to help family members and children, the imminent threat to the patient’s life, the perception of bystander CPR as an altruistic prosocial behavior and the underlying desire to help others in need. In addition, the interviews revealed a number of misconceptions that may impair the ability to recognize when a cardiac arrest has occurred and impact a bystanders propensity to act. Misconceptions that impair the ability to recognize cardiac arrest included lack of knowledge with respect to the symptoms or cardiac arrest and conflation between cardiac arrest and other
medical emergencies, for example a heart attack or fainting. Barriers that impair the ability to act included risk of infection, fear of possible litigation, fear of causing harm or not performing CPR correctly, reluctance to help strangers, a lack of social responsibility and looking to others to help first. The findings were used to inform a nation-wide survey, which allowed for the investigation of how widespread some of these views might be on a larger scale. The results of this survey are presented in the following chapter.
Chapter 5
Phase Two: Quantitative Study

5  Phase Two: Quantitative Study

5.1  Introduction

In this chapter, I present phase two of this investigation in detail. The goal of phase two of this research study was to investigate Canadian knowledge, perceptions and attitudes towards cardiac arrest, bystander CPR and Automated External Defibrillator (AED) use through an online, scenario-based survey informed by the interview data presented in the phase one study. Specifically, the primary objective of this phase of the research was to determine if the Canadian general public is more willing to perform chest-compression-only CPR compared to traditional CPR involving compressions and mouth-to-mouth ventilations at a rate of 30:2. The secondary objectives were: 1) to better characterize the level and accuracy of public knowledge with respect to cardiac arrest, CPR and AEDs and 2) to elucidate reasons why the Canadian general public may be willing and/or unwilling to perform bystander CPR in OHCA. The survey was designed in such a manner to allow for both confirming and non-confirming evidence to emerge, with respect to the findings of phase one.

5.2  Methods

5.2.1  Survey Design

A thirty-two item survey was developed specifically for this study and followed the Tailored Design Method proposed by Dillman\textsuperscript{201}. An initial draft of the survey tool was developed on the basis of the literature, expert consultation and examples of scenario-based surveys previously conducted on this topic\textsuperscript{10,11,36,39,41,47}. The tool was further modified and informed by the exploratory, in-depth qualitative study results presented in Chapter 4. Interview data were analyzed using an inductive thematic analytic approach\textsuperscript{162} and the resulting five themes that emerged from this analysis were used to identify subtopics of particular interest for examination in this nation-wide survey. Thus, the survey tool was robust, well-informed and designed to fulfill the specific objectives of the survey outlined above.
Table 3 summarizes how survey questions were mapped to the qualitative themes that emerged from the analysis presented in Chapter 4.
<table>
<thead>
<tr>
<th>Question:</th>
<th>Qualitative theme/ domain to which this question is “mapped” to:</th>
<th>Comments:</th>
</tr>
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<tbody>
<tr>
<td><strong>CPR</strong></td>
<td></td>
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<tr>
<td>Have you ever heard of cardiopulmonary resuscitation (CPR) before?</td>
<td>- Knowledge of CPR</td>
<td>- Based on literature, presence/ absence of CPR training will impact answers to the rest of this survey</td>
</tr>
<tr>
<td>How would you rate your overall knowledge of CPR?</td>
<td></td>
<td>- Mimic what was used for interview screening</td>
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<tr>
<td>Have you ever received training in CPR before?</td>
<td></td>
<td>- May impact answers in this survey; some participants spoke to this in the interviews</td>
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<tr>
<td>If yes, what kind of training did you receive?</td>
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<td>How many times have you been trained in CPR?</td>
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<td>How many years ago did you receive your last CPR training?</td>
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<td>Have you ever performed CPR before in a real life emergency?</td>
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<tr>
<td>CPR is made up of several steps. What steps of CPR do you remember? (List as many as possible)</td>
<td>- “training groups” - i.e. never trained, recently trained and not recently trained</td>
<td></td>
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<td></td>
<td>- Most important steps of CPR</td>
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<td></td>
<td>- CPR steps and actions</td>
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<tr>
<td><strong>AEDs</strong></td>
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<tr>
<td>Have you ever heard of an Automated External Defibrillator (AED, “Mikey”, PAD, defibb) before?</td>
<td>- All the AED questions are mapped to the AED theme (subtheme of knowledge, also connected to education)</td>
<td>- AEDs were not included in the interview guide, but many interviewees discussed theme—subtheme emerged on this topic. Added a section to the survey to address this</td>
</tr>
<tr>
<td>How would you rate your overall knowledge of AEDs?</td>
<td>- Knowledge of AEDs</td>
<td></td>
</tr>
<tr>
<td>Would you be willing to use a public AED in an emergency situation? If MAYBE or NO, please specify a reason</td>
<td></td>
<td>- Interviewees noted that they would hesitate to use AEDs because they have never seen/ used one and they wouldn’t know how to, would not know when it would be appropriate to</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Do you think you would know when to use an AED?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think you would know how to use an AED?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If you have never received AED training, would you ever want to learn how to use an AED?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cardiac Arrest</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| How would you rate your overall knowledge of cardiac arrest?            | - Self-perception of knowledge  
- Definition of cardiac arrest  
- Symptoms of cardiac arrest  
- Recognition of cardiac arrest  
- Estimation of survival rate from OHCA  
- Life vs. death  
- Social responsibility  
- Burden of “knowing CPR”  
- Don’t have the knowledge/training  
- Any of the specific barriers in the “barriers” theme |
| In your own words, a cardiac arrest is:                                 | - These two questions are asked in an open ended format for 2 reasons:  
1) Do not want to lead survey respondents to an answer in a particular way (i.e. lead them to confuse cardiac arrest and heart attack)- open ended format will allow them to get there on their own rather than us giving them limited options  
2) Looking for any non-confirming evidence- perhaps the interviewees stated X, Y and Z as symptoms but all of the survey respondents say A, B and C. This format allows for the emergence of such comparisons  
This format allows us to build upon what was found in the qual study (i.e. good understanding of what cardiac arrest is whether symptoms associated with cardiac arrest, conflated with heart attack symptoms) but not lead survey respondents into answering a specific way  
- this question attempts to get at concepts like “life vs. death” and “social responsibility” that are harder to ask overtly  
- can then compare their initial answer here to the first question in each of the specific scenarios—see if their answer changes (i.e. they might say yes here and then when asked to think about doing chest compressions and mouth-to-mouth ventilations they say no) |
| If someone was having a cardiac arrest, list 3-5 things that you think they would be experiencing or things that would be happening to them: (boxes for input) |                                                                                                                                 |
| Let’s suppose 10 people have out-of-hospital cardiac arrests. If you could take a guess, how many do you think would survive? |                                                                                                                                 |
| If you witnessed a cardiac arrest, do you think you would act to help the victim? Please provide a reason with your answer: |                                                                                                                                 |
| **Scenario #1 (2005 guidelines, traditional CPR)**                      |                                                                                                                                 |
| Thinking about this scenario (#1), would you start chest compressions and mouth-to-mouth ventilations? Please provide a reason with your answer: | - Goal of scenario based section: are people more, less or equally willing to do CPR, without mouth-to-mouth ventilations? |
Please list the reason(s) why you would OR would not initiate CPR for each scenario: (Scenarios: family member, friend/ someone you know, young child, stranger, unkempt individual)

<table>
<thead>
<tr>
<th>Scenario #2 (2010 guidelines, chest-compression-only CPR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking about this scenario (#2), would you start chest compressions and mouth-to-mouth ventilations? Please provide a reason with your answer:</td>
</tr>
<tr>
<td>Please list the reason(s) why you would OR would not initiate CPR for each scenario: (Scenarios: family member, friend/ someone you know, young child, stranger, unkempt individual)</td>
</tr>
</tbody>
</table>

- barriers: family vs. stranger, child vs. adult, what the person looks like

Rationale for open ended format to address barriers: similar to rationale as mentioned above for definition/ symptoms of CA
- Want respondents to report their own personal barriers (eg. Fear of being sued, personal safety, disease contraction, do not know what to do etc.) on their own, rather than cornering them into answering in a particular way
- this format would also allow for new barriers to emerge that maybe were not explored in depth and emerged as a major theme in the qualitative study

Demographics
Gender
Age
Marital Status
Children
Prior heart disease diagnosis
Education
Ethnicity

- similar to what was collected for the interviews

Same rationale as above
One of the key qualitative findings presented in the previous chapter was that interviewees, members of the general public of Toronto both previously trained and untrained in CPR, understood what a cardiac arrest was on a superficial level by providing a dictionary-type definition. Many correctly articulated that a cardiac arrest meant that the heart stopped beating. However, upon probing more deeply regarding the symptomatology of cardiac arrest, most of the participants were unable to associate their definition with the appropriate symptoms. For instance, when asked to describe what they thought someone who was having a cardiac arrest might look like or what they might be experiencing, participants listed symptoms associated with heart attacks; clutching of the chest, nausea, pain radiating to the back and through the left arm, chest pain and shortness of breath. While many of these signs may precede a cardiac arrest, they are not the symptoms of the actual arrest itself. Very few participants actually noted the more dramatic symptoms of cardiac arrest; sudden collapse, absent pulse, absence of normal breathing, unresponsiveness and loss of consciousness. Additionally, none of the participants mentioned or described irregular breathing, medically known as agonal breathing, as a symptom of cardiac arrest. Agonal respiration is an abnormal pattern of breathing presenting in nearly half of cardiac arrest cases. It is often described to EMS dispatchers as barely breathing, heaving or labored breathing, problems breathing, noisy breathing, gasping, snorting, gurgling, moaning and groaning. Participants typically noted that cardiac arrest patients may have trouble breathing or shortness of breath, but none attempted to describe abnormal or agonal breathing. One of the potential factors underlying consistently low bystander CPR rates in this country may be that bystanders are unable to recognize when a cardiac arrest has actually occurred and hesitate to start CPR. Furthermore, there were some interviewees who used the terms ‘cardiac arrest’ and ‘heart attack’ interchangeably and viewed the two medical ailments as one and the same. Confusion between the terms heart attack and cardiac arrest has been found to exist in Wellington, New Zealand and in London, England. While heart attacks are one of the leading causes of cardiac arrest, they are not the only cause and they are in fact different from cardiac arrest. Moreover, in phase one, a global overestimation of the survival rate from OHCA was observed. Therefore, the survey was designed in such a way that it would: a) assess if the disconnect between the definition and the symptoms of cardiac arrest exists on a larger scale, and b) evaluate if overestimation of the OHCA survival rate is a widespread phenomenon throughout Canada.
Several participants brought up the topic of AEDs unprompted during their interviews. Within the open ended, semi-structured interview and despite no direct questions, participants discussed AEDs as a relevant and important topic. Despite the fact that many participants correctly understood the function of the AED, there were a number of barriers they identified to spontaneously reach for the device and deploy it on a bystander. Many participants voiced concerns such as not knowing how to use the machine properly, never having seen one open before, and uncertainty about the instructions provided. Furthermore, they wished to have further guidance on how to use one. As such, an additional section regarding AED knowledge and perceived use was added to the survey to explore some of these concerns on a broader scale.

One of the primary aims of the survey was to explore whether members of the general public would be more, less or equally willing to perform bystander CPR in OHCA with the removal of mouth-to-mouth ventilation and the recommendation for chest-compression-only CPR. Mouth-to-mouth ventilation was raised as a universal and significant concern during the interviews. A number of participants articulated that patient characteristics would impact their decision to provide CPR and specifically, provide ventilations. These patient characteristics included the patient’s relationship to the bystander, the patient’s appearance and their apparent age. For example, many participants indicated that they would be more willing to perform CPR on family members or people they knew compared to strangers, and special considerations were made for children. When discussing ventilations, several participants were hesitant to provide ventilations to strangers or people who appeared homeless or unkempt. Concerns surrounded the contraction of a disease or infection and the intimate nature of performing mouth-to-mouth ventilation. To explore these specific findings in the survey, a scenario-based format was utilized to assess willingness to perform both mouth-to-mouth and chest-compression-only CPR.

The final survey can be found in Appendix G and contained four general sections. The first section contained three screening questions to ensure appropriate distribution of age, gender and province of completion. The second section was designed to gather information regarding past CPR educational experience (if applicable) and to assess participant knowledge of cardiac arrest, CPR and AEDs. Questions regarding past exposure to cardiac arrest and performance of CPR in a real cardiac arrest emergency were also included in this
section. Knowledge regarding AEDs and willingness to use them in OHCA were not part of the initial objectives for this research. As mentioned above, the topic of AEDs was explored in detail throughout the qualitative interviews that informed this study and thus, questions on AEDs were added to this survey.

In the third section, participants were asked about their perceived willingness to initiate CPR in two sets of identical scenarios. Participants were told to visualize that they were the witness in each situation and to respond accordingly. Each set of scenarios began with a clear description of what they had witnessed and set of instructions. One set of instructions were based on the 2005 AHA guideline recommendation for traditional CPR involving chest compressions and mouth-to-mouth ventilations at a universal rate of 30:2. The second set of instructions were based on the 2010 AHA guideline recommendation for chest-compression-only CPR. Both sets of recommendations pertaining to bystander CPR were described in lay, non-scientific language. After reading the description and instructions, participants were asked in general, whether they would be willing to initiate CPR in general based on the CPR instructions provided. Along with their answer, they were asked to provide a short rationale or explanation for their answer. The participant was then asked whether they would be willing to initiate CPR in five different scenarios: family member, friend/ someone you know, young child, stranger and an unkempt individual (eg. homeless). For each of the five scenarios, the respondent was prompted to provide a brief explanation for their answer in an open-ended format. This format was selected to avoid leading respondents to answer in a particular manner. It also allowed for the emergence of both confirming and non-confirming evidence in relation to prior research. For any particular respondent, the order in which the two sets of scenarios appeared was completely random. That is, it was random whether the 2005 set of scenarios (i.e. recommending traditional CPR) appeared first or second. This randomizing capability was pre-programmed into the computer programming survey software168. The purpose of this was to promote truthful and honest answering and to eliminate any bias resulting from the order of the CPR instructions.

The fourth and final section of the survey collected demographic data such as marital status and number of children, prior diagnosis with heart disease, education level, ethnicity and birthplace to ensure adequate sample to population representation.
5.2.2 Sample and Pilot Testing

Considering factors such as cost and feasibility of general public recruitment, an online administration format was selected. Conversion to the online format also followed procedures outlined by Dillman et al. This survey was conducted with a representative sample of adults living in each of the Canadian provinces. An external marketing company, Canadian Viewpoint, aided with nation-wide sampling and recruitment. Canadian Viewpoint has a well-established, representative Canadian consumer research panel. Members of the Canadian general public have previously opted to be a part of this research panel, provided their personal contact information to the company and indicated a willingness to receive survey invitations by email.

To be eligible for inclusion in this survey, all potential respondents had to be 18 years of age or older, speak and read English and be registered to the Canadian Viewpoint research panel. The three Canadian territories were excluded since their combined population is extremely small in relation to Canada as a nation and thus, their representation in the survey sample size would be negligible. French-speaking Canadians were also excluded as I do not have sufficient experience in translation between French and English.

The anticipated survey sample size was 400 respondents. This was based on the total population of the Canadian provinces (33,369,423), a 95% confidence level and a 5% margin of error. For the purposes of recruitment, Canada was divided into five main regions: British Columbia, the Prairies, Ontario, Quebec and the Maritimes. Each of these regions was given a quota in the survey sample that was representative to the actual population distribution.

Prior to widespread administration of the survey, a pilot test of the online tool with a sample of thirty five respondents was conducted. Upon completing the survey, pilot test respondents were given the opportunity to provide feedback regarding clarity, brevity, wording of questions and general concerns and comments in an open-ended fashion. Pre-test data were examined for quality and completeness. All pilot test feedback was positive in nature and no suggestions were made by participants to improve the clarity of the questionnaire.
This study was approved by both the St. Michael’s Hospital and University of Toronto Research Ethics Boards (REBs).

5.2.3 Data Analysis

The SAS statistical software 9.3 was used to conduct all analyses. Descriptive statistics were used to characterize the study sample\textsuperscript{201} and the distribution of questionnaire answers are presented as frequencies and percentages. Open-ended questions were analyzed qualitatively\textsuperscript{162}. Due to the large sample size and number of open-ended responses requiring coding, a broad coding framework was adopted. Therefore, responses conveying similar yet not necessarily identical ideas were grouped into larger descriptive categories.

Chi-square, t-test (where applicable) and multivariable logistic regression analyses were conducted to measure any shifts in intent and willingness to provide bystander CPR based on the change from traditional to chest-compression-only CPR. Definite willingness (i.e. ‘yes’ responses) was coded as ‘yes’ and unsure or unwilling responses (i.e. ‘maybe’ or ‘no responses) were coded as ‘no’. Under both 2005 and 2010 CPR instruction, each participant was classified either as a Yes or a No, indicating their perceived intent (see Table 4 for summary of shorthand notation). To evaluate any shifts in intent in the analyses, four groups of individuals within the sample were created:

1) YES under both 2005 and 2010 CPR descriptions \((Y_{05}/Y_{10})\),
2) NO under both 2005 and 2010 CPR descriptions \((N_{05}/N_{10})\),
3) NO under 2005 and YES under 2010 CPR description \((N_{05}/Y_{10})\),
4) YES under 2005 and NO under 2010 CPR description \((Y_{05}/N_{10})\)

To assess changes in willingness based on the guidelines, groups two \((N_{05}/N_{10})\) and three \((N_{05}/Y_{10})\) were compared in the chi-square and multivariable logistic regression analyses presented below. Based on the literature\textsuperscript{49} and the prior exploratory qualitative work, seven different variables that may influence intention to provide CPR were examined. These variables were gender, age, marital status, children, education, immigration status and prior CPR training. Of these variables, gender, marital status, children, education, immigration status and prior CPR training were dichotomized. Age was analyzed as a continuous variable. A p-value of 0.05 or less was considered statistically significant. Finally, McNemar’s test was used for the analysis of dependent categorical variables in the scenario situations.
Table 4: Shorthand notation for Willingness Groups

<table>
<thead>
<tr>
<th>Willingness Response</th>
<th>Shorthand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2005- $Y_{05}$</td>
</tr>
<tr>
<td></td>
<td>2010- $Y_{10}$</td>
</tr>
<tr>
<td>Unsure/ No</td>
<td>2005- $N_{05}$</td>
</tr>
<tr>
<td></td>
<td>2010- $N_{10}$</td>
</tr>
</tbody>
</table>

5.3 Results

A- Participant Demographics

In total 428 surveys were completed; 213 (49.8%) respondents were male and 215 (50.2%) were female. To ensure that the survey sample was comparable to the larger Canadian population, the distribution of respondents by region was roughly comparable to that of the total Canadian population by comparison to the 2006 Census of Canada\(^{204}\). Most respondents (82.7%) identified themselves as Caucasian, which is comparable to the total Canadian population as captured in the Canadian National Census\(^{204}\). Over half of the survey respondents (58.2%) were married/living common law and over half (60.05%) reported having children. Table 5 provides a summary of the demographic information and characteristics of the study sample, and draws comparisons to the 2006 Census of Canada\(^{204}\).
Table 5a: Characteristics of Survey Respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sample</th>
<th>Census (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>213</td>
<td>49.8</td>
</tr>
<tr>
<td>Female</td>
<td>215</td>
<td>50.2</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prairies</td>
<td>92</td>
<td>21.5</td>
</tr>
<tr>
<td>Ontario</td>
<td>202</td>
<td>47.2</td>
</tr>
<tr>
<td>Maritimes</td>
<td>44</td>
<td>10.3</td>
</tr>
<tr>
<td>Quebec</td>
<td>14</td>
<td>3.27</td>
</tr>
<tr>
<td>British Columbia</td>
<td>76</td>
<td>17.8</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/ Never Married</td>
<td>110</td>
<td>25.7</td>
</tr>
<tr>
<td>Married/ living common law</td>
<td>249</td>
<td>58.2</td>
</tr>
<tr>
<td>Separated, but still legally married</td>
<td>23</td>
<td>5.4</td>
</tr>
<tr>
<td>Divorced</td>
<td>34</td>
<td>7.9</td>
</tr>
<tr>
<td>Widowed</td>
<td>12</td>
<td>2.8</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>257</td>
<td>60.1</td>
</tr>
<tr>
<td>No</td>
<td>171</td>
<td>39.9</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade school</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td>Some high school</td>
<td>13</td>
<td>3.1</td>
</tr>
<tr>
<td>High school graduate</td>
<td>93</td>
<td>22.0</td>
</tr>
<tr>
<td>College or technical school degree</td>
<td>143</td>
<td>33.8</td>
</tr>
<tr>
<td>Attended university</td>
<td>33</td>
<td>7.8</td>
</tr>
<tr>
<td>Graduated university with an undergraduate degree</td>
<td>87</td>
<td>20.6</td>
</tr>
<tr>
<td>Completed a post-graduate degree</td>
<td>41</td>
<td>9.7</td>
</tr>
<tr>
<td>Completed a professional degree</td>
<td>13</td>
<td>3.1</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td>Immigration Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Immigrant</td>
<td>363</td>
<td>84.8</td>
</tr>
<tr>
<td>Immigrant (by birthplace)</td>
<td>65</td>
<td>15.1</td>
</tr>
<tr>
<td>Asia</td>
<td>27</td>
<td>6.3</td>
</tr>
<tr>
<td>Europe</td>
<td>24</td>
<td>5.6</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>n</td>
<td>min</td>
</tr>
<tr>
<td>-----------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Caucasian</td>
<td>354</td>
<td>18</td>
</tr>
<tr>
<td>Chinese</td>
<td>20</td>
<td>4.7</td>
</tr>
<tr>
<td>South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)</td>
<td>16</td>
<td>3.7</td>
</tr>
<tr>
<td>African Canadian</td>
<td>5</td>
<td>1.2</td>
</tr>
<tr>
<td>European Descent</td>
<td>6</td>
<td>1.4</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>6</td>
<td>1.4</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>4.9</td>
</tr>
</tbody>
</table>

| Prior heart disease diagnosis                                   |     |     |     |          |               |               |
| Yes                                                             | 51  | 11.92 | |           |               |               |
| No                                                              | 377 | 88.08 | |           |               |               |

* censored (n ≤ 5)
** Variable not captured by the Census

Table 5b: Characteristics of Survey Respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>min</th>
<th>max</th>
<th>Mean ± SD</th>
<th>Sample Median</th>
<th>Census Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>428</td>
<td>18</td>
<td>77</td>
<td>45.97 ± 14.94</td>
<td>45.0</td>
<td>40.6</td>
</tr>
<tr>
<td>Years in Canada (for immigrants)</td>
<td>64†</td>
<td>1</td>
<td>68</td>
<td>26.42 ± 18.22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† one missing value
B- CPR training background

A total of 274 (64.0%) respondents had received some type of CPR training and 154 (36.0%) individuals were untrained. Within the trained subgroup, 73 (26.6%) respondents had been trained recently within the last 3 years and 201 (73.4%) respondents had been trained three or more years ago. Additionally within the trained subgroup, 122 (44.5%) respondents had been trained only once, 80 (29.2%) twice and 72 (26.3%) three or more times. The most commonly reported CPR training method was a course that granted a certificate or card upon completion (74.1%). 44 (16.1%) participants took a course and did not receive a certificate or card upon completion and only 2 (1.5%) people identified video or online training as their source of CPR education. A small proportion of respondents (8.4%) were trained using multiple different methods, or were trained via some other method such as a first aid course or could not recall how they were trained.

C- Knowledge of Cardiac Arrest, CPR and AEDs

When asked the general question, in your own words, a cardiac arrest is defined as: 188 (41.4%) respondents indicated that cardiac arrest means the heart has stopped beating. The next most common answer was a heart attack, reported by 89 (20.8%) individuals. Respondents were asked to identify three to five symptoms associated with cardiac arrest. The three most frequently cited symptoms of cardiac arrest were chest pain, identified by 244 respondents (57.0%), followed by difficulty breathing or shortness of breath, identified by 239 individuals (55.8%) and other pain (including general pain, left and/or right arm pain, shoulder, jaw, back or neck pain) identified by 159 individuals (37.2%). Figure 8 summarizes the percentage of respondents that reported a particular symptom.
The most commonly reported estimate for the survival rate was 50% (90 participants, 21.0%). Only 6 individuals (1.4%) reported a survival rate of 0% and 30 people (7.0%) reported a survival rate of 10%, which is the estimate most closely aligned with current rates in the literature\textsuperscript{1,65}. The distribution of responses is found in Figure 9.
Participants were also asked to rate their self-perceived knowledge of cardiac arrest, CPR and AEDs on a five point scale (very poor, poor, fair, good, excellent) (Figure 10). Most respondents reported fair knowledge of cardiac arrest (191, 44.6%) and CPR (176, 41.1%). In contrast, more than half of the respondents indicated either very poor (126, 29.4%) or poor (166, 38.8%) knowledge of AEDs.

**Figure 10: Self-perceived knowledge of Cardiac Arrest, CPR and AEDs**

Within the study sample, 400 individuals (93.5%) had previously heard of cardiopulmonary resuscitation and 28 (6.5%) had not. When asked to list as many steps in performing CPR as possible, airway, breathing and circulation or some variation of the ABCs was noted in 37.6% of cases. Chest compressions and rescue breaths were listed by 22.2% of respondents and only 14% of respondents indicated chest compressions only, as currently recommended in the 2010 guidelines. In their answers many of the respondents noted that they were unsure of the order of the steps and that they were unable to recall the correct ratios. For example, a wide range of different compression: ventilation ratios were listed: 2:2, 3:1, 3:2, 3:3, 3-5:1, 5:1, 5:2, 5:3, 5:5, 7:2, 8:1, 10:1, 10:2, 10:3, 10:10, 10-15:2, 15:1, 15:2, 15:3, 20:1, 25:2, 25-30:2, 30:1 and the recommended ratio of 30:2. Responses were often followed by “I’m sorry, I don’t remember the exact number”, “???” “I think?”, or “ish”. Only 7/428 (1.6%) responses referred to performing chest compressions to the beat of Stayin’ Alive, as promoted by the AHA Hands-Only CPR video campaign.
With respect to AEDs, 332 individuals (77.6%) had heard of an AED before. When asked if they would be willing to use an AED, only 262 (61.2%) indicated yes, 117 (27.3%) indicated maybe and 49 (11.5%) indicated no. Individuals who were unsure or would not be willing to use an AED provided two primary reasons: 1) “I don't know how to use one”; and 2) “I would be willing to use one if I was trained or had instructions”. Moreover, 236 (55.1%) thought that they would be able to operate an AED since they thought it comes with instructions or would be fairly easy to use. More than half of the respondents (54.0%) indicated that they would not know when to use an AED.

D- Willingness to Perform Traditional and Chest-Compression-Only CPR

Several statistical tests were conducted to measure willingness and shifts in intention to provide CPR:

1) Chi square and Multivariable Logistic Regression Analyses

As mentioned in the previous section, the sample was divided into four group based on reported willingness to provide CPR according to both the 2005 and 2010 AHA guidelines. The distribution of the study sample into these groups can be found in Table 6.
Table 6: Distribution of Respondents into Combined 2005/2010 willingness Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Y_{05}/Y_{10}</th>
<th>N_{05}/N_{10}</th>
<th>N_{05}/Y_{10}</th>
<th>Y_{05}/N_{10}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n=213)</td>
<td>72</td>
<td>78</td>
<td>45</td>
<td>18</td>
</tr>
<tr>
<td>Female (n=215)</td>
<td>70</td>
<td>59</td>
<td>76</td>
<td>10</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/living common law (n=272)</td>
<td>93</td>
<td>82</td>
<td>81</td>
<td>16</td>
</tr>
<tr>
<td>Not married (n=156)</td>
<td>49</td>
<td>55</td>
<td>40</td>
<td>12</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n=257)</td>
<td>89</td>
<td>78</td>
<td>72</td>
<td>18</td>
</tr>
<tr>
<td>No (n=171)</td>
<td>53</td>
<td>59</td>
<td>49</td>
<td>10</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before post-secondary (n=111)</td>
<td>40</td>
<td>32</td>
<td>32</td>
<td>7</td>
</tr>
<tr>
<td>Some or more than post-secondary (n=317)</td>
<td>102</td>
<td>105</td>
<td>89</td>
<td>21</td>
</tr>
<tr>
<td>Immigration Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immigrant (n=65)</td>
<td>28</td>
<td>17</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>Non-immigrant (n=363)</td>
<td>114</td>
<td>120</td>
<td>104</td>
<td>25</td>
</tr>
<tr>
<td>Prior CPR training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trained (n=274)</td>
<td>95</td>
<td>80</td>
<td>80</td>
<td>19</td>
</tr>
<tr>
<td>Not trained (n=154)</td>
<td>47</td>
<td>57</td>
<td>41</td>
<td>9</td>
</tr>
<tr>
<td>Age</td>
<td>45.3±13.8</td>
<td>47.6±15.6</td>
<td>45.2±15.6</td>
<td>44.5±14.5</td>
</tr>
<tr>
<td>Total (n=428)</td>
<td>142</td>
<td>137</td>
<td>121</td>
<td>28</td>
</tr>
</tbody>
</table>

Chi square analyses for dichotomous variables (gender, marital status, children, education, immigration status and prior CPR training) and a t-test for the continuous variable (age) were used to determine if any of these variables of interest were significantly associated with shifting intention to provide CPR based on the changes in the guidelines. To measure this, the N_{05}/N_{10} and the N_{05}/Y_{10} groups were compared. As shown in Table 7, the distribution of gender between these two groups was significantly different (p=0.0015). Thus, of those individuals who did not express a willingness to perform CPR according to the 2005 guidelines, women were more likely to express an increased willingness to perform CPR when mouth-to-mouth ventilation was removed from the requirements.

A multivariable logistic regression model was run to characterize who increased their willingness to provide CPR based on the changes in the guidelines. After adjusting for the other variables of interest in the model, the only variable that was significantly associated with
increasing willingness was gender; females were more likely to increase their willingness with the change in the guidelines compared to males (OR: 2.3, 95% CI [1.4, 3.8]).

Table 7: Chi Square Analyses

<table>
<thead>
<tr>
<th>Variable (%)</th>
<th>$N_{05} / N_{10}$ (n= 137) (%)</th>
<th>$N_{05} / Y_{10}$ (n= 121) (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>78 (56.9)</td>
<td>45 (37.2)</td>
<td>0.0015*</td>
</tr>
<tr>
<td>Female</td>
<td>59 (43.1)</td>
<td>76 (62.8)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/living common law</td>
<td>82 (59.8)</td>
<td>81 (66.9)</td>
<td>0.2388</td>
</tr>
<tr>
<td>Not married</td>
<td>55 (40.2)</td>
<td>40 (33.1)</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>78 (56.9)</td>
<td>72 (59.5)</td>
<td>0.6763</td>
</tr>
<tr>
<td>No</td>
<td>59 (43.1)</td>
<td>49 (40.5)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before post-secondary</td>
<td>32 (23.4)</td>
<td>32 (26.4)</td>
<td>0.5665</td>
</tr>
<tr>
<td>More than post-secondary</td>
<td>105 (76.64)</td>
<td>89 (73.6)</td>
<td></td>
</tr>
<tr>
<td>Immigration Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immigrant</td>
<td>17 (12.4)</td>
<td>17 (14.1)</td>
<td>0.6974</td>
</tr>
<tr>
<td>Non-immigrant</td>
<td>120 (87.6)</td>
<td>104 (85.9)</td>
<td></td>
</tr>
<tr>
<td>Prior CPR training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trained</td>
<td>80 (58.4)</td>
<td>80 (66.1)</td>
<td>0.2022</td>
</tr>
<tr>
<td>Not Trained</td>
<td>57 (41.6)</td>
<td>41 (33.9)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>47.6 ± 15.61</td>
<td>45.2 ± 15.62</td>
<td>0.2093a</td>
</tr>
</tbody>
</table>

* Two sample t-test
b Reported as mean ± standard deviation

Table 8: Multivariable Logistic Regression Analysis of Increased Willingness to Provide Chest-compression-only CPR compared to Traditional CPR

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Adjusted Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.195</td>
<td>0.988</td>
<td>0.970, 1.006</td>
</tr>
<tr>
<td>Sex</td>
<td>0.0017*</td>
<td>2.28*</td>
<td>1.365, 3.817*</td>
</tr>
<tr>
<td>Marital status</td>
<td>0.131</td>
<td>1.58</td>
<td>0.873, 2.847</td>
</tr>
<tr>
<td>Children</td>
<td>0.888</td>
<td>1.05</td>
<td>0.571, 1.912</td>
</tr>
<tr>
<td>Education</td>
<td>0.380</td>
<td>0.77</td>
<td>0.421, 1.390</td>
</tr>
<tr>
<td>Immigration Status</td>
<td>0.476</td>
<td>1.32</td>
<td>0.619, 2.801</td>
</tr>
<tr>
<td>Prior CPR training</td>
<td>0.196</td>
<td>1.43</td>
<td>0.833, 2.440</td>
</tr>
</tbody>
</table>
2) McNemar’s Test

McNemar’s test was used to compare the proportion of individuals willing to perform chest-compression-only CPR compared to traditional CPR in each scenario situation (Table 5). Before being placed in specific scenarios, respondents were asked to report their perceived willingness to perform CPR solely based on the description of CPR provided. Based on this alone and when the group was analyzed as a whole, the proportion of respondents willing to do chest-compression-only CPR was significantly greater than the proportion of respondents willing to perform traditional CPR with ventilations (61.5% vs. 39.7%, p < 0.001). In analyzing specific scenarios, the proportion of respondents willing to perform chest-compression-only CPR was significantly greater than the proportion willing to provide traditional CPR in two scenarios: stranger (55.1% vs. 38.8%, p < 0.001) and unkempt/homeless individual (47.9% vs. 28.5%, p < 0.001). Statistically significant differences were not observed in the family, friend, and child scenarios.

Table 9: Comparison of number of YES responses* between Chest Compressions and Mouth-to-Mouth CPR and Chest-Compression-Only CPR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>General willingness</td>
<td>170/428 (39.72%)</td>
<td>236/428(61.45%)</td>
<td>p&lt;0.001*</td>
</tr>
<tr>
<td>Family</td>
<td>357/428(83.41%)</td>
<td>352/428(82.24%)</td>
<td>0.435</td>
</tr>
<tr>
<td>Friend</td>
<td>336/428(78.5%)</td>
<td>337/428(78.74%)</td>
<td>0.89</td>
</tr>
<tr>
<td>Child</td>
<td>258/428(60.28%)</td>
<td>253/428 (59.11%)</td>
<td>0.522</td>
</tr>
<tr>
<td>Stranger</td>
<td>166/428(38.79%)</td>
<td>236/428(55.14%)</td>
<td>p &lt; 0.001*</td>
</tr>
<tr>
<td>Unkempt (ex. Homeless)</td>
<td>122/428(28.5%)</td>
<td>205/428(47.9%)</td>
<td>p&lt;0.001*</td>
</tr>
</tbody>
</table>

*Comparison of Yes responses to Maybe/No responses using McNemar’s test for the analysis of 2 dependent categorical variables

E- Rationales for Providing CPR or Not

Respondents were asked to provide a rationale or explanation for their willingness or unwillingness to provide CPR. Based on the description of traditional or chest-compression-only CPR alone, the most commonly reported explanation was that the respondent felt a duty or responsibility to help and that they would act no matter what. Furthermore, respondents were similarly asked to provide an explanation in each of the ten scenarios they were asked about. A duty or responsibility to help was the most common response in nine out of the ten
scenarios. The one exception was performing traditional CPR on an unkempt individual; 40.2% of individuals feared doing mouth-to-mouth ventilations and putting themselves at risk for disease or infection. Furthermore, 23.6% of respondents reported similar fears in the case of a stranger.

There were certain rationales that were child specific. First, fear of causing harm was not a common concern across the scenarios, except in the case of the child. 13.2% of respondents articulated a fear of causing harm in the child scenario under traditional CPR instruction. This number increased to 18.7% under chest-compression-only CPR conditions. Concerns surrounded pressing too hard and hurting or injuring the child because of their smaller size. Second, 13.4% and 10.1% of individuals in the chest-compression and ventilation CPR and chest-compression-only CPR scenarios respectively reported a special concern for children. Within this specific category of rationales, participants spoke about young children having a long life ahead of them, that this (cardiac arrest) should not be happening to the young and that children should not suffer. For instance, respondents said the following:

“could never let a child suffer”-survey respondent #114, child scenario, traditional CPR

“you HAVE to help children when they are in trouble”-survey respondent #242, child scenario, traditional CPR

“Seeing a child in distress would move me to act”-survey respondent #194, child scenario, chest-compression-only CPR

“They have their whole life ahead of them”-survey respondent #423, child scenario, chest-compression-only CPR

Barriers such as lack of knowledge/ confidence in CPR skills, fear of litigation and depends on who else was there to help, were reported more frequently in the case of the stranger and unkempt individuals.

5.4 Discussion

The present study examined whether the Canadian general public would be more inclined to provide chest-compression-only CPR compared to traditional CPR involving mouth-to-mouth ventilation. Findings demonstrate that the proportion of individuals willing to perform chest-compression-only CPR is significantly greater than the proportion of individuals willing to perform traditional CPR in three instances: 1) in general when the victim was not specified, 2)
strangers and 3) unkempt or homeless individuals. This was not observed in the cases of family, a friend or a child. Furthermore, females were found to be more inclined to provide CPR with the switch in the guidelines compared to males. Barriers and facilitators to the performance of bystander CPR were situation-specific and significant knowledge gaps with regards to recognition and outcomes of cardiac arrest and the specifics of the CPR process were elucidated. These may have a significant impact on willingness to provide CPR in OHCA.

Only 64% of participants in the current study had been previously trained in CPR, most of which (73%) were trained more than three years prior to completing this survey and a substantial proportion (45%) had only been trained once. The importance of training and retraining of CPR skills has been endorsed and promoted by the resuscitation science community. Nonetheless, Vaillancourt (2011) notes that CPR is a ‘life skill’ acquired by too few Canadians and unfortunately, CPR skills are often not kept up to date or practiced resulting in hesitation and inaction when presented with a real life emergency situation. Daring to perform CPR in OHCA requires both courage, and confidence in knowledge. Despite this, when asked to report their self-perceived level of knowledge with respect to cardiac arrest and CPR, a considerable proportion of individuals reported having only fair knowledge of both. Currently, longer-term maintenance of public CPR skills is not being accomplished effectively and requires further attention.

Shortcomings in knowledge likely manifest as bystander inaction in OHCA. Findings demonstrated significant gaps in the level and accuracy of knowledge in several domains. First, consistent with the data presented in Chapter 4, Canadians were highly optimistic about survival from OHCA and perceived a higher survival rate than what is actually observed. Just over half of the survey respondents (51%) indicated a survival rate of 50% or higher. Similar findings have been documented in the literature. In a study surveying a sample of members of the general public in London, England, Donohoe et al. (2006) reported a similarly high perception of the survival rate, with 65% of respondents assumed that at least half of OHCA patients survive. It is possible that public beliefs are strongly shaped by images and portrayals of cardiac arrest and CPR in the media. Diem et al. (1996) analyzed how three popular television programs depict CPR and found a large discrepancy between TV representations and the reality of cardiac arrest. Researchers found that 77% of patients...
receiving CPR on Chicago Hope, ER and Rescue 911 survived their arrest\textsuperscript{183}, which is significantly higher than the survival rates documented in the medical literature. Furthermore, the researchers found that 65\% of the patients who got CPR on these programs were children, teenagers and young adults who had experienced acute, traumatic injuries\textsuperscript{183}. Unrealistic assumptions about survival from OHCA may be influenced by these misrepresentations and demonstrate a lack of awareness within the general public. This may, on a subconscious level, influence the decision to provide bystander CPR.

Second, participants’ responses demonstrated a low capacity for successful cardiac arrest recognition and differentiation from a myocardial infarction or heart attack. While 41.4\% of respondents indicated that a cardiac arrest means the heart has stopped, 20.8\% claimed that a cardiac arrest meant a heart attack. Confusion between the terms heart attack and cardiac arrest has been found elsewhere. In Wellington, New Zealand, Larsen et al. (2004) found 40\% of survey respondents believed heart attack and cardiac arrest were the same thing\textsuperscript{202}. Similarly, in London, England, Donohoe and colleagues (2006) demonstrated that 51\% of surveyed individuals understood that cardiac arrest meant the heart stops suddenly; one third of these individuals applied this definition to a heart attack\textsuperscript{35}. Moreover, in the present study, the most commonly reported symptoms respondents associated with cardiac arrest were symptoms typically associated with heart attacks; chest pain, shortness of breath and other pain including general pain, left and/or right arm pain, shoulder, jaw, back or neck pain. Cardiac arrest and heart attack constitute two distinct medical conditions, characterized by very different symptoms and each requiring different courses of action on the part of the bystander. The ability of the Canadian general public to appreciate when a person has suffered a cardiac arrest appears to be poor. Arrest identification is the first step to the initiation of appropriate and timely CPR. Simplified identification algorithms have been developed involving the removal of the pulse check, the recognition of agonal breathing and initiating CPR on anyone found to be unconscious and unresponsive\textsuperscript{79}. Furthermore, there is a population-based need for marketing strategies that advertise how to identify a cardiac arrest victim. Several groups have developed strategies to help members of the public identify myocardial infarction\textsuperscript{206-209}. Although not identical in their approaches, they implemented public education initiatives through the mass media, professional education for paramedics and physicians to accomplish this. These strategies have been effective and something similar should be developed and
implemented for the identification of cardiac arrest. This strategy should place an increased emphasis on the distinguishing features of cardiac arrest and on recognition techniques that are simple and effective for laypersons.

Third, knowledge regarding AEDs was limited. Nearly one quarter of survey respondents (22.4%) had never heard of an AED before, and ~39% were unsure or would not use the machine, primarily because they had never been trained and did not know how to use one. In addition to these findings, more than half (54%) indicated that they would not know when to use an AED. Several researchers have recently focused on mathematically optimizing the placement of AEDs in community settings based on spatio-temporal OHCA occurrence\textsuperscript{83-85}. The novelty and value of such research is obvious, yet the applicability is questionable if members of the general public hesitate to use them because they believe they need to be trained to operate them and do not know when to use them. Current AED awareness strategies should be developed that concentrate on the simplicity of AED operation and when to deploy them.

Finally, a lack of understanding of CPR protocols was observed. While many noted that CPR was comprised of \underline{Airway}, \underline{Breathing}, \underline{Circulation} (ABCs), participants’ responses demonstrated confusion with the order and duration of all of the steps. Only 14% of respondents indicated chest compressions only, as currently recommended and only 7 individuals alluded to performing chest compressions to the beat of Stayin’ Alive, as promoted in the AHA Hands-Only CPR campaign. Despite the fact that chest-compression-only CPR has been endorsed since 2008\textsuperscript{14}, the data suggests that awareness around this endorsement is not widespread. In Arizona, Coons et al. (2009) noted similar unawareness about chest-compression-only CPR; just over a third of respondents in his study had previously heard of chest-compression-only CPR through media sources such as the television and newspaper\textsuperscript{11}. Most surprisingly, twenty-four different compression:ventilation ratios were identified in the current study, which is cause for serious concern. Moran’s paper on toddler parents understanding and perceptions of CPR from Auckland, New Zealand reported similar confusion in the ability to correctly recall recommended ratios, with only 18.5% able to correctly report the current recommended ratios for adult CPR. This number dropped to 12.2% with regards to child CPR ratios\textsuperscript{48}. 

The present study assessed if members of the Canadian general public would be more inclined to perform chest-compression-only CPR compared to traditional CPR involving both mouth-to-mouth ventilations and chest compressions. The findings further support the existing body of international literature from the United States, Asia, Australia and Europe that demonstrates increased perceived willingness to perform CPR if the protocol does not involve mouth-to-mouth ventilations. In general, the proportion of Canadians willing to perform chest-compression-only CPR was significantly larger than the proportion of Canadians willing to perform traditional CPR involving ventilations. Similarly, in specific victim situations, a larger proportion of individuals was willing to perform chest-compression-only CPR on strangers and unkempt individuals compared to traditional CPR. Perhaps less surprisingly, the data did not indicate significant differences in willingness in scenarios of family, friends or children between the two protocols. This seems to suggest willingness to provide CPR is influenced by who the victim is, which has been well established in the literature. Again, these studies demonstrated international representation, and thus, the Canadian data seem to be agreeing with findings already demonstrated elsewhere in the world.

I performed further statistical analyses to evaluate and characterize who demonstrated an increased willingness to perform chest-compression-only CPR compared to traditional CPR. After adjusting for the other variables of interest, gender was found to be the only significant predictor of increased willingness to perform bystander CPR based on the change in the guidelines. More specifically, females were significantly more likely to increase their willingness based on the shift in the guidelines compared to males. Taking these two findings together, community-wide CPR initiatives should continue to promote a simpler, chest-compression-only bystander CPR technique and gender should be considered in the development and delivery of such initiatives.

The promotion of chest-compression-only CPR on its own might not be enough to see marked improvements in bystander CPR rates. Qualitative analysis of survey respondents’ explanations and rationales in each scenario provides further insight to the enablers and obstacles to bystander CPR in specific scenarios. Performing ventilations was a very minor concern in the family, friend and child scenarios. One possible explanation for this, which was alluded to by a substantial proportion of respondents, is that something about the situation (for example, the person and their medical condition or status) was known to them, making them
comfortable performing ventilations. Alternatively, performing ventilations on strangers and unkempt individuals was concerning for many due to a perceived risk of infection or contracting a disease. Perceptions of risk to personal safety were nearly completely diminished under chest-compression-only CPR conditions.

A host of barriers were identified that were relatively minor, compared to reported barriers in the literature, and seemed to be situation specific. Previous research has demonstrated that a lack of knowledge and/or confidence in skills is a significant barrier, being reported by as much 67-80% of respondents in some studies. However, in this study, it was reported at a fairly consistent, low level (6-12%) across scenarios. Fear of litigation has been an inconsistently reported barrier in the literature; some studies found it to be a key issue while others a very minor issue. Survey results indicate that fear of litigation is not a prevalent issue for Canadians, with the exception of the stranger scenario where it was reported by 7.5% and 4.9% of respondents under traditional and chest-compression-only CPR instructions respectively. Such a wide discrepancy in the literature may be due to the differences in Good Samaritan type laws in other countries. Fear of causing harm was more commonly reported in the child scenario and not the remaining four scenarios.

Most interestingly, underlying humanitarian and altruistic values played a key role in the perceived decision-making process. In Chapter 4, two competing ideas were explored in-depth; the ‘life vs. death’ notion and widespread, diffusion and lack of responsibility for others in need of help. Essentially, the ‘life vs. death’ notion embodies the idea that in a life-or-death situation, there is an underlying duty and obligation to help those who are in distress. In nine out of ten specific scenarios, the most commonly reported rationale to providing CPR or not was an enabler: a responsibility or duty to help any person in need. In an interview study of volunteer bystanders, Axelsson notes that humanitarian values, expressed as a wish to save a life or the wish to help another person, constituted the foundation of bystanders’ actions. This idea seems to underscore much of Canadian perceived willingness to perform bystander CPR. Our efforts should focus on embracing these core ideals and values, while effectively dispelling minor misconceptions and providing hands on practice to the point where the potential bystander feels confident in their skills and empowered to act.
The public perspective on cardiac arrest and resuscitation has important implications for the continued attempt to strengthen the links of the Chain of Survival. The significance of early and effective bystander action in OHCA has been recognized for decades, yet has somehow not translated well into action at the point of care. This study offers important insights into Canadian perspectives on cardiac arrest and resuscitation that, until this point, had not been previously established.

Taking the above findings into consideration, we should by no means be advocating that every member of the general public become an expert in CPR and AED use, since this is both unrealistic and unfeasible. Rather, focus should be placed on communicating the basics of CPR in an engaging and compelling manner and putting forth a better effort to systematically train and retrain the larger community. In light of my research, I recommend and advocate for the development of: 1) a standardized educational approach to training the public in the basics of CPR and 2) a systematic strategy for increasing public awareness and translating knowledge about chest-compression-only CPR into the public realm. In Chapter 6, I will further develop this idea and propose a strategy for accomplishing this in the future.

5.5 Limitations

Although the present study offers important insights to inform future practice, the results should be interpreted with caution as a result of limitations of the study. First, due to funding concerns, the sample size was limited around a target of 400 respondents. It should be noted that the goal of this survey was to represent the Canadian public perspective, and provide survey estimates for the population as whole. If the goal had been to compare responses by regional subgroups, this would have required a much larger sample size and accordingly, a higher cost.

Second, while the web mode of distribution offered a significant advantage in terms of the size and range of respondents represented in the sample, selection bias was inevitable. In order to complete this survey, potential participants had to be registered to the Canadian Viewpoint panel and have access to the Internet. Thus, this narrowed down the potential sample significantly. After consultation with my thesis committee, I felt that this approach to
public recruitment was the optimal one for achieving a large sample of members of the Canadian general public.

Third, several open-ended questions were included in the survey to allow participants to voice their opinions without being lead to answer in a particular manner. Although the questionnaire was carefully considered from a design standpoint, there is the possibility that respondents tried to give what they believed to be desired or ‘right’ answers. For instance, a substantial amount of responses indicated a duty, responsibility or obligation to help others as the rationale to provide CPR. In Chapter 6, I analyze this critically and speculate as to why this may have been the case.

5.6 Summary

This is the first study exploring lay knowledge and willingness to engage in resuscitative efforts in OHCA among members of the general public in Canada. Although there are some limitations to this work, findings offer new knowledge of lay perspectives within a Canadian context. The results identify several significant knowledge gaps that warrant further attention. Perceived willingness seems to be underpinned by particular values of a shared, humanitarian responsibility for others, and reported barriers were disparate and scenario specific. In Chapter 6, I synthesize the key findings, from both chapters 4 and 5, and use this as a foundation for recommending a well-informed, future knowledge translation and educational initiative.
Chapter 6
Conclusions and Future Directions

“To him who devotes his life to science, nothing can give more happiness than increasing the number of discoveries, but his cup of joy is full when the results of his studies immediately find practical applications.”
- Louis Pasteur

6 Conclusions and Future Directions

Throughout this thesis, it has been emphasized that survival from cardiac arrest in the out of hospital setting is extremely low and can be markedly improved with the provision of early bystander CPR and defibrillation. For decades, we have strived to increase the penetrance of cardiac arrest and CPR knowledge, training and awareness. Researchers have recognized that the first step towards achieving this goal is to characterize public knowledge, identify key gaps in that knowledge and leverage that to strategize how to reduce those gaps in the future\textsuperscript{49}. Despite all of the research that has been conducted in this field and the various efforts to strengthen the early links in the Chain of Survival, an increase in Canadian bystander intervention rates has not been observed.

The goal of this research was to generate a holistic picture of the Canadian, lay public perspective toward cardiac arrest and resuscitation. Employing a mixed-methods approach, knowledge, attitudes and perceived willingness to perform bystander CPR were explored in depth with a representative sample of members of the Canadian public. The findings have elucidated both enablers and barriers to the delivery of CPR within a Canadian context and highlighted several gaps in understanding on the part of many members of the lay public. As a consequence, we are now better equipped with specified knowledge to guide, tailor and refocus our tactics to improve bystander CPR rates throughout the country. In the remainder of this chapter, I will integrate the key findings from the research phases above. Finally, I will end by offering a possible resolution, calling attention to one domain of research, namely knowledge translation (KT) and implementation science, as a core focus to guide future endeavors and actions in this field.
6.1 What we have learned

It is obvious that the endeavor to revive a victim from cardiac arrest requires some knowledge (general or specific) of what needs to be done on the part of potential bystanders. The OHCA situation is unquestionably multidimensional. In addition to being a stressful and shocking environment for the bystander, the decision to provide aid is influenced by several subconscious elements: core values, motivations, fears and apprehensions.

One of the first roadblocks that may result in significant delays in initiation of CPR and activating EMS is that the bystander may not recognize when a cardiac arrest has in fact occurred. Findings common to both studies provide overwhelming support that many Canadians would have trouble recognizing a cardiac arrest. The survey indicated that 41.4% of respondents thought that a cardiac arrest meant that the heart stopped beating. This corroborated findings from our qualitative study. Despite the fact that members of the general public demonstrated a good understanding of this literal definition of what a cardiac arrest is, they were unable to connect this to the overt signs of cardiac arrest: victims are unconscious, unresponsive and pulseless. Instead, in both studies, participants perceived cardiac arrest to be associated with symptoms typical of a myocardial infarction or heart attack: chest pain, radiating arm pain, neck pain, nausea and dizziness. Although members of the Canadian lay public may be equipped with the necessary skills and willingness to perform CPR, they may be unable to recognize when those skills need to be put into action.

As I discussed earlier, it is possible that public beliefs are strongly shaped by images and portrayals of cardiac arrest and CPR in the media. Diem et al. (1996) analyzed how three popular television programs depict CPR and found important misrepresentation of cardiac arrest and CPR in the media\textsuperscript{183}. This may contribute to laypersons developing unrealistic impressions from these depictions and then generalizing them to real life situations. Further, this could shape public perceptions of cardiac arrest and their beliefs about CPR.

A host of barriers to performing CPR were identified in both studies. In the qualitative analysis presented in Chapter 4, several obstacles and challenges to the performance of bystander CPR were elucidated; fear of litigation, fear of contracting disease as a consequence of performing mouth-to-mouth ventilations, lack of knowledge, fear of causing harm and fear of missing a step or ‘performing it wrong’. While barriers identified in the survey from Chapter 5 were
comparable to those identified in the qualitative study, further analysis of survey responses
demonstrated that the distribution and prevalence of barriers was really dependent on who the
patient was. For example, in the survey, fear of causing harm was more commonly reported in
the child scenario compared to the remaining four adult scenarios. The qualitative findings
suggest that fear of causing harm (e.g. rib fracture) is also a concern. Supporting the findings
that emerged from the qualitative analysis presented in Chapter 4, in phase two, the fear of
performing mouth-to-mouth ventilations was a central concern in the stranger and unkempt
survey scenarios, but not in the other three.

In the survey, the barrier lack of knowledge and/or confidence in skills was reported at a fairly
consistent, low level (6-12%) across scenarios, which was surprising since this was a prevalent
concern explored by interviewees in the qualitative study. One possible explanation for this
discrepancy is that in providing an answer in the survey, there was another factor or influence
that was more important and that had precedence over a lack of knowledge. In the survey, if
there had been an opportunity to provide multiple reasons for performing or not performing
CPR, perhaps a lack of knowledge would have been a more common response.

Fear of litigation was a very minor concern across survey scenarios, which seemed to disagree
with perceptions held by several informants in the qualitative interviews. Perhaps the
interviewees perceived there to be a general lack of awareness regarding the protective, Good
Samaritan laws throughout the country, which lead them to believe that many people would
fear litigation if they were to step in and provide help. Furthermore, in most parts of Canada,
including Ontario where the qualitative interviews took place, there is a Good Samaritan Law
or an equivalent act established that protects bystanders who provide help in OHCA.
However, as discussed in Chapter 2, these laws are not universal throughout the country. This
may have also contributed to the disagreement between the phase one and phase two findings.
Nevertheless, the results from the survey indicate that fear of litigation is not a major issue for
Canadians compared to some of the other barriers and concerns that participants noted. This
result was similar to findings from Queensland, Australia\textsuperscript{44} demonstrating low fear of
litigation, but was dissimilar to findings from the United States\textsuperscript{2,11} and Korea\textsuperscript{40} demonstrating a
prevalent fear of litigation.
In both datasets, humanitarian values, cultural and social perceptions were found to be embedded within the decision to provide bystander CPR. Thematic analysis of the interview data revealed two competing concepts: the notion of ‘life vs. death’ and a perceived diffusion of responsibility within our larger culture. The ‘life vs. death’ concept embodies the idea that when others are in distress and could potentially die without help, then, as the bystander, we have an obligation and a duty to help them no matter who it is. In sharp contrast, several interviewees stated that they would look to other bystanders to step in and provide CPR first before they would intervene themselves. Numerous interviewees commented on what they characterized as a ‘lack of responsibility’ for other human beings within the broader community, asserting that people distance themselves from situations involving responsibility and ignorance is rampant throughout our society. Thus, in situations of OHCA where the bystander should be performing CPR, people do not want the responsibility of someone else’s life in their hands.

The survey provided the opportunity to explore the breadth of these competing concepts and to see how widespread these views might be throughout Canada. Survey respondents were provided the opportunity to briefly explain (in an open-ended manner) their decision to provide or not provide bystander CPR in each scenario. This was done so as not to restrict respondents to answering in a limited set of response options, permitting us to identify additional possible explanations beyond those offered in the qualitative investigation. In the survey, the most commonly reported explanation for deciding to provide CPR was the responsibility or duty to help that person. This was reported in 33.4% of cases under traditional CPR instructions and 37.4% of cases under chest-compression-only CPR instructions. With respect to individual scenarios (family, friend, child, stranger and unkempt individual), responsibility or duty to help/act no matter what was the most frequently reported rationale across all scenarios, under both sets of guidelines. The single exception to this was with chest compression and mouth-to-mouth ventilation CPR on an unkempt individual scenario; 40.2% of individuals reported a fear of doing mouth-to-mouth ventilation and putting themselves at risk and only 26.9% reported a responsibility or duty to help. This trend was reversed under the chest-compression-only CPR instructions. Thus, the survey confirmed a prevalence of the ‘life vs. death’ notion that emerged in the exploratory qualitative work.
In light of these findings, it seems necessary and appropriate to speak to the study’s Canadian cultural context. While Canada may be a vast geographic and ethnic nation, its citizens have gained a certain reputation so to speak. In Madison et al.’s *Is there a Canadian Philosophy? Reflections on the Canadian Identity*, the authors embark upon a quest to ascertain a ‘Canadian’ philosophy. While much of the content of this book is philosophical in nature, Madison alludes to this distinctive ‘reputation’ or as he puts it, a “national ethos” of the Canadian culture and perspective. For instance, he notes:

“Inherent to the Canadian way of life- the modes of public discourse and self-understanding, the social practices and institutions, the economic and ethical relations that constitute our national *ethos*- is a *modus operandi* visible throughout a great many manifestations and assuming a multiplicity of forms…While it is therefore exceedingly difficult to state in straightforward terms what it means to be a Canadian, there can, nonetheless be no doubt that such a creature does in fact exist. Visitors to Canada, from both the US and elsewhere, readily “sense” the difference between Canadians and Americans- the all-pervasive material similarities in their way of life (and Canadians’ television viewing habits) notwithstanding”\(^\text{210}\)

Madison further supported this statement with sociologist Rhoda Howard’s parallel observation: “Canadians…have a particular way of life, a particular way of looking at things, that they share with other Canadians but not with foreigners.”\(^\text{211}\) Thus, both Madison and Howard propose that something unquantifiable is so deeply rooted in our ways in our culture that makes us ‘uniquely Canadian.’ Our national character seems to be marked by community ties, humanitarian values and an internal cohesiveness that seems stronger compared to other nations\(^\text{210}\). However, upon reflection of the consistently low and unimproved Canadian bystander CPR rates, these humanitarian values and desire to help others seems to be informing intent rather than behaviour. This may, to some extent, explain the results observed above. Nevertheless, based on the overwhelming positive intent found in this study, education and public health efforts should focus on fostering a connection between the positive intent demonstrated by Canadians and actual behavior.

Although bystander CPR has been recommended as an integral and critical part of cardiac arrest resuscitation for decades now, bystander CPR rates remain consistently low around the world and particularly in Canada. The resuscitation research community has devoted their efforts over the years to improving and simplifying the CPR process for bystanders, such that survival rates might be optimized. One of the more provocative changes has been the
endorsement of a simpler chest-compression-only CPR technique for bystander rescuers. Despite this profound change in the AHA guidelines, there has been a relatively slow uptake of this knowledge into the public realm, as evidenced by findings from this research. Although chest-compression-only CPR has been endorsed since 2008\textsuperscript{14}, findings from both phases indicate that the general public is, for the most part, unaware of the changes. Specifically in the survey, respondents reported twenty-four different chest compression:ventilation ratios and tried to articulate specific and detailed steps of CPR, which included pulse and breathing checks. The survey results indicated a higher proportion of people were inclined to provide chest-compression-only CPR compared to traditional CPR in situations involving strangers and unkempt or possibly homeless individuals. Upon characterization of who demonstrated an increased inclination to provide chest-compression only CPR compared to traditional CPR, gender was found to be the only significant predictor and females were more likely than males to increase their willingness. This should somehow be considered in educational initiatives moving forward.

6.2 A Knowledge Translation Solution

Ultimately, this research indicates that we need to reevaluate both what and how we are teaching Canadians about cardiac arrest and resuscitation. Considering either of these components alone with respect to our training methods will likely be less effective. For instance, we could be teaching all the ‘right things’- the what- about cardiac arrest and CPR but in an extremely ineffective manner, such that bystanders do not feel compelled to act or confident in their skills. Furthermore, it is possible that education is so inconsistent that everyone is receiving a different message and is learning something different. The alternative situation is also possible. Perhaps we standardize how we educate everyone, but what we are teaching is misguided. Thus, to achieve optimal efficiency in our efforts moving forward, both must be considered together.

Based on the findings uncovered in this thesis and the above consideration, I propose a two-pronged solution moving forward:

1) The development of a standardized educational plan that is tailored to consider the specific findings from my research. This comprises four key domains: recognition of
cardiac arrest, focusing on the basics with chest-compression-only CPR, debunking misconceptions (these are detailed below) and reconceptualizing the public perspective.

2) The development of a more effective strategy for translating knowledge regarding cardiac arrest, CPR and AEDs into the public realm that address the key sociocultural phenomena presented above and that focuses on widespread moral and social responsibility within our larger community. This strategy should integrate and consider core concepts from the field of knowledge translation (KT).

I will conclude this discussion by elaborating on each of the two components in more depth.

**Component #1- Standardized Educational Plan (the ‘what’ component)**

Based on the findings presented above, there are four essential elements that need to be considered and incorporated into the educational plan:

1) **Recognition**- The ability of Canadian laypersons to appreciate when an individual has suffered a cardiac arrest seems inadequate. Increased emphasis should be placed on how to recognize a cardiac arrest, paying specific attention to the difference between a heart attack and a cardiac arrest, and their respective warning signs and symptoms. While both are serious medical emergencies, their symptoms and treatment are different. Before providing any type of care, laypersons need to be able to distinguish the two and recognize when a cardiac arrest has occurred. Recognition strategies and techniques should be simple and effective for laypersons.

2) **Focus on the basics with chest-compression-only CPR**- While formal training courses still teach traditional CPR, the option to provide chest-compression-only CPR should be provided and stressed. The less the potential bystander needs to recall and execute in a real life emergency, the better. Endorsing chest-compression-only CPR will streamline the educational process and minimize what the bystander needs to remember and execute at the point of care. Thus, we will be shifting away from the notion that CPR is a complex procedure, necessitating a number of steps that need to be performed in a ‘correct order’, to a simple skill that can be executed by anyone.
3) **Debunk Misconceptions**- A host of misconceptions were elucidated in this research. For instance, fear of breaking ribs and causing more harm by providing CPR was raised. Moreover, there was a widespread concern about performing mouth-to-mouth ventilation and the possibility of contracting a disease or infections. Fear of litigation, although a less prevalent concern was still a concern nonetheless. It is not enough for educators to assume that the lay public has some knowledge about these topics. Rather, educators should be addressing these concerns appropriately and head on. Learners should be provided the opportunity to voice their concerns and questions and the educator should provide a compelling answer and solution moving forward. For instance, learners should be adequately prepared for the eventuality of breaking a rib, reassured that this is ok and is better than letting someone die. Furthermore, concerns about ventilations are legitimate and should be addressed as such. Again, the option to provide chest-compression-only CPR should be reinforced. Finally, where they exist, Good Samaritan laws should be explained in lay language to ensure that laypersons understand and grasp their protection from litigation. In sum, efforts to dispel misconceptions must be active.

4) **Reconceptualize the public perspective**- In order to engage the public, the scientific data needs to be adapted into a compelling argument that is relevant and meaningful to the potential adopter\(^\text{212}\). We need to convince the public of the seriousness, magnitude and extent of the problem of OHCA. We need to make them believe in the problem. This might be achieved using a number of strategies. First, the prevalence and survival rate from OHCA should be made clear to potential bystanders. This should be coupled with a clear and simple message that CPR can and does make a difference and that doing something is better than doing nothing at all. Second, our initiatives should emphasize that cardiac arrest happens anytime, anywhere and to anyone. The educational curriculum should cultivate a conception of what it means to be a bystander that is positive in nature and that emphasizes the social and community responsibility to help others. Thus, within our initiative there needs to be a balance between hands-on practice, a basic understanding of the science behind cardiac arrest, CPR and AEDs and focus on the larger social and community obligation. Evidence from the present study indicated that these should be critical components in education and that one or more of them were lacking in participants’ past experiences with CPR education.
In summary, these four key elements must be considered in the development of a Canadian CPR education program. These areas were directly informed by the results of this study and speak directly to Canadian-specific issues and concerns and leverages Canadian-specific facilitators. Subsequently, we need a systematic plan for educating and translating this into the public domain. I address this as the second component of the recommended approach.

Component #2- Effective Knowledge Translation Strategy (the ‘how’ component)

In Canada, knowledge translation (KT) has been widely accepted as an umbrella term used to describe the activities involved in moving research findings into practice. Recently, the Canadian Institutes of Health Research (CIHR) has taken an active stance towards KT by promoting a framework for translating novel research findings into practice within primary healthcare settings. Although this framework forms the foundation for many Canadian KT initiatives, it is really geared towards translating knowledge to healthcare providers and rarely into the public domain. Thus, the CIHR definition and framework for KT initiatives was not the most ideal or suitable for this work. However, many public health researchers have emphasized the critical importance of KT efforts. For instance, Lang et al. (2007) describes KT and its associated activities in such a way that it can be applied to public health issues:

“Knowledge translation describes any activity or process that facilitates the transfer of high-quality evidence from research into effective changes in health policy, clinical practice, or products. This increasingly important discipline attempts to conceptually combine elements of research, education, quality improvement, and electronic systems development to create a seamless linkage between interventions that improve patient care and their routine implementation in daily [clinical] practice.”

KT can be viewed as the efforts that close the research circuit: it is the bridge between discovery of new knowledge and its impact on health outcomes. The fundamental essence of health research is innovation and the discovery of new information that will enhance care, outcomes, health and well-being. Researchers have cultivated this notion that progress towards better health is achieved by gaining more and new knowledge. However, research findings are ultimately of no value if they are not adequately integrated into the practice of medicine and public health endeavours.

Recently, there has been an increased awareness surrounding the ‘practical application’ component: how effectively do healthcare systems integrate evidence-based medicine
(EBM) into practice? Despite the considerable resources devoted to scientific research, the literature suggests that the movement of new knowledge into the health care practice is delayed and haphazard. There is substantial evidence that we are failing to translate evidence-based findings into clinical practice. Studies from the United States and the Netherlands demonstrate that 30-45% of patients do not get treatments of proven effectiveness, and more strikingly, 20-25% of patients get care that is either not necessary or is potentially harmful\textsuperscript{216-218}. Even worse, it has been estimated that on average it takes approximately seventeen years to translate evidence-based discoveries into practice\textsuperscript{219} and a mere 14% of evidence-based discoveries are believed to enter day-to-day clinical practice\textsuperscript{220}. If we are ineffective in translating knowledge into healthcare practice, to those with a professional stake in its success, then it is probable that we are even less successful at translating knowledge to members of the lay public.

It has been noted in the literature that public health researchers also do not disseminate their research well for use in community settings where it is likely to have optimal positive impacts\textsuperscript{221}. Brownson et al. (2006) writes that scientists typically address other scientists in scientific papers and presentations\textsuperscript{212}. Novel research findings are typically relayed via specialty journals and conferences where the audience is comprised of collaborators within that same field\textsuperscript{212}. With respect to this research, scientific presentations and publications on their own would likely be ineffective in moving the findings into the public sector, raising awareness and causing behavioural changes on the part of the potential bystanders. While it is important to provide summaries and briefings to key scholarly stakeholders (in this instance, the resuscitation research community, practitioners, EMS agencies, paramedics, funding bodies and policy makers), this must be supplemented with a framework and strategy for translating tailored knowledge incorporating the emerging findings into the public domain. Bystanders are the first line of defense in OHCA and they are the end-users of the knowledge presented in this thesis. Every effort must therefore be made to promote the uptake of knowledge and facilitate change within the lay community.

Brownson et al. (2006) proposes a four stage framework for translating research findings into public health action, which is informed by empirical evidence regarding the dissemination of health-related research findings as well agricultural and social change models. Phase one of their model is the discovery phase, whereby researchers explore determinants of health,
disease and behaviours and attempt to better understand a certain domain of medicine, science or public health. Authors note that this phase is multi-disciplinary in nature, often involving contributions from behavioural sciences, biostatistics, health services, basic science, and environmental health\(^\text{212}\). 

The subsequent phase, translation, involves synthesizing the key findings from the discovery phase and transforming them into something that can be utilized by the target audience. Here, context and cultural adaptation must be considered in this phase to ensure maximal utilization of the program information and effective uptake of the knowledge conveyed.

The third phase is the dissemination phase. The goal of this phase is to convey and distribute discoveries in a robust, relevant and effective way. Lomas distinguishes three approaches to the distribution of knowledge that range from passive to active\(^\text{222}\). The most passive of the three forms is *diffusion*, the goal of which is to “get the information out there”\(^\text{223}\) to raise awareness within a general audience. The second, *dissemination* involves not only generating awareness, but changing attitudes as well. This is accomplished by intentionally engaging in activities, such as mailing out results to key stakeholders, conference presentations and holding workshops, to share findings with a specified audience. Finally, *implementation* involves the active transfer of knowledge with the goal of changing behaviours and maintaining these changed behaviours over time.

The final phase of the framework seeks to measure and monitor long-term change as a result of the combined efforts of the first three phases. Evidence-based behavior changes should theoretically result in improved health outcomes. Thus, Brownson stresses the importance of selecting meaningful metrics and establishing both ‘intermediate endpoints’ that monitor adoption and effectiveness of interventions over an extended period of time and ‘traditional endpoints’ that are meaningful health outcomes.

The research presented in this thesis falls within the discovery phase of this larger framework. Component #1 of my recommended solution sought to take that ‘discovery’ knowledge and use it to inform a ‘translation phase’ intervention. In discussing the current state of KT, Graham (2006) articulates that education should be based on the best available knowledge and strategies shown to be effective at transferring knowledge should be employed\(^\text{224}\). Despite the fact that Graham is referring to KT involving primary healthcare providers, his
point is equally applicable to KT within the public health arena. Essentially, Graham’s argument calls for a better linkage between Brownson’s discovery phase and the translation and dissemination phases. This is the core goal of component #2 of my recommended plan. To address this, two questions must be asked: What are the essential elements or active ingredients of the discovery without which its effectiveness or value is diminished? And who would benefit from the discovery?  

The vast majority of the Canadian public, particularly those individuals with little or no medical knowledge, would benefit most from our research. To achieve this, trans-disciplinary partnerships and collaboration must be developed and fostered. A systematic approach to the dissemination of CPR knowledge in Canada does not exist. Furthermore, Canada is a large nation comprised of provinces and territories that act fairly autonomously. As such, I advocate for a logical, ‘tiered’ approach to bring order to the process of dissemination. The Heart and Stroke Foundation of Canada, our key stakeholder with respect to cardiac arrest and resuscitation awareness, should oversee long-term change. With that being said, the HSFC should ensure that a) provincial branches of the organization are established and communicate effectively with one another and b) that each individual agency receives the same knowledge to disseminate. The provincial branches should then facilitate local dissemination through the development of relationships with like-minded intermediary organizations, for example, branches of Red Cross and St. John’s Ambulance, private educators, workplaces, community centres and high schools. Perhaps additional intermediary beneficiaries may be those like the provincial transportation organization responsible for issuing drivers’ licenses, and both traditional and novel media platforms such as television and print advertising, Facebook and Twitter. These organizations are better situated to reach the end users and this ‘tiered’ framework provides a more systematic approach to enhancing awareness and training.

The final step in the KT scheme proposed above is to quantify how our discovery in phase one, our translational developments in phase two and our movement efforts in phase three have cumulatively changed behavior and health outcomes, if at all. We must continue to measure bystander CPR rates and survival from OHCA as these metrics will indicate the effectiveness of our process and interventions and the impact on health outcomes. Furthermore, future research should focus on longitudinally monitoring general public
attitudes and behavioural intentions in cardiac arrest. For instance, Taniguchi et al. (2010) recently published a paper concerning current attitudes held by members of the Japanese public towards bystander CPR and to compare them with attitudes documented in previous studies conducted in 1998 and 2006. Such longitudinal work ought to be both quantitative and qualitative in nature as this would call to attention areas of success and areas requiring further improvements.

6.3 Summary

As evidenced by both the existing literature and the research contained in this thesis, shortcomings in knowledge of OHCA and CPR and public beliefs and attitudes towards performing CPR require attention and consideration. I have proposed a focus for future resuscitation research and education, particularly within the field of KT, which I believe could have a tremendous and positive influence in resuscitation outcomes. Increasing our bystander CPR rates to just 50% could result in an additional 2000 lives saved annually across our nation\textsuperscript{20}. In light of this projection, it is time for us to be proactive and directed in our future engagements and begin saving more lives from cardiac arrest.
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APPENDIX A - Interview Guides

A- Semi-Structured Interview Guide- Initial version; December 3, 2012

Opening questions (demographics):

- Just to get started, tell me a little bit about yourself (male/female, age, education, employment etc.)

Knowledge of CPR:

- How much would you say you know about cardiac arrest?
- Describe what do you think the term “CPR” stands for and what it involves.
- If you could take a guess, how many people do you think survive from cardiac arrest?
- Describe to me what actions you would take if you were to see someone collapse in front of you
  - Which of these do you feel are most important?
  - If participant answers no action, probe as to why?

Training experiences and CPR education:

- Have you ever been trained in CPR before?
  a) If yes, could you please describe your experience with training
     - How long ago were you trained
     - Brief summary of what you remember from your training experience with respect to CPR/ AED use
     - Institution you received your training at
     - Time and cost required for training
     - Reflecting back on your past training experience, are there any changes you would like to see made to the CPR education process
     - What initially motivated you to train in CPR
  b) If no, why have you never sought out CPR training before? (probe participant to provide reasons)

Barriers and facilitators to performing CPR:

- If you were in a public place and someone were to collapse, what are some of the things you would think about/consider in deciding whether or not you would help
  - Describe the factors that would make you want to help, and why
  - If your could pick one thing, what would be the #1 factor that would make you want to help- tell me a little bit more about this and why
  - Describe the factors that would prevent you from helping, and why
o If your could pick one thing, what would be the #1 factor that would make you not want to help- tell me a little bit more about this and why

B- Semi- Structured Interview Guide- Modified version; January 15, 2013

Opening questions (demographics):
- Just to get started, tell me a little bit about yourself (male/female, age, education, employment etc.)

Knowledge of CPR:
- How much would you say you know about cardiac arrest?
- In your own words, describe what you think the term cardiac arrest means. What do you think a person suffering cardiac arrest would look like?
- If you could take a guess, how many people do you think survive from cardiac arrest?
- Describe what do you think the term “CPR” stands for and what it involves.
- Describe to me what actions you would take if you were to see someone collapse in front of you
  o Which of these do you feel are most important?
  o If participant answers no action, probe as to why?
  o Does this change depending on who the person is?
- Walk me through what you think would be going on in your head at that moment in time, if you saw someone collapse in front of you.
- What would be your expectations in terms of the patient's outcome/ what would happen to them and your reaction to the situation? How would that make you feel

Barriers and facilitators to performing CPR:
- If you were in a public place and someone were to collapse, what are some of the things you would think about/consider in deciding whether or not you would help
  o Describe the factors that would motivate you to help, and why; what would be the #1 factor (tell me a little bit more about this and why)
  o Describe the factors that would prevent you from helping, and why; what would be the #1 (tell me a little bit more about this and why)

Training experiences and CPR education:
- Have you ever been trained in CPR before?
  c) If yes, could you please describe your experience with training
    o How long ago were you trained- what motivated you to get training in CPR
    o Brief summary of what you remember from your training experience with respect to CPR/ AED use
    o Time and cost required for training
Reflecting back on your past training experience, are there any changes you would like to see made to the CPR education process?

d) If no, why have you never sought out CPR training before? (probe participant to provide reasons)
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APPENDIX G- Final Survey

Welcome to the Canadian CPR Survey!

We are conducting a short 10 minute survey. We appreciate your participation.

If you cannot finish the entire study in one sitting, you can resume this study by clicking the original link. Our system saves your previous answers and will allow you to resume where you left off so long as the study remains open.

Part 1:
What is your gender:
☐ Male
☐ Female

How old are you? ___

Which province or territory are you from?
☐ Alberta
☐ British Columbia
☐ Manitoba
☐ New Brunswick
☐ Newfoundland and Labrador
☐ Northwest Territories
☐ Nova Scotia
☐ Nunavut
☐ Ontario
☐ Prince Edward Island
☐ Quebec
☐ Saskatchewan
☐ Yukon Territory
☐ None of the above

Part 2:
Have you ever heard of cardiopulmonary resuscitation (CPR) before?
☐ Yes
☐ No

Have you ever received training in CPR before?
☐ Yes
☐ No

What kind of training did you receive?
☐ Course, received certificate/ card
☐ Course, did not received certificate/ card
☐ Video or online training
☐ Other, please specify:

How many times have you been trained in CPR?
Once
Twice
Three or more times

How many years ago did you receive your last CPR training?
Please choose the category that best describes how long ago your most recent CPR training experience was.
☐ Less than 3 years ago (during or after 2010)
☐ 3 or more years ago (before 2010)

Have you ever performed CPR before in a real life emergency?
☐ Yes
☐ No
☐ Prefer not to answer

How would you rate your overall knowledge of CPR?
☐ Excellent
☐ Good
☐ Fair
☐ Poor
☐ Very poor

CPR is made up of several steps. What steps of CPR do you remember? (1 open ended box)

Have you ever heard of an Automated External Defibrillator (AED, Mikey, PAD, defibb) before?
☐ Yes
☐ No

How would you rate your overall knowledge of AEDs?
☐ Excellent
☐ Good
☐ Fair
☐ Poor
☐ Very poor

An Automated External Defibrillator (AED) is a small machine that can provide an electric shock to the heart when the heart has stopped beating and it detects certain abnormal heart rhythms. AED machines are now found in many public places such as community centres, subways, shopping malls and fitness clubs.

Would you be willing to use a public AED in an emergency situation?
☐ Yes
☐ Maybe (Please specify a reason):
☐ No (Please specify a reason):

Do you think you would know when to use an AED?
☐ Yes
☐ No

Do you think you would know how to use an AED?
☐ Yes, I remember from my training
☐ Yes, I think it comes with instructions or it is simple or it is self-explanatory
☐ No
If you have never received AED training, would you ever want to learn how to use an AED?
☐ Yes
☐ Maybe (Please specify a reason):
☐ No (Please specify a reason):

How would you rate your overall knowledge of cardiac arrest?
☐ Excellent
☐ Good
☐ Fair
☐ Poor
☐ Very poor

In your own words, a cardiac arrest is defined as: (open ended response box)
If someone was having a cardiac arrest, list 3-5 things that you think they would be experiencing or things that would be happening to them: (5 open ended boxes)

A cardiac arrest can happen anytime and anywhere; it can happen inside a hospital or outside a hospital. Out-of-hospital cardiac arrests include all of the arrests that happen anywhere outside of a hospital (for example: shopping malls, workplaces, homes, sporting arenas etc.

Let’s suppose 10 people have out-of-hospital cardiac arrests. If you could take a guess, how many do you think would survive? (drop down menu, 0-10)

If you witnessed a cardiac arrest, do you think you would act to help the victim?
☐ Yes
☐ Maybe
☐ No

Please briefly explain your answer: (open ended response box)
**Part 3:**
The following pages will provide different cardiac arrest situations. You are the witness in each of these cases. Please read the scenario description carefully and answer the questions.

**Scenario:**

Description and instructions: You are in a public place and see an individual collapse in front of you. It is recommended that cardiopulmonary resuscitation (CPR) be started on the collapsed, non-responsive person. In this scenario, CPR involves providing **chest compressions and mouth-to-mouth breathing** in an alternating manner.

Thinking about this scenario, would you start **chest compressions and mouth-to-mouth breathing**? Please provide a reason with your answer:

☐ Yes
☐ Maybe
☐ No

Please briefly explain your answer: (open ended response box)

I am now going to give you a list of individuals. Some people might feel differently about doing CPR depending on who the victim is (i.e. the person in need of CPR). For each of the individuals listed below, would you start **chest compressions and mouth-to-mouth breathing CPR** on this individual? Please list the reason(s) why you would OR would not initiate CPR for each scenario:

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<th>Reason</th>
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<td>Stranger</td>
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<tr>
<td>Unkempt individual (for example, someone who appears dirty or might possibly be homeless)</td>
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Scenario:

Description and instructions: You are in a public place and see an individual collapse in front of you. It is recommended that cardiopulmonary resuscitation (CPR) be started on the collapsed, non-responsive person. In this scenario, CPR involves providing only continuous chest compressions, by pushing hard and fast in the centre of the individual’s chest.

Thinking about this scenario, would you start continuous chest compressions? Please provide a reason with your answer:

☐ Yes
☐ Maybe
☐ No

Please briefly explain your answer: (open ended response box)

I am now going to give you a list of individuals. Some people might feel differently about doing CPR depending on who the victim is (i.e. the person in need of CPR). For each of the individuals listed below, would you start continuous chest compression CPR on this individual? Please list the reason(s) why you would OR would not initiate CPR for each scenario:

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Part 4:
What is your current marital status?
☐ Single and never married
☐ Married or living common law
☐ Separated, but still legally married
☐ Divorced
☐ Widowed

Do you have children?
☐ Yes
☐ No

Have you ever been diagnosed with a heart related medical condition?
☐ Yes
☐ No

What is the highest level of schooling you have completed or the highest degree you have received? *If currently enrolled, please mark the previous grade or highest degree received.*
☐ Grade school
☐ Some high school
☐ High school graduate
☐ College or technical school degree
☐ Attended university
☐ Graduated university with an undergraduate degree
☐ Completed a post-graduate degree (for example- Master’s, PhD)
☐ Completed a professional degree (for example- MD, LLB)
☐ Prefer not to answer

Which of the following categories best describes what you would consider your ethnic or cultural origins?
☐ Caucasian
☐ South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
☐ Chinese
☐ African Canadian
☐ Filipino
☐ Latin American
☐ Arab
☐ Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc.)
☐ West Asian (e.g., Iranian, Afghan, etc.)
☐ Korean
☐ Japanese
☐ Don’t know
☐ Prefer not to answer
☐ Other (please specify):

Were you born in Canada?
☐ Yes
☐ No

If No, where were you born? (open ended box)
Approximately what year did you come to Canada? (drop down menu)
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